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I. NOTES ON THE COLLECTION OF COCCI-
DAE IN THE INDIAN MUSEUM.

II.—FURTHER OBSERVATIONS ON THE GENUS
MARGARODES.

By E. ERNEST GREEN, F.E.S., F.Z.S.

(Plates i—iv.)

The following particulars of the life history of *Margarodes* have been rendered possible by the discovery of fresh material of the two species, *papillosus* and *niger*, by Messrs. L. C. Coleman (Entomologist in the Mysore State) and T. Bainbrigge Fletcher (Entomologist to the Government of the Presidency of Madras), to whose assistance I am greatly indebted.

Margarodes papillosus, Green.

(Pl. i, figs. 1-9; pl. ii, figs. 10-21.)

Adult male. Colour reddish. Legs, notal plates and eyes brown. A long slender backwardly directed tuft of silky white filaments on the dorsum of the abdomen, at the junction of the 7th and 8th segments. Abdomen subglobular, the sides inflated, the ventral segments more densely chitinous. Compound eyes large and prominent, involving the greater part of the head, but more widely separate—above and below—than in the male of *M. indicus*. A single ocellus on hinder edge of each compound eye. Antenna (pl. i, fig. 1) with 10 joints only; the 1st short and broad; the 2nd smallest, hemispherical; the 3rd short, narrowed at base, slightly longer than broad; the remainder elongate, gradually increasing in length to the 10th which is the longest; all the joints clothed with short hair. Legs well developed, with strongly thickened femora, especially those of first and third limbs; anterior leg (pl. i, fig. 2) with tibia short and stout, equal in length to tarsus and claw which are fused together; mid and hind legs (pl. i, figs. 3, 4) with the tibiae elongated and comparatively slender, equal in length to femur (minus trochanter), approximately four times length of tarsus. Claw of first leg simple; that of second leg deeply bifid; that of third leg deeply trifid (pl. i, fig. 5). The spines on the outer edge of tarsus and apical part of tibia of 2nd and 3rd legs are strongly thickened and compressed. Wings with only two conspicuous nervures, and a denser costal area. Halter strap-shaped (pl. i, fig. 6), with a stout blunt hook at extremity, and a



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inner face and near the apex of the outer face. Mid and hind

large hyaline spot on costa. The glandular patch on dorsum of abdomen (pl. i, fig. 7) is divided into three contiguous plates or lobes, the anterior lobe situated on a backward extension of the 7th and the two posterior lobes on the 8th segment. Each lobe contains a number of closely packed polygonal cells, with an elongate pore in the centre of each cell communicating with a well-defined sublying tubular gland. Notal plates with numerous spiniform hairs, a transverse series of similar hairs on each of the abdominal sternites and some small hairs on the abdominal tergites. Genital sheath with numerous translucent pores; intromittent organ terminating in a stout falcate point. Total length (exclusive of antennae) 2.5 mm.

It appears (*vide* notes by the collector of the material) that the males pass through a nymphal encysted stage similar to that of the females; but I have, at present, been unable to identify the male cyst.

Adult female reddish, inclining to brick-red in newly emerged examples, but afterwards darkening to purplish brown. The body, after fertilization, becomes more or less covered with white mealy powder and loose wooly secretion. When boiled in potash, the female gives out a deep carmine stain. Body broadly oval; slightly narrower in front; convex above. Margins of abdominal segments slightly prominent.

Dorsum (pl. i, fig. 8) with a series of ill-defined chitinous plates on the lateral area of all the abdominal segments (except the 1st and the terminal), and a transverse median plate on the penultimate and antipenultimate segments. Each of these plates bears a series of stout conical papilliform spines, directed forwards; a semilunar series of similar spines on the terminal segment; a small group on the subdorsal area of each abdominal segment; and other backwardly directed groups on the lateral and subdorsal areas of the metathoracic and 1st abdominal segments. The polygonal character of the chitinous areas (described in my previous paper) is not so noticeable in fully matured examples. Immediately anterior to each group of spines are some hairs and series of circular pores. There are similar hairs and pores on the median and lateral areas of the remaining segments. Six small spiracles open dorsally on each side of the abdomen, situated—probably—at the intersegmental areas. There is a gap in the series, between the first and second of these spiracles, but the missing organ is found to be present on the ventral surface. There are, consequently, 7 abdominal spiracles on each side, 6 of which open on the dorsum and 1 on the venter. It is noticeable that, in *M. mediterraneus* of the six pairs of abdominal spiracles, the uppermost of the series is ventral, while the remainder assume a lateral position.

Venter (pl. i, fig. 9) with a curved series of spines on each side of the terminal segment; a median transverse series on each of the first seven abdominal segments, and a smaller subdorsal series on each side of 2nd to 8th segments; those on the anterior segments containing one or two spines only, those on the 6th to 8th segments

with from five to ten. The spines on the first five segments are more slender and sharply pointed (pl. ii, fig. 15), those on the remaining segments being blunt and papilliform—like the dorsal spines (pl. ii, fig. 16). There are fine hairs and small circular ceriferous pores on the median and submarginal areas. Each hair springs from a conical pit (pl. ii, fig. 15). In my earlier description (vol. vii, part i), drawn up from an imperfect mount of an immature example, the median series of spines were erroneously stated to be dorsal.

There is no trace of buccal apparatus, or of eyes.

Antenna (pl. ii, fig. 10) 7-jointed; the basal joint broadest, the apical joint narrowest and ovoid; all the joints (except the first) with an apical series of stout spiniform hairs.

Anterior limb (pl. ii, fig. 11) large and stout; femur with some longish stout hairs on the side and inner margin; tibia approximately quadrate; tarsus and claw in one piece, stout, strongly falcate, grooved—near the tip—on the inner edge, several stout hairs near the base, probably representing the unguis digitules. Second and third limbs smaller but well developed (pl. ii, fig. 12); tibia elongate; tarsus distinct; claw slender, falcate, swollen at base.

The four thoracic spiracles open on the ventral surface, behind the bases of the first and second limbs respectively. They are large and conspicuous. The opening of each spiracle (pl. ii, fig. 13) is circular consisting of a broad flat chitinous ring, with strongly defined outer margin; within the central cavity is the opening into the trachea and four circular ceriferous pores. Four minute pores are present, close to the outer border of the chitinous ring. The seven pairs of abdominal spiracles, one of which opens on the venter and the remainder on the dorsum, are much smaller. The external aperture is subquadrate (pl. ii, fig. 14) and leads into a thickened chitinous chamber which is connected with paired tracheal vessels. In the mouth of the external opening are four circular ceriferous pores.

Both the anal and the genital apertures open on the venter. The former is small and surrounded by a rather dense chitinous ring. The genital orifice is transversely elongate, and appears to be situated at the junction of the terminal with the penultimate segment.

Dimensions variable, some individuals being more than double the size of others. A corresponding variation is found in the dimension of the limbs. The smallest adult females that I have seen measure 1.5 mm. by 1.15 mm., and the largest 4 mm. by 3 mm.

Female nymph pale yellow, sometimes orange yellow or reddish; subglobular; without limbs or external appendages of any kind. Derm minutely pustular or cellular (*vide* vol. vii, part i, No. 5, p. 74, text figure 1). Internal rostral apparatus (consisting of tentorium and setae) strongly developed in some individuals, but weak in others; the condition probably dependent upon the stage of development of the nymph. On each side of the

inner face and near the apex of the outer face. Mid and hind

rostrum is a truncate conical tubercle (pl. ii, fig. 17), with a deep central pit from which springs a stout bristle: this presumably represents the nymphal antenna. The anus is small but densely chitinous, and the future genital orifice is indicated by a transverse scar (pl. ii, fig. 18). On each side, about midway between the genital scar and the anal aperture, is a circular glandular disc (pl. ii, fig. 19). There are eight pairs of spiracles, all of approximately the same size. Four (2 pairs) of these open on the ventral surface of the thorax; the remainder are disposed near the lateral margin of the abdomen. In one example I find 7 abdominal spiracles on one side and 6 on the other. The structure of abdominal and thoracic spiracles is identical, the former being distinguished solely by their position and by the presence—on one side—of three minute pores which are absent in the abdominal spiracles. Similar pores are associated with the thoracic spiracles of the adult female. The stigmatic aperture opens into a broad cylindrical chamber, at the base of which is a group of prominent ceriferous glands. This is followed by a smaller (? valvular) chitinous chamber communicating with the tracheal vessels (pl. ii, fig. 20).

Nymphal cyst globular or broadly ovoid, smaller examples sometimes irregular in form; smooth; consisting of very thin and brittle nacre; transparent and colourless, or slightly yellowish; the pale golden or honey-yellow appearance being due to the colour of the contained nymph. Empty cysts assume an opaque whitish tint, with a slight pearly lustre, due to decomposition and the presence of air between the lamellae. The cysts 'd,' described on page 71 of my previous paper (loc. cit.), and shown on plate iii, figs. 12, 13, undoubtedly belong to this species and not to *M. indica*. The cysts that I have seen vary in diameter from 1 to 2.5 mm., but much larger cysts must occur; to produce the larger females that I have received.

Living females, placed on fine soil, deposited numerous eggs, amongst a mass of loose woolly secretion. The eggs (pl. ii, fig. 21) are very elongate and narrow; very pale yellow; approximately three times as long as broad,—0.57 by 0.2 mm. These eggs proved infertile and I have been unable to obtain young larvae.

Since my earlier and very imperfect description, I have received ample material of this interesting species, both from Mr. Coleman and from Mr. Fletcher. The former informs me that his specimens were collected by his Assistant at "Honnali, in the Shimoga District, Mysore State, about 120 miles north-west of Bangalore." They are reported to have been found "while digging for egg-pods (of the Jola Grasshopper) in a broad bund at Honnali. They were fairly numerous and were obtained from 5 to 7 inches beneath the soil. The males were also enclosed in shells but emerged soon after excavating, and were observed copulating towards the evening." They are said to have been associated with 'hariali' grass (*Cynodon dactylon*).

Mr. Fletcher's specimens were obtained in the Bellary District, Madras Presidency (on the Mysore frontier), by one of his

Assistants (Mr. Y. Ramachandra Rao), who reports that they were found "while digging the ground for the egg masses of the 'Deccan Grasshopper.' This form was found in all soils—black and red, but seems to be more abundant in clayey soils." He notes that adult males and females were emerging early in June, at which time the cysts "were somewhat reddish in colour." Earlier in the year (in February) the cysts were of a "yellow colour with a pearl-like lustre," and were found, when broken, to contain nothing but a milky fluid.

Margarodes papillosus must be very closely allied to *M. mediterraneus* of Silvestri (described very fully in the "Bulletino della Società Entomologica Italiana," xxxviii, 1906, p. 140 *et seq.*). It differs principally in the colour of the adult female, which is creamy white or straw-coloured in the Mediterranean, and brick-red or purplish red in the Indian species. The disposition of the spines is approximately the same in both species, but they appear to be more numerous and more strongly developed in the Indian form. I am, unfortunately, not in a position to compare the larval characters, which are quite peculiar in *M. mediterraneus*. Silvestri states that his species has 8 pairs of spiracles, against the 9 pairs found in *papillosus*. It is interesting to note that, in both species, one of the abdominal spiracles is placed on the venter.

Margarodes niger, Green.

(Pl. iii, figs. 22-35; pl. iv, figs. 36-45.)

Male not known.

Adult female (pl. iii, fig. 22) oblong oval, slightly narrower in front; subglobose. Colour creamy white, thickly covered with pale reddish brown, very fine but shaggy hair, which is denser and of a deeper colour on the thoracic area. Claws dark brown.

Antenna (pl. iii, fig. 23) 6-jointed; weakly chitinized; all the joints short (broader than long); basal joint largest, the remainder gradually diminishing in size to the extremity; two or three long fine hairs and a few spines at apex of 6th joint, a transverse series of slender truncate spines on 2nd to 5th joints, several long fine hairs on the side of the 2nd and 3rd joints, and a transverse series of similar hairs on the 1st joint.

Anterior limb (pl. iii, fig. 24) large and stout, the claw (pl. iii, fig. 25), which includes the tarsal joint, densely chitinous, of a peculiar form that is quite unlike that of any other known species of *Margarodes*. It is strongly curved in two directions, both the inner face and the apical margin being concave. It has almost the appearance of being chelate, but the opposing points (the outermost of which is longer and more sharply pointed) cannot be approximated. Tibia represented by a small triangular joint between the claw and the femur, with a group of minute pores on its outer face. Femur with some long fine hairs on the disc of the inner face and near the apex of the outer face. Mid and hind

limbs small, short and stout (pl. iii, fig. 26). Coxa comparatively large. Tarsus small, fused with tibia but distinct from claw which is sunk into the apex of the tarsus like the fang of a tooth. The claw itself (pl. iii, fig. 27) is long and slender, strongly falcate. There appears to be a tubular channel from the tip of the claw to its base, communicating with an oval cyst which occupies the greater part of the tarsus. The whole limb clothed with very long slender hairs.

There are four large thoracic spiracles, and eight pairs of small abdominal spiracles. The thoracic spiracles are placed on the venter, in the interspaces between the legs. The external aperture of each is horseshoe-shaped (pl. iii, fig. 28), with a densely chitinous rim, opening into a chamber the sides and floor of which are studded with circular ceriferous pores. A densely chitinous paraphysis, with a broadly expanded extremity, runs inwards from the external stigmata. The abdominal spiracles, though properly belonging to the dorsum, have assumed a ventral aspect owing to the expansion of the dorsal area which overlaps the comparatively narrow venter. The anterior spiracle on each side is shifted outwards until it assumes an almost directly lateral aspect. The external aperture of an abdominal spiracle (pl. iii, fig. 29) has a dense chitinous rim, with a tooth-like projection on its upper and lower edges. There is an irregular ring of ceriferous pores just within the opening.

The anus (pl. iii, fig. 30) is represented by a lunate chitinous bar, within the thickness of which there is a very narrow linear opening.

The derm—both of the dorsum and venter—is studded with small circular multilocular ceriferous pores (pl. iii, fig. 31).

Size very variable. The smallest example in my series measures 3.75 by 3.25 mm., while the largest is 11 by 8 mm.

The nymphs apparently undergo several stages, but I have been unable to determine their exact number. The final stage (which discloses the adult insect) is in the form of a globular or subglobular cyst, of an opaque black colour and dense texture. The cysts are apparently naked, consisting of the hardened cuticle of the nymph, with fragmentary and inconspicuous patches of very thin nacre. They vary greatly in size, those from the Bellary district (pl. iii, fig. 32), with a diameter of 7 to 8 mm., averaging four times the size of those received from the Shimoga district (pl. iii, fig. 33) which range from 3.5 to 5 mm. in diameter. Some of the latter are more irregular in shape, showing a prominence on one side, which probably represents the original point of attachment.

In my earlier observations (loc. cit.) upon this species, it was noted that "after boiling in caustic potash, the black derm becomes partially decolorized and separates into two layers. The outer layer swells and becomes rugulose, but still retains its pustular structure. The inner layer is minutely granular." The later examples, under similar treatment, did not exhibit this

separation into two layers. The outer rugulose pustular layer was not observed. Possibly this may be a temporary phase in the development of the insect. The cleared cysts of these later specimens display a minutely granular but not pustular cuticle. The development of the tentorium varies considerably, being very weakly developed in some, but strongly chitinized in other examples. There is a distinct anal aperture, surrounded by a horseshoe-shaped area of denser derm and, immediately in front of it, are three small translucent cicatrices. The stigmata (pl. iii, fig. 34) are well developed, there being 9 on each side, of which 7 are abdominal and 2 thoracic. They are all of the same size and structure, but the thoracic spiracles are more centrally disposed. There are also 3 (sometimes 5) median series of ill-defined circular glandular plates. The rudimentary antennae are represented by a pair of chitinous tubercles, each bearing two stout curved bristles (pl. iii, fig. 35). These cysts, when exposed in a glass jar, developed a series of white waxy filaments emanating from the stigmata (both thoracic and abdominal), proving that the spiracles remain functional throughout the encysted stage.

Earlier stages of the nymph were found to be attached to the rhizomes of *Cynodon*, partially surrounded by white mealy secretion, in which condition they resemble examples of *Antonina indica*. These were of an irregular rounded form; with a dense opaque black cuticle. The anal aperture and stigmata are of the same form and structure as those found in the final nymphal stage; but these cysts were of very much smaller size, having a greater diameter of not more than 2 mm. On clearing these small cysts, they were found to contain what I suppose to be an intermediate nymphal stage, of an oval form, with a short, pliant and almost colourless cuticle. This intermediate stage (pl. iv, fig. 36) displays a conspicuous series of 9 spiracles on each side, of which 7 are abdominal and open onto the dorso-lateral area, while the remaining two pairs are considerably larger and open onto the venter of the thorax. The mouth parts are well developed, the labium usually displaced to a position anterior to the tentorium. The antennal tubercles (pl. iv, fig. 37) are rudimentary, with a deep central pit from which spring two stout curved bristles. The thoracic spiracles (pl. iv, fig. 38) consist of a broad cylindrical outer chamber, with thickened rim, the base of the chamber studded with small circular translucent pores. Near the base of each thoracic spiracle, on its outer side, is an elongate rugose plate with a few minute pores. The abdominal spiracles are of similar structure but of a considerably smaller size; and they have no rugose plates in association with them. The anal aperture (pl. iv, fig. 39) is surrounded by a sharply defined densely chitinous horseshoe-shaped plate which bears numerous short hairs. There are, on the venter, five longitudinal series of small circular glandular pits; the median series containing 8 (the two uppermost being paired), and the remaining four series each containing 6 of these pits. Each pit consists of several concentric rings (pl. iv, fig. 40), with a

central granular plate at its base. The insect, in this stage, measures 2.5 by 2 mm.

What appears to be a still earlier stage has been observed. It differs from that shown at figure 36 in its smaller size (1.25 by 0.75 mm.), and in the presence of only two series of glandular pits on the venter. It is possible that both of these intermediate forms may be stages in the early development of the male insect, which has not yet been identified.

Newly hatched larva (pl. iv, fig. 41) oblong oval, with a transverse row of stout hairs on each segment. Posterior extremity of body with two very long fine setae, as long as the body of the insect. Rostral apparatus with the labium displaced forwards to a position immediately in front of the tentorium. Antenna (pl. iv, fig. 42) 6-jointed; 1st joint stout, approximately as broad as long, equal in length to 2nd and 3rd together; 2nd joint narrow, cylindrical, longer than broad; 3rd, 4th and 5th short, widest medially; 6th as broad as but longer than 1st, the apex obliquely truncate; hairs disposed as in the figure. Anterior limb very stout; tibia and tarsus fused together to form a stout curved claw. Median and posterior limbs long and slender; with two distinct small joints, presumably representing a divided trochanter, as in certain parasitic Hymenoptera, between the coxa and the femur (pl. iv, fig. 43). Foot (pl. iv, fig. 44) with a long, slender, pointed, almost straight claw, more than three-quarters the length of the tarsus. There are four relatively large thoracic spiracles; abdominal spiracles minute, 7 on each side, the 7th almost obsolete. Length of body, 1 mm.

A single unhatched egg (pl. iv, fig. 45), found amongst a crowd of young larvae, measures 1 mm. by 0.43 mm. This egg contained a fully developed embryo.

The present examples of *M. niger* were received from the same localities that produced the fresh material of *M. papillosus*, viz., from Honnali, Shimoga district, Mysore State (*L. C. Coleman*), and from the Bellary district, Madras Presidency (*T. Bainbrigg Fletcher*). In both instances they appear to have been found at the roots of *Cynodon dactylon*, and early stages of the insect were found to be actually attached to the rhizomes of this grass. They were also found at the roots of 'Red Gram.' Mr. Fletcher's Assistant (Mr. Y. Ramachandra Rao) supplies the following particulars:—The peculiar globular egg-like bodies were met with at a depth varying from $\frac{1}{2}$ to 3 inches in the soil. This form occurred mostly in red soils. The majority of the specimens were perfectly globular, but some had depressions and irregularities on their surface. There was much variation in size; the biggest measured 8 mm. in diameter, while the smallest were less than 2 mm. The shell is very hard in encysted forms, but is soft, tender and purplish brown in colour when the scale is immature. Fresh and carefully collected specimens showed at one spot (the anterior end of the insect) the vestiges of a mouth with two long delicate hairs arising from it. These break off when the shell hardens. Towards the end of February and in March,

some of these bodies hatched into stout, soft, hairy, grub-like creatures. (These are the adult females. Specimens kept in my laboratory have continued to hatch out, at irregular intervals, through the past year. E. E. G.). Egg-masses of this Ground Pearl were observed in the soil at a depth of 2-3 inches. The cells in which the eggs were found were long-oval, lined inside with a coating of mealy wax. Hundreds of eggs were found filling up the interior of each cell. The dead mother scale—shrivelled and rotten,—was to be found at one pole of the cell.... When about to hatch it (the egg) assumes a pinkish colour. The just hatched larvae are somewhat flattened, with bright red eyes."

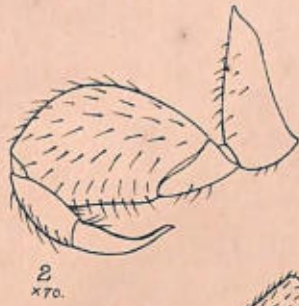
On the strength of Mr. Rao's careful observations, and having regard to the strong development of the rostral apparatus observed in some of my examples, as well as to the great increase in size that takes place during the nymphal development, my previously expressed opinion (*loc. cit.*, p. 67) that the larva of *Margarodes* "must take in a sufficient store of nutriment to sustain it during the succeeding nymphal and imaginal stages," must be modified so far as the nymph is concerned.

Our knowledge of the two species just described is not yet complete. Of *M. papillosus* the larva still remains to be observed. Judging by the close resemblance of the adult female to that of *M. mediterraneus*, I anticipate that the larva, when discovered, will be found to possess but a single pair of legs, and that its antennae will be only 3-jointed. Of *M. niger* the male is still unknown. And the serial development of the insect, from the larva to the final stage of the nymph, requires elucidation—in both species. These problems can be solved only by observation on the spot where the insects occur in life.

EXPLANATION OF PLATE I.

Margarodes papillosus.

1. Antenna of adult male, × 70.
2. Anterior leg of ,, × 70.
3. Median ,, ,, × 70.
4. Posterior ,, ,, × 70.
5. Posterior foot of ,, × 250.
6. Halter of ,, × 70.
7. Glandular patch from dorsum of adult male, × 250.
8. Adult female, dorsal view, × 24.
9. ,, ,, ventral ,, × 24



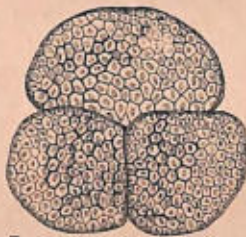
2
x70.



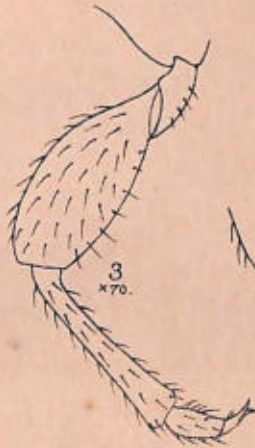
1
x70.



6
x70.



7
x250.



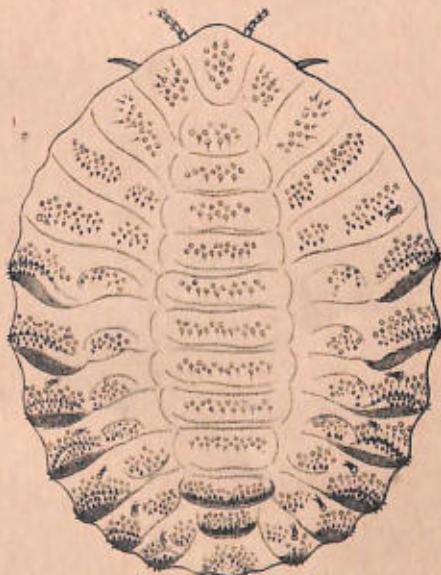
3
x70.



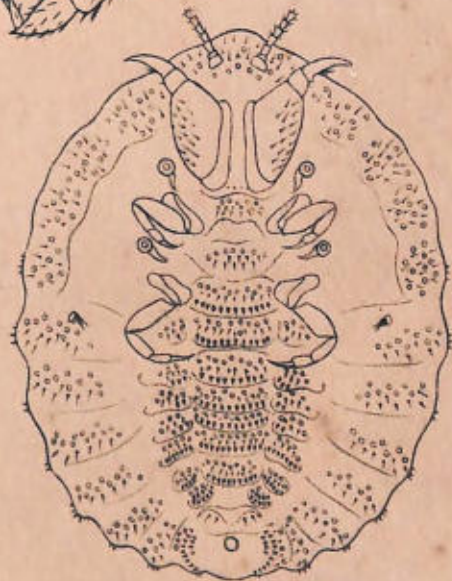
4
x70.



5
x250.



8
x24.



9
x24.

E. E. Green, del.

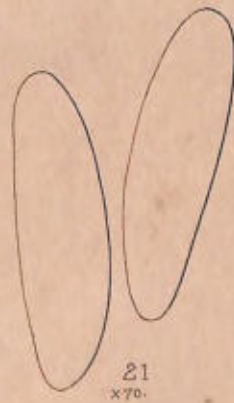
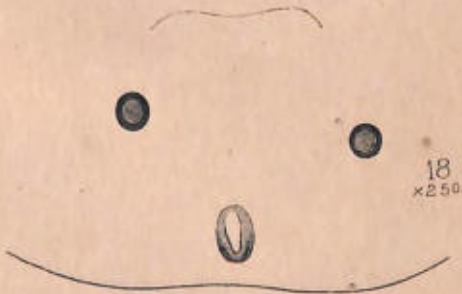
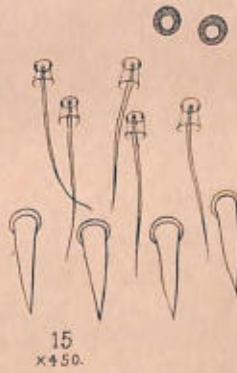
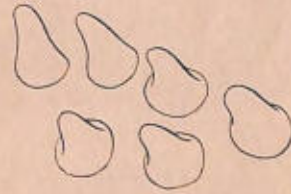
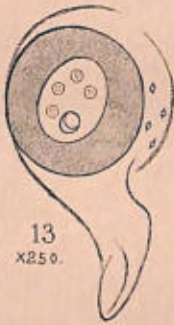
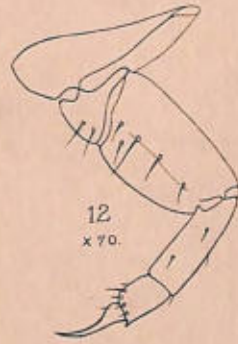
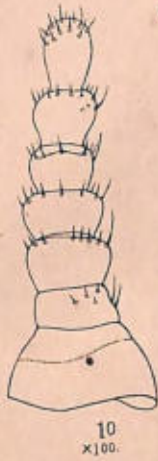
A. C. Chowdhary, lith.

MARGARODES PAPILLOSUS, Green.

EXPLANATION OF PLATE II.

Margarodes papillosus.

10. Antenna of adult female, × 100.
11. Anterior limb of ,, × 70.
12. Posterior ,, ,, × 70.
13. Thoracic spiracle of ,, × 250.
14. Abdominal ,, ,, × 250.
15. Spines, hairs, and pores, from median ventral area of adult female, × 450.
16. Spines from dorsum of adult female, × 450.
17. Antennal tubercle of nymph, × 450.
18. Posterior extremity ,, × 250.
19. Ceriferous disc from posterior extremity of nymph, × 450.
20. Thoracic spiracle of nymph, × 250.
21. Eggs, × 70.



E.E. Green, del.

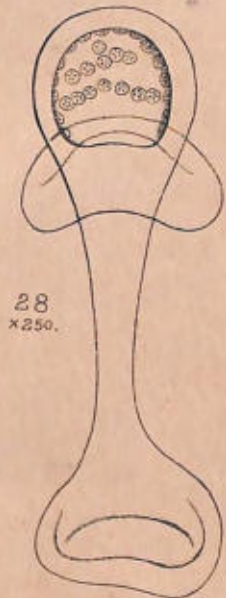
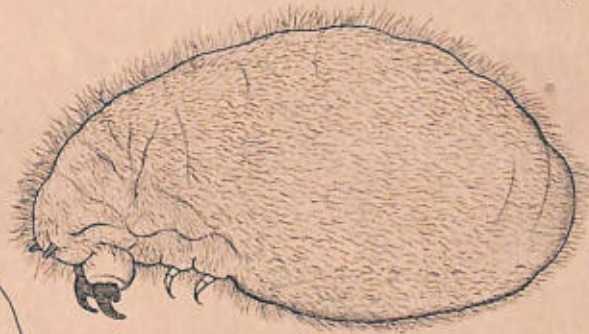
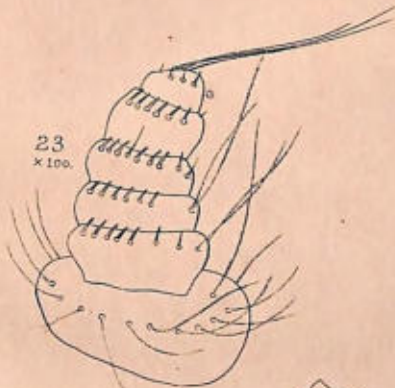
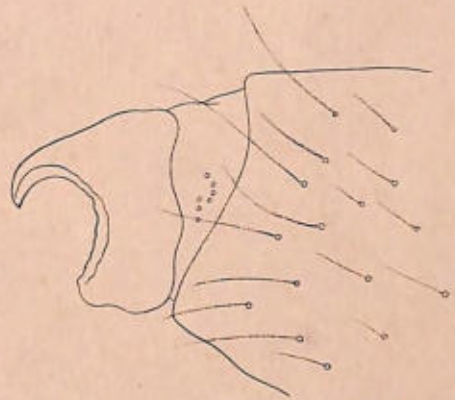
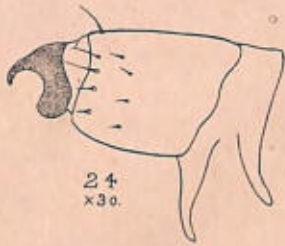
A.C. Chowdhary, lith.

MARGARODES PAPILLOSUS, Green.

EXPLANATION OF PLATE III.

Margarodes niger.

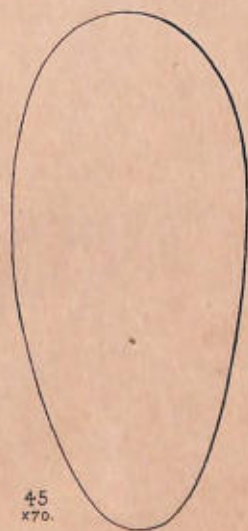
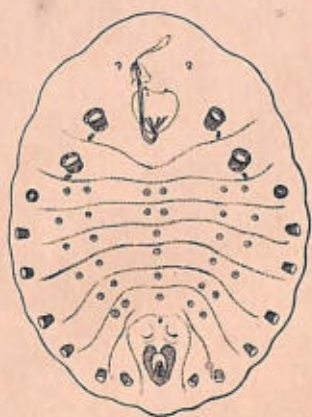
22. Adult female, side view, $\times 10$.
23. Antenna of adult female, $\times 100$.
24. Anterior limb of ,, $\times 30$.
25. Foot of anterior limb of female, $\times 70$.
26. Posterior limb of adult ,, $\times 70$.
27. Claw of posterior limb of ,, $\times 250$.
28. Thoracic spiracle of ,, $\times 250$.
29. Abdominal ,, ,, $\times 250$.
30. Anal aperture of ,, $\times 250$.
31. Dermal gland of ,, $\times 450$.
32. Nymphal cysts (Bellary district), nat. size.
33. ,, ,, (Shimoga district), nat. size.
34. Spiracle of nymph, $\times 250$.
35. Antennal tubercle of nymph, $\times 450$.



EXPLANATION OF PLATE IV.

Margarodes niger.

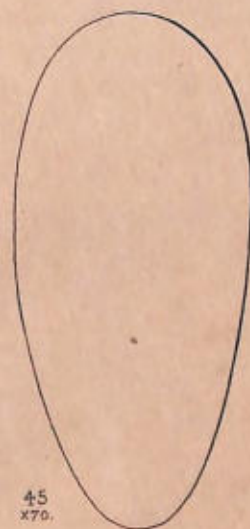
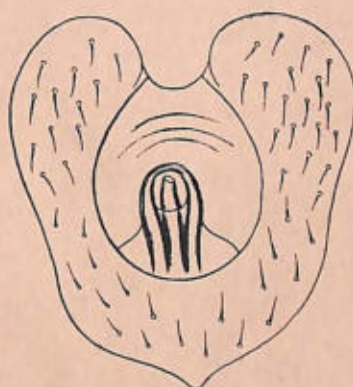
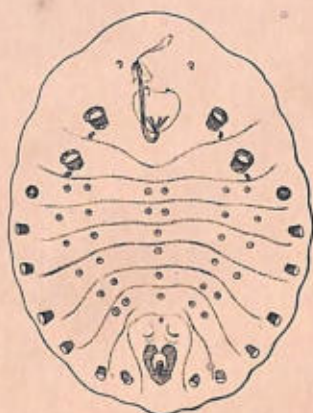
36. Intermediate stage of nymph, $\times 30$.
37. Antennal tubercle of intermediate stage, $\times 450$.
38. Thoracic spiracle of " " $\times 250$.
39. Anal aperture of " " $\times 250$.
40. Ventral gland of " " $\times 450$.
41. Newly hatched larva, $\times 50$.
42. Antenna of " $\times 250$.
43. Basal portion of posterior limb of larva, $\times 250$.
44. Foot of posterior limb, $\times 250$.
45. Egg, $\times 70$.



EXPLANATION OF PLATE IV.

Margarodes niger.

36. Intermediate stage of nymph, $\times 30$.
37. Antennal tubercle of intermediate stage, $\times 450$.
38. Thoracic spiracle of " " $\times 250$.
39. Anal aperture of " " $\times 250$.
40. Ventral gland of " " $\times 450$.
41. Newly hatched larva, $\times 50$.
42. Antenna of " $\times 250$.
43. Basal portion of posterior limb of larva, $\times 250$.
44. Foot of posterior limb, $\times 250$.
45. Egg, $\times 70$.



II. NEW INDIAN EMPIDAE.

By E. BRUNETTI.

Over fifty new species of *Empidae* are described in the present paper, all the types of which (except four in the Pusa collection) repose in the Indian Museum. Two new genera, allied to *Cyrtoma*, are established. The previously known oriental species are also listed here under their respective genera.

The family is not known to be rich in species in the tropics, and most of the new ones herein described come from places of some little altitude. The natural home of the *Empidae* is the temperate region of both Europe and North America.

The previously recorded species are listed at the head of each genus.

Sub-family *HYBOTINAE*.

HYBOS, Meig.

- brachialis*, Rond., Ann. Mus. Gen., vii, 446 (1875). Borneo.
gagatinus, Big., Ann. Soc. Ent. Fr. (1889), p. 127. Assam.
geniculata, Wulp, Termes Fuzet., xx, 137 (1897). Ceylon.
bezzii, Kert., *l.c.*, xxii, 175 (1899). Papua.
papuanus, *id.*, *l.c.*, 175 (1899). Papua.
bisetosus, Bezzi, Ann. Mus. Hung., ii, 324 (1904). East India.
pallipes, Meij., Tijds. v. Ent., liv, 323 ♂ ♀ (1911). Java.
setosa, *id.*, *l.c.*, 324 ♀. Java.

Hybos nigronitidus, mihi, sp. nov.

♂ ♀ Darjiling district.

Long. $3\frac{1}{2}$ mm.

Head.—Black; occiput a little dark grey tinged; proboscis as long as height of head, palpi nearly as long.

Thorax.—Shining black, beset with microscopic reddish hairs. Sides of thorax a little greyish but not at all conspicuously so. Two or three stiff bristly hairs about the base of the wing and one stiff hair on each humerus; a few of unequal length placed in a row on each side of the median line, and at least two of these (the two hindmost) of considerable size; two also at tip of the concolorous scutellum. Both thorax and scutellum bear irregularly placed softer hairs.

Abdomen.—Shining black; in certain lights with a little greyish reflection, a little black pubescence in ♂; in ♀ the hairs brown and more numerous. Genitalia shining black.

Legs.—Black, shortly pubescent. Femora with a row of stiff hairs below, most conspicuous on hind pair; tibiae with some stiff hairs, including two at tip. Knees narrowly brown; under side of tarsi with pale hairs.

Wings.—Pale grey, highly iridescent, venation normal. Stigma small, pale brown, sometimes hardly perceptible. Halteres yellow.

Described from one ♂ and three ♀♀ in the Indian Museum. Type ♂ from Sukna (500 ft.), 1-vii-08 [Annandale]; type ♀ from Darjiling, 29-v-10 [Brunetti]; two additional ♀♀ from Kurseong, 7-8-vii-08.

Hybos apicis, mihi, sp. nov.

♂ Lower Burma.

Long. $3\frac{1}{2}$ mm.

Head.—Black. Proboscis and palpi light brown, shining; ocular orbits narrowly brown, under side of antennae pale.

Thorax.—Wholly shining black; bristly hairs as in *nigronitidus*.

Abdomen.—Black, moderately shining; a few pale hairs at sides. Genitalia shining black.

Legs.—Moderately dark brown, hind femora blackish brown. Tips of middle femora, whole of middle tibiae and major part of middle tarsi, pale yellowish brown. Tips of hind femora rather broadly, base of hind tibiae less broadly, and hind tarsi wholly except tips, pale yellowish brown. Bristly hairs as in *nigronitidus*.

Wings.—Nearly clear; stigma oval, brown, halteres brownish yellow.

Described from one ♂ in the Indian Museum taken by Dr. Annandale in jungle at the western base of the Dawna Hills, Lower Burma, 1-iii-08.

Hybos brunnipes, mihi, sp. nov.

♂ Darjiling district.

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

Head.—Blackish; antennae wholly dark brown.

Thorax.—Black, moderately shining; viewed in certain lights it appears light grey dusted. Two bristly hairs on hind margin of scutellum. (Those on the thorax are mostly broken off.)

Abdomen.—Brownish black, with pale hairs; genitalia small.

Legs.—Moderately dark brown; hind femora with soft grey pubescence. Bristly hairs as in the two preceding species.

Wings.—Clear, iridescent; no stigma; halteres yellow.

Described from one ♂ in the Indian Museum from Kurseong, 8-viii-08.

Hybos niger, mihi, sp. nov.

♀ Darjiling district.

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

Head.—Black. Eyes with upper facets distinctly though not greatly larger than lower ones, both blackish brown, but with tinges

of red in the former. Occiput dark brownish grey, ocular orbit with a fringe of black, well separated hairs, vertex with two long bristly hairs. Antennae, proboscis and palpi all black, the latter as long as the proboscis.

Thorax.—Blackish, shining, tending to greyish towards the sides, anterior margin and shoulders. Two narrow well separated inconspicuous grey dorsal stripes. Dorsum with soft short hairs, and, viewed from certain directions, with brownish tomentose reflections; some longer bristly hairs in the usual situations. Scutellum concolorous, with two long bristles and some short stiff hairs. Pleuræ and metanotum moderately dark grey.

Abdomen.—Blackish, with a moderate amount of pale pubescence, belly similar.

Legs.—Wholly black, anterior tibiae with long stiff bristly hairs; hind femora with a row of small teeth below; each bearing a strong bristle.

Wings.—Nearly clear, stigma distinct but not sharply defined, brown, filling nearly the apical half of the marginal cell and extending to the costa. Halteres bright yellow.

Described from a single ♀ in the Indian Museum from Kurseong, 26-vi-10 [*Annandale*].

Hybos tenuipes, mihi, sp. nov.

♂ Darjiling district.

Long. 3 mm.

Head.—Black, upper eye facets red, and much larger than the lower ones, which are black. Antennae black, arista four times as long as 3rd joint, and distinctly pubescent for the basal two-thirds, the remainder quite bare.

Thorax.—Black, shining, sides and metanotum similar; scutellum broad, brownish yellow, the colour extending to the posterior angles of the thoracic dorsum.

Abdomen.—Dark brown, with pale pubescence; belly similar.

Legs.—Pale yellow. Fore tibiae with a single long bristle in the middle; middle tibiae with two such, one at one-third of its length, on the outer side, the other just before the middle, and placed on the under side. Hind femora with a row of a few long stiff hairs below; remainder of legs with short pubescence.

Wings.—Pale grey, inclining to yellowish on the costa; stigma indistinct; halteres yellow.

Described from a ♂ in the Indian Museum, from Kurseong, 27-vi-10 [*Annandale*].

Hybos nitens, mihi, sp. nov.

♀ Bihar.

Long. 2 mm.

This species has considerable general resemblance to both *brunnipes*, mihi, and *fuscipennis*, mihi.

The head is dull black, including the very short proboscis, the palpi and the antennae. Body shining black, with soft, rather

numerous pale hairs. Legs very dark brown, nearly black, with distinct though rather short pale pubescence.

Wings distinctly brown, paler on apical and posterior parts; stigma very distinct and large, dark brown; venation normal, halteres brown.

H. nitens is distinguished from *brunnipes* by the very brown wings and conspicuous large stigma; by the nearly black legs, and especially by the very shining black thorax and abdomen.

From *fuscipennis* it is separated by the shining black thorax and abdomen, the black proboscis, the very dark legs and its smaller size, 2 mm. as compared with 3 mm.

Described from one ♀ in the Pusa collection taken at Pusa, April 1908.

Hybos flavipalpis, mihi, sp. nov.

♂ Darjiling district.

Long. 3 mm.

Head.—Eyes with upper facets much smaller than usual, but larger than lower ones; antennae black; proboscis black, shining; palpi yellowish. Occiput blackish, with a row of well separated, curved, black stiff hairs, placed some distance behind the eye margins. Two bristles on vertex.

Thorax.—Shining black, stiff bristly hairs laterally towards posterior margins and two on the shining black scutellum.

Abdomen.—Black, moderately shining, yellowish grey; rather long and ragged hair at the sides. Tip of abdomen enlarged; genitalia very large, black, shining, with a little whitish soft hair.¹

Legs.—Mainly black, but anterior tibiae and tarsi more nearly dark brown; hind tibiae distinctly brown towards tips, and slightly enlarged there; hind tarsi also distinctly brown. All the legs normally minutely pubescent, tibiae with several long stiff bristly hairs on outer side. Hind femora with two rows of small teeth below, bearing bristles.

Wings.—Pale grey; stigma present but weak, brownish; halteres yellow.

Described from one ♂ in the Indian Museum from Kurseong, taken 25-vi-10 by Dr. Annandale.

Hybos auripes, mihi, sp. nov.

♂ ♀ Darjiling.

Long. 5 mm.

Head.—Black; proboscis not much longer than head, brownish yellow tipped; palpi rather long, pubescent.

Thorax.—Blackish grey; when seen from certain directions, brownish grey dusted. Sides dark grey. (Bristles on thorax broken off, but from those remaining apparently consistent with the arrangement in the other species herein described.)

¹ The claspers being tightly closed, no more detailed description can be given.

Abdomen.—Blackish grey, with a brownish cinereous dust; a few pale hairs at the sides; genital organs in ♂ large, robust, conspicuous, consisting of an upper and lower thick cup-shaped piece, the former ending in two narrow blunted hairy points, the latter ending in two short obtuse bare points, the two pieces together enclosing a large ventral chamber in which are some smaller intermediate processes of a yellow colour, the whole of the genitalia, otherwise, being black, with stiff black hairs on the outside. In the ♀ the organs are small, pale and inconspicuous.

Legs.—Black, pubescent. Hind femora with a row of about twenty small teeth on under side, each bearing a short spine. In addition, a row of long stiff bristles. Anterior tibiae with at least two long bristles on inner and two on outer side of each. Tarsi black, with pale hair on under side, that on under side of hind pair golden yellow, and there is a little such golden yellow hair at the tips of the hind tibiae on the under side.

Wings.—Pale brownish grey; stigma oval, brown, not very conspicuous; halteres yellow.

Described from a type ♂ from the Botanical Gardens, Darjiling, 12-viii-09 [*Paiva*], and a type ♀ from Kurseong, 7-ix-09 [*Annandale*], both specimens in the Indian Museum.

Hybos gagatinus, Big.

The type of this species is in the Indian Museum collection, and I therefore add a few details to Bigot's very short description. The specimen is in fairly good condition except that the head is a little crushed, and the antennae gone. A pre-alar bristle is evident, two on the scutellum, nearly erect, and one or two on the sides of the thorax. The under side of the thorax is dark bluish grey. The legs are best described as moderately dark shining brown. The anterior tibiae, the hind knees, broadly, and all the tarsi, light brownish yellow. Legs pubescent, with two long bristles on upper part of outer side of middle tibiae, and two similar apical ones. The hind femora have a row of about 10 long but not very strong spines on the under side. The wings are quite clear, very iridescent, 6th vein somewhat faint; halteres yellowish.

Long. 4 (not 5) mm. Moreover the locality (Margherita) is in Assam, not in India proper.

SYNDYAS, Loew.

parvicellulata, Bezzi, Ann. Mus. Hung., ii, 321 (1904).
Ceylon and Papua.

eumera, *id.*, *l.c.*, 323. Papua.

elongata, Meij., Tijd. v. Ent., liii, 67 (1910) Java.

brevior, *id.*, *l.c.*, 68. Java.

SYNECHES, Walk.

1. Sub-genus *Syneches* (s. str.).

bigoti, Bezzi, Ann. Mus. Hung., ii, 360 (*nom. nov.*), (1904).
India.

Pterospilus bicolor, Big., Ann. Soc. Ent. Fr. (1889), 126.

N.B.—The name *bicolor* is preoccupied by Walker's *Hybos bicolor*, a species now referred to this genus.

dichaetophorus, Bezzi, Ann. Mus. Hung., ii, 330 (1904).
Papua.

semibrunnea, Meij., Tijd. v. Ent., liv, 325 (1911). Java.

2. Sub-genus *Epiceia*, Walk.

bicolor, Walk., Proc. Linn. Soc. Lond., iii, 91 (*Hybos*) (1859).
Aru Is. and Papua.

deficiens, Walk., *loc. cit.*, iii, 129 (*Hybos*) (1859). Papua,
Key Is.

ferruginea, Walk., *l.c.*, v, 149 (1861). Amboina, Mysol,
Ceram.

eustylata, Big., Ann. Soc. Ent. Fr. (1889), 126 (*Pterospilus eustylatus*). Papua and "Indian Archipelago."

hyaloptera, Bezzi, Ann. Mus. Hung., ii, 331 (1904). Papua.

minor, *id.*, *l.c.*, 332. Papua.

? *stigma*, Walk., Proc. Linn. Soc. Lond., viii, 111 (*Hybos*)
(1865). Papua.

N.B.—This last species referred here with a doubt.

3. Sub-genus *Harpamerus*, Big.

signatus, Big., Rev. Mag. Zool. (1859), 7. Ceylon.

dinoscelis, Bezzi, Ann. Mus. Hung., ii, 333 (1904). Papua.

velutinus, Meij., Nov. Guin. Results, v, 79 (1906). Papua.

N.B.—These genera *Syneches*, *Epiceia* and *Harpamerus* do not appeal to me with sufficient clearness for me to be sure of their validity, and therefore the following new species must be regarded as belonging to *Syneches*, *sensu lato*. Of these *inaequalis* has slightly incrassated towards the tip, but much *lengthened* hind femora, and is certainly a true *Syneches*, *sensu stricto*, whilst *insignis* has the femora thickened throughout their length, and also belongs to this section.

Note on Syneches bigoti, Bezzi.

Bigot's original name for this species was *Pterospilus bicolor*, but through Walker's *Hybos bicolor* being now referred to *Syneches*, the name has had to be altered.

Two points now arise: the first being that the present species is remarkably akin to the European *Pterospilus muscarius*, Rond., the only points of difference being the brown thorax with two dorsal more or less distinct yellowish stripes, and the brownish yellow or entirely yellow scutellum. In *muscarius* the thorax is blackish and the scutellum dark, but in the few specimens of Bigot's species present in the collection considerable variability is shown in various characters. The depth of colour of the thorax, also the width and colour of the thoracic stripes, are pale yellowish in one specimen and moderately dark brownish yellow in others. In one example the scutellum is yellow, in others dark brownish yellow. The proboscis is brownish yellow, and in a European example of *muscarius* (identified in Europe) it is also wholly yellowish, though Schiner describes it as black. The colour of the hind legs also varies considerably both in the ground colour (yellowish to rather dark brown) and in the width and intensity of the two hind femoral bands (basal and apical); the anterior legs being however fairly uniform in colour, pale yellowish.

Secondly the dividing line between *Hybos* and *Syneches* appears a very slender one, the distinction as given by Prof. Bezzi being that in the former the 2nd longitudinal vein begins near the middle of the wing, and in the latter near the base of the wing.

My three new species *niger*, *apicis* and *auripes*, placed in *Hybos*, might almost as well be placed in one genus as the other, the origin of that vein occurring at an intermediate stage.

Schiner's distinction between *Hybos* and *Pterospilus* is that in the former the anal cell is longer than the 2nd basal and that it is rounded in front, the wings being clear; whilst in *Pterospilus* the anal cell is of equal length with the 2nd basal and is pointed in front, the wings being marked. This applies well enough regarding the single species *muscarius*, but the distinction fails as applied to oriental species, since the length of the 2nd basal and anal cells are so nearly equal in many species, referred to both *Hybos* and *Syneches*; moreover there is no fine distinction in the distal extremity of the cell, which generally takes the form of a well curved arc meeting a straight line.

Again, the wing is only distinctly marked (apart from the stigma, which may be conspicuous or weak, according to the species) in *bigoti* (*bicolor*, Big.), and this is not a generic character.

In my new species referred to *Hybos* the stigma is almost absent in some and quite conspicuous in others.

The degree of incrustation of the hind femora also varies with the species; likewise the size of the tooth-like processes on their under side, and also the strength and length of the spines or bristles placed there.

Bigot's type ♂ is from Margherita, Assam, the Indian Museum specimens are from Pallode, S. India, 15-xi-08 [*Annandale*] and Peradeniya, i-1911. I have several in my own collection from Ceylon and Mr. Green has it from Kandy, v-1910.

Syneches palliditarsis, mihi, sp. nov.

♀ Darjiling district.

Long. 5 mm.

Head.—Black; the narrow face a little grey dusted. Eyes above antennae absolutely contiguous, the upper facets reddish brown, the lower facets, which are much smaller, darker brown. Proboscis shining brown, projecting considerably beyond head (in one specimen twice as long as head). Palpi very short, nearly black. Antennae moderately light brown.

Thorax.—Shining black; when viewed from certain directions it appears distinctly brownish grey dusted; the anterior part bare; some long soft hairs on posterior half and on scutellum, on which is a row of long stiff hairs on the margin.

Abdomen.—Black, a little shining, with brownish yellow hair, which is a little more plentiful than in the other Indian species of this genus. A peculiar feature in this species is the presence on the under side of the 5th segment of two parallel rows, placed longitudinally a short distance apart, of long soft golden yellow hairs. Genitalia elongate.

Legs.—Dark brown or blackish. Tibiae and tarsi mainly brownish yellow, but base of former and tips of latter darker. Femora with rather copious long soft hair; tibiae with similar hair, less regular and not so long, and with a row of longer stiffer hairs. First two joints of tarsi with two longer stiff hairs at their tips.

Wings.—Brownish grey, darker anteriorly; stigma brown, oval, moderately large. Halteres dark brown.

Described from 3 ♀♀ in the Indian Museum taken at Sukna (500 ft.), base of Darjiling Hills, by Dr. Annandale, 2-vii-8 (*type*) and 1-vii-08 (two others).

N.B.—The palpi in *Hybos* are theoretically of a length approaching that of the proboscis but in this species they are quite short, certainly not a fifth part as long as the proboscis.

Syneches fratellus, mihi, sp. nov.

♀ Western Himalayas.

Long. 2½ mm.

Very like *palliditarsis*, but quite distinct. Eyes wholly black; antennae wholly black. Abdomen without the two fringes of yellow hair on belly, and the dorsal pubescence of the abdomen is more whitish than yellow. The legs have only the tarsi and extreme tips of the tibiae yellow, the remainder being black. The wings are nearly clear. It is a much smaller species. One ♀ in the Indian Museum from Bhowali, Kumaon District (5700 ft.), 29-vi-10 [*A. D. Imms*].

Syneches immaculatus, mihi, sp. nov.

♂ Ceylon.

Long. 4 mm.

Head.—Dark grey. Upper facets of eyes reddish brown, very much larger than the lower ones, which are coffee brown. Proboscis about as long as height of head, yellow; palpi very

small, yellow, with a long bristle at the tips. Antennae bright pale yellow, with a very long bisinuate drooping black arista.

Thorax.—Bright brownish yellow, with a few sparse hairs and four bristles towards posterior margin. Scutellum concolorous, with two long apical bristles. Metanotum concolorous; sides of thorax also, an irregular elongate dark brown spot or streak from the shoulder to the base of the wings.

Abdomen.—Wholly black, with a little black pubescence on upper and under sides; genitalia small.

Legs.—Yellow; fore femora a little brown above, with short golden yellow pubescence; all the tibiae with a row of well separated long stiff dark hairs.

Wings.—Pale grey, unmarked except for the distinct brownish yellow stigma; halteres brown.

Described from one ♂ in the Indian Museum taken by Mr. E. E. Green at Peradeniya, Ceylon, April 1911.

N.B.—This appears to be allied to *S. pullus*, Bezzi, from Ceylon.

Syneches insignis, mihi, sp. nov.

♂ Western Himalayas.

Long. 2½ mm.

Head.—Occiput blackish grey; proboscis yellowish on apical half. Eyes with upper facets much larger than lower ones. Antennal 1st joint black (remainder missing).

Thorax.—Blackish grey, with microscopic brownish grey pubescence and soft black hairs variously dispersed; humeral calli black, shining, rather prominent, yet small. Remainder of thorax, with scutellum and metanotum blackish, the scutellum with at least two long bristly hairs.

Abdomen.—Blackish, with a slight deep blue tinge and sparse pale pubescence.

Legs.—Black, with a slight deep blue tinge; anterior knees, tips of anterior tibiae, and all the tarsi wholly yellowish. The middle tibiae brown. All the legs with soft black pubescence, hind femora considerably thickened; a row of small teeth and a row of isolated long stiff bristly hairs on under side.

Wings.—Grey. Stigma very large, quite circular, dark brown, placed in the rather distinct curve downwards taken by the 2nd longitudinal vein.

Described from one ♂ in the Indian Museum, taken by Dr. A. D. Imms at Bhowali, Kumaon District (5700 ft.), 2-vii-10.

Syneches inaequalis, mihi, sp. nov.

♂ Darjiling district.

Long. 3 mm.

Head.—Occiput dark grey; proboscis about as long as head; antennae blackish grey, arista considerably pubescent.

Thorax.—Shining black.

Abdomen.—Dull blackish grey (if viewed from in front it appears a lighter grey); towards tip greyish. Pale hairs laterally. Genitalia comparatively large, apparently normally formed.

Legs.—Wholly yellowish, except tips of femora exceedingly narrowly black. Legs softly and distinctly pubescent, the tibiae with three or four long stiff bristly hairs each.

Wings.—Pale brownish yellow; stigma oval, indistinct, of moderate size.

Described from a single ♂ from Kurseong, 3-vii-08, taken by Dr. Annandale. In the Indian Museum.

***Syneches minutus*, mihi, sp. nov.**

♂ Lower Burma.

Long. 2 mm.

Head.—Upper facets of eyes large, reddish; lower ones nearly black, much smaller; vertex and occiput black; three distinct small yellowish ocelli. Antennae brown, pale if viewed from above, as is also the arista. Proboscis light brownish yellow, a little longer than the head.

Thorax.—Very highly arched; dark blackish brown, a little shining. Seen from certain directions the hinder half has a brown dusted tinge. Some long stiff hairs laterally. Scutellum with a distinct brown or brownish grey tinge, and with long stiff hairs.

Abdomen.—Blackish brown, with a little dark hair. Genitalia black, apparently normally shaped and of moderate size.

Legs.—Pale brownish yellow; coxae and sometimes extreme base of anterior femora and extreme tips of tarsi dark. Legs almost bare except for one or two long stiff hairs on tibiae.

Wings.—Pale brown, stigma imperceptible, halteres black.

Described from four ♂♂ in the Indian Museum, taken by Dr. Annandale at the western base of the Dawna Hills, Lower Burma, 1-2-iii-08.

***Syneches rusticus*, mihi, sp. nov.**

♂ Darjiling.

Long. 3½ mm.

Head.—Eyes with upper facets red, the lower smaller ones coffee brown. Three large ocelli, pale yellow and very distinct. Antennae blackish grey, 3rd joint and the rather thick arista paler. Proboscis longer than head.

Thorax.—Black, only a little shining; some stiff hairs laterally and on posterior margin of scutellum.¹ Viewed from a low angle at the sides, the anterior part of the mesonotum appears brown dusted.

Abdomen.—Uniformly dark blackish brown, with yellowish brown hairs laterally. Genitalia concolorous, inconspicuous.

Legs.—Yellowish, pubescent; coxae, major part of anterior femora, tips of all femora (very narrowly) and apical half of all tarsi, black. Hind femora with a row of stiffer long hairs below.

Wings.—Distinctly brown, but not deeply so, highly iridescent; stigma ill defined but distinct. Halteres blackish brown.

¹ Most of the bristly hairs are broken off and therefore cannot be described with exactitude.

Described from one ♂ in the Indian Museum taken by me at Darjiling, 26-v-10.

ACARTERUS, Loew.

pallipes, Bezzi, Ann. Mus. Hung., ii, 335 (1904). "Oriental India."

orientalis, Meij., Tijd. v. Ent., 1., 250, pl. vi, 17 (1907). Java.

Acarterus fuscipennis, mihi, sp. nov.

♂ Ceylon.

Long. 3 mm.

Head.—Eyes wholly contiguous, the upper facets much larger than the lower ones, bright reddish brown. Proboscis reddish yellow, as long as the height of the head; palpi brownish yellow, very small. Antennae brownish, with long arista. Back of head blackish.

Thorax.—Dull black, highly arched, with a few hairs, a few lateral long stiff hairs, also some towards posterior margin. Sides similarly coloured or dark grey; scutellum with a fringe of long dark hairs.

Abdomen.—Black, scarcely pubescent; belly a little pale.

Legs.—Bright light brownish yellow, a little pubescent; coxae and basal half of femora black; tarsi tips blackish. Under side of hind femora and outer side of posterior tibiae with a few long stiff hairs.

Wings.—Brownish, stigma darker brown; halteres large, black.

Described from two ♂♂ taken by Mr. E. E. Green at Peradeniya, Ceylon, vi-10 (type, in Indian Museum), and v-11 (in Mr. Green's collection).

PARAHYBOS, Kert.

iridipennis, Kert., Termes. Fuz., xxii, 176 (1899). Papua.

chaetoproctus, Bezzi, Ann. Mus. Hung., v, 565 (1907). Formosa.

infuscatus, Meij., Tijd. v. Ent., liv, 326 ♂ (1911). Java.

pusillus, *id.*, *l.c.*, 327 ♂. Java.

Parahybos flavipes, mihi, sp. nov.

♂ Darjiling District.

Long. 3 mm.

Head.—Eyes above reddish, closely contiguous, the lower facets coffee brown and much smaller. Antennae yellowish, arista very long, 2nd joint bristly, 3rd with a single bristle above. Face deeply sunk, greyish.

Thorax.—Wholly dull black, some soft hairs towards posterior margin and on scutellum, which latter with the metanotum is concolorous.

Abdomen.—Wholly dull, very dark blackish brown with pale pubescence.

Legs.—Rather bright brownish yellow except coxae and basal half of femora; traces of black at tips of femora and tarsi. Soft yellow pubescence on legs, no conspicuous bristly hairs.

Wings.—Pale grey, stigma indistinct, brown; halteres black.

Described from a single ♂ in the Indian Museum taken at Sukna, base of Darjiling Hills, 1-vii-08, by Dr. Annandale.

N.B.—An immature specimen, probably a ♀, from near Bhowali, Kumaon, Western Himalayas, taken by Dr. A. D. Imms, 13-vi-10, is apparently this species.

I am inclined to doubt the distinction between *Acarterus* and *Parahybos*; Professor Bezzi's difference being only that the 3rd antennal joint is more or less elongate, with apical arista in the former, whilst it is nearly round, with preapical arista in the latter. In the present species both these characters are difficult to decide, and appear of an intermediate nature. *Acarterus*, Loew, has priority.

Sub-family *EMPINAE*.

BREVIOS, mihi, gen. nov.

Near *Cyrtoma*, Mg.

Type *B. longicornis*, sp. nov.

Auxiliary and 1st longitudinal veins united, ending at about middle of wing in the costa which latter veins ends at the tip of the 4th longitudinal; 2nd longitudinal ending before the wing tip, 3rd vein simple, ending approximately at wing tip or a little below it; the 4th more or less parallel to 3rd but diverging at their middles, then converging and again slightly diverging at their tips; 5th vein nearly straight, 6th moderately long, parallel to hind border of wing, ending opposite tip of 1st vein. Basal cells about equal in width and length, not attaining middle of wing. Anterior cross vein placed just beyond base of 3rd vein, short; posterior cross vein barely proximad of anterior cross vein, very sloping. Anal cell half the length of the 2nd basal, the anal cross vein forming an acute angle with the 5th longitudinal vein, so that the anterior side of the anal cell is longer than the posterior one. No discal cell.

First two antennal joints very short, subequal, 3rd very long, elongate conical, three times as long as 1st and 2nd together, with long pubescent style as long as the 3rd joint itself. Eyes closely contiguous. Proboscis and palpi very short. Thorax well arched; legs with only the middle femora slightly incrassated; fore coxae small. Abdomen cylindrical, normal; genitals small, concealed.

Brevios longicornis, mihi, sp. nov.

♂ Nepal.

Long. 2 mm.

Head.—Occiput blackish grey, with pale yellowish grey pubescence; eyes closely contiguous; antennae blackish, 3rd joint

and its style with rather dense whitish pubescence. Proboscis shorter than height of head, yellowish.

Thorax.—Bright ferruginous, also scutellum and metanotum. A short black streak above each wing apparently joined together near posterior margin by an irregular blackish mark. (Thorax slightly damaged in this spot by the pin). Sides grey.

Abdomen.—Black, roughened, nearly bare. Genitalia rather large, black.

Legs.—All wholly pale brownish yellow, with soft pubescence, middle femora slightly thickened.

Wings.—Pale grey, highly iridescent; a slight obliteration of the veins at tips of basal cells. Venation in accordance with the generic diagnosis. Halteres brownish yellow.

Described from a single ♂ from Sarath, Nepal, 24-ii-08. In the Indian Museum.

HOWLETTIA, gen. nov.

Allied to *Cyrtoma*, Mg. and *Brevios*, mihi.

Eyes separated above by a moderately broad frons, and only very narrowly separated below antennae. Antennae of three distinct joints, the first two short, subequal, the third shortly conical with long terminal arista. Proboscis about equal to height of head, perpendicular; palpi half the length of proboscis or a trifle longer.

Thorax not more arched than in normal species of *Empis* and *Rhamphomyia*. Abdomen a little longer than thorax, somewhat compressed. Legs rather long and slender; fore coxae short, middle femora distinctly but not conspicuously incrassated. All the tarsi longer than the tibiae.

Wings with 1st longitudinal vein rather further from the costa than usual, ending beyond middle of wing; 2nd vein beginning at one-fourth of the wing, ending towards tip of costa. The 3rd vein begins at the middle of the wing, the anterior cross vein placed just beyond the origin of the 3rd vein (which latter ends at about the wing tip); the 4th vein very nearly straight, ending just below wing tip; 5th nearly straight; 6th (anal) very long, complete to the border of the wing, a short distance below the tip of the 5th. Posterior cross vein joining 4th vein at the spot where the anterior cross vein meets it, but not in a straight line with it. Anal cross vein forming acute angle with 5th vein. The 2nd basal cell very little longer than the 1st, the anal cell barely half as long as 2nd basal. No discal cell.

The ♀ only present.

The genus is named after Mr. F. M. Howlett, of the Agricultural Research Institute at Pusa.

Howlettia flavipes, mihi, sp. nov.

♀ Western Himalayas.

Long. 2½ mm.

Head.—Blackish, proboscis dark brown, palpi brownish yellow, ocellar triangle rather prominent.

Thorax.—Shining black, with very short whitish pubescence towards the margins of the dorsum. Sides of thorax and dorsum of scutellum slightly grey dusted. A few weak prealar bristly hairs.

Abdomen.—Black, a little shining, belly brownish yellow, a little very short whitish pubescence.

Legs.—Brownish yellow, minutely pubescent, middle femora a little incrassated, with a row of very short bristles on under side. Tarsi blackish.

Wings.—Clear; iridescent; venation in accordance with generic diagnosis. Halteres dull brownish yellow.

Described from a single ♀ in the Pusa collection taken by Mr. F. M. Howlett at Mussoorie, ix-06.

EMPIS, L.

ceylonica, Bezzi, Ann. Mus. Hung., ii, 343 (1904). Ceylon.

papuana, *id.*, *l.c.*, 344. Papua.

jacobsoni, Meij., Tijds. v. Ent., 1, 251 (1907). Java.

abbrevinervis, *id.*, *l.c.*, liv, 328 ♀ (1911). Java.

Empis subcilipes, mihi, sp. nov.

♀ Western Himalayas.

Long. 5½ mm.

Head.—Ash grey, frons about one-fourth the width of the head. Some short black stiff hairs behind the eyes, and a little soft white hair on lower part of occiput. Antennae reddish brown, rather long, black streaked on upper side and with a whitish shimmer on the inner side in certain lights. Antennal style of moderate length. Proboscis nearly three times the height of the head, reddish brown, with the under side black.

Thorax.—Moderately dark ash grey. A broad brownish grey median stripe from the anterior margin and a less distinct much shorter stripe each side, not extending to the shoulders. Surface of dorsum with short setae more or less irregularly placed, but a distinct double row in the centre and a number towards each shoulder. Some stiff bristles above and in front of each wing, and four on posterior margin of scutellum, which latter with the metanotum are both light mouse grey. Sides dark grey.

Abdomen.—Rather dark grey; 1st segment with a little black and grey pubescence; remainder of segments with scattered pale very short hairs. Belly tawny; genitalia very dark brown.

Legs.—Brownish yellow, coxae a little bluish grey on basal half. Femora more or less blackish in middle and on upper side generally; tarsi mainly black. Upper and lower sides of four posterior femora with thick but short black ciliated hair. Rest of legs finely black pubescent.

Wings.—Pale grey, veins brownish yellow on basal part, blackish distally. Stigma imperceptible. Halteres brownish yellow.

Described from a single ♀ in the Indian Museum taken at Mundali, Jaunsa division, Dehra Dun district (9000 ft.), 12-v-10.

***Empis rostrata*, mihi, sp. nov.**

♀ Western Himalayas.

Long. 7 mm.

Head.—Occiput grey, with a few bristly black hairs above. Frons and face concolorous grey, the former comparatively wide, with parallel edges, the latter much wider. Antennae black, 2nd joint very distinctly bright brownish yellow. Palpi bright brownish yellow, short. Proboscis two and three quarter times the height of the head; when extended on the under side reaching beyond the base of the abdomen; brownish yellow in colour, a little blackish in the middle on under side. A few whitish hairs on under side of head.

Thorax.—Dorsum (somewhat discoloured in the centre) light brownish grey, with a narrow median darker brown stripe and a wider one on each side not quite extended to anterior margin of thorax; and laterally two brownish spots, one in front of and one behind the pre-sutural depression. Sides, scutellum and metanotum concolorous, or a little more nearly ash grey. (Thorax denuded of bristles).

Abdomen.—Light grey, brownish at base of each segment, the colour broader in the centre; genitalia slender, cylindrical, terminated by two thin finger-like lamellae, concolorous. Belly light grey, unmarked.

Legs.—Between light brown and tawny; coxae a little grey dusted and with a little soft whitish hair; tarsi more or less blackish on upper side; extreme tips of femora very narrowly black. Posterior femora with thick but short bristly black or blackish brown hairs above. Posterior tibiae with blackish brown scales, much thicker and larger on hind pair, on which they occur below the metatarsi also, and are even continued on a less pronounced scale-like form on the under side of the remaining tarsal joints. The legs generally with minute black stiff hairs.

Wings.—Brownish yellow; stigma practically imperceptible. Halteres brownish yellow.

Described from a single ♀ in the Indian Museum taken by Dr. Annandale, 1-v-07, at Theog, Simla district (8000 ft.).

***Empis griseonigra*, mihi, sp. nov.**

♂ Western Himalayas.

Long. 5 mm.

Head.—Occiput blackish. Eyes absolutely contiguous above antennae; face dark grey; antennae black; palpi black. Proboscis one and a quarter times the height of the head, dark brownish yellow, black on under side.

Thorax.—Brownish grey, with three moderately wide brown dorsal stripes, the median one attaining the anterior margin, the outer ones only extending as far as the shoulders. Some short bristly hairs on shoulders, soft black pubescence over the dorsum generally, and stiffer hairs and bristles distributed as in the other species. Sides of thorax a little darker grey, pleurae light grey.

Abdomen.—Blackish, with short sparse black pubescence; whitish pubescence at sides of the first two segments. Genitalia blackish.

Legs.—Blackish, with black pubescence. Knees reddish brown, with a trace of this colour over some of the other joints.

Wings.—Pale grey; stigma imperceptible; halteres bright yellow.

Described from one ♂ in the Indian Museum from Mundali, Jaunsa division, Dehra Dun (9000 ft.), 12-v-10.

Empis elegans, mihi, sp. nov.

♀ Western Himalayas.

Long. 3 mm.

Head.—Black; antennae black; palpi large, yellow; proboscis twice the height of the head, black or blackish brown.

Thorax.—Shining black, including sides, scutellum and metanotum; wholly unmarked; a little whitish soft hair. Distinct bristles apparently absent; a few stiff pale hairs towards hind margin and on scutellum.

Abdomen.—Darker brown, nearly bare; genitalia slender, normal, elongate, concolorous.

Legs.—Brownish yellow. Hind coxae, tips of tibiae and all the tarsi blackish. Femora quite bare; tibiae with only a few short stiff hairs towards tips; tarsi pubescent.

Wings.—Clear, highly iridescent; anterior cross vein very near base of discal cell; stigma barely perceptible. Halteres brownish yellow.

Described from two ♀♀ in the Indian Museum from Mundali, 12-v-10, taken in company with *E. griseonigra*.

Empis centralis, mihi, sp. nov.

♀ Western Himalayas. Long. 5 mm. (extreme length).

Head.—Occiput black, with black hairs above, a little white hair below. Frons and face proportioned as in *E. rostrata*, but blackish, as are also the antennae, but the face, viewed from below, shows dark grey reflections. Palpi bright brownish yellow. Proboscis one and a half times the height of the head, the upper side brownish yellow.

Thorax.—Light brownish grey, with soft black pubescence, and bristly hairs laterally and towards the hind margin. Two narrow median well separated brown stripes from anterior margin extending three-fourths of the distance to the scutellum. A

lateral broader stripe on each side, practically formed of three irregularly shaped elongate spots placed, one on the shoulder, one in front of and one behind the pre-sutural depression, the spots contiguous and the hind one attaining the posterior margin of the dorsum. Some bristles laterally and towards hind margin of mesonotum, also four on the scutellum. Sides of thorax and metanotum light grey, dorsum of scutellum brownish grey.

Abdomen.—Darker grey, with short sparse black hairs; posterior margins of segments more or less black. Genitalia elongate, concolorous, much as in *E. rostrata*. Belly dark grey.

Legs.—Coxae dark grey, remainder of legs brownish yellow, extreme tips of femora blackish, and tips of tarsal joints more broadly blackish. All the legs with black pubescence. Posterior femora with blackish bristly hair above; hind femora with scales. Posterior tibiae with blackish brown scales on front and hind sides, as in *E. rostrata*, but much less strong, and apparently confined to the basal half of the hind pair. On the hind side of the hind tibiae a row of moderately long, well separated bristles.

Wings.—Very pale grey, nearly clear. Anterior cross vein directly over the middle of the discal cell. Halteres bright brownish yellow.

Described from one ♀ in the Indian Museum from Mundali, Jaunsa division, Dehra Dun, 12-V-10.

Empis carbonaria, mihi, sp. nov.

♂ Ceylon.

Long. 4 mm.

Wholly and uniformly coal black, moderately shining. Eyes separated by a narrow frons. Antennal 3rd joint distinctly longer than the first two together, and its distal half rather suddenly narrow, style thick, half as long as the joint. Proboscis nearly twice the height of the head, labium bifid at the tip. Head, thorax and abdomen covered with long, soft, but not copious pubescence. Legs with rather soft black hairs; fore femora almost bare. Fore and hind metatarsi distinctly incrassated, cylindrical, lengthened, the fore pair with longer black hair. Posterior tibiae and tarsi with a row of well separated long stiff hairs. Genitalia small, rounded, not conspicuous. Wings clear, stigma slightly brownish, small. Halteres black.

Described from 2 ♂♂ in the Indian Museum and one in Mr. E. Green's collection, all collected by that gentleman on the Horton Plains, Ceylon, in May 1911.

Type in Indian Museum.

Empis squamata, mihi, sp. nov.

♀ Ceylon.

Long. 2½—3 mm.

Wholly coal black. Proboscis three times as long as the head. Antennae normal. Thorax with soft black hairs. Abdomen nearly bare, roughened, shining; belly similar; ovipositor small, elongate,

Thorax.—Brownish grey, with three moderately wide brown dorsal stripes, the median one attaining the anterior margin, the outer ones only extending as far as the shoulders. Some short bristly hairs on shoulders, soft black pubescence over the dorsum generally, and stiffer hairs and bristles distributed as in the other species. Sides of thorax a little darker grey, pleurae light grey.

Abdomen.—Blackish, with short sparse black pubescence; whitish pubescence at sides of the first two segments. Genitalia blackish.

Legs.—Blackish, with black pubescence. Knees reddish brown, with a trace of this colour over some of the other joints.

Wings.—Pale grey; stigma imperceptible; halteres bright yellow.

Described from one ♂ in the Indian Museum from Mundali, Jaunsa division, Dehra Dun (9000 ft.), 12-v-10.

Empis elegans, mihi, sp. nov.

♀ Western Himalayas. Long. 3 mm.

Head.—Black; antennae black; palpi large, yellow; proboscis twice the height of the head, black or blackish brown.

Thorax.—Shining black, including sides, scutellum and metanotum; wholly unmarked; a little whitish soft hair. Distinct bristles apparently absent; a few stiff pale hairs towards hind margin and on scutellum.

Abdomen.—Darker brown, nearly bare; genitalia slender, normal, elongate, concolorous.

Legs.—Brownish yellow. Hind coxae, tips of tibiae and all the tarsi blackish. Femora quite bare; tibiae with only a few short stiff hairs towards tips; tarsi pubescent.

Wings.—Clear, highly iridescent; anterior cross vein very near base of discal cell; stigma barely perceptible. Halteres brownish yellow.

Described from two ♀♀ in the Indian Museum from Mundali, 12-v-10, taken in company with *E. griseonigra*.

Empis centralis, mihi, sp. nov.

♀ Western Himalayas. Long. 5 mm. (extreme length).

Head.—Occiput black, with black hairs above, a little white hair below. Frons and face proportioned as in *E. rostrata*, but blackish, as are also the antennae, but the face, viewed from below, shows dark grey reflections. Palpi bright brownish yellow. Proboscis one and a half times the height of the head, the upper side brownish yellow.

Thorax.—Light brownish grey, with soft black pubescence, and bristly hairs laterally and towards the hind margin. Two narrow median well separated brown stripes from anterior margin extending three-fourths of the distance to the scutellum. A

lateral broader stripe on each side, practically formed of three irregularly shaped elongate spots placed, one on the shoulder, one in front of and one behind the pre-sutural depression, the spots contiguous and the hind one attaining the posterior margin of the dorsum. Some bristles laterally and towards hind margin of mesonotum, also four on the scutellum. Sides of thorax and metanotum light grey, dorsum of scutellum brownish grey.

Abdomen.—Darker grey, with short sparse black hairs; posterior margins of segments more or less black. Genitalia elongate, concolorous, much as in *E. rostrata*. Belly dark grey.

Legs.—Coxæ dark grey, remainder of legs brownish yellow, extreme tips of femora blackish, and tips of tarsal joints more broadly blackish. All the legs with black pubescence. Posterior femora with blackish bristly hair above; hind femora with scales. Posterior tibiae with blackish brown scales on front and hind sides, as in *E. rostrata*, but much less strong, and apparently confined to the basal half of the hind pair. On the hind side of the hind tibiae a row of moderately long, well separated bristles.

Wings.—Very pale grey, nearly clear. Anterior cross vein directly over the middle of the discal cell. Halteres bright brownish yellow.

Described from one ♀ in the Indian Museum from Mundali, Jaunsa division, Dehra Dun, 12-V-10.

Empis carbonaria, mihi, sp. nov.

♂ Ceylon.

Long. 4 mm.

Wholly and uniformly coal black, moderately shining. Eyes separated by a narrow frons. Antennal 3rd joint distinctly longer than the first two together, and its distal half rather suddenly narrow, style thick, half as long as the joint. Proboscis nearly twice the height of the head, labium bifid at the tip. Head, thorax and abdomen covered with long, soft, but not copious pubescence. Legs with rather soft black hairs; fore femora almost bare. Fore and hind metatarsi distinctly incrassated, cylindrical, lengthened, the fore pair with longer black hair. Posterior tibiae and tarsi with a row of well separated long stiff hairs. Genitalia small, rounded, not conspicuous. Wings clear, stigma slightly brownish, small. Halteres black.

Described from 2 ♂♂ in the Indian Museum and one in Mr. E. Green's collection, all collected by that gentleman on the Horton Plains, Ceylon, in May 1911.

Type in Indian Museum.

Empis squamata, mihi, sp. nov.

♀ Ceylon.

Long. 2½—3 mm.

Wholly coal black. Proboscis three times as long as the head. Antennae normal. Thorax with soft black hairs. Abdomen nearly bare, roughened, shining; belly similar; ovipositor small, elongate,

normal. Legs with a dense row of long closely placed dark brown or blackish elongate scales on the upper and lower sides of all the femora and tibiae, except the upper side of the fore femora. The middle and hind legs have a few but much smaller such scales on the upper side of the metatarsi. Only the unscaled parts of the legs bear a little black pubescence. Wings pale brown, stigma black, halteres black.

Described from several ♀♀ collected by Mr. E. E. Green on the Horton Plains, Ceylon, May 1911.

Type (and some other of the specimens) in the Indian Museum.

***Empis inconspicua*, mihi, sp. nov.**

♂ Northern India.

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

Head.—Blackish; antennae black; palpi a little yellowish. Proboscis twice the height of the head, yellow above, black below.

Thorax.—An intermediate shade between light and dark grey, with comparatively long and rather stiff hairs. Four long stiff hairs on scutellum, which, with sides of thorax and metanotum are concolorous, but just below shoulders a lighter grey.

Abdomen.—Concolorous, rather broad and flat, with parallel sides, and black soft pubescence. Genitalia blackish, with reddish brown bisinuate terminal hooks. Belly blackish.

Legs.—Uniformly dark brown, pubescent; middle tibiae with four long stiff hairs on outer side; hind tibiae with long hair on hinder side.

Wings.—Pale grey; stigma brownish, ill defined, much elongated and reaching the costal margin. Halteres yellow.

Described from two ♂♂ in the Indian Museum from Lucknow, 17-i-08 (*type*) and 9-ii-08. Sent by the Lucknow Museum.

***Rhamphomyia himalayana*, mihi, sp. nov.**

♀ Western Himalayas.

Long. barely 3 mm.

Head.—Black. Occiput moderately dark grey, with black hairs. Frons wide, dark grey. Three distinct ocelli on vertex, with a pair of divaricate bristles between the two upper ones. Antennae black; proboscis blackish, about as long as the head.

Thorax.—Moderately dark ash grey, with two median very narrow whitish lines from the anterior margin. Dorsum with short blackish pubescence. Sides, scutellum and metanotum concolorous.

Abdomen.—Dark grey, with short blackish pubescence; belly similar. Genitalia very elongate, terminating in two unusually long finger-like lamellae.

Legs.—Dark brown, with blackish pubescence; femora and tibiae with a row of stiff hairs; hind femora with thick short black hair above and dark brown scales on lower side; hind tibiae with thicker and more bristly black hair.

Wings.—Pale brownish grey. Stigma absent; halteres yellow.
Described from a single ♀ taken by Dr. Annandale at Matiana, Simla district (8000 ft.), 28—30-iv-07. In the Indian Museum.

***Rhamphomyia unifasciata*, mihi, sp. nov.**

♂ Western Himalayas. Long. 3 mm.

Head placed on a neck of moderate length, blackish. The 1st and 2nd antennal joints rounded, a little broader at the tips, 3rd as long as 1st and 2nd together, elongate-oval; arista placed at the extreme tip of the dorsal side.

Thorax.—Bright brownish yellow. An oval black spot on anterior part of dorsum, drawn out to a point on anterior margin; sometimes not narrowed in front but diminished in intensity, and in some cases extended posteriorly towards the hind margin. Traces of two narrow lines from the hinder corners of the spot towards posterior margin, and a trace of a small blackish spot between these lines; scutellum concolorous, rather wide, a little blackish at the base.

Abdomen.—Shining, dark blackish brown; belly more or less yellowish; genitalia withdrawn.

Legs.—Brownish yellow; tibiae and tarsi barely darker.

Wings.—Very pale grey, nearly clear; stigma present but indistinct. Halteres brownish yellow.

Described from two ♂♂ in the Indian Museum from Mundali, Jaunsa division, Dehra Dun (9000 ft.), 12-v-10 (*type*) [C. W. Beebe] and Simla, 12-v-08, the latter taken by Dr. Annandale.

***Rhamphomyia griseonigra*, mihi, sp. nov.**

♂ Western Himalayas. Long. 4 mm.

Head.—Eyes dark reddish brown, upper facets much the larger. Occiput grey, with black stiff hairs. Antennae blackish, 3rd joint elongate, with distinct, elongate style; face dark grey; proboscis blackish, shining, brownish towards tip.

Thorax.—Dark cinereous grey, lighter grey on shoulders and pleurae. The centre of the dorsum is slightly brown tinged, with two indistinct longitudinal narrow black stripes. The whole dorsum with short black stiff hairs irregularly situated, and some longer bristly hairs in the neighbourhood of the wings. Scutellum concolorous, with black hairs on posterior margin but apparently no very strong ones; metanotum dark grey.

Abdomen.—All blackish grey, with very short black hairs.

Legs.—Black, shortly black pubescent; tibiae with a few stiff black hairs; hind femora apparently with only microscopic pubescence, hind tibiae with soft black hairs on outer side, becoming longer towards the tips, where these tibiae themselves are gradually thickened; hind metatarsi lengthened and enlarged.

Wings.—Pale brown, stigma an indistinct darker brown streak. Halteres dirty brownish yellow.

Described from a single ♂ from Mundali (9000 ft.), Dehra Dun, 12-v-10. In the Indian Museum.

Empimorpha rufithorax, mihi, sp. nov.

♂ Darjiling.

Long. nearly 4 mm.

Head.—Occiput, frons, which is moderately wide, with parallel linear edges, and face all black, with a few black bristles. Vertex with three distinct large reddish ocelli, with a pair of strong divaricate bristles between the upper ones. Antennae yellow, 3rd joint elongate onion shaped, with a long closely pubescent black arista, ending in a small bare black pointed bristle. The first two antennal joints with some short bristles near their tips. Proboscis about the height of the head, the basal half yellowish, the apical half blackish; palpi very long, longer than proboscis, somewhat broadened and flattened at the tips, with a few yellowish hairs.

Thorax.—Bright light yellowish brown, with three black dorsal stripes, of which the median one is of moderate width, the outer ones are broad enough to extend over the lateral margins, and all three attain the anterior margin of the dorsum. A few bristly hairs about the roots of the wings and much smaller ones on the dorsal stripes. Sides a little more yellowish than the dorsum, with which latter the scutellum and metanotum are concolorous, the scutellum bearing a few stiff black hairs on the hind margin; the metanotum a little dusky in the centre.

Abdomen.—Dark blackish brown, with black pubescence. Genital organs dark grey, with a little pubescence. Belly similar to dorsal side of abdomen.

Legs.—Coxae and femora yellowish; tibiae dark brownish yellow, tarsi dark brown. All the legs shortly pubescent; tibiae with two rows of five or six long stiff hairs.

Wings.—Pale brown; stigma vague, very elongate, a little darker brown. Halteres yellowish brown.

Described from a single type ♂ in the Indian Museum taken by me at Darjiling, 29-v-10, on the hillside.

HILARA, Mg.

bares, Walk., List Dipt. Brit. Mus., iii, 491 (1859). East India.

N.B.—This is the only previously recorded species of *Hilara* from the East.

Hilara compacta, mihi, sp. nov.

♂ Western Himalayas.

Long. barely 2½ mm.

Head.—Blackish; frons rather narrow. Antennae with greyish reflections viewed from certain angles. Proboscis about as long as height of head; shining black above; labium, which is

shining yellowish, much longer than the hypopharynx and sharply pointed. Palpi large, nearly as long as proboscis, brownish yellow, pubescent.

Thorax.—Wholly dark grey, including sides, scutellum and metanotum; a little black pubescence, and some stronger hairs on dorsum laterally.

Abdomen.—Blackish, pubescent, sometimes pale below at base. Genitalia a little broader than the abdomen.

Legs.—Pale yellowish brown, pubescent. Tibiæ with a row of longer stiff hairs on outer side; front metatarsi much thickened, as wide as the tibiæ, and longer than the remaining fore tarsal joints. Posterior metatarsi normal, not so long as the remaining tarsal joints.

Wings.—Pale grey; stigma elongate, pale brownish, ill defined. Halteres dirty brownish yellow.

Described from three ♂♂ from Simla, 16-v-09 (*type*) and 9-v-09, taken by Dr. Annandale. In the Indian Museum.

Sub-family OCYDROMINAE.

Leptozepe vitripennis, mihi, sp. nov.

♂ ♀ Western Himalayas and Burma. Long. 2 mm.

Head.—Blackish. Proboscis horizontal, as long as the length of the head, shining black; palpi short, porrect, black. Antennæ with elongate conical 3rd joint and long apical bristle.

Thorax.—Very highly arched, shining black in middle of dorsum with short whitish hairs laterally.

Abdomen.—Shining black, with short whitish pubescence, belly similar.

Legs.—Rather pale pitch brown, a little pubescent.

Wings.—Very clear and iridescent; halteres black.

Described from a *type* ♂ from Oncha Gaon, Naini Tal district, 1-6-iv-07 and a *type* ♀ and a second ♀ from Rangoon, 24-ii-08, taken by Dr. Annandale.

The three specimens in the Indian Museum.

"*Ocydromia cothurnata*," Big., nom. nud.

A headless specimen thus labelled is present in the Indian Museum collection. Unless cotypes exist in the Bigot collection or elsewhere, the name must be abandoned. Moreover the specimen is not even an *Ocydromia* but belongs to the subfamily Hybotinae.

Sub-family HEMERODROMIINAE.

Trichozepe fusca, mihi, sp. nov.

♀ Darjiling district. Long. 3 mm., wing 4½ mm.

Head.—Blackish, eyes sub-contiguous. Antennæ with very long cylindrical 1st joint, short large sub-globular 2nd joint and

very elongate conical 3rd joint, which has a very long thick curved minutely pubescent style.

Thorax.—Dark brown, lighter at the sides. Scutellum and metanotum concolorous with dorsum.

Abdomen.—Dark brown, but a little lighter than the thorax; very sparsely pubescent; genitalia inconspicuous, belly brownish yellow.

Legs.—Long and slender, uniformly pale yellowish except the blackish tarsi. Fore coxae twice as long as the others, but one-third the length of the fore femora. The whole of the femora are approximately equal in length. The tibiae are very little shorter than the femora, the hinder pair a little incrassated at the tips. The tarsi are about as long as the tibiae, blackish. All the femora possess a few isolated long stiff hairs on the under side, and the middle femora have one on the front side near the tip. All the tibiae with one such stiff hair on outer side a little before the first third of the length, and a few shorter ones on hinder side of middle tibiae, also a single one on the hinder side of the hind tibiae at about one-third of the length.

Wings.—Very pale grey, very iridescent. The 3rd longitudinal vein widely forked beyond half its length; prongs of upper branch of 4th longitudinal vein issuing wide apart from the discal cell, the latter being large, long, pointed basally, about equal in length to the 2nd posterior cell. The 1st basal cell a little longer than the 2nd, which latter is about as long as the anal cell. Halteres yellow.

Described from a unique ♀ taken by Mr. Gravely, 25-iii-10, at Kurseong. In the Indian Museum.

N.B.—The peculiar nature of the antennae ought to easily distinguish this species from all other Indian Empidae.

HEMERODROMIA, Mg.

orientalis, Meij., Tijds. v. Ent., liv, 330, pl. xix, 25 ♂ (1911).
(*Microdromia*). Java.

PTILOPHYLLODROMIA, Bezzi.

Ann. Mus. Hung., ii, 344 (1904).

biroi, Bezzi, *loc. cit.*, 345. Papua.

Chelipoda flavida, mihi, sp. nov.

♂ ♀ Chota Nagpur, E. Himalayas and Lower Burma.

Long. 2 mm.

Head.—Yellowish, three ocelli on the black vertical triangle, which also carries two divaricate long bristles. Frons moderately broad. Occiput with four long curved bristles placed equidistantly. Seen from behind, the occiput has a greyish tinge, as has

sometimes the frons also. Eyes black, rounded, almost contiguous immediately below the antennae for a short space, the face broadening below. The latter, seen from above, appears silvery white. Proboscis very short, half the height of the head, conical, sharply pointed, yellowish, the upper part (hypopharynx) narrow, hard, shining. First two antennal joints yellowish, with some short bristles at the tips of each, 3rd joint dark brown, elongate onion-shaped, with long brown microscopically pubescent arista.

Thorax.—Very variable; generally brownish yellow, with more or less blackish colour, either in the form of a dorsal stripe, a lateral irregular and somewhat indistinct border, or the posterior part of the dorsum more or less blackish. Sides generally lighter, in some specimens attaining a pinkish fawn colour.

Abdomen.—Variable; brownish yellow, more or less blackish in part or wholly. Belly brownish yellow; genitalia small, concolorous. Tip of abdomen in ♂ stump-like; in ♀ tapering, the two terminal lamellae pale yellowish.

Legs.—Yellowish or pale yellow. Front coxæ narrow, cylindrical, nearly as long as the femora, the latter slightly brownish at tips, and considerably incrassated, with two yellow bristles near the base on the under side, and a row there also of microscopic spines. Posterior coxæ and femora of normal size, the former a little brownish, as are also the tarsi tips.

Wings.—Very pale grey, veins black; halteres brownish yellow.

Described from several specimens in the Indian Museum from Paresnath (4000—4300 ft.), Chota Nagpur, 9—13-iv-09 [*Annandale*], including type ♂ (9-iv-09); Dawna Hills (2—3000 ft.), 2-iii-08, type ♀ [*Annandale*]; Darjiling, 28-v-10 [*Brunetti*]. The Paresnath specimens were taken on stones where they were in considerable numbers hidden in undergrowth at the edge of a spring.

Type ♂ and ♀, with the other examples, in the Indian Museum.

Chelipoda dorsalis, mihi, sp. nov.

♂ ♀ Western Himalayas.

Long. 2 mm.

Head.—Blackish. Proboscis pale yellowish, very stout at the base; the upper piece prolonged into a long hard shining rostrum. Antennae wholly pale yellowish white.

Thorax.—Brownish yellow; dorsum black or dark brown, the colour extending more or less over the sides; scutellum and metanotum concolorous with dorsum.

Abdomen.—Brownish yellow. The dorsum of each segment black, thus forming a continuous black stripe from base to tip, but the hind borders of some of the segments escape the black colour. Belly brownish yellow. Genitalia in ♂ large, wholly black, rather complex, comprising at least a pair of claspers which are stout at the base and with flexible finger-like appendages; also a long narrow ventral style.

Legs.—Very pale yellow. Fore femora with a row of very short microscopic spines, fore tibiae possessing two such rows. The fore femora also have a row of long stiff bristly hairs on the under side, and two still longer ones below near the base.

Wings.—Clear, veins brown; halteres pale brownish yellow.

Described from three specimens in the Indian Museum, taken by Dr. Annandale at the edge of a small stream at Barogh, in the Simla Hills (5000 ft.), 10-V-10.

***Clinocera obscura*, mihi, sp. nov.**

♂ Western Himalayas.

Long. 2 mm.

Head.—Blackish grey, some stiff hairs on occiput and frons, which latter is very broad. Proboscis short, half the height of the head, shining black, with a much swollen apical part (this latter in one specimen partly brownish yellow). Palpi very small, brownish yellow. Antennal 3rd joint elongate oval, with long black arista.

Thorax.—Brownish grey, including scutellum. Sides and metanotum bluish ash grey. Some dorso-central and lateral bristly hairs.

Abdomen.—Dark brown, softly pubescent; genitalia extremely long and conspicuous, blackish, with a few pale hairs, egg-shaped, convex, bent under the belly, the narrower end pointing towards the base of the abdomen. Posteriorly (*i.e.* from the broader end) project some yellowish filamentous appendages.

Legs.—Brownish yellow; coxae ash grey, especially the posterior pairs; tarsi a little darker. Fore femora with a few soft pale longer hairs; remainder of legs microscopically pubescent.

Wings.—Very pale grey, wholly unmarked, highly iridescent; halteres brownish yellow.

Described from two ♂♂ taken by Dr. Annandale at Simla, 10-V-09.

***Clinocera (s. str.) fluviatilis*, mihi, sp. nov.**

♂ Western Himalayas.

Long. 3 mm., wing 4 mm.

Head.—Brownish grey, with isolated black bristles on the occiput, and a few on the frons; frontal tubercle bearing two divergent bristles. Antennae black, 1st and 2nd joints subequal, 3rd onion-shaped, with moderately long, nearly bare arista. Proboscis and palpi blackish, both short.

Thorax.—Very dark brownish grey, nearly black, a whitish grey stripe on the sides from just below the shoulder to as far as below the ends of the transverse suture. Ventral part of thorax also whitish grey. Dorsum bearing several isolated bristles (many of these are broken off), of which one is present on the shoulder, and one towards but not at, the hinder corner. The scutellum bears two long bristles.

Abdomen.—Dark grey, normally pubescent; genitalia large, consisting of a ventral dark grey plate, a large concave lower piece

and a pair of claspers above, these latter constituted of a large oval basal concolorous joint and an elongate brownish yellow horny bifid second joint. The whole of the genitalia a little pubescent.

Legs.—Long and slender, uniformly dark brownish grey, practically bare.

Wings.—Very pale grey. The 3rd longitudinal vein forked beyond three-fourths of its length, the branches approximate to one another and parallel; anterior cross vein before middle of discal cell, and at about one-third the length of the wing. Branches of upper branch of 4th longitudinal vein issuing close together from discal cell, thence gradually diverging; the discal cell much longer on its anterior border than its posterior one. Lower branch of 4th vein nearly straight, rather more strongly developed; 2nd basal cell short, lying against the middle third of the upper basal cell; anal cell barely longer than 2nd basal; 6th vein very short. Halteres, stem yellow, clubs dark grey.

Described from a single specimen from Bhowali, Kumaon district, 12-vi-10 [*Imms*], on stones on banks of stream.

A specimen which probably belongs to this species, but showing a discrepancy in the shape of the discal cell, is amongst the diptera recently collected by Mr. Kemp on the Abor Expedition.

Dolichocephala septemnotata, mihi, sp. nov.

♂ Western Himalayas.

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

Head.—Blackish. Frons broad, some stiff hairs on both frons and occiput. Epistome (the whole of the head below the eyes) conical, short, half the height of the rest of the head. Antennæ black; 3rd joint conical with long black thick arista, microscopically pubescent. No palpi apparent.

Thorax and Abdomen.—Wholly black, moderately shining, practically bare except for a few stiff hairs laterally on the former. Genitalia small, rounded, simple.

Legs.—Pale yellowish, upper side of fore femora and tips of tarsi a little brownish.

Wings.—Very pale brown, with seven very distinct moderate sized circular pale spots. Six of these are placed in two parallel rows of three in each; the upper row just above the 3rd longitudinal vein, the lower row a little above the hind margin of the wing, so that the spots appear like 3 pairs situated longitudinally. The first pair (*i.e.* the basal spots of both rows) is situated a little before the middle of the wing; the 2nd pair a little beyond the middle; the 3rd pair half way between the 2nd pair and the wing tip, the upper spot being in the middle of the submarginal cell. Of the spots in the longer row, the first is placed a little before, the second a little beyond the lower branch of the 5th longitudinal vein; the third is in the middle of the 2nd posterior cell. The seventh spot is near the wing tip, at the end of the 1st posterior cell. The 3rd, 4th and 5th longitudinal veins are all wavy, the 3rd

is forked at two-thirds the length of the wing, the submarginal cell narrowed in the middle, with the marginal cross vein just beyond the cell's base, uniting it to the 2nd longitudinal vein just before its tip. The 4th longitudinal vein, although wavy, is mainly in a straight line, and divides the wing into nearly equal parts, ending just below the wing tip. Anterior cross vein very near base of wing; posterior cross vein at middle of wing, joining the upper branch of the widely forked 5th vein, soon after the furcation. Anal cell oblong, very short. Halteres brownish yellow.

Described from one ♂ from Simla, 10-v-09, taken by Dr. Annandale. In the Indian Museum.

Litanomyia indica, mihi, sp. nov.

♀ Darjiling.

Long. 2 mm.

Head.—Black. Antennae large, the 1st and 2nd joints yellowish; 3rd black, oblongo-conical, cupshaped at bottom, and furnished with a long arista. Face whitish grey, occiput and underside of head dark grey, the lower part of the head projects forward somewhat, in accordance with the generic character; the proboscis is short, pointed and slightly curved.

Thorax.—Nearly as long as abdomen, oblongo-ovate, blackish grey, moderately shining. There are three conspicuous bristles towards each side of the thorax, placed, one on the shoulder, one towards the hind corner of the dorsum and one about equidistantly between these two, this middle pair being rather closer to each other (that is, to the middle line of the thorax) than the others are; yet still a considerable distance apart. There is also one on the side of the thorax, in front of the wing. Scutellum with two bristles.

Abdomen.—Dark brown, almost devoid of pubescence.

Legs.—Wholly pale yellow; fore femora much enlarged, fore coxae and fore tibiae each very slightly longer than the fore femora, the latter being spiny and bristly below. Hind tibiae very slightly enlarged, at the tip only.

Wings.—Very pale grey, a little yellowish towards base and costa, unmarked.

Described from one ♀ in the Indian Museum taken by me at Darjiling, 29-v-10 (7000 ft.), on the hillside, in mixed herbage.

N.B.—Only two species are known of this genus, both hailing from North America, but there seems little if any doubt of the present species belonging here; the only discrepancy in *indica* from the description of *Litanomyia* given by Melander, its author, being that the antennae are distinctly large, whilst he notes them as small, and that an additional pair of bristles occur on the thorax (those in front of the wings, on the pleurae). The presence of the three pairs of widely separated bristles, placed respectively on the shoulders, mid thorax and towards the hind corners of the dorsum, is in itself a convincing coincidence. The proportions of the divisions of the forelegs are exactly as in *Litanomyia*; the

absence of spurs to the tibia tips and the slight enlargement of the tips of the hind tibiae are all in accordance with Melander's description. The wing also agrees exactly with his figure.

It may be observed that Prof. Kertész sinks this genus in *Chelipoda*, Macq.

Sub-family *TACHYDROMINAE*.

DRAPETIS, *sensu stricto*.

- aenescens*, Wied., Auss. Zweifl., ii, 649. Formosa.¹
obscuripennis, Bezzi, Ann. Mus. Hung., ii, 351 (1904). Papua.
xanthopyga, *id.*, *l.c.*, 352. Papua.
divergens, *id.*, *l.c.*, 353. Papua.
bahamata, *id.*, *l.c.*, 353. Papua.
callosotibia, *id.*, *l.c.*, 354. Papua.
lutea, Meij., Tijd. v. Ent., liv, 332 ♂ ♀ (1911). Java.
binotata, *id.*, *l.c.*, 333 ♀. Java.

Sub-genus **CTENODRAPETIS**, Bezzi.

Ann. Mus. Hung., ii, 351 (1904).

- gracilis*, Bezzi, *loc. cit.*, 354. Papua.
discoidalis, *id.*, *l.c.*, 355. East India.
rubrithorax, *id.*, *l.c.*, 356. Papua.
strigifera, Meij., Tijd. v. Ent., liv, 333 ♂ (1911). Java.

N.B.—This subgenus appears a weak one, as intermediate forms are almost certain to occur, and as a matter of fact Kertész sinks it in *Drapetis* in his catalogue of the World's Diptera. My new species must be taken to refer to *Drapetis*, *sensu lato*.

Drapetis brevior, mihi, sp. nov.

♂ Burma and India.

Long. 2—2½ mm.

Head.—Very dark grey, the eyes contiguous for a considerable distance, rounded; vertical triangle dark grey, with three ocelli, and two strong long proclinate bristles. Two equally long ones behind the eyes, curved towards each other, with also some smaller ones. Antennae with first two joints dark brownish yellow, the 3rd black, as long as the first and second taken together, with a very long black apical arista, microscopically setulose. Face very narrow, dark grey. Proboscis moderately long, bluntly but not shortly conical, a patch of pale hairs on upper part of dorsal surface.

Thorax.—Well arched, shining black, with light short yellowish grey pubescence and some bristles laterally. Scutellum and metanotum shining black.

Abdomen.—Shining black, short, conical, very stout, covered rather freely with pale yellowish grey hairs; the belly similar; the genitalia imperceptible.

¹ Wiedemann described it from the Cape but Bezzi records it from Formosa.

Legs.—Bright brownish yellow, wholly clothed with rather copious yellow hairs. The femora broadly black to a variable extent, leaving sometimes only the tips pale; the tarsi tips black or blackish.

Wings.—Clear, microscopically setulose, highly iridescent; veins yellowish or brownish. Halteres small, yellow.

Described from several examples in the Indian Museum from Mandalay, 12-iii-08, type [Annandale]; Rangoon, 26-ii-08 [Annandale]; Calcutta, 23-x-07; and Puri, Orissa coast, 24-ii-08 [Paiva]. One specimen in the Pusa collection from Pusa, 26-xi-08.

***Drapetis fascifemorata*, mihi, sp. nov.**

♀ Darjiling district.

Long. 2 mm.

Very near *brevior*, but the 3rd antennal joint is onion-shaped, much shorter than in that species. The legs are wholly reddish yellow, with a black streak on the upper side of the femora.

Described from a single ♀ in the Indian Museum taken 4-vi-08 by Dr. Annandale at Kurseong.

N.B.—This might have been considered provisionally the ♀ of *brevior* as the likeness between the two species is so great, and the difference in colour of the legs might easily be a sexual one only; but the different structure of the antennae points to it being specifically distinct.

***Drapetis rotundicornis*, mihi, sp. nov.**

♂ East coast of India.

Long. 2½ mm.

Very near *brevior*, from which it differs in the 3rd antennal joint being nearly round, drawn out to a slight point at the tip, from which the long arista projects. The anterior legs are all reddish yellow, the hind femora have the middle part blackish on the upper side.

Described from a single ♂ in the Indian Museum from Puri, Orissa coast, 18—19-i-08, taken by Dr. Annandale.

N.B.—In this species again I should have regarded it as a mere variation of *brevior* but for the different structure of the antennae.

***Drapetis rufipes*, mihi, sp. nov.**

♂ Eastern Bengal.

Long. 2 mm.

Very near *brevior*. The 3rd antennal joint is obconical, black in colour, with apical arista. Legs entirely reddish yellow; tarsi tips brown.

Described from a single ♂ in the Indian Museum taken by Dr. Annandale "at light" on board a steamer at Damukdia ghat, eastern Bengal, 30-vi-08.

N.B.—Although these three species are all so very near *brevior* they have every appearance of being actually distinct, otherwise

they would not have been erected by me upon such slender material.

Drapetis variegata, mihi, sp. nov.

♂ Burma.

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

Head.—Occiput and frons shining black; eyes as in *brevior*. First two joints of the antennae dark brown, 3rd black, very elongate conical, with long apical arista. Proboscis short, brownish yellow, with yellow hairs.

Thorax.—Dark shining brown on anterior part, with three black, not very obvious stripes (with, however, linear edges), all of which begin on the anterior margin. Posterior half of thorax more or less blackish. Scutellum yellowish with blackish dorsum and two long curved apical bristles; metanotum shining brown.

Abdomen.—Dorsum with very sparse pale yellow hairs. Basal third (except the extremely narrow black actual base) yellowish; middle third blackish; apical third yellowish or brownish yellow. Belly yellowish (in one example somewhat blackish across the middle).

Legs.—Wholly bright yellow; coxae brown, tarsi hardly, if any darker.

Wings.—Pale yellowish grey, iridescent, veins and halteres yellowish.

Described from two ♂♂ from Rangoon, 25-ii-08, taken by Dr. Annandale. A very marked and handsome species. In the Indian Museum.

COLOBONEURA, Mel.

Tr. Am. Ent. Soc., xxviii, 229.

argyropalpa, Bezzi, Ann. Mus. Hung., ii, 358 (1904). Papua.

PLATYPALPUS.

abdominalis, Wied., Auss. Zweifl., ii, 12 (*Tachydromia*) (1830). South China.

chionochoeta, Bezzi, Ann. Mus. Hung., ii, 359 (1904). Papua.

Platypalpus orientalis, mihi, sp. nov.

♀ Darjiling.

Long. 3—4 mm.

Head.—Occiput and frons covered with close pale yellowish grey tomentum, the frons with almost parallel sides, the ocelli placed just below the vertex, with two proclinate bristles between them and with two similar bristles just behind the vertex, each of the latter placed in a minute black spot on the surface. Two rows of distinct yellow hairs behind the eyes, below the vertical margin, and some on the lower part of the back of the head. Antennal basal joints bright reddish yellow, 3rd joint darker brown, elongate onion-shaped, with normally formed arista. Face grey, with pale grey hairs which give it a whitish reflection when viewed from certain directions. Proboscis about half the height of the

head, shining black, elongate conical, bare; the palpi nearly half as long as the proboscis, yellow, of moderate size, cylindrical, with a few hairs.

Thorax.—Dorsum with close very short yellowish grey or cinereous tomentum, and some lateral bristles. Scutellum concolorous, with two strong apical converging bristles, and a smaller pair outside of these; metanotum concolorous, or in some examples more blackish grey.

Abdomen.—Dark mahogany brown or blackish brown, with a little short pale pubescence, a little broader on the middle segments, the apical half conical; the genitalia elongate, dark grey; the belly similar to upper side.

Legs.—Bright brownish yellow; the femora, especially the posterior pairs, darker, or with a tinge of brown. The tips of the joints of the tarsi are also narrowly brown.

Wings.—Pale but distinctly yellow, veins a little deeper yellow; halteres yellowish.

Described from several ♀♀ in the Indian Museum taken by me at Darjiling (7000 ft.), 29-v-10.

Platypalpus gentilis, mihi, sp. nov.

♀ Himalayas.

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

Head.—Wholly blackish; antennae and proboscis dull brownish yellow, the latter when fully protruded about as long as the height of the head; yellow at the base, black tipped. Palpi about half as long as the proboscis, stoutly cylindrical, pale yellow, with a few hairs.

Thorax.—Dorsum shining black, with sparse yellow hair and a few lateral bristles. Sides a little grey dusted, as is more or less the metanotum; scutellum shining black, with four yellow bristles.

Abdomen.—Black, moderately shining, shortly conical, almost bare; genitalia elongate; belly much as upper side.

Legs.—Pale brownish yellow; femora and the tarsi tips barely darker, the middle femora incrassated, and armed below as in *orientalis*.

Wings.—Clear; halteres yellowish.

Described from four ♀♀ in the Indian Museum taken by me at Darjiling, 26-29-v-10 (*type* 28-v-10); and one from Simla, 10-v-09 [*Annandale*].

Platypalpus ferrugineus, mihi, sp. nov.

♀ Darjiling district.

Long. 2 mm.

Head.—Rather dark brownish yellow; proportions, pubescence and bristles as in *orientalis* and *gentilis*. Face blackish. Antennae with first two joints yellow, the 3rd blackish. Proboscis as long as height of head, blackish; palpi short, rather thick, pale yellowish.

Thorax.—Rather bright ferruginous brown, shining, with a moderately broad black, median dorsal stripe beginning on the anterior margin, and a much shorter one on each side of it, these two not attaining either the anterior or posterior margin. Short sparse pale yellowish hairs over the dorsum and sides, most conspicuous just below the shoulders; two strong pre-alar bristles each side, and one towards the posterior corner of the dorsum. Scutellum shining black, with very minute pale yellowish hairs, and two long apical converging spines. Metanotum black, shining, with minute pale yellow hairs. Sides of thorax black.

Abdomen.—Black, a little shining, almost bare; belly similar; genitalia pale yellowish, elongate.

Legs.—Bright yellow, fore femora a little thickened, middle femora considerably thickened and with two rows of very small black spines and also a row of long stiff hairs, all placed on the under side. The middle tibiae have a short but distinct spur-like tooth at the tip, and possess a single row of minute black spines on the under side.

Wings.—Pale yellowish grey, veins a deeper yellow; surface of wing with short hairs and also microscopically setulose. Halteres yellowish.

Described from a single ♀ taken by Dr. Annandale at Kur-seong, 4-vii-08. In the Indian Museum.

***Platypalpus palliditibiae*, mihi, sp. nov.**

♂ Western Himalayas.

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

Head.—Blackish; frons and occiput with microscopic whitish hairs, some also on under side of head. Antennae black; proboscis mainly black, not so long as height of head; palpi nearly white, half as long as the proboscis.

Thorax.—Wholly blackish, with microscopic pale yellowish hairs; scutellum, metanotum and sides all similar. Bristles distributed as in the three previous species.

Abdomen.—Black, with sparse pale hairs, tip stump-like, genitalia of moderate size, rounded exteriorly, mainly withdrawn. Belly as upper side.

Legs.—Yellowish; femora mainly blackish, as are the tarsi tips.

Wings.—Clear; halteres, stem black, clubs whitish.

Described from one ♂ from Simla, 11-v-08 [Annandale]. In the Indian Museum.

***Platypalpus incisus*, mihi, sp. nov.**

♂ Western Himalayas.

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

Head.—Blackish, occiput with short whitish grey hairs. Frons moderately narrow, widened a little in the middle, at which place are situated the three limpid ocelli in the form of a triangle. Proboscis brownish yellow, half the height of the head; palpi pale yellow, with a few black bristles. Antennae large, the 2nd

joint yellowish with a row of subapical short bristles, the 3rd dark brown, with minute pale pubescence, squarish or nearly V-shaped at tip, a long thick arista from the upper angle at the tip.

Thorax.—Wholly shining black, bare, except for microscopic yellow hairs and two or three notopleural bristles. Scutellum with two apical bristles.

Abdomen.—Black, moderately shining, practically bare, belly similar. Genitalia rather large, black, a pair of claspers with large basal joint with long crooked terminal black hook-like appendages.

Legs.—Brownish yellow, fore coxae half as long as the femora; anterior femora incrassated, hind femora not thickened, long; tarsi more or less brown. All the legs minutely pubescent.

Wings.—Venation normal, anal cell absent; the anal cross vein present but incomplete. Wings microscopically setulose, pale brown, no stigma.

Described from a single ♂ in the Indian Museum taken by Dr. Annandale at Simla, 20-vii-11.

ELAPHROPEZA, Macq.

exul, Os. Sac., Berl. Ent. Zeits., xxvi, 113 (1882). Philippine Is.

fulvithorax, Wulp, Termes Fuzet., xx, 138 (1907). Ceylon.

spuria, Bezzi, Ann. Mus. Hung., ii, 347 (1904). Papua.

metatarsata, *id.*, *l.c.*, 348. Ceylon.

basalis, *id.*, *l.c.*, 349. Ceylon.

formosae, *id.*, *l.c.*, v, 566 (1907). Formosa.

palpata, Meij., Tijd. v. Ent., liv, 330 ♂ (1911). Java.

lineola, *id.*, *l.c.*, 331 ♀. Java.

calcarifera, Bezzi, Ann. Mus. Hung., v, 568 (1907).

Elaphropeza variegata, mihi, sp. nov.

♂ ♀ Bengal, Assam and Orissa. Long. barely 2 mm.

Head.—Black; occiput with microscopic pale hairs. Eyes contiguous except for a small vertical triangle which carries the three ocelli. Antennae with first two joints brownish yellow, a few bristles at the tip of the 2nd; the 3rd elongate conical, blackish, with long pubescent arista. Proboscis short, base much thickened, brownish yellow; palpi much shorter, pale yellow.

Thorax.—Bright ferruginous, a little blackish about the base of the wings and a thin black median stripe present or absent. Scutellum and metanotum concolorous with thoracic dorsum. A few lateral bristles on the latter, a few towards the posterior border and two on the scutellum.

Abdomen.—The tip stump-like in ♂, tapering in ♀; dull yellowish on basal and apical thirds, the middle third black; in some examples the basal third is more brownish than yellowish. Belly similar to upper side; genitalia small, concolorous.

Legs.—All yellowish, except for the slightly brown coxae; femora not at all thickened; hind tibiae with two long stiff hairs

on outer side, placed equidistantly so as to divide the limb into three equal parts; middle tibiae with a long single stiff hair near the tip.

Wings.—Pale yellowish grey, no sign of any anal cell; 2nd basal cell twice as long as 1st; halteres very pale yellow.

Described from several ♂♂ and ♀♀ in the Indian Museum. Calcutta, 5-xii-07, *type* ♂ [Annandale], 14-ix-09, *type* ♀ [Paiva]. The other specimens are also from Calcutta, 31-i-08; 17-ii-08; 16-viii-07; 2-15-xii-07, and include one from Puri, 18-19-i-08. One specimen is amongst the diptera collected on the recent Abor Expedition.

N.B.—A very striking and easily recognized species.

Elaphropeza ferruginea, mihi, sp. nov.

♂ Eastern Himalayas and Lower Bengal. Long. 1 $\frac{3}{4}$ mm.

Head.—Eyes closely contiguous above and below the antennae for the whole distance, vertex with three rather large ocelli. Occiput light brownish yellow, with numerous stiff bristly hairs above and pale softer hairs on lower part. Antennae with first two joints brownish yellow, the 1st much shorter than the 2nd, which latter is considerably setose at tip, the 3rd joint very elongate conical, blackish, closely pubescent, with long microscopically pubescent arista. Proboscis very short, brownish yellow; palpi shorter still, pale yellow, each with a very long bristle.

Thorax.—Wholly brownish yellow, with numerous very short pale yellow hairs and the usual pre-alar stiff bristles. Scutellum blackish, with two long bristles. Sides of thorax concolorous with dorsum, metanotum blackish.

Abdomen.—Blackish, with a very little pale pubescence, ovipositor pale yellow, short.

Legs.—Wholly pale brownish yellow from coxae to tarsi tips.

Wings.—Pale yellow, halteres pale yellow.

Described from a *type* ♂ from Lower Lebong, Darjiling Hills (4500 ft.), 2-9-vi-09 [Howlett], and three other ♂♂ from Port Canning, 24-xii-07 [Howlett]. All in the Pusa collection.

Elaphropeza bicoloripes, mihi, sp. nov.

♀ Eastern Himalayas.

Long. 1 $\frac{3}{4}$ mm.

Head.—Eyes absolutely contiguous above and below antennae for the full distance; occiput blackish with stiff hairs above and softer hairs below; vertex with three whitish ocelli and two long stiff bristles. Antennae rather large, both the first joints yellowish, wider at tips than bases, the 2nd spinose on margin, the 3rd joint brownish, elongate conical, pubescent, with very long arista. Proboscis blackish, palpi short.

Thorax.—Shining black, lateral margins in front of wing narrowly brownish, dorsum with soft short, pale hairs. Pre-apical stiff

hairs as usual. Scutellum black, shining, with two convergent apical long bristles. Sides of thorax shining black.

Abdomen.—Shining black; apparently a tendency to a little paleness at base and to a dark brown towards tip; very sparsely pubescent. Belly similar.

Legs.—Brownish yellow; hind femora, except broadly at base, fore and hind tibiae wholly dark brown.

Wings.—Pale yellowish grey, iridescent, venation normal; halteres dirty brown.

Described from a single ♀ in the Pusa collection taken by Mr. F. M. Howlett at Lower Lebong (4500 ft.), 2-9-vi-09.

ADDENDUM.

Whilst this paper was passing through the press, Prof. Bezzi has published descriptions of a number of new Empidæ from Formosa, in the Ann. Mus. Hung., vol. x (1912). These species are appended here.

- Hybos major*, ♂ ♀, 454.
 „ *tibialis*, ♂ ♀, 455.
Syneches (s. str.) *praestans*, ♂, 458.
 „ (*Epiccia*) *luctifer*, ♀, 459.
 „ „ *pullus*, ♂ ♀, 460.
Parahybos incertus, ♂, 461.
 „ *melas*, ♀, 461.
 „ *simplicipes*, ♂ (♀?), 462.
 „ *chiragra*, ♂ ♀, 463.
 „ *sauteri*, ♂ ♀, 464.
Cyrtoma (*Bicellaria*) *spuria*, Fln.? (with a doubt).
Rhamphomyia rostrifera, ♂ ♀, 465.
 „ *sauteri*, ♂ ♀, 466.
Empis raptoria, ♀, 468.
 „ (*Coptophlebia*) *hystrichopyga*, ♂ ♀, 469.
 „ „ *inclinata*, ♀, 470.
 „ „ *plorans*, ♀, 470.
 „ „ *velutina*, ♂, 471.
 „ „ *tenuinervis*, ♂, 471.
 „ (*Pterempis*) *scopulifera*, ♂ ♀, 472.
 „ (s. str.) *hyalogyne*, ♂ ♀, 473.
Hilara orientalis, ♂ ♀, 474.
 „ *melanochira*, ♂ ♀, 474.
Leptopeza biplagiata, ♀, 475.
Chelipoda (s. str.) *pictipennis*, ♂, 476.
 „ (*Phylldromia*) *fusciseta*, ♂ ♀, 477.
 „ „ *fuscicornis*, ♂ ♀, 478.
Drapetis pubicornis, ♂ ♀, 482.
 „ *brevis*, ♀, 483.
 „ *femoralis*, ♀, 484.
 „ (*Clenodrapetis*) *hamifera*, ♀, 485.

- Elaphropeza pictithorax*, ♂ ♀, 486.
,, *kerteszi*, ♂ ♀, 486.
,, *scutellaris*, ♂ ♀, 487.
,, *xanthocephala*, ♂, 488.
,, *calcarifera*, ♂ ♀, 488.
,, *marginalis*, ♂ ♀, 489.
,, *melanura*, ♂ ♀, 489.
Tachista bistigma, ♀, 490.
Halsanalotes juscipes, ♀, 490.
Platypalpus longirostris, ♀, 491.
,, *caudidiseta*, ♀, 492.

Bezzi also records two European species from Formosa, *Platypalpus albiseta*, Panz., and (with a doubt) *Cyrtoma (Bicellaria) spuria*, Fln. He also includes in his list *Drapetis phaeopterus* and *distans*, Bezzi, from Papua, *Elaphropeza kerteszi*, Bezzi, from Formosa, and *E. binotata* and *lutea*, Meij., from Java, but of all these species I can trace no reference. Of his previously described species *Drapetis obscuripennis* and *divergens* he says nothing.

III. A NEW VARIETY OF FRESHWATER CRAB FROM TRAVANCORE.

By J. R. HENDERSON, M.B., C.M., F.L.S., Superintendent,
Madras Government Museum.

In a small collection of crabs sent for identification by the Director of the Trivandrum Museum were two specimens on which the following remarks are based. They appear to constitute a new variety of the species from a stream in the Cochin State Forests, described as *Paratelphusa malabarica* in the Records of the Indian Museum, vol. vii, part ii, May 1912.

***Paratelphusa (Liotelphusa) malabarica*, Henderson,
var. *travancorica*, nov.**

Habitat.—Ponmudi, Travancore, 2500 ft., 30-xii-11. Two specimens (♂ and ♀) and a third in a bad state of preservation.

These specimens agree with *P. malabarica* in general appearance and size, but differ in the following respects. The epigastric and postorbital crests of the carapace are more prominent and form a continuous line in the new variety. The epigastric crests are represented, as in *P. malabarica*, by patches on either side of the somewhat deep mesogastric furrow, but in the variety *travancorica* they are distinctly elevated, and bounded posteriorly by a line representing the crest proper, which is higher than the surface in front of it. This surface shows some minute almost linear elevations. The frontal surface is more convex than in *P. malabarica*, and its anterior margin is no longer straight, but slightly bilobed. A broad shallow excavation, not seen in *P. malabarica*, occurs on either side of the carapace, leading up towards the lateral epibranchial tooth, but it is not continuous with the crescentic cervical groove. This excavation no doubt represents a forward extension of the cervical groove, and it at any rate occurs in the position which the latter would have occupied had it been definitely present. The sixth segment of the male abdomen has the proximal end distinctly wider than the distal, and the length of the segment is only slightly greater than its width; in *P. malabarica* the two ends are of subequal width. The ischium of the external maxillipedes has a distinct, though not sharply cut, longitudinal line on the outer surface. In this last character the new variety resembles *P. austrina*, Alcock, but the latter species has the cervical groove hardly visible, the mesogastric furrow is indistinct, the epigastric and postorbital crests are only just

distinguishable, and the edge of the front is distinct from the edge of the antennular fossæ.

With more material it may hereafter be shown that the present form is entitled to specific rank, but for the present I prefer to regard it as a variety of *P. malabarica*. This determination is equivalent to the admission that certain characters, which have been regarded as of value in separating the so-called species of freshwater crabs, are liable to considerable variation in closely related individuals. It would no doubt be possible, in some cases, to discover slight differences which are more or less constant, among

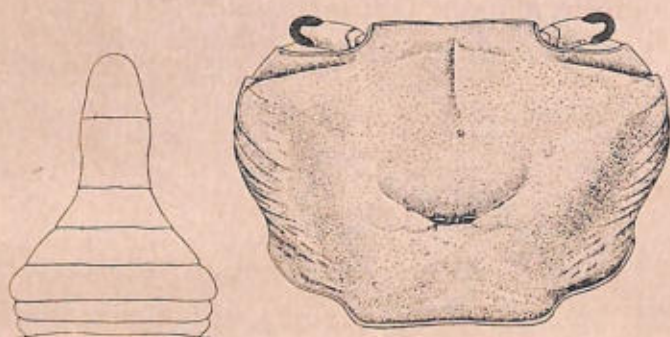


Fig. 1.—*Paratelphusa malabarica*, Henderson, ♂ type, × 3.

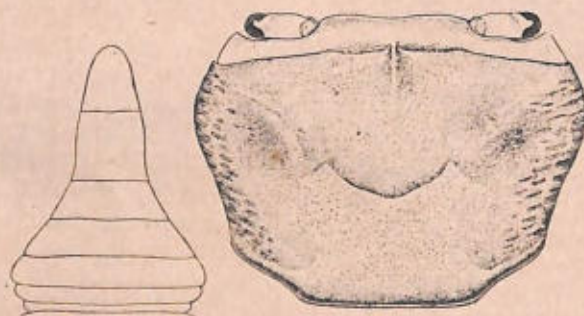


Fig. 2.—*Paratelphusa malabarica* var. *travancorica*, nov., ♂ type, × 3.

individuals belonging to one of the recognized 'species,' if collected from different streams and particularly from those on different hill ranges, but it may be doubted if any benefit would result from the attempt to name such slightly marked varieties. In the new variety just described, the characters on which it is based cannot, however, be described as slight.

This Travancore crab also illustrates the difficulty which sometimes arises in connection with the assignment of a species to one or other of the so-called subgenera. It cannot be said to show obscure epigastric and postorbital crests, which is one of the out-

standing features of the subgenus *Liotelphusa*; indeed in this respect it agrees better with *Barytelphusa*, in which the crests are well defined. It, however, differs from most species of the latter subgenus in the small size of the individuals and the incompleteness of the cervical groove, hence it may be placed in *Liotelphusa*. In any case its affinities with *P. malabarica* are unmistakable, and the latter is clearly a *Liotelphusa*.

The opportunity is taken of figuring the type-specimen of *P. malabarica*, preserved in the Indian Museum, as well as the type of the new variety.

The type of the variety described above (Crustacea Reg. No. $\frac{7932}{10}$) is preserved in the Indian Museum.

IV. ON SOME THYSANURA IN THE INDIAN MUSEUM.

By F. SILVESTRI.

I have received a small, but a very important collection of Indian Thysanura from Dr. N. Annandale, Superintendent of the Indian Museum, and in two other papers¹ I have described the Machilidae: 3 new genera (*Allopsontus*, *Megalopsobius*, *Machilontus*) and 4 new species. I describe or record here the species of Campodeidae, Japygidae and Lepismidae. These families are

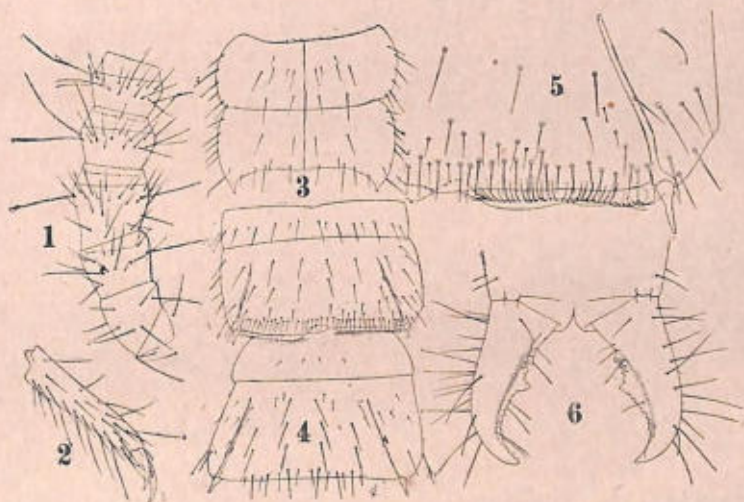


FIG. 1.—*Japyx indicus*: 1. antennae pars proximalis ab articuli primi apex; 2. pedis paris tertii tarsus et praetarsus; 3. abdominis tergita 6^{um} et 7^{um}; 4. abdominis urosterna 1^{um} et 2^{um}; 5. urosterni primi dimidia pars postica; 6. abdominis pars postrema cum cerco.

represented in the Indian Museum by 14 species, of which 5 species and 1 variety are new to science.

Fam. CAMPODEIDAE.

Lepidocampa weberi, Oudm.

Three specimens from Kobo, N.E. frontier of B. India. This species has a very wide distribution in the tropics (Asia and America).

¹ Materiali per lo studio dei Tisanuri, xii-xv. *Boll. Lab. Zool.*, v, 1910 (*Allopsontus annandalei*, pp. 89-90).

Machilidarum (*Thysanura*) species nonnullae novae ex regione indo-malayana. *Zool. Anz.*, xi, 1912 (*Machilis gravis*, p. 1; *Megalopsobius convergens*, p. 4; *Machilontus gravelyi*, p. 6).

Campodea, sp.

I have seen some specimens of this genus collected at Paltipola, Ceylon, but in a condition that it was impossible to identify or describe them.

Fam. JAPYGIDAE.

Japyx indicus, Oudm.

Specimens collected at Peradeniya (Ceylon). The figures of the more important parts of the body are represented in fig. i.

Parajapyx grassianus var. indica, nov.

Stramineus, abdominis segmento decimo cum forcipe ferrugineo. Corpus setis brevibus simplicibus instructum. Antennae

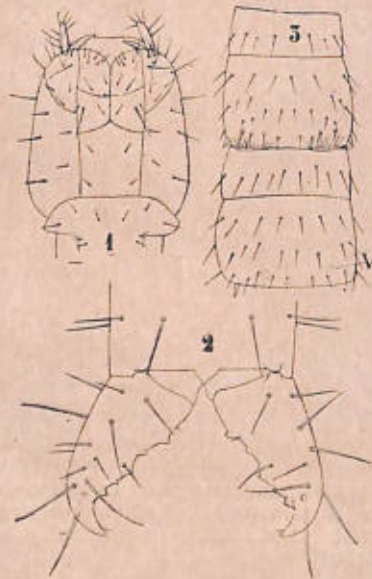


FIG. ii.—*Parajapyx grassianus* var. *indica*: 1. caput supinum; 2. abdominis pars postrema cum forcipe; 3. abdominis sterna 10^{ma} et 11^{ma}: V. vesicula.

18-articulatae, setis brevioribus instructae, sensillis unisetis nullis. Labium (fig. ii, 1) palpo nullo, propalpo seta longa instructum. Pedes breves, parce setosi, praetarsi unguibus parum inaequalibus, simplicibus, unguicola mediana brevissima.

Abdomen tergito septimo angulo postico obtuso, segmento octavo quam septimum c. $\frac{1}{2}$ angustiore, segmento decimo subtus menso c. $\frac{2}{3}$ longiore quam latiore. Urosternum primum (fig. ii, 3) setis nonnullis brevibus ut urosterna cetera instructum, nec non in margine postico utrimque organo parum lato, setis brevibus uniseriatis aucto. Stili breves, conici. Urosterna 2-3 utrimque vesicula sphaerica sub margine postico oblecta instructa.

Forceps (fig. ii, 2) quam segmentum decimum subtus mensum c. dimidio brevior, brachiis subaequalibus dentibus 5 acutis, inter sese aliquantum remotis armatis, apice sat attenuato et sat recurvo.

Long. corp. mm. 2.35; lat. abdominis segmenti septimi 0.195; long. forcipis 0.135.

Habitat.—Exemplum ad Ghunti ("Darjiling dist., E. Himalayas"), F. Gravely legit.

Observatio.—Varietas haec forcipis dentibus minoribus et segmento decimo parum longiore a specie typica vix distinguenda.

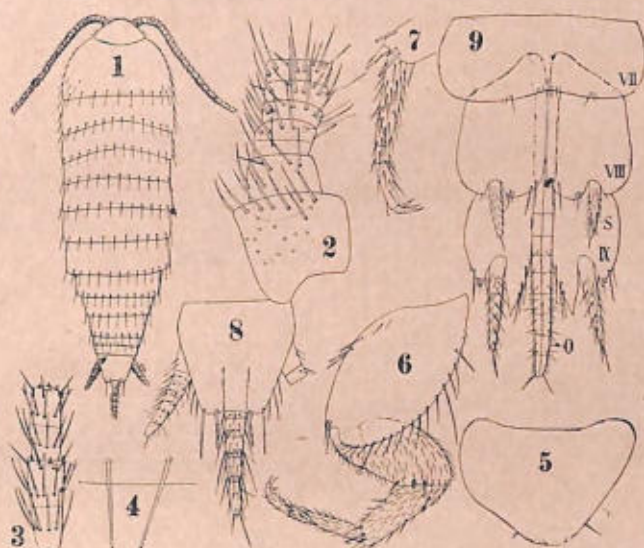


FIG. iii.—*Lepisma gravelyi*: 1. corpus pronum; 2. antennae pars proximalis; 3. ejusdem pars terminalis; 4. abdominis tergiti quinti particula postica; 5. metasternum tertium; 6. pedis paris tertii; 7. ejusdem tibiae apex. tarsus et praetarsus; 8. corporis pars postica; 9. abdominis sterna 6^{ma} ad 9^{am}: O. ovipositor, S. stili.

Lepisma gravelyi, sp. nov.

♀ Nigra; corporis squamae crebre pluriradiatae majores μ 94 \times 64. Caput supra bene squamosum, antice et lateraliter setis brevibus et setis sat longis, robustis, in apice incisus instructum. Oculi parvi. Antennae in exemplo typico forsan integrae quam thorax parum longiores, 26-articulatae, articulis ab articulo octavo in articulinis duobus paullum distinctis divisus, setis et sensillis *cf.* fig. iii, 2-3. Palpi maxillares breviores setosi; palpi labiales articulo ultimo subovali. Thorax (fig. iii, 1) quam abdominis par antica vix latior, scuto dorsuali singulo serve postica setarum robustarum et setis brevibus marginalibus lateralibus instructo. Metasterni lamina mediana (fig. iii, 5) ad basim latior quam longior, postice angustata, rotundata, setis nonnullis instructa. Pedes *cf.* fig. iii, 6-7.

Abdomen partem posticam versus gradatim angustatum, tergitis 1-8 serie setarum (fig. iii, 1) posticarum longarum robustarum instructis. Urotergitum decimum (fig. iii, 8) subaeque longum atque ad basim latum, partem posticam versus gradatim paullum angustatum, margine postico paullulum sinuato, seta sublaterali et seta laterali posticis, longis, robustis, nec non setis nonnullis lateralibus instructum. Urosterna 1-2 setarum pectine mediano, urosterna 3-7 (fig. iii, 9) setarum pectine mediano et pectine parvo laterali instructa. Urosterni octavi subcoxae ad latus internum stilorum setis duabus longis et duabus ad marginem internum instructae; urosterni noni subcoxae angulo interno longo, dimidium stilum superante. Stili in segmenti 8-9 sat longi, seta apicali robustiore.

Ovipositor (fig. iii, 9) tenuis, longus, stilorum segmenti noni apicem parum superans, anulatus, setis paucis instructus. Cerci laterales (fig. iii, 9) 5-6-articulati marginem posticum urotergiti decimi parum superantes, setis externis brevibus robustis et sensillis praesertim internis instructi; cercus medianus quam laterales aloquantum longior, 6-7-articulatus.

Long. corp. mm. 3.5; lat. thoracis 1.2; long. antennarum 1.35; palpi maxillaris 0.32; pedum paris tertii 1.69; cerci mediani 0.50; cercorum lateralium 0.32.

Habitat.—Exemplum typicum ad Calcutta ("maidan") inter folias super humum legit F. H. Gravely, cui speciem dico.

Observatio.—Species haec ad *Lepisma gyriniformis*, Luc., proxima est, sed colore nigro, tergitorum setis seriei posticae aliquantum brevioribus et robustioribus, urotergito decimo partem posticam versus minus angustato, distinctissima est.

Lepisma nigrina, sp. nov.

♀ Corpus dorso nigro, ventre subterreo, squamis crebre pluri-radiatis majoribus μ 177 × 70. Caput supra bene squamosum antice et lateraliter setis sat longis robustis, in apice incisus instructum. Oculi parvi. Antennae in exemplis typicis haud integrae, partis basalis et partis distalis setis et sensillis *cfr.* fig. iv, 2-3. Palpi maxillares et palpi labiales *cfr.* fig. iv, 4-5. Thorax (fig. iv, 1) quam abdomen aliquantum latior, scutorum dorsualium margine postico setis nullis, margine laterali setis pluribus brevibus et setis 5-6 sat longis, robustis, in apice incisus aucto. Pedes *cfr.* fig. iv, 7-8.

Abdomen partem posticam versus gradatim aliquantum attenuatum. Urotergita 1-3 setis lateralibus inferis et seta laterali supra, urotergitum 4^{um} etiam seta sublaterali, urotergita 5-8 (fig. iv, 9) setis tribus lateralibus inferis, seta supra laterali, seta sublaterali et seta submediana et urotergitum nonum setis lateralibus inferis aucta. Urotergitum decimum (fig. iv, 10) longum, fere $\frac{1}{2}$ longius quam ad basim latius, partem posticam versus gradatim paullum angustius, margine postico parum sinuato, angulis posticis seta sat longa, robusta, auctis. Urosterna

1-2 setarum pectine mediano et urosterna 3-7 setarum pectine laterali etiam instructa. Urosterni 8ⁱ subcoxae (fig. iv, 11) stilorum sinu profundo, angulo externo quam internus parum magis producto, angulo interno setis duabus longis robustis, praeter setas breves, aucto. Urosterni 9ⁱ subcoxae angulis posticis longis, acutis, angulo interno quam externus c. $\frac{2}{3}$ longiore.

Stili in segmentis 8^o et 9^o, noni quam subcozarum angulus internus c. duplo longiores, breviter setosi et apice setis duabus apicalibus sat longis robustis instructo.

Ovipositor (fig. iv, 11) sat tenuis, longus, quam stili noni paullum brevior, anulatus, breviter setosus.

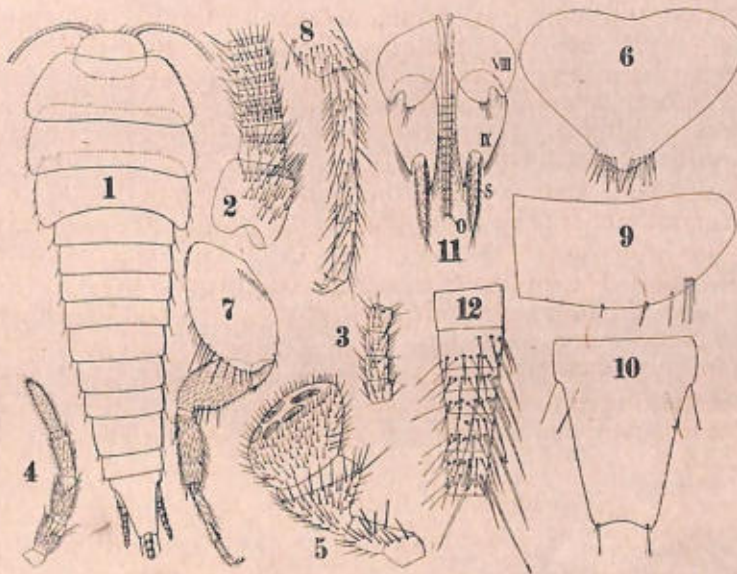


FIG. IV.—*Lepisma nigrina*: 1. corpus pronum; 2. antennae pars proximalis; 3. antennae articuli duo partis distalis; 4. palpus maxillaris; 5. palpus labialis; 6. metasterni pars mediana; 7. pes paris tertii; 8. ejusdem tibiae apex, tarsus et praetarsus; 9. abdominis tergiti sexti dimidia pars; 10. urotergitum decimum; 11. abdominis sterna viii-ix; O. ovipositor, S. stilus; 12. cercus lateralis (haud integer).

Cerci in exemplis typicis haud integri partis basalis setis et sensillis *cf.* fig. iv, 12.

♂ Penis brevissimus: paramera quam angulus internus subcozarum segmenti noni paullum breviora, breviter setosa.

Long. corp. mm. 7; lat. thoracis 2.2; long. antennarum ?; palpi maxillaris 1.17; pedum paris tertii 3.38; cercorum ?.

Habitat.—Exempla nonnulla vidi ad Puri, Orissa coast, S. W. Kemp collecta.

Observatio.—Species haec ad *Lepisma indica*, Esch., proxima est, sed thorace aliquantum latiore et tergiti decimi margine postico parum sinuato distincta videtur.

Ctenolepisma nigra (Oudm.).

Syn. *Lepisma nigra*, Oudm.

Color (in alcohol): dorso squamis vestito subcastaneo antennis, cercis, ventre pedibusque stramineis. Corporis squamae magnae, majores μ 180 \times 148, dense pluriradiatae.

Caput in frontis parte submediana antica et lateraliter setis nonnullis simplicibus et setis nonnullis ciliatis instructum, clypeo utrinque setis pluribus coaservatis, mandibularum facie externa setis pluribus aucta. Antennae in exemplis observatis haud integris quam corpus parum breviores attenuatae. Palpi maxillares (fig. vi, 1) 5-articulati, tenues. Palpi labiales (fig. vi, 2) articulo ultimo crasso, subaeque longo atque lato. Thorax (fig. v) quam abdomen haud latior, lateribus subparallelis, scutorum dorsalium



FIG. v.—*Ctenolepisma nigra*: animalculi circumlitio.

marginē laterali setis paucis subtilibus brevibus et seta longa subtili, margine postico seta robusta et setis brevibus subtilibus 2-3 sublateraliter instructo. Metasterni pars mediana (fig. vi, 3) aliquantum ad basim latior quam longior margine postico rotundato.

Pedes *cfr.* fig. vi, 3.

Abdomen partem posticam versus parum angustatum. Tergitum primum setis duabus sublateralibus, tergita 2-5 (fig. vi, 4) utrimque setarum pectinibus tribus (pectine laterali) incluso, pectine interno tantum setis duabus constituto, supero laterali setis tribus et infero laterali setis quatuor praeter setas breviores subtiliores. Tergita vi-viii pectine supero sublaterali et pectine laterali externo tantum instructa. Sternita 3-8 pectine setarum

2-3 sublaterali instructa. Subcoxae ix parte interna sat longa triangulari, angustata, acuta. Cerci in segmentis 8-9 sistentes, longi setosi, segmenti noni apicem subcozarum c. dimidia longitudine superantes.

Ovipositor tenuis, longus, apicem stilorum ix multo superans.

Tergitum decimum (fig. vi, 5) breve, subtrapezoideum, angulis aliquantum rotundatis, postice subrecte truncatum vel vix sinuatum.

Cerci longi, tenues et attenuati, setosi et sensillis unisetis pluribus longis, subtilissimis aucti; in exemplis observatis haud integris, quam corpus parum breviores.

♂ Penis (fig. vi, 6) brevissimus.

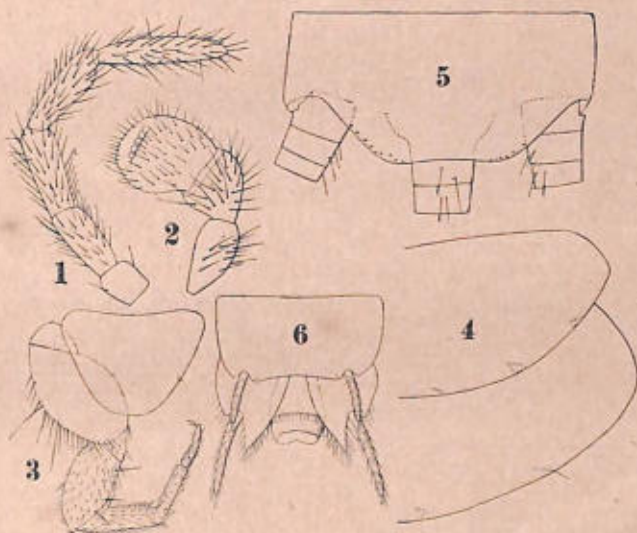


FIG. vi.—*Ctenolepisma nigra*: 1. palpus maxillaris; 2. palpus labialis; 3. pes paris tertii cum metasterni pars mediana; 4. abdominis tergitorum 5 et 6 dimidia pars; 5. abdominis pars postica cum cercorum basi; 6. maris abdominis sterna 8mm et 9mm.

Long. corp. mm. 6; lat. thoracis 1.45; long. antennarum 5; palpi maxillaris 0.95; pedum paris tertio 2.52; cercorum 5.

Habitat.—Ceylon (Peradenya), in domis; Calcutta.

Ctenolepisma longicauda, Esch.

There are specimens in the collection from Calcutta, Peradenya, Siliguri, Darjiling. The species is also known from South Africa.

Thermobia domestica, Pack.

This cosmopolitan species was found common in houses at Lahore in the Punjab by Dr. Annaudale.

Acrotelsa collaris (F.).

Calcutta. This is also common in the tropics.

Atelura typhloponis, sp. nov.

♀ Corpus creineum, squamis consuetis, pluriradiatis, radiis postice vix liberis.

Caput supra squamosum antice et lateraliter setis nonnullis brevibus, quarum nonnullae majores ad apicem breviter bifurcatae sunt. Antennae quam thorax breviores, 13-articulatae, articulis a septimo tenuissime in articulinis duobus divisus, setis et sensillis *cf.* fig. vii, 2-4. Palpi maxillares et labiales *cf.* fig. vii, 5-6. Thorax (fig. vii, 1) quam abdominis pars antica parum

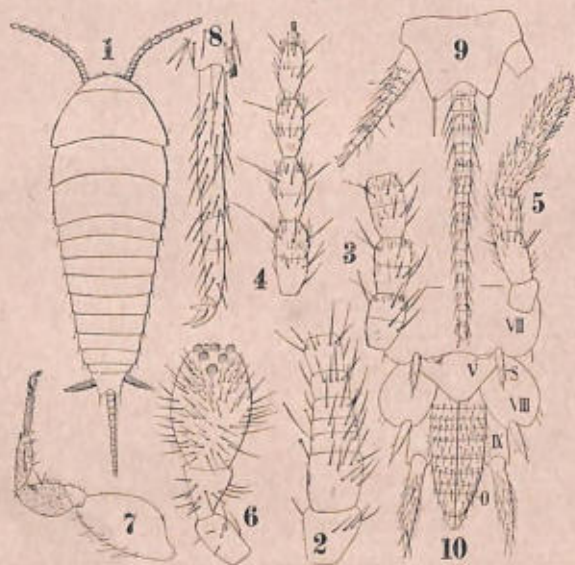


FIG. vii.—*Atelura typhloponis*: 1. corpus pronum; 2. antennae pars proximalis; 3. antennae articulis tres dimidiae partis; 4. ejusdem pars apicalis; 5. palpus maxillaris; 6. palpus labialis; 7. pes paris tertii; 8. ejusdem tibiae apex, tarsus et praetarsus; 9. corporis pars postrema a segmento decimo; 10. abdominis sterna viii-ix: V. vesicula, S. stili, O. ovipositor.

latior et c. $\frac{1}{3}$ brevior, tergitorum margine postico setis nullis, margine laterali setis brevioribus et seta brevi robusta subpostica instructo.

Pedes *cf.* fig. vii, 7-8.

Abdomen partem posticam versus gradatim parum angustius, tergitorum margine postico tantum seta laterali robusta apice bifurcato et seta breviori subtili instructo. Urotergite decimo (fig. vii, 9) fere $\frac{1}{3}$ ad basim latius quam longius, partem posticam versus gradatim aliquantum angustatum, margine postico sat profunde sinuato, angulis posticis acutis, seta apicali longa robusta instructis. Urosternum secundum vesiculis duabus medi-

anis parvis instructum, urosterne 3-7 setis duabus submedianis, urosterne 5-9 etiam stilis et urosterne septimum pseudovesicula instructa. Stili sat longi, segmenti noni quam octavi magis quam duplo langiores et aliquantum crassiores. Urosterne octavi pars mediana, sat magna subcordiformis.

Ovipositor (fig. vii, 10) crassiusculus, stilorum ix dimidiam longitudinem attingens, tenuissime anulatus, breviter setosus.

Cercus medianus quam laterales c. duplo longior, setis et sensillis *cf.* fig. vii, 1.

Long. corp. mm. 3; lat. thoracis 1.10; long. antennarum 0.98; pedum paris tertii 1.65; cerci mediani 0.85; cercorum lateralium 0.48.

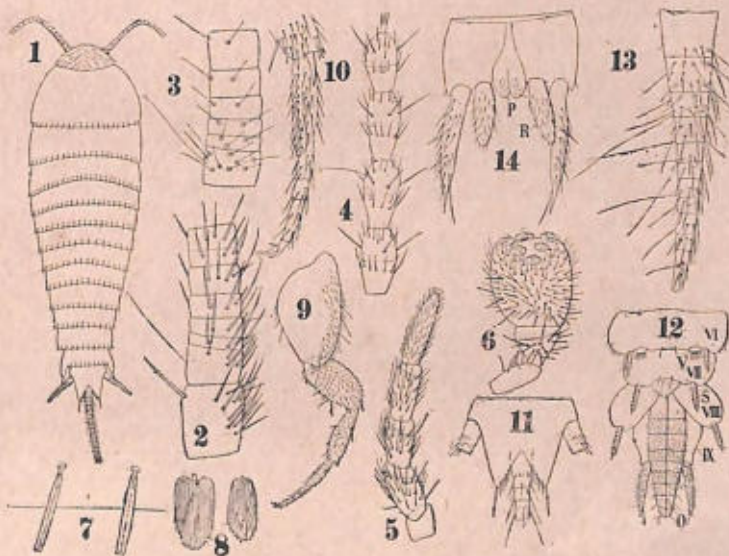


FIG. viii.—*Gastrotheus indicus*: 1. corpus pronum; 2. antennae pars proximalis supra inspecta; 3. ejusdem pars proximalis ab articulo tertio subtus inspecta; 4. ejusdem pars apicalis; 5. palpus maxillaris; 6. palpus labialis; 7. urotergiti quinti particula postica; 8. squamae dorsuales; 9. pes paris tertii; 10. ejusdem tibiae apex, tarsus et praetarsus; 11. abdominis pars postica cum cercorum parte proximali; 12. abdominis sterna vi-ix: V. vesicula, S. stili, O. ovipositor; 13. cercus dexter; 14. maris urosterne nonum cum pene P, R. paramera.

Mas ignotus.

Habitat.—In nidis *Dorylus (Typhlopone) labiatus*, Shuck, d. N. Annandale et S. Kemp ad Siliguri ("base of E. Himalayas") exempla nonnulla legit.

Observatio.—Species haec ad *Atelura jacobsoni*, Silv., perproxima est, sed stilorum numero (in *A. jacobsoni* paribus tribus) bene distincta est.

Gastrotheus indicus, sp. nov.

♀ Corpus ochroleucum, squamis (fig. viii, 8) pluriradiatis, radiis postice spatio brevissimo liberis.

Caput setis brevibus, robustis, attenuatis, integris nec non setis brevioribus instructum. Antennae 14-15 articulatae, articulis ab octavo in articulis gradatim magis sejunctis divisis, partis basalis et apicalis setis et sensillis *cfr.* fig. viii, 2-4. Palpi maxillares et labiales *cfr.* fig. viii, 5-6. Thorax (fig. viii, 1) quam abdominis pars antica vix latior, scutis dorsalibus serie setarum posticarum et setis brevibus lateralibus instructis. Setae serili posticae, ut caedem abdominis (fig. viii, 7) breves, latiusculae, apice inciso. Pedes femoris apice supra spina breve bifurcata, tibiae apice supra spinis brevibus tribus bifurcatis armata, cetero *cfr.* fig. viii, 9-10.

Abdomen partem posticam versus gradatim aliquantum angustatum, tergitis 1-9 serie postica setarum brevium, robustarum, ut eadem thoracis, instructis nec non seta robustiore parum

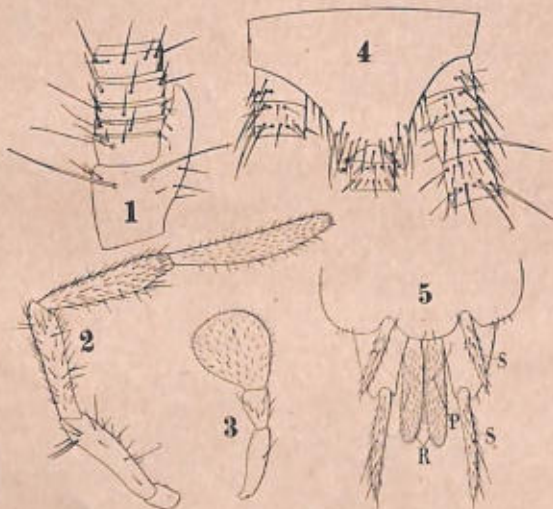


FIG. ix.—*Lepidospora ceylonica*: 1. antennae pars proximalis ab articulo secundo; 2. palpus maxillaris; 3. palpus labialis; 4. abdominis pars postica cum cercorum basi; 5. abdominis sternum 8^{um} et 9^{um}: P. penis, R. paramera, S. stili.

longiore laterali. Urotergitum decimum (fig. viii, 11) parum ad basim latius quam longius, partem posticam versus gradatim parum angustatum, postice angulatim profunde incisum, seta apicali longa robusta et setis nonnullis per marginem internum incisurae instructum. Urosterna 2-5 setis duabus submedianis et setis nonnullis lateralibus, urosternum sextum (fig. viii, 12) setis duabus submedianis, pseudovesicula magna, seta 5 robustas gerente, et stilis sat longis, urosternum septimum vesiculis obsoletis, stilis et setis duabus submedianis instructa; urosternum octavum parte mediana triangulari. Stili noni quam octavi aliquantum longiores.

Ovipositor (fig. viii, 12) crassus, partem posticam versus attenuatus, apicem stilorum ix vix superans, tenuissime anulatus setis brevibus pluribus instructus.

Cerci laterales (fig. viii, 13) quam urotergitum decimum parum longiores, setis nonnullis externis brevibus robustis, sensillis superis ad basim et internis, nec non setis nonnullis brevibus instructi; cercus medianus quam laterales longior.

Long. corp. mm. 4.2; lat. thoracis 1.8; long. antennarum 1.30; palpi maxillaris 0.78; pedum paris tertii 2.73; cercorum lateralium 0.65; cerci mediani 1.45.

♂ Antennarum articulus secundus simplex; penis brevissimus, paramera (fig. viii, 14) longa, c. dimidium stilum attingentia.

Habitat—Exemplum ♀ ad Puri, Orissa coast, S. W Kemp et exemplum ♂ ad Bangalore ("S. India, ca. 3000 feet") N. Annandale legit.

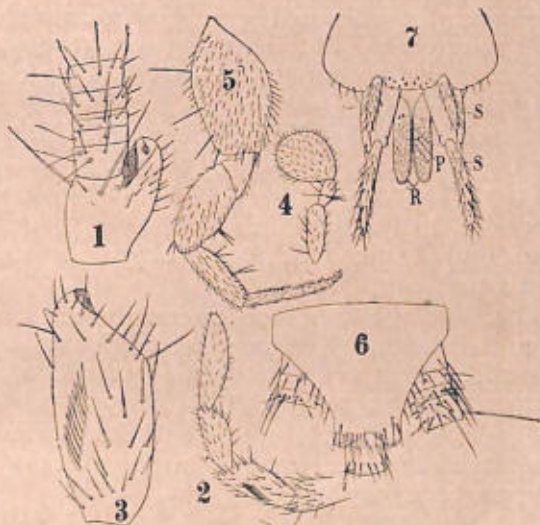


FIG. X.—*Lepidospora notabilis*: 1. antennae pars proximalis ab articulo secundo; 2. palpus maxillaris interne inspectus ab articulo secundo; 3. palpi maxillaris articulus tertius interne inspectus; 4. palpus labialis, 5. pes paris tertii; 6. abdominis pars postica cum cercorum basi; 7. abdominis sterna 8^{um} et 9^{um}; P. penis, R. paramera, S. stili.

Lepidospora ceylonica, Silv.

I refer to this species a male collected at Rotuna under stones. As I described only the female from Ceylon, I give here the figures (ix, 1-5) of the more characteristic parts of the male.

I have also seen specimens of this species collected by Dr. Imms in Kumaon.

Lepidospora notabilis, sp. nov.

♂ Corpus ochroleucum lateribus subparallellis, postice tantum aliquantum angustatum, squamis et setis instructum. Squamae sat crebre pluriradiatae, majores μ 117 \times 52.

♂ Caput supra setis sat numerosis brevibus et nonnullis sat longis instructum. Antennae in exemplo typico haud integrae, abdominis segmentum sextum attingentes, articulo primo parum longiore quam latiore, articuli secundi parte apicali supera interna (fig. x, 1) in processum latiusculum obtuse-rotundatum producta, articulis ceteris setis et sensillis *cf.* fig. x, 1. Palpi maxillares (fig. x, 2) sat longi, articuli tertii facie interna pectine longitudinali setarum (fig. x, 3) aucta; palpi labiales (fig. x, 4) articulo ultimo parum longiore quam latiore, apice late rotundato. Thorax abdominis latitudini subaequalis, lateribus parallelis, tergitis setis sat numerosis brevibus, nonnullis lateralibus et posticis longis et squamis instructis. Pedes setis *cf.* fig. x, 7.

Abdomen tergitis setis brevibus a primo gradatim minus numerosis et squamis magis numerosis instructis et setis nonnullis posticis longis; tergito decimo (fig. x, 6) parum ad basim latiore quam longiore, angustato, margine postico sat profunde inciso, angulis posticis crassis, rotundatis et subtus ad apicem tuberculis spiniformibus tribus auctis; urosternis squamosis setis duabus submedianis et nonnullis posticis instructis. Stili et vesiculae bene evoluta.

Penis (fig. x, 7) brevis paramera subcylindracea quam stili segmenti noni aliquantum breviora.

Cerci in exemplo typico haud bene integri sed quam abdomen breviores et attenuati.

Long. corp. mm. 6; lat. thoracis 1.10; long. antennarum?; palporum maxillarium 1.43; pedum paris tertii 2.50; cercorum?.

Habitat.—Exemplum typicum ad Sukli ("E. side of Dawna Hills, L. Burma, ca. 2100 ft.") F. H. Gravely legit.

Observatio.—Species haec a praecedenti praesertim palpi maxillaris articulo tertio setarum pectine instructo et tergiti decimi abdominali forma bene distincta est.

V. THE TORTOISES OF CHOTA NAGPUR.

By N. ANNANDALE, D.Sc., F.A.S.B., Superintendent, Indian
Museum.

(Plates v-vi).

The Chelonia, and more particularly the terrestrial tortoises of Chota Nagpur, the territory that lies between the Ganges and Orissa in the interior of the north-eastern part of the Indian Peninsula, have considerable interest of a geographical kind, for they appear to differ from those of the Ganges valley and to resemble those of northern Assam. In other words, this valley now separates the terrestrial Chelonian fauna of North-Eastern India into two distinct and widely parted sections, one inhabiting the wooded hills of the interior of the northern Peninsular area, the other found in northern Assam, where the jungle is even denser and has more of an "equatorial" character. No terrestrial tortoise of any species has hitherto been found either in the lower part of the Gangetic valley nor, so far as is precisely known,¹ in the country between it and the Himalayas. More detailed information, however, is badly needed as to the westward range in Assam and possibly northern Bengal of those tortoises that inhabit the foothills north of the Brahmaputra on the one hand, and the hills of Central India (to use the term in a geographical rather than a political sense) on the other.

As I believe that the collection of Indian Chelonia now in the Indian Museum, brought together largely by the exertions of Blyth, Theobald and John Anderson, is very much more nearly complete than any collection elsewhere, I have based the following notes upon it. They are confessedly of a tentative nature and are published largely in the hope of attracting attention to our ignorance and thereby appealing to naturalists throughout India to assist, by contributing specimens and information, in the preparation of a full revision of the Indian Chelonia. This work I have had in hand for nearly eight years; not only have constant interruptions occurred, but I have found it extraordinarily difficult to obtain specimens of many of the species. Large series of all but a few very common forms are still necessary, and the fact that our collection is so large makes it the more imperative to render it still more complete.

¹ Anderson was informed by Major Kinloch that the latter had found a living tortoise in the Jelpaiguri district that agreed with a figure of *Testudo elongata* (Anat. Zool. Res. Yunnan, p. 712, 1879). (See also foot-note on p. 74.)

I have to thank Dr. J. R. Henderson of the Madras Museum, Mr. N. B. Kinnear of the Bombay Natural History Society and Mr. B. L. Chaudhuri of the Indian Museum for assistance in preparing this paper.

Family TESTUDINIDAE.

Genus *Geoemyda*, Gray.

- Geoemyda*, Gray, *Proc. Zool. Soc.*, 1834, p. 100; Boulenger, *Cat. Chel.*, p. 135 (1889), *Fauna Ind.*, p. 23 (1890) and *Fauna Mal. Pen.*, p. 16 (1912); Stejneger, *Proc. Biol. Soc. Washington*, XV, p. 257 (1902) and *U.S. Nat. Mus. Bull.*, 58, p. 500 (1907); Siebenrock, "Synopsis der rezenten Schildkroten," *Zool. Jahrb. Suppl.* 10, Heft 3, p. 495 (1909); Henderson, *Rec. Ind. Mus.*, VII, p. 217 (1912).
- Nicoria*, Gray, *Cat. Sh. Rept.*, I, p. 17 (1855); Boulenger, *Cat. Chel.*, p. 129 and *Fauna Ind.*, p. 26; Annandale, *Journ. As. Soc. Bengal*, 1906, p. 205.
- Chaibassia*, Theobald, *Cat. Rept. Ind.*, p. 6 (1876); Anderson, *Anat. Zool. Res. Yunnan*, p. 718 (1879).
- Heosemys*, Stejneger, *Proc. Biol. Soc. Washington*, XV, p. 258; Siebenrock, *Zool. Jahrb. Suppl.* 10, Heft 3, p. 506.

The genus *Geoemyda* was originally described in 1834 by Gray, who designated as its type-species Gmelin's *Testudo spengleri*. Ten years later the same author described another new (or supposed new) genus, for which he coined the name *Nicoria*, again with *T. spengleri* as type-species. Mr. Boulenger in all his more important works has used the generic name *Geoemyda* for the little group of species that includes Gray's *Emys spinosa*, and has accepted the later name *Nicoria* for the group typified by *T. spengleri*; but Dr. Stejneger has pointed out, as is doubtless true in the strict letter of the law of priority, that this course is inadmissible and has relegated to *Geoemyda*, *T. spengleri* and its allies, inventing a new generic name (*Heosemys*) for the *Emys spinosa* group. This change has been accepted by Dr. Siebenrock in his valuable "Synopsis der rezenten Schildkroten" and also by Dr. J. R. Henderson in his description of a new Indian species recently published in these "Records." Mr. Boulenger's books are of such fundamental importance to all students of herpetology that I had proposed to follow his lead. The discovery, however, of a new species exactly intermediate between the two so-called genera and of certain anatomical facts in connection with described forms, renders it unnecessary to adopt either course, and I am forced to combine the two groups under the generic term *Geoemyda*, which is undoubtedly the older of the two names.

Between the groups *Nicoria* and *Geoemyda*, to use the terms in the sense adopted in the "Fauna," there was, at the time that work was written, every reason to believe, as indeed there still is

so far as published statements go, that a valid difference existed in the skull, *viz.* the presence or absence of a temporal arch. Two factors are concerned in the formation of this arch, the ossification of the quadrato-jugal and the production of a backwardly-directed (postorbital) process of the orbital ring in the formation of which both the postfrontal and the jugal bones take a part. If the arch is complete it is formed by a dovetailing of the forward process of the quadrato-jugal and the backward process of these two bones.

In the three species of *Geoemyda* (*s.s.*) (*i.e.* of *Heosemys*, Stejneger) it is probable that the temporal arch is always absent, the quadrato-jugal being absent or vestigial and the postorbital process of the postfrontal and jugal short and blunt. In one skull of Blyth's *Geoemyda tricarinata* (pl. vi, fig. 6*b*) from Assam the same condition occurs. This skull was removed from the head of a specimen preserved in spirit and only a very thin, almost membranous cartilage was found in the place of the quadrato-jugal. In two other skulls of the same species, including that of the type from Chota Nagpur (pl. vi, fig. 6*a*), there is a short postorbital process and the quadrato-jugal, although distinctly ossified, is very delicate and slender and barely meets it. In many skulls of the typical form and of both the races *thermalis* and *edeniana* of "*Nicoria*" *trijuga* the arch, although quite complete, is extremely delicate, being at any rate no thicker than the lower posterior part of the orbital ring. But in some skulls of these races the arch is as stout as any part of that ring: apparently it is always complete. It is also complete in the type-skull of *N. trijuga coronata*, but its condition much more closely resembles that found in the two skulls of *G. tricarinata* in which it is ossified. In the two skulls of the new species *Geoemyda indopeninsularis* as yet examined the postorbital process is well developed; but there is no quadrato-jugal. There is thus a distinct arch, but it is incomplete.

These facts leave, in my opinion, no course but to amalgamate the genera *Nicoria* and *Geoemyda* under the latter name; for I can find no real generic difference between the shells of species assigned to one group or the other.

A more difficult question is, Should Blyth's genus *Chaibassia* be recognized as distinct? The single species included in this genus exhibits considerable variation in skull-characters, but differs from all other Oriental species that can be assigned to *Geoemyda* (except the recently described *G. sylvatica*) in the vestigial nature of the digital webs and in the approximation of the hind feet to the type characteristic of the genus *Testudo* and its allies: it and *G. sylvatica* are true land-tortoises, whereas the other Asiatic species are amphibious. The American forms, however, most closely related to the Oriental "*Nicoriae*" show great specific variation in respect to the webbing of the fingers and toes. Until it has been possible to compare large series of specimens from the two continents, I think, therefore, that it is as well not to revive *Chaibassia* as a distinct genus.

The following key should make it possible to distinguish the Indian and Burmese species of the genus formed by joining together *Groemyda* (s.s.), *Nicoria* and *Chaibassia*.

- I. Species with flattened feet and distinctly webbed fingers and toes.
1. Carapace tricarinate.¹ Posterior orbital process elongate and slender. (Anterior margin of shell smooth).
 - A. Second vertebral shield considerably more than half as wide as first costal shield; quadrato-jugal ossified .. *G. trijuga.*
 - B. Second vertebral shield a little more than half as wide as first costal shield; quadrato-jugal absent .. *G. indopentinsularis.*
 2. Carapace with a single median carina. No temporal arch.
 - A. Anterior margin of shell serrated; second vertebral shield much broader than long, at least as broad as second costal shield .. *G. spinosa.*
 - B. Anterior margin of shell smooth; second vertebral shield not much broader than long, not as broad as second costal.
 - a. Vertebral region arched or tectiform in cross-section in the adult; the whole carapace flattened in the young .. *G. grandis.*
 - b. Vertebral region flattened .. *G. depressa.*
- II. Digital webs vestigial, hind feet more or less club-shaped. (Carapace tricarinate).
1. Upper jaw distinctly hooked; carapace flattened as a whole .. *G. sylvatica.*
 2. Upper jaw distinctly notched; carapace domed .. *G. tricarinata.*

As can be seen from the key, the Indian and Burmese species fall readily into three groups, which perhaps may be ultimately recognized as subgenera.

- I. Amphibious species with a tricarinate carapace, fully webbed digits and a temporal arch, which, however, may be incomplete, = *Nicoria*, Gray.

¹ In the carapace of aged specimens the three keels may be almost completely obliterated.

2. Amphibious species with a unicarinate carapace, with webbed digits but without a temporal arch, = *Geoemyda*, Boulenger (Gray), = *Heosemys*, Stejneger.
3. Terrestrial species with a tricarinate carapace, with the digits hardly webbed and the hind feet club-shaped; the temporal arch present or absent, = *Chaibassia*, Theobald.

The only other Oriental species [*G. spengleri* (Gmelin)] belongs to the first of these groups. There is some doubt as to the limits of its range, but it is supposed to be distributed over an area extending from Sumatra to Japan. The Indian species of this group have their head-quarters in India south of the Indo-Gangetic plain, but a race of one of them is found in Burma. Those of the second group are Burmese and in two out of three instances also occur in the Malay Peninsula. One of these two species is also found in Siam and Indo-China, the other in Sumatra and Borneo. The species of the third group are found in the Indian Peninsula and in Assam. A fossil form allied to them but perhaps specifically distinct is described by Lydekker from the Pliocene of the Siwalik Hills under the name *Nicoria tricarinata* var. *sivalensis* (*Journ. As. Soc. Bengal*, 1889, p. 333, fig. 2).

The American species assigned to *Nicoria* by Mr. Boulenger, and to *Geoemyda* (s.s.) by some recent writers, differ from the Oriental ones in having only a single keel on the carapace and at the same time possessing a complete bony temporal arch.

Geoemyda trijuga (Schweigg.).

1. *Forma typica*

Testudo trijuga, Schweigg., *Prodromus*, p. 41 (1814); Boulenger (*Nicoria*), *Cat. Chel. Brit. Mus.*, p. 121 and *Fauna Brit. Ind. Rept.*, p. 27; Siebenrock (*Geoemyda*), *Synops. Schildkroten*, p. 495.

Emys trijuga var. *madrassetana*, Anderson, *Anat. Zool. Res. Yunnan*, p. 729.

The descriptions given by Boulenger and by Siebenrock serve for the ready recognition of the species. I propose merely to lay stress on sub-specific characters, on which the large series of specimens at my disposal makes it possible to cast further light.

Shell.—Carapace broadly oval, usually of a warm brown colour, but sometimes nearly black, not more than about 22 cm. long in a straight line, moderately depressed, distinctly flattened on the dorsal surface in adults (as well as young) of both sexes; keels sometimes yellowish. Plastron moderately concave in the adult male, brown or blackish, sometimes with a yellowish longitudinal streak on each side.

Head of young dull olivaceous with yellowish and greenish streaks and veins (never very conspicuous) on the dorsal and

lateral surfaces: of adult much duller with small yellowish spots on the posterior part. Iris white.

Geographical distribution.—Common in the east-central parts of the Madras Presidency and found at an altitude of at least 3000 ft. on the Mysore Plateau. Also recorded (? correctly) from Chota Nagpur, from Poona and from the Jhelum canal in the Punjab. The exact limits of the range are unknown. Recently introduced into Calcutta, but not indigenous to the Gangetic delta.

Habits.—The Madras Pond-tortoise is mainly aquatic and vegetarian in habits. Individuals released in a pond in Calcutta left the water at night and made their way upstairs in a house near the edge.

2. Race *thermalis* (Lesson).

Emys thermalis, Lesson, *Cent. Zool.*, p. 86, pl. xxix (1830); Boulenger (*Nicoria trijuga* var. *thermalis*), *Cat.*, p. 122 and *Fauna*, p. 27; Siebenrock (*Geoemyda trijuga thermalis*), *Synops.*, p. 496; Robinson (*Nicoria trijuga*), *Quart. Journ. Micro. Sci.*, LV, p. 742 (1910).

Shell a little broader and distinctly flatter, in old individuals of both sexes, than in the *forma typica*, also larger (up to 26 cm. long) and as a rule darker.

Head black with conspicuous orange or orange-red spots and streaks scattered assymmetrically on the dorsal, lateral and ventral surfaces: spots and streaks less conspicuous in the adult than in the young but never absent. Iris (? always) chocolate.

Geographical distribution.—Ceylon (plains and hill-country up to at least 1600 ft.) and the district of Ramnad on the Indian shore of the Gulf of Manaar; also (probably introduced) in the Maldives and the Chagos Archipelago.

Habits.—The tortoises of this race exhibit remarkable individual variation in habits. In Ceylon they are abundant in ponds, sunning themselves, sometimes two or three deep, on stones and logs that project from the surface of the water. If disturbed they dive immediately and swim along beneath the surface. At night they are frequently found in ditches and among wet grass. In the lake at Kandy they frequent the mouths of drains that open into the lake. But, as Miss Muriel Robertson has noted, some individuals are much more terrestrial in their habits than others. In Ramnad I found both young and half-grown tortoises in the shade of xerophytic plants growing in the sand a long way from water. Mr. T. Southwell tells me that he has dissected many specimens in Ceylon and has never found remains of any but vegetable food in their stomachs.

3. Race *coronata* (Anderson).

Emys trijuga var. *coronata*, Anderson, *Anat. Zool. Res. Yunnan*, p. 729; Siebenrock (*Geoemyda trijuga coronata*), *Synops.*, p. 496; Henderson (*Geoemyda trijuga* var. *coronata*), *Rec. Ind. Mus.*, VII, p. 218 (1912).

Shell uniform black, otherwise probably as in the *forma typica*, but perhaps smaller.

Head black, a great part of the dorsal and lateral surfaces being occupied by a broad V-shaped pale yellow mark the point of which is directed backwards on the occiput; the tympanum and the surrounding skin black.

Geographical distribution.—Only known from the southern parts of the Malabar Zone (Travancore and Cochin) on the western side of the Western Ghats. Northern limits of range unknown.

Habits.—Henderson states that this race is aquatic in its habits.

Type (skeleton). Rept. Ind. Mus. No. 1012 (♀).

The type-specimen of this race is a skeleton, which could hardly be distinguished from one of the typical form. There is a large example in spirit in the British Museum, labelled *thermalis*. So far as colouration is concerned, this is perhaps the most easily recognized of the races of *N. trijuga*.

4. Race *edeniana* (Theobald).

Melanochelys edeniana, Theobald, *Cat. Rept. Brit. Mus.*, p. 12 (1876); Boulenger (*Nicoria trijuga* var. *edeniana*), *Cat. Chel. Brit. Mus.*, p. 123 and *Fauna*, p. 28; Siebenrock (*Geoemyda trijuga edeniana*), *Synops.*, p. 496.

Emys trijuga var. *burmana*, Anderson, *Anal. Zool. Res. Yunnan*, p. 723, pls. lvii and lviii.

Nicoria trijuga var. *edeniana*, Annandale (*partim*), *Journ. As. Soc. Bengal*, 1906, p. 205.

Shell black in the adult, with (except in very old individuals) conspicuous yellow keels on the carapace and lateral stripes on the plastron, in the young brown and less conspicuously marked. In very old shells in which the surface of the epidermal shields is worn, the colours are dull and inconspicuous. *The carapace is not known to exceed 29 cm. in length in a straight line.* It is not quite fully ossified when 19 cm. long. In the adult it is more strongly arched and deeper than in any of the races yet discussed and this is more conspicuously the case in the female than in the male, but the plastron of the male is only slightly concave.

Head.—“The head of the male above is nearly uniform brown, darkest on the upper surface over the nose, and destitute of any markings. In some females, the upper surface of the head is reticulated with olive-brown and orange-yellow An orange spot on the mandible below the angle of the mouth, leading interruptedly to the tympanum.” (Anderson).

Geographical distribution.—Upper Burma, Arrakan (hills and coast), N. Tenasserim. There is a stuffed specimen in the Indian Museum labelled “Assam,” but it is not quite typical, having the second vertebral shield much broader than usual: the skull is not present. Possibly it may represent a distinct race or species.

Habits.—Anderson states that this race feeds on water-plants, more particularly on *Vallisneria*.

Types (skeletons). Rept. Ind. Mus. Nos. 1369, 2589, 1010-11, 1097 and 830.

The same specimens form the types of Theobald's *Melanochelys edeniana* and of Anderson's *Emys trijuga* var. *burmana*. Apparently the latter name had priority in manuscript, and Anderson refused to resign it. Both in the British Museum "Catalogue" and in the "Fauna" there is an error as to the dimensions of this race. Mr. Boulenger informs me that the largest specimen in the British Museum has a carapace 29 cm. long by direct measurement. The largest carapace in our collection is 27.5 cm. long. It is that of an adult not yet aged, but two slightly smaller carapaces have the lines of growth on the epidermal scales completely obliterated and evidently belonged to very old tortoises. There is no specimen on record larger than the one in the British Museum. In a shell 19 cm. long the foramina between the costal and the marginal bones are not completely closed, as they are in one 19.7 cm. long. They have completely disappeared in much smaller shells of the other races.

In examining a large series of skulls of the different races of *G. trijuga* it does not seem possible to find any distinctive racial character, except that skulls of adult individuals of *edeniana* and *thermalis* are larger than those of the typical form, as might be expected from the greater size of the whole animal. The thickness of the bone that forms the temporal arch varies considerably; sometimes it is no thicker than that of the lower posterior part of the orbital framework, sometimes it is nearly twice as thick. In some of our older specimens of young skulls the arch appears to be incomplete, owing to the falling away of the quadrato-jugal, which is never firmly ankylosed to the tympanic frame except in old individuals. In such cases, however, it is always possible to detect on the outer margin of the framework a slight projection above the point which had originally corresponded with the antero-superior limit of the missing bone.

The geographical distribution of the species as a whole is a somewhat discontinuous one, extending all over Peninsular India south of the Indo-Gangetic plain and perhaps penetrating into that plain in the north-west, but not including the valley of the Ganges, although it does include the greater part of Burma. It is a little doubtful whether any race occurs in Chota Nagpur, in which *G. indopeninsularis* may replace *G. trijuga*, but Anderson states that the typical form occurs there.

Specimens in the Indian Museum.

I. GEOEMYDA TRIJUGA MADRASPATANA (ANDERSON) (=*forma typica*).

831 (15b. A.S.B.), ♀	Madras.	Madras Museum.
(stuffed).		
1008-9. ♀ ♀ (skeletons)	„	„

40-1; 53, ♂ ♀ (spirit)	Madras	Madras Museum.
16723, ♀ (spirit)	Madras (town).	Dr. J. R. Henderson.
16722 ♂ (skeleton)	" "	" "

Nos. 831, 1008-9, 40-1 and 53 are co-types of *Emys trijuga* var. *madraspatana*, Anderson.

2. GEOEMYDA TRIJUGA THERMALIS (Lesson).

1400-4; 1389-91; 1357-63,	} ♂ ♂, ♀ ♀ (skeletons)	} Ceylon.	} Dr. Kelaart;
1382; 1384-5; 1638; 2906;				} Dr. J. Ander-
1348; 1399; 1395; 832;			son.
933; 1373-4.			
18; 20-36; 54-69; 637.	♂ ♂, ♀ ♀, juv. (spirit)	Ceylon.	Dr. J. Anderson.
16691, ♂ juv. (spirit).	Anuradhapura, Ceylon.		Dr. N. Annandale.
16692, ♀ ,, ,,	Kandy Lake, Ceylon; 1600 ft.		" "
15435-8, ♂ ♀ juv. ,,	Mandapam, Ramnad, S.E.	India.	" "

3. GEOEMYDA TRIJUGA CORONATA (Anderson).

15534, ♀ (skeleton)	Travancore.	First Prince of Travancore.
17018, ♀ (spirit)	Chalakudi, Cochin.	Dr. J. R. Henderson.

No. 15534 is the type of *Emys trijuga* var. *coronata*, Anderson.

4. GEOEMYDA TRIJUGA EDENIANA (Theobald).

1369, 2589, 1010-11, 1018.	♂ ♂ ♀ ♀ (skeletons)	Burma.	Hon. A. Eden.
1097, (skull)		" "	
830 (15a. A.S.B.) ♀	Arrakan hills.		Dr. W. T. Blandford.
o (shell)			
17112, ♂ (shell)	No history.		
178, ♀ (stuffed)	Assam.		Major Sladen.

Nos. 1369, 2589, 1010-11, 1018, 1097 and 830 are apparently all co-types both of *Melanochelys edeniana*, Theobald and of *Emys trijuga* var. *burmana*, Anderson.

Geoemyda indopeninsularis, sp. nov.

Nicoria trijuga var. *edeniana*, Annandale (*partim*), *Journ. As. Soc. Bengal*, 1906, p. 205.

Carapace dark brown or blackish without markings except for some yellowish blotches at the axilla and groin, relatively deep, flattened on the vertical region in the male and in the young female, strongly arched in the aged female, with three longitudinal keels which (except the median keel in its posterior half) become obscure in adult tortoises. Nuchal small, much longer than broad; first

vertebral shield at least as long as broad, octagonal, with a distinct notch in its posterior margin (which is the shortest), about half as broad as the first costal; second vertebral shield similar in shape and proportions but sometimes shorter; third vertebral shorter than either of the first two; fourth and fifth broader than long; fifth as broad as fourth costal; two caudals, the notch between them obscurely indicated. Posterior margin of shell smooth, somewhat retroverted, especially in the female; anterior margin smooth, barely retroverted in either sex. Lower part of marginal shields on the bridge very deep and approaching the vertical.

Plastron brown with paler margins, deeply concave in the male; the anterior lobe considerably, the posterior lobe distinctly shorter than the bridge; posterior notch deeply angulate; anterior extremity truncate. Epidermal shields in the following order of length: humerals, pectorals, anals, abdominals, gulars. *Plastron* firmly united by bone to the carapace, with axillar and inguinal buttresses as in *G. trijuga*. Axillary and (sometimes) inguinal shields present.

Head longer than tail, dark olivaceous or brownish without definite markings in either sex, but with a somewhat obscure dark mid-dorsal line running backwards from the snout in the male and narrowing posteriorly; throat dirty white. Skull resembling that of *G. trijuga*, but with the temporal arch incomplete owing to the vestigial condition of the quadrato-jugal bone; dorsal surface flat and horizontal; dorsal profile of squamosal bone much more strongly concave than in *G. trijuga* and supra-occipital bone more strongly produced backwards; upper jaw deeply notched at apex; tooth at apex of lower jaw very prominent and distinct. In the hyoid skeleton the posterior cornua are much broader and the median cornua longer and stouter than in the allied species. The iris is chestnut-brown.

Limbs powerful, black above, greyish below; feet flattened, with well-developed webs; claws long and powerful (especially in the male), sharply pointed, more or less curved, blackish; horny shields large and strong on both limbs, arranged as in *G. trijuga*.

Types. Nos. 17098 (♂) and 17100 (♀) *Rept. Ind. Mus.*

Geographical distribution.—The specimens in the Indian Museum are from the Singhbhum district of Chota Nagpur and there is one in the vivarium of the Bombay Natural History Society from the Dharwar district in the interior of the southern part of the Bombay Presidency. It was taken at Devikop, 26 miles south of the town of Dharwar.

Measurements of specimens of Geomyda indopeninsularis.

	Type ♂.	Type ♀.	Bombay ♀.
Length of carapace (straight)	336 mm.	342 mm.	284 mm.
Breadth of " (")	231 "	236 "	" "
Height of " "	130 "	148 "	135 "
Length of " along curve	350 "	350 "	" "
" plastron (notch to notch)	282 "	310 "	258 "

	Type ♂.	Type ♀.
Length of skull (to occipital condyle) ..	58 mm.	56 mm.
Zygomatic breadth of skull ..	38 "	38 "
Length of orbit ..	15 "	15 "
Height of nasal aperture (skull) ..	10 "	10 "
Breadth of nasal aperture (") ..	10 "	11 "
Interorbital breadth ..	14 "	14.5 "
Breadth of lower jaw (at symphysis) ..	4 "	4 "

In measuring the height of the male carapace I have not included the concavity of the plastron but have measured from the surface on which the shell rested to its highest point. The greatest depth of the concavity is about 20 mm.

This species is closely allied to *G. trijuga* and it is not improbable that confusion has occurred in the case of immature tortoises. Apart from the incompleteness of the temporal arch, there are apparently constant differences in the skull, and the shape of the carapace is different, although it is difficult to bring out this difference by means of measurements. One of our specimens was examined by the late Dr. J. Anderson, who apparently thought that there was some mistake about the label, but the capture of a second specimen from the same district makes this improbable, as there is no evidence against the authenticity of the recorded history except the fact that no other individual was known from that district. The first specimen was taken by the late Dr. V. Ball.

Very little is known of the habits of this species. Mr. Chaudhuri, who obtained the male specimen in our collection through Mr. B. C. Sen, I.C.S., from the Hos, an aboriginal tribe of Chota Nagpur, tells me that they regard it as a land tortoise. The female living in the rooms of the Bombay Natural History Society was, however, taken in a shallow tank, and I detected on its shell the remains of a colony of the polyzoon *Plumatella*, which cannot live long out of water. It is not improbable that tortoises of the species visit water in hot weather, but live habitually, without actually entering water, in damp places. The Bombay female laid several eggs in April and March and did not at that time of year show any inclination to enter water. The eggs were 148 mm. long by 30 mm. in transverse diameter.

Geoemyda tricarinata, Blyth

- Geoemyda tricarinata*, Blyth, *Journ. As. Soc. Bengal*, 1856, p. 714; Theobald (*Chaibassia*), *Cat. Rept. Brit. Ind.*, p. 7 (1876); Anderson (*Chaibassia*), *Anat. Zool. Res. Yunnan*, p. 718 (1879); Boulenger (*Chaibassia*), *Cat. Chel.*, p. 139 (1889); Lydekker (*Nicoria*), *Journ. As. Soc. Bengal*, 1889, pp. 327, 330, fig. 1; Boulenger (*Nicoria*), *Fauna*, p. 28 (1890); Siebenrock (*Geoemyda*), *Zool. Jahrb. Suppl.*, x, Heft 3, p. 497 (1909).
Chaibassia theobaldii, Anderson, *op. cit.*, p. 718; Boulenger, *Cat. Chel.*, p. 140.

I have no doubt that recent authors are right in regarding these two species of Anderson (*tricarinata* and *theobaldii*) as specifically identical. There is little if any constant difference between skulls from the two districts (Chaibassa and northern Assam) in which the two species were supposed to live, but the individual variation between two skulls from Assam is not only considerable but also of great importance in the taxonomy of the genus. I have already indicated its nature (p. 65), which is clearly shown in fig. 6, pl. vi. No information is available as to the soft parts of specimens from Chota Nagpur.

The following measurements include those of the type of *Geoemyda tricarinata*, Blyth, and of two co-types of *Chaibassia theobaldii*, Anderson:—

	No. 816. (♂)	No. 1017. (♀)	No. 188. (♀)	No. 189. (♂)
Length of carapace (straight)	136 mm.	163 mm.	163 mm.	130 mm.
Breadth of carapace (straight)	91 "	101 "	97 "	83 "
Length of carapace along curve	165 "	197 "	190 "	159 "
Breadth of carapace along curve	145 "	163 "	160 "	132 "
Height of carapace	52 "	70 "	75 "	56 "
Length of plastron (notch to notch)	104 "	132 "	135 "	106 "
Length of skull	23.5 "	..	23.5 "	..
Breadth of skull	21 "	..	22 "	..
Length of orbit	10 "	..	10 "	..
Interorbital breadth	7 "	..	7 "	..
Length of snout	5.5 "	..	7.5 "	..
Height of nasal aperture	4 "	..	5 "	..
Width of nasal aperture	5 "	..	5 "	..
Breadth of lower jaw and of symphysis	4.5 "	..	5 "	..

The skull of No. 1017 was accidentally broken some years ago and that of No. 189 has not been removed from the specimen. Although exact measurements of the former cannot be given, sufficient of it remains to prove its close resemblance to that of No. 188.

*Geoemyda tricarinata*¹ has hitherto been found in the district of Singhbhum (Chaibassa) in the south of Chota Nagpur and at the base of the foot-hills north of the Brahmaputra. Anderson has shown that the locality "Naga Hills" was given in error. The species is apparently terrestrial in habits. Specimens are very difficult to obtain on account of the inaccessible districts in which it occurs.

¹ Since this paper went to the printer I have received a living specimen from Mr. Lancelot Travers, who obtained it in the neighbourhood of the Baradighi tea-estate in the Jalpaiguri district of northern Bengal.

Specimens in the Indian Museum.

816 (10a. A.S.B.), ♂ (shell and imperfect skeleton).	} Chaibassa (Singhbhum) district, Chota Nagpur.	} A.S.B. (Blyth).
189, ♂ (spirit).			Bisnath plain, N. Assam.	Capt. Godwin-Austen.
188, ♀ (spirit: skull separate).	Bisnath plain, N. Assam.	..
1017, ♀ (skeleton).	Base of Daffa Hills, N. Assam.	..

No. 816 is the type of *Geoemyda tricarinata*, Blyth, while Nos. 189 and 188 are co-types of *Chaibassia theobaldii*, Anderson.

Geoemyda sylvatica, Henderson, from Cochin is apparently related to this species, but only the external characters have as yet been described. Its depressed carapace, strongly hooked upper jaw, etc. separate it distinctly.

Genus *Testudo*, Linn.

Since Mr. Boulenger published his volume on the Reptiles and Batrachia in the *Fauna of British India* four species of this genus have been added to the Indian list. I have to add a fifth. The four additional species already known are:—

1. *Testudo latinuchalis*¹ (Vaillant) (Lower Burma and Malaya).
2. *Testudo travancorica*,² Boulenger (Western Ghats).
3. *Testudo horsfieldii*,³ Gray (Central Asia, Baluchistan).
4. *Testudo baluchiorum*,⁴ Annandale (Baluchistan).

The fifth species I propose to name *Testudo parallelus*. Its position among the Indian species will be shown by the following key:—

I. Species with five claws on the fore-feet.

1. Supracaudal shield single.

A. Forehead with large shields; carapace not marked with radiating pale lines; no spurs on hind thighs.

a. Nuchal shield (usually) present; gular suture no longer than pectoral suture, which is at least nearly as long as humeral suture

T. elongata.

¹ Boulenger, *Fauna of the Malay Peninsula*, vol. i, p. 15 (1912).

² *Id.*, *Journ. Bombay Nat. Hist. Soc.*, vol. xvii, p. 560, 2 pls.

³ *Id.*, *Cat. Chel.*, p. 178.

⁴ Annandale, *Journ. As. Soc. Bengal*, 1906, pp. 75 and 205, pl. 2, fig. 1.

- b. Nuchal shield present; gular suture as long as pectoral and humeral sutures together .. *T. parallelus.*
- c. Nuchal shield absent; gular suture no longer than pectoral suture, which is not more than half as long as humeral suture .. *T. travancorica.*
- B. Forehead with small, irregular shields; carapace with radiating yellow lines; spurs on hind thighs present or absent.
- a. Spurs on hind thighs well developed; plastron with dark radiating lines well developed on shields .. *T. elegans.*
- b. Spurs on hind thighs feeble; dark radiating lines absent from or poorly developed on plastron .. *T. platynota.*
2. Supracaudal shields two.
- A. Antero-lateral border of second and third vertebral shields not or but slightly shorter than postero-lateral .. *T. emys.*
- B. Antero-lateral borders of second and third vertebral shields much shorter than postero-lateral .. *T. latinuchalis.*
- II. Species with four claws on the fore-feet.
1. Carapace much depressed .. *T. horsfieldii.*
2. Carapace not depressed .. *T. baluchiorum.*

Testudo parallelus, sp. nov.

Testudo elongata, Anderson (*partim*), *Anat. Zool. Res. Yunnan*, p. 712 (1879).

The statement that *Testudo elongata* occurs in Peninsular India, which is repeated in several revisions of the Testudinidae, appears to rest on a passage in Anderson's account of that species cited above. He says that he obtained specimens from Chaibassa in Chota Nagpur from Colonel Dalton. None of these specimens can now be traced; another from the same district differs in so many characters from any individual in our long series of Burmese examples that it must be recognized as the type of a new but closely allied species, for which the name *Testudo parallelus* is proposed.

Carapace long and narrow, about $2\frac{1}{2}$ times as long as high and $1\frac{2}{3}$ times as long as broad; *sides parallel*; *costal region steep, not at all convex*; *vertebral region hardly flattened but by no means strongly arched longitudinally*; *posterior region convex backwards, descending abruptly*; anterior and posterior margins retroverted and somewhat feebly serrated. Nuchal narrow, with parallel sides, projecting strongly in front; vertebral shields as in *T. elongata*; supracaudal

undivided, strongly arched and curved inwards below. Shields of a warm golden-brown colour, some of them bearing small eccentric black marks; axillary and inguinal shields well developed.

Plastron large, of the same colour as the carapace, with a few scattered black spots; bridge longer than either anterior or posterior lobe; the former truncate and slightly retroverted in front, the latter deeply notched behind. *Gulars* very large, the suture between them equal to the median humeral and pectoral sutures together or to the median femoral suture; suture between the pectorals a little longer than that between the humerals; that between the abdominals much the longest; anals forming a short suture.

Head pale yellow (in spirit), of moderate size; a pair of very large praefrontals covering the snout, followed behind by a much smaller frontal with a pair of shields considerably longer than itself disposed symmetrically one on either side of it; occipital region covered with small irregular shields. Jaws by no means strongly hooked or prominent; upper jaw feebly tricuspid.

Limbs not very powerful. Fore limbs with five claws, covered with well-developed scales; those on the dorsal surface irregular in size, with three very much larger than the others; outer edge of the limb with strongly projecting, imbricate, claw-like scales. Hind limb devoid of femoral spurs; some relatively small projecting tubercles on the heels.

Tail moderate, ending in a claw-like spur.

Skull closely resembling that of *T. elongata* but with the terminal tooth of both jaws shorter.

Type (♀). No. 11379. Rept. Ind. Mus.

Habitat.—Chaibassa (Singbhum) district, Chota Nagpur.

Closely as this species is related to *T. elongata*, it can be recognized by the straight and parallel sides and abrupt posterior region of its shell, the plane (non-convex) costal region and the large gular shields. The cephalic shields and the scales on the dorsal surface of the fore-feet are also different. The same characters will separate it from *T. travancorica*. The type is an adolescent female in spirit from which I have had the skull removed. Its shell is 185 mm. long. It is unfortunate that only a single specimen is available. I have been attempting in vain for some years to obtain more material; but our series of *T. elongata* is a large one and no confusion with any other species is possible. In *T. travancorica* the gulars are shorter than in *T. elongata* and the frontal shield is even larger, unless, as is sometimes the case, it is broken up irregularly into several scales.

Family TRIONYCHIDAE.

Emyda granosa intermedia, Annandale.

Emyda granosa intermedia, Annandale, *Rec. Ind. Mus.*, VII, p. 171, pl. vi, fig. 3 and p. 264 (1912).

This race is apparently common all over Chota Nagpur, except probably in the hills. I have recently obtained specimens from

Angul in the interior of Orissa from Mr. J. Taylor; other localities are given in the papers cited.

Although I can at present only put on record definitely five species of *Chelonia* as having been recorded from Chota Nagpur, viz. :—

- ? *Geoemyda trijuga* (amphibious),
Geoemyda indopeninsularis, nov. (amphibious),
Geoemyda tricarinata (terrestrial),
Testudo parallelus, nov. (terrestrial),
and *Emyda granosa intermedia* (aquatic),

it is probable that the following species, at any rate, also occur :—

Testudinidae	{	<i>Kachuga lineata</i>	} Aquatic species.
		<i>Kachuga dhongoka</i>	
		<i>Kachuga tectum intermedia</i>	
		<i>Batagur baska</i>	
Trionychidae	{	<i>Testudo elegans</i>	} Terrestrial species.
		<i>Trionyx leithii</i>	
		<i>Trionyx gangeticus mahanad-</i> <i>dicus</i>	

These seven forms have been found on both sides of Chota Nagpur, and no reason why they should not be found in that division of the Province of Bihar and Orissa can at present be brought forward.

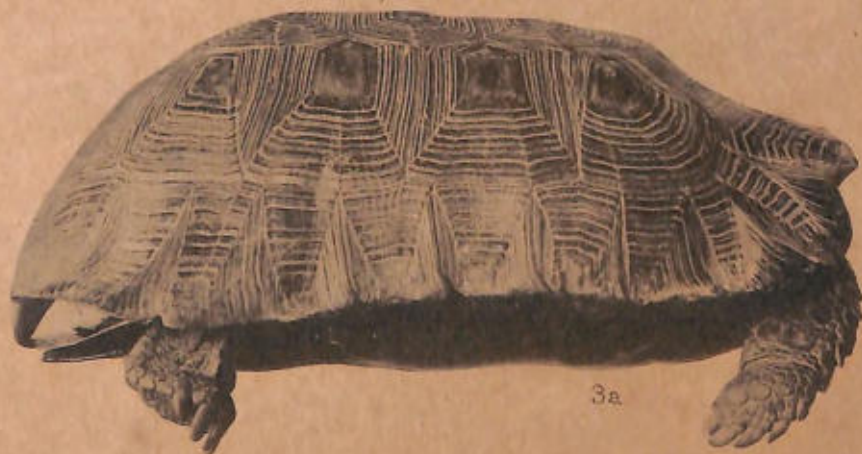
It would be idle, until we know more of the tortoises of the division, to discuss in detail the geographical distribution of those that have actually been found. It is, however, noteworthy that of the four Testudinidae, two should belong to previously undescribed species; while two, or possibly three, are closely related to, when not identical with, forms otherwise known only from territory east of the Gangetic delta, and quite distinct from forms found in the valley of the Ganges. The three species are:—*Geoemyda tricarinata*, which is specifically identical with a form only known to occur in Assam north of the Brahmaputra, *Testudo parallelus* (very closely related to *T. elongata*, found in Assam, Burma, Indo-China and the Malay Peninsula) and *Geoemyda indopeninsularis*, which is related to the Burmese (? and Assamese) race of *G. trijuga* and ranges westwards and southwards into the Bombay Presidency. *Testudo parallelus* is closely related not only to *T. elongata* but also to *T. travancorica*, which is only known from the Western Ghats,¹ and also to *T. forsteri* from Celebes; the four species together forming a very compact and distinct section of the genus *Testudo*.

¹ Dr. J. R. Henderson has recently sent me a specimen from the western slopes of that range in Cochin and Mr. P. Hannington one from Coorg.

EXPLANATION OF PLATE V.

New Species of Tortoise from Chota Nagpur.

- FIG. 1. Female type of *Geoemyda indopeninsularis* (reduced).
FIG. 2. Shell of male type of *Geoemyda indopeninsularis* (reduced).
FIGS. 3, 3a. Type (female) of *Testudo parallelus* (reduced).



EXPLANATION OF PLATE VI.

- FIG. 1. *Geoemyda indopeninsularis*.
1, 1a.—Head of male type, $\times \frac{1}{2}$: 1b.—Skull of same specimen (nat. size): 1c.—Hind foot, $\times \frac{1}{2}$.
- FIG. 2. Head of typical form of *Geoemyda trijuga*: young female from Madras (nat. size).
- FIG. 3. Head of *Geoemyda trijuga coronata*: young female from Cochin (nat. size).
- FIG. 4. Head of *Geoemyda trijuga thermalis*: young female from Ramnad, S.E. Madras (nat. size).
- FIG. 5. Skull of *Geoemyda trijuga edeniana* from Burma (nat. size).
- FIG. 6. *Geoemyda tricarinata*.
6.—Hind foot of specimen from northern Assam (nat. size): 6a.—Skull of type of *G. tricarinata* from Chota Nagpur (nat. size): 6b.—Skull of one of the co-types of *Chaibassia theobaldii* from northern Assam.

NOTE.—The head of *G. trijuga thermalis* is figured entirely from a specimen in spirit. The spots and streaks are much darker in life and the iris is rarely, if ever, white.



1a.



1b.



1.



3a.



1c.



3.



2a.



6a.



2.



6b.



4.



4a.



5.



6.

VI. NOTES FROM THE BENGAL FISHERIES
LABORATORY, INDIAN MUSEUM.

No. I.

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(Plates vii—x.)

INTRODUCTION.

Dr. Linton in presenting his report on the Parasites of fishes of Beaufort, North Carolina, to the American Bureau of Fisheries (1)¹ made the following remarks:—

“To the naturalist no defence need be made for the time and energy spent in the study of life in any of its phenomena. To those who are not naturalists, however, some justification is due. Particularly does this become proper when the general public, by means of such laboratories as those of the Bureau of Fisheries, furnishes facilities for scientific enquiry. One who has never undertaken to get knowledge at first-hand from nature is likely to have little conception of the vast amount of work which is oftentimes necessary for the establishment of a very simple proposition. Suppose, for example, exact and complete information is desired as to the food of the English sparrow. It should not require much reflection to convince anyone that before an adequate answer can be made to such an inquiry, trustworthy observations must be made, by competent investigators, on the feeding habits of this bird, both adult and young, in different localities throughout the year, and through a series of years. But the general public may wish to know, and in this case has a right to know, what advantage there is to it in such scientific inquiry as is implied by an investigation made on the food and the parasites of fishes.

“It may, I think, be confessed that so far as may be seen while the investigations are in progress, much of the information which is collected will be of interest only to zoologists. In view, however, of the well-known fact that many diseased conditions, and even epidemics, result from the presence of parasites, and, further, that the parasites are as a rule introduced, either as eggs or larvae, along with the food, it is not difficult to see that the more complete and systematic our knowledge becomes of the interrelations of the animals which harbour the parasite, interrelations which depend very intimately on the food habits of fishes, the more certain are we to be able to cope successfully with any disease which may arise. A case in point is furnished by one of the recent triumphs of medical knowledge. It is scarcely possible that the cause of malaria and of yellow fever could have been discovered if it had not been for the previous contributions to knowledge made by investigators in parasitism. The germ of malaria is a parasite whose round of life is passed in the blood-cells of man, and in certain organs of the mosquito. The germ of yellow fever seems to have a similar history. These interrelations between the mosquito and man were not even dreamed of a generation ago. The history of trichinosis is now so well known that a simple allusion to it in this connection is sufficient. Every well-informed

¹ These numbers refer to the literature cited at the end.

person knows, or may easily know, how the disease is communicated and what part is played in the matter by the pig and by rats and mice.

"The immense value to humanity of such a discovery as the cause of malaria and of yellow fever is entirely beyond our powers to estimate; and yet, this value must not be credited to this one discovery alone, as if it were a thing apart. No less credit must be given to the long line of investigators whose persistent interrogations of nature have led up to this discovery, and will surely lead to others no less valuable."

Linton's remarks apply very aptly to the situation of affairs in India. As our knowledge of the parasites of freshwater fish in India is at present nil, it is impossible to say to what extent the inland fisheries in particular are affected through this cause. As far as we know, there are no fish parasites in India capable of infecting man. In Europe, the larva of *Bothriocephalus latus* (a worm inhabiting man and often measuring 20 to 30 ft. in length) occurs in the Pike and is transmitted from this host to man; but up to the present this worm has not been recorded from India. It is just possible that a certain rare Trematode (*Gasterodiscus hominis*, Lewis and McConnel) recorded twice from man in Calcutta, may have its earlier stages either in the flesh or on the skin of certain fish. As far as we know at present, the bad effects of parasitism amongst fish are confined, in Bengal, entirely to the fish themselves, and amongst those forms inhabiting freshwater tanks these effects tend to be cumulative. An illustration will emphasize my meaning.

In the following paper is recorded a large larval worm (*Ligula simplicissima*) from the coelom of *Labeo calbasu*. This worm has its adult stages in a certain bird. Such birds live in the vicinity of the tanks containing the fish on which they feed. When a bird becomes infected, the parasite matures in the bird's intestine and passes millions of eggs to the exterior with the bird's faeces. Such faeces are often dropped in a tank and provide an extensive source of infection to the fish in the tank. The cumulative infection of the fish is due solely to the fact that such tanks have no current of running water. To what extent such infection exists in Indian fish has still to be determined. Infected fish are almost always thin, emaciated, undersized and lacking in vitality.

Of the Cestode parasites, the majority occur in the gut or on the mesenteries, and are thus removed before the fish is eaten. Up to the present no Cestode parasite, or cyst, has been recorded from the flesh of any fish in India. The Trematode parasites may occur either on the skin or in the gut, or, as in the case of the Mahseer recorded in this paper, the parasite may infect the muscles.

Of other causes resulting in the disease of fishes, such as parasitic Crustacea, Acanthocephala, Nematodes, infectious parasitic fungi, infectious parasitic Protozoa (Myxosporidia) and bacteria, India provides a new field of work, and at present it is impossible to say to what extent the inland fisheries suffer through the effects of such parasites.

ON SOME TREMATODE AND CESTODE PARASITES
FROM FISH.

The only work done as yet on the parasites of Indian fish consist of the reports of :—

I. Shipley and Hornell who worked out the collection of Cestodes made by Prof. Herdman in Ceylon.

II. The present writer who continued and extended that work and described his own collections in the Ceylon Marine Biological Reports. (17).

III. Max Lühe who described the Trematodes collected by Prof. Herdman. (5).

These reports all deal with parasites from marine fish. The present paper is the first one dealing with parasites mostly from freshwater fish, either in India, Burma or Ceylon.

CESTODA.

The two species of Cestode parasites to be described, viz. *Ophryocotyle bengalensis*, n. sp., and *Bothriocephalus (Anchistrocephalus) polyptera* (Leyd) constitute the first record of any adult Cestode found in any Teleostean fish in Indian waters. Southwell in his examination of marine Teleosts in Ceylon over a period of five years never obtained a single adult Cestode parasite, although encysted larval forms were extremely common. The above two species were obtained from (a) *Ophiocephalus striatus* (Bengali, Sol) and (b) *Labeo rohita* (Bengali, Rohu). Both species of parasites occurred in each species of fish. Those from *Labeo rohita* were few in number. Those from *Ophiocephalus striatus* occurred in such large numbers, along with some undescribed Trematodes, that the lumen of the intestine of this fish in one particular case appeared entirely choked. Specimens of *Ophryocotyle bengalensis*, n. sp. were numerous. Only two specimens of *Bothriocephalus (Anchistrocephalus) polyptera* (Leyd.) were obtained. It has been noted that cystic forms of Cestoda in general are exceedingly common amongst marine Teleosts. On the other hand such cysts are quite rare in freshwater forms. Up to the present I have been unable to discover any except the larva of *Ligula simplicissima*, which will be referred to later, and this was not encysted, but free in the coelom. Contrary to what occurs in marine fish, adult Cestodes are fairly common in freshwater Teleosts in Bengal, and our examples were obtained from the first fish of the preceding species which we examined. This difference finds an explanation in the widely different conditions existing normally in the sea, and in fresh water. In the sea, adult Cestodes are always found in fish of the shark and ray tribe, which, on the whole, are not subject to the ravages of other predatory fish. In such an host the adult tapeworms find a safe and secure retreat, from which abode an unending stream of eggs are liberated.

The following list given by Linton will illustrate this fact:—

Cestode.	Usual or only known final host.	Intermediate hosts.
<i>Tetrarhynchus bisulcatus</i> ..	<i>Carcharhinus obscurus</i>	18 species of Woods Hole fishes. 22 species of Beaufort fishes. 2 species of Bermuda fishes.
<i>Rhynchobothrium bulbifer</i> ..	<i>Mustelus canis</i> ..	22 species of Woods Hole fishes.
<i>Rhynchobothrium speciosum</i> ..	<i>Carcharhinus obscurus</i>	12 species of Woods Hole fishes. 3 species of Beaufort fishes. 5 species of Bermuda fishes. 4 species of Tortugas fishes.
<i>Rhynchobothrium imparispine</i>	<i>Raja ocellata</i> ..	28 species of Woods Hole fishes.
<i>Otobothrium crenacolle</i> ..	<i>Sphyrna zygcena</i> ..	In a large number of Woods Hole and Beaufort fishes, and in 3 Bermuda fishes; especially abundant in flesh of butterfish.

In fresh water, similarly suitable conditions for the parasite are found in Teleosts, as the larger forms of this group like *Labeo rohita*, and the voracious *Ophiocephalus striatus* (which occasionally attains a length of 3 feet or more), are seldom, if ever, preyed upon. There are only two species of freshwater rays known in India, viz. *Hypolophus sephen* (Mull. and Hen.) and *Trygon fluviatilis* (H.B.), measuring $5\frac{1}{2} \times 3\frac{1}{2}$ and $4\frac{1}{2} \times 2\frac{1}{2}$ feet respectively. These are not voracious, and it is improbable that either of them devour large Teleosts.

In the sea, Teleosts are frequently eaten by sharks and rays, and hence we find that Teleosts under these conditions harbour cystic forms only, and that these are capable of maturing and becoming adult in the intestines of their larger and more powerful enemies. In this connection it has already been pointed out (Southwell, 17) that marine Teleosts are not usually intermediate, but collateral hosts to the parasite, and this statement receives strong support from the conditions found to exist in freshwater Teleosts. The larval forms of the parasites to be described have not up to the present been found. It seems probable that they will eventually be discovered encysted either in certain Copepoda on which *Labeo rohita* feeds, or on the mesenteries of smaller fish such as are devoured by *Ophiocephalus striatus*.

The following list comprises, as far as I have been able to ascertain, all species of Cestodes which have been recorded from Teleosts. It is compiled from the works of Rudolphi (16), Lönnerberg

(13), Riggenbach (15), Diesing (10), Lühe (14), Ward (18), Braun (9) and various papers by Linton. In some cases I have been unable to determine the authority for certain of the species of parasites named, and especially is this the case with those recorded by Diesing. The name placed in *square* brackets, after the specific name of the worm, indicates the source from which the record is derived. Those fish marked with an asterisk (*) are marine; those marked with a dagger (†) are freshwater forms, whilst those marked with a double dagger (‡) live partly in the sea, and partly in fresh water.

Parasite.		Host.
<i>Sanguinicolle armata</i> , Plehn.	[Lühe.]	† <i>Tinca tinca</i> .
„ <i>inermis</i> , Plehn.	„	† <i>Cyprinus carpio</i> .
	(Parasitic in the blood.)	
<i>Caryophyllaeus mutabilis</i> , Rudolphi.	[Lühe.]	† Cyprinoids generally.
<i>Cyathocephalus truncata</i> (Pall.)	„	† „ „
<i>Leuckartia</i> sp., Moniez.	[Ward.]	‡ Salmon.
<i>Bothriocephalus proboscideus</i> (Block.)	„	‡ „
„ <i>solidus</i> , Drummond.	„	‡ „
„ <i>succicus</i> , Lönn.	[Lönnberg.]	‡ <i>Salmo salar</i> .
„ <i>cordiceps</i> , Liedy.	[Ward.]	‡ Salmon.
„ <i>infundibuliformis</i> , Rudolphi.	„	‡ „
„ <i>claviceps</i> , Rudolphi.	[Lühe.]	‡ <i>Anguilla anguilla</i> .
„ <i>carpionis</i> .	[Diesing.]	‡ <i>Salmo carpio</i> .
„ <i>eriosis</i> .	„	* <i>Salmo eriox</i> .
„ <i>barbatulae</i> .	„	† <i>Cobitis barbatula</i> , Linnaeus.
„ <i>callariae</i> , Rudolphi.	„	* <i>Gadus callarias</i> , Linnaeus.
„ <i>gadi rediani</i> .	„	* <i>Gadus (Morrhua) minutus</i> , Cuvier.
„ <i>gadi morrhua</i> , Cuvier.	„	* <i>Gadus morrhua</i> .
„ <i>lophii</i> .	„	* <i>Lophius piscatorius</i> , Linnaeus.
„ <i>cepolae</i> .	„	* <i>Cepola rubescens</i> , Linnaeus.
„ <i>bicolor</i> , Nordm.	„	* <i>Pelamys sarda</i> , Cuvier.
„ <i>rectangulatum</i> , Rudolphi.	[Rudolphi.]	† <i>Cyprinus barbuis</i> .
„ <i>fragilis</i> , Rudolphi.	„	‡ <i>Clupea alosa</i> .

<i>Bothriocephalus punctatus</i> , Ru-	[Rudolphi.]	* <i>Cottus scorpio</i> .
dolphi.		
„ (<i>Anchistroce-</i>	[Southwell.]	† <i>Labeo rohita</i> and
<i>phalus</i>) <i>poly-</i>		† <i>Ophiocephalus striatus</i> .
<i>lyptera</i> (Ley-		
den).		
<i>Dibothrium belones</i> , Rudol-	[Diesing.]	* <i>Belones acus</i> , Cuvier.
phi.		
„ <i>punctatum</i> , Risso.	„	* <i>Rhombus barbatus</i> .
„ <i>crassiceps</i> , Cu-	„	* <i>Merluccius vulgaris</i> .
vier		
„ <i>rugosum</i> , Ru-	„	* „ „
dolphi.		
„ <i>plicatum</i> , Ru-	„	* <i>Xiphias gladius</i> , Lin-
dolphi.		naeus.
„ <i>heteropleurum</i> ,	„	* <i>Centrolophus pompilus</i> ,
Diesing.		Lac.
„ <i>angustatum</i> ,	„	* <i>Scorpena scrofa</i> , Lin-
Rudolphi.		naeus.
„ <i>labracis</i> .	[Diesing.]	* <i>Labrax lupus</i> , Cuvier.
„ <i>manubriforme</i> ,	[Linton.]	* <i>Tetrapturus imperator</i> .
Linton.		
„ <i>hastatum</i> , Lin-	„	† <i>Polyodon spathula</i> .
ton.		
„ <i>laciniatum</i> , Lin-	„	* <i>Tarpon atlanticus</i> .
ton.		
„ <i>occidentale</i> , Lin-	„	* <i>Sebastes</i> .
ton.		
„ <i>restiforme</i> , Lin-	„	* <i>Tylosurus carribaeus</i> .
ton.		
„ <i>punctatum</i> , Lin-	„	* <i>Platessa plana</i> .
ton.		
„ <i>microcephalum</i> ,	„	* <i>Mola rotunda</i> .
Linton.		
„ <i>plicatum</i> , Lin-	„	* <i>Xiphias gladius</i> .
ton.		
„ <i>rugosum</i> , Lin-	„	* <i>Gadus morrhua</i> .
ton.		
„ <i>aluterae</i> , Lin-	„	* <i>Alutera schoepfi</i> .
ton.		
<i>Taenia ocellata</i> , Rudolphi.	[Braun.]	††* <i>Salmo</i> , <i>Perca</i> , <i>Aceri-</i>
		<i>na</i> , <i>Esox</i> .
„ <i>osculata</i> , Goeze.	[Diesing.]	† <i>Silurus glanis</i> .
„ <i>pollochii</i> , Ratke.	„	* <i>Merlangus pollachius</i> .
„ <i>octolobata</i> .	[Rudolphi.]	* <i>Cottus norvegica</i> .
„ <i>filicollis</i> , Rudolphi.	„	* <i>Cottus cernua</i> .
„ <i>calycina</i> ,	„	† <i>Silurus glanis</i> .
„ <i>dilatata</i> , Linton.	[Linton.]	* <i>Anguilla chyrsopta</i> .
<i>Ichthyotaenia diesingii</i> , Mont-	[Riggenbach]	† <i>Silurus dargado</i> .
ticelli.		

<i>Ichthyotaenia macrocotyle</i> , Monticelli.	[Riggenbach]	‡ <i>Silurus megalcephalus</i> .
„ <i>coryphicephala</i> , Monticelli.	„	† „ sp.
„ <i>abscisca</i> , Rig- genbach.	„	„ „
„ <i>fossata</i> , Rig- genbach.	„	‡ <i>Pimelodus pati</i> .
„ <i>malapteruri</i> , Fitsch.	„	† <i>Malapterurus electricus</i> .
„ <i>hemisphaerica</i> , Molin.	„	‡ <i>Anguilla vulgaris</i> .
„ <i>salmonis omul</i> , Pallas.	„	‡ <i>Salmo omul</i> .
„ <i>eperlani</i> , Acha- rius.	„	* <i>Osmorus eperlanus</i> .
„ <i>idus</i> , Viborg.	„	† <i>Leuciscus idus</i> .
„ <i>macrophalla</i> , Dies.	„	† <i>Cichla monoculus</i> .
„ <i>belones</i> , Müller.	„	* <i>Belone acus</i> .
„ <i>micropteri</i> , Liedy.	„	† <i>Micropterus nigricans</i> .
„ <i>osculata</i> [Lühe.] (Goeze).		† <i>Silurus glanis</i> .
„ <i>longicollis</i> (Ru- dolphi).	„	‡ Salmonidea.
„ <i>torulosa</i> (Batsch).	„	† Cyprinoids.
„ <i>percae</i> (Müll.)	„	† <i>Perca</i> , etc.
„ <i>salmonis umb- lae</i> , Zschokke.	„	‡ <i>Salmo salvelinus</i> .
„ <i>sagitta</i> , Grimm.	„	† <i>Nemachilus barbatula</i> .
„ <i>ambigua</i> (Duj- ardin).	„	† <i>Gasterosteus laevis</i> .
„ <i>cyclops</i> , Lin- stow.	„	† <i>Coregonus maraena</i> .
„ <i>macrocephala</i> , Creplin.	„	‡ <i>Anguilla anguilla</i> .
<i>Bothriotaenia</i> <i>proboscidea</i> , Mühling.	[Ward.]	‡ Salmon.
<i>Ophryocotyle</i> <i>bengalensis</i> , Southwell.	[Southwell.]	† <i>Labeo rohita</i> and † <i>Ophiocephalus striatus</i> .
<i>Rhynchobothrium</i> <i>crassiceps</i> , Diesing.	[Diesing.]	* <i>Lophius piscatorius</i> , Linnaeus.
<i>Tetrarhynchus</i> <i>appendicula- tus</i> , Rudolphi.	[Ward.]	‡ Salmon.
„ <i>macrobothrius</i> , Von Siebold.		
<i>Stenobothrium</i> <i>appendicula- tum</i> , Diesing.	[Ward.]	‡ „

<i>Tetrarhynchus grossus</i> , Rudolphi.	[Ward]	†	Salmon.
„ <i>solidus</i> , Drummond.	„	†	„
„ sp., McIntosh.	„	†	„
„ sp., Creplin.	[Lühe.]	†	<i>Silurus glanis</i> .
<i>Dibothriorhynchus gracilis</i> .	[Diesing.]	*	<i>Ammodytes cicerelus</i> , Rafinesque.
<i>Tetrabothriorhynchus migratorius</i> , Diesing.	„	*	<i>Belones acus</i> , Cuvier.
<i>Tetrabothrium minimum</i> , Linstow.	[Ward.]	†	Salmon.
<i>Monobothrium hexacotyle</i> , Linton.	[Linton.]	†	<i>Catostomus</i> sp.
<i>Ptychobothrium belones</i> , Mihi.	[Lönnberg.]	*	<i>Belone vulgaris</i> .
<i>Triaenophorus anguilla</i> , Lönn.	„	†	<i>Anguilla</i> „

In addition to the preceding, the following parasites are probably adult in certain Teleosts, but I have been unable to verify this statement:—

<i>Alyselminthus gasterostei</i> , Zed.	<i>Taenia cyclops</i> , Linstow.
<i>Bothriocephalus gadi barbati</i> , Rudolphi.	„ <i>cyprini idi</i> , Rudolphi.
„ „ <i>merluccii</i> , Rudolphi.	„ <i>gasterostei</i> , Fabr.
„ <i>cyprini phoxini</i> , Leuckart.	„ <i>percae</i> , Müll.
„ <i>salmonis carpionis</i> , Rudolphi.	„ <i>salmonis</i> , Müll.
„ „ <i>umblae</i> , Koll.	„ „ <i>umblae</i> , Zschokke.
„ <i>salvelina</i> , Lönnberg.	„ „ <i>wartmanni</i> , Fröl.
	„ <i>salvelina</i> , Schrk.
	<i>Tetrabothrium polypteri</i> , Leydig.
	<i>Tetrarhynchus morrhuae</i> , Rudolphi.

The preceding list represents, I think, in a general way, all the adult Cestodes recorded to date from Teleosts. As far as I have been able to ascertain, I have excluded larval and immature forms from the list. In this respect I am by no means sure that this list is free from error, or that it includes absolutely every adult form recorded.

In all about a hundred species are recorded. As the total number of Cestodes known is probably well over 2000 species, the percentage recorded from Teleosts amounts to less than 5 per cent. of known species. It will be noted that very many of the Teleosts named, from which adult Cestodes have been obtained, are either marine, or spend some part of their life out at sea. Thus, salmon are marine fish which normally migrate up the rivers to spawn. The eels, on the other hand, are freshwater forms which migrate to the sea to spawn. In both cases it seems highly probable that the initial infection is brought about out at sea. This is certainly the case with the salmon. Excluding the migratory and marine species from the list, the number of Cestodes recorded from fish

which are purely freshwater forms is not more than 30, or approximately 1·5 per cent.

Specimens of the parasites described in this paper have been deposited in the Indian Museum.

***Ophryocotyle bengalensis*, sp. nov.**

(Pl. vii, figs. 1—3.)

Over sixty specimens of this worm were obtained from the intestine of *Ophiocephalus striatus*, and a few were also obtained from the intestine of *Labeo rohita*. Both fish were caught at Berhampur Court, Bengal, in a freshwater tank. This genus of tapeworm usually occurs in birds, and considerable interest attaches to the presence of these adult forms in Teleosts. The average length of the worms was 7·5 mm. Greatest breadth (at posterior end) ·8 mm. These latter segments were from 4 to 5 times broader than long. The head consists of four cup-shaped suckers, directed slightly forward. Anteriorly the head terminates in an umbrella-shaped protrusible rostral disc whose circumference is armed with a large number of hooks arranged in two rows. The exact number could not be determined, as, in removing the parasites from the intestine of the fish, many of the hooks had been torn away. The exact number counted in three specimens is given in the following table;—

- (i). One row of twenty-five hooks
- (ii). Two rows with a total of fifty-three hooks.
- (iii). Two rows with a total of fifty-two hooks.

The hooks appear to be all similar. They have broad bases and are sharply recurved in profile. Viewed end on they appear elongated (plate vii, fig. 3).

The suckers are armed with exceedingly minute spines which appear to be limited to their anterior borders. The head measures about ·5 mm. broad. The neck is fairly long, measuring 2·7 mm. Dots of black pigment are scattered about over the whole worm. The first proglottides are exceedingly shallow, and *all* proglottides are broader than long. The lateral margins are wrinkled in such a way that in young specimens the true strobilization can only be determined under a lens. The genital apertures are lateral and are almost all on one side.

The uterus appears to be made up of a number of rounded egg capsules scattered about the proglottid.

Habitat.—The intestines of *Labeo rohita* and *Ophiocephalus striatus*. Berhampur Court, Bengal, June 1912. About sixty specimens.

Amongst the worms just described were two large specimens measuring 27 mm. and 22 mm. respectively. They differ from the smaller forms only in having the neck very much shorter and in being much larger. Two rows of about 50 hooks were counted round the circumference of the rostral disc.

Bothriocephalus (Anchistrocephalus) polyptera (Leyd.).

(Pl. vii, figs. 4—6.)

Two specimens of this tapeworm were obtained. One was from *Ophiocephalus striatus* (Bengali, *Sol*) and the other from *Labeo rohita* (Bengali, *Rohu*). As far as I am aware it has hitherto been recorded only from *Polypterus bichar*.

Our largest worm measured 17 mm. long and the greatest breadth was .8 mm. The head is rectangular in shape and consists of two fleshy bothridia united along their whole length, and deeply concave laterally, thus forming two sucker-like discs. The suckers vary slightly in size according to their degree of contraction. In the largest specimen the head measured 1 mm. long and .45 mm. broad. Anteriorly it terminates in an umbrella-shaped sucker-like rostral disc, armed with about fifty-six spines around its circumference. The spines are fairly large and spindle-shaped, and are limited to a single row round the circumference of the rostral disc. These are arranged as in fig. 6. There is no neck. The anterior segment is overhung by the posterior edges of the bothridia. The first proglottid is almost square; succeeding proglottides broaden and become slightly shorter, so that the last segment is about five times as broad as long. The edges are markedly salient. The genitalia and excretory systems were not made out. Under high magnification the body was seen to be slightly pigmented, the pigment being distributed in the form of minute globular dots. Our specimens differ from the figure given by Braun (9) of this species, in the following points:—

I.	II.
<i>Our specimens.</i>	<i>Braun's figure.</i>
(a) Fifty-four spines round terminal disc.	(a) Only thirty-two spines shown.
(b) Spines spindle-shaped and straight.	(b) Spines slightly sinuous.
(c) Two spines, anterior and opposite to each lateral sucker.	(c) Absent.

Only having two specimens, I have not thought it desirable to propose a new species on these minor differences. These variations may occur in this species. The occurrence of this worm in a Teleost is unique and has already been referred to.

Syndesmobothrium filicolle, Linton.

This parasite was obtained from a "Hilsa." As is well known, this fish (*Clupea ilisha*, Day) migrates from the sea up the principal rivers of Bengal in order to spawn. This takes place between August and October. One or more pterocercoid larvæ are frequently found on the mesenteries of each adult

fish. Such cysts have been obtained from Hilsa caught at Monghyr, Buxar, Calcutta and Diamond Harbour. The cysts are usually tadpole-shaped, but a few are strap-shaped. They vary extensively both in size and shape. The strap-shaped examples measured on an average 20 mm. long and 3 mm. broad. The tadpole-shaped cysts measured on an average 30 mm. long. The "head" of the cyst measured 3 mm. by 3 mm. and the rest of the cysts are 1.2 mm. broad. The larva itself is contained in the "head" of the cyst. This species appears to have a very wide distribution and was first described by Linton, who obtained it from a sting ray (*Trygon centrura*) in tropical America. The genus was founded by Diesing. Southwell also recorded it from Ceylon (17) as under:—

" I have no hesitation in referring to this species a number of larval forms obtained from the intestines of *Cybium guttatum* and *Chorenemus lysan*. The head of the larva is squarish in front view, with a bothrium at each corner. The bothridia are oval or cup-shaped. The larva agrees in every detail with Linton's figure of this species, save that in our types the exit of the proboscides were closed. The proboscis sacs were marked with fine criss-cross lines only visible under a high power.

" *Habitat* I. The mesenteries of *Chorenemus lysan*.

" February 25th, 1911; 45 specimens.

" These larvæ were enclosed in tadpole-shaped cysts. The cysts measuring on an average 25 mm. by 2.5 mm. The larva was contained in the head part of the cyst which, in preserved specimens, was of a yellow colour.

" The rest of the cyst was white, membranous and transparent. The larvae measured 2 mm. by .5 mm.

" II. The mesenteries of *Cybium guttatum*.

" November 27th, 1910.

" Fifty-five specimens; the same as the preceding. I believe these specimens to be the same as those described by Shipley and Hornell from *Cybium guttatum* in Part V of the Ceylon Pearl Oyster Reports, plate iii, fig. 43. It is interesting to note that Linton states that he has met with encysted forms similar to this (*Syndesmobothrium filicolle*) in various species of Teleostei, such as *Pomatomus saltatrix*, *Cybium regale*, etc. He described one from Spanish Mackerel (*Cybium regale*) in the 'American Naturalist' for February 1887, under the name of *Tetrarhynchobothrium*.

" The occurrence of this larva in these Teleosts raises the question as to the position of this stage in the life-history of the parasite. On the whole I feel confident, and I have every reason to believe, that the larvæ normally inhabit the tissues of either crabs or molluscs, and have their adult stage in some Elasmobranch. The presence of the larvae in these Teleosts is due to their feeding on crabs or molluscs, but the larva does

“ not develop any further in them than in crabs and molluscs.
 “ But if either the fish containing these cysts derived from crabs
 “ and molluscs, or the crabs and molluscs themselves, be eaten
 “ by an Elasmobranch, then, in every case, the larva would attain
 “ the adult form in the Elasmobranchs. The stage found in
 “ these fish is probably not intermediate, but casual and accidental.
 “ These fish are not to be regarded as intermediate but as
 “ accidental hosts.”

Rhynchobothrium sp. ?

A large number of club-shaped Cestode cysts were obtained from *Cybium guttatum*, Day, caught at Puri in January 1912. They measured 11 mm. long by 3 mm. broad. The smallest measured 6 mm. by 2 mm. This is the same species as that obtained and figured by Southwell from Ceylon waters (17) and from the same species of fish. The larva was also obtained in Ceylon from *Chorenemus lysan*, and was referred to as *Rhynchobothrium*, species I. The bothridia are two in number and are concave. Each bothridium appears to be divided by a faint longitudinal septum into two halves. At the posterior end, each bothridium is indented. The proboscides are coiled. The hooks are all similar and are long and slender, and bent suddenly almost at right angles at their extremity. Ninety-five specimens were collected from Ceylon in February 1911, eighty-six being from *Chorenemus lysan* and nine from *Cybium guttatum*.

Ligula simplicissima, Rudolphi.

(Pl. vii, figs. 7—8.)

Ligula simplicissima, Diesing.

“ *monogramma*, Creplin.

“ *digramma*, Creplin.

“ *catostoma*, Linton ?

“ *intestinalis*, Linnaeus.

Dibothrium ligula, Donnadieu.

Our examples were taken from the coelom of *Labeo calbasu* caught in a tank at Berhampur Court, Bengal, in September 1912. Five specimens were obtained having the following measurements:—

Specimen.	Length.	Breadth.
I.	22 mm.	8 mm.
II.	30 mm.	7 mm.
III.	43 mm.	10 mm.
IV.	145 mm.	8 mm.

The largest specimen fragmented itself during preservation, but it measured over 320 mm. and its greatest breadth was 9.5 mm. These measurements refer to preserved specimens. The average

thickness was approximately 1 mm. This larva is very widely distributed in the coelom of fishes, particularly Cyprinoids. It becomes adult in from one to two days in the intestine of certain water birds, such as those of the genus *Sterna*, *Larus*, *Colymbus*, *Urinator*, etc., which normally devour infected fishes. The adult worm (*Ligula intestinalis*, Linnaeus) sometimes measures 1 metre long and from 5-15 mm. broad, and differs but little from the larval form.

In the Indian Museum there are the following specimens of this larva :—

I. One specimen from *Labeo rohita* (Bengali, *Rohu*), measuring 165 mm. long and 10 mm. broad.

II. One specimen from *Nemachilus rupicola* (Bengali, *Korika*), length 69 mm., breadth 5.5 mm., from a small mountain stream in the East Himalayas.

III. Three specimens with no history having the following measurements :—

(a) Length 147 mm. Breadth 9 mm.

(b) " 165 mm. " 10 mm.

(c) (Fragmented). Over 350 mm. long and 9 mm. broad.

The parasite is strap-shaped, and in our specimens the extremities vary considerably in appearance. In three specimens both the anterior and posterior extremities are deeply concave. In the remaining two, the posterior extremity tapers gradually to a rounded point, whilst the anterior extremity is broadly rounded with deep, acute, median indentation. The structure and anatomy of *Ligula catastoma* is described by Linton.

These larval Cestodes form articles of food in Italy where they are sold in the markets as "Maccaroni piatti," and in southern France where they are sold in the markets as "Ver blanc" and eaten extensively.

TREMATODA.

Isoparorchis, gen. nov.

Leaf-like and translucent worms, longer than broad. Oral and ventral suckers present, the latter being near the anterior extremity. Genital aperture almost midway between the two suckers. Each intestinal ramus in the form of a continuous letter **S** extending to the posterior margin of the worm. Testes in front of germarium, paired and globular, anterior, one on each side and very slightly posterior to ventral sucker. Vitelline glands dendritic and posterior. Germarium single, tubular and posterior. Uterus single, very long, disposed along the laterally directed loops of each ramus of the intestines, passing from one loop on one side to a loop on the other side alternately, across the body of the worm, to a point near the ventral sucker. It then runs straight in the median line to the genital aperture. Shell gland minute, situated at the junction of the uterus with the duct of the vitelline glands. Excretory pore terminal, median and posterior. Vesicle of varying size.

Excretory vessel bifurcating into two lateral branches a little anterior to vesicle, each branch running approximately parallel to the intestinal ramus on its own side. Parasitic in fishes.

***Isoparorchis trisimilitubis*, sp. nov.**

(Pl. viii, figs. 9-11; and pl. ix, fig. 12.)

These Trematodes were first discovered infesting the air bladder of an adult specimen of the Silurid fish, *Wallago attu* (Bengali, *Boali*), caught in a freshwater tank at Bankipur, in March 1912. Since then, large numbers of specimens have been obtained, and every adult fish examined was found to be infected. Immature forms of this parasite have since been noted to occur in the flesh of the Mahseer (*Barbus tor*). Specimens of *Wallago attu* occur extensively in nearly all rivers of North and North-east India, and during the floods their larvae and fingerlings enter the tanks *via* the paddy fields. The fish is exceedingly voracious.

The following are the dimensions of a few of the parasites from *Wallago attu* :—

Specimen.	Length.	Breadth.
(a) ..	33 mm.	16 mm.
(b) ..	30 mm.	20 mm.
(c) ..	35 mm.	18 mm.
(d) ..	28 mm.	17 mm.
(e) ..	25 mm.	13 mm.
(f) ..	26 mm.	12 mm.
(g) ..	19 mm.	11 mm.
(h) ..	20 mm.	9 mm.
(i) ..	19 mm.	10 mm.
(j) ¹ ..	10 mm.	4.5 mm.

The thickness of the largest worm was .9 mm., that of the smallest .2 mm. (approximately). The dimensions and thickness of the worms varied a little according to the degree of contraction.

The parasites were killed in an expanded condition by spreading two drops of spirit over the surface of the body. The worms in every case expanded. When fully expanded, they were plunged into 5 per cent formalin. For the determination of the anatomy, a few specimens were dehydrated, cleared in clove oil, and mounted whole. A few were stained with Delafields Haematoxylin, and others with Borax Carmine. I did not prepare sections, but made careful dissections of the genital organs.

External characters.—The parasites are leaf-like and of a deep flesh-colour, roughly oval in shape, the posterior margin

¹ The smallest specimen obtained.

being broadly rounded and the anterior extremity being produced into a rather long, thickened, acute projection with a rounded extremity. The thickening is apparently due to the presence of the cirrus sac. This projection shows a marked tendency to curve ventrally and assume a position at right angles to the body. The oral sucker is situated somewhat ventrally, at the extreme anterior. In the largest specimen (referred to as *c*) the diameter of the sucker was .7 mm. In the same specimen the ventral sucker was situated 7 mm. from the anterior extremity and had a diameter of 1 mm. with extremely thick muscular walls. The genital aperture is situated midway between the oral and the ventral suckers and had a diameter of .85 mm. The aperture of the excretory apparatus is situated posteriorly and is median. In mature specimens the testes can be seen as opaque milky-white globular bodies, 1 mm. in diameter, situated one on each side, and slightly posterior to the ventral sucker. The vitelline glands are conspicuous as darkish masses aggregated on the posterior dorsal surface and disposed principally round the posterior termination of the two rami of the gut. These two rami stand out prominently as a pair of black sinuous tubes having a diameter of 1 mm., and running from the anterior to the extreme posterior end of the worm, where they terminate blindly. They occupy a considerable part of the middle $\frac{3}{4}$ of the length and breadth of the worm. The uterus is just visible as a delicate sinuous tube starting from the posterior end, running along the posterior laterally-directed loop of one ramus of the intestine, across to the laterally directed loop of the other ramus of the intestine, etc., to the genital aperture. Under magnification the tissue of the parasite presents a granular appearance.

Digestive system.—The mouth is situated at the base of the oral sucker and leads directly into a stout muscular pharynx. The oesophagus is exceedingly short and divides immediately into the two rami forming the intestine. Each branch runs at first straight towards the lateral margin of the worm and, rounding the ventral sucker laterally, runs ventrally to the posterior end in the form of a continuous letter **S**. The two rami do not lie symmetrically. The centrally directed loop of one ramus is situated opposite the laterally directed loop of the other ramus. The disposition of the coils of the uterus round these loops will be noted later. The two rami of the intestine extend to the extreme posterior extremity, where they terminate blindly, close to each other. The wall of the intestine is pigmented with very dark brown, almost black, and is minutely, annularly rugose throughout its length.

Excretory system.—Unless sections are made the gross details of this system cannot be made out, except perhaps in the living worm, and not always then.

The excretory aperture is situated at the posterior margin of the worm and is median. This aperture leads into a more or less globular or cylindrical contractile vesicle. From this vesicle the excretory duct runs forward a little distance and then bifurcates.

The two branches follow the contour of the two rami of the intestine, one on each side, to a point near the ventral sucker, beyond which they could not be traced. The inwardly directed loops of the branches of the excretory duct, however, extend much nearer the median line than do the corresponding loops of the intestine.

Reproductive system: (A) Male.—The testes are a pair of opaque globular bodies 1 mm. in diameter, situated one on each side of, and very slightly behind, the ventral sucker, and one testis is slightly anterior to the other. The efferent canals run forward towards the median line of the body where they appear to meet just in front of the ventral sucker. The vas deferens is short. The vesicula seminalis was not clearly made out. As sections were not prepared it was impossible to make out further details.

(B) Female.—The germarium is single and is situated posteriorly, and just anterior to the last inwardly directed loop of the right ramus of the intestine, and about 5 mm. from the posterior margin of the worm. It lies transversely as a sinuous tube. The uterus is a very long sinuous tube which first runs along the penultimate laterally directed loop of the right ramus of the intestine. It then runs across the body of the worm and along the penultimate laterally directed loop of the left ramus of the intestine. Then across the body again to the antepenultimate laterally directed loop of the right ramus of the intestine, etc., to the anterior, where it passes dorsal to the ventral sucker, to the genital aperture. The vitelline glands lie on the posterior dorsal surface. They consist of a large number of grape-like follicles connected to a duct which opens to the germarium close to the junction of the germarium with the shell gland. The shell gland is situated close to the junction of the vitelline duct with the uterus.

The recent advances made in parasitic zoology have resulted in the old genus *Distomum* having been split up into over eighty new genera. As far as I have been able to ascertain our specimens are not closely related to any of these genera.

A few specimens of this parasite were found in the flesh of a Mahseer (*Barbus tor*) caught by Capt. Parker, R.A.M.C., Sanitary Officer, Poona (Bombay Presidency), in April 1910, and were sent by him to the Indian Museum. The specimens were afterwards sent to Dr. Lieper of the Tropical School of Medicine, London. A single mounted specimen was retained in the Indian Museum and this I have examined. It measured 8 mm. in length, and the greatest breadth was 4 mm. It was immature.

Capt. Parker states that the parasite in the flesh of the Mahseer was surrounded with black pigment, and that the pigmented area extended to the surface of the skin, thereby suggesting that the parasites had bored their way in. As, however, these worms have no armature, this seems unlikely. Mahseer occur generally throughout India, but are found in greatest abundance, and of largest size, in mountain streams, or in streams which are rocky.

Wallago attu occurs throughout India, Ceylon and Burma. If Mahseer is a normal host of this parasite, then two hosts are now known. The host, or hosts, in which the earlier larval stages, sporocyst, redia and cercaria, occur, have still to be discovered.

Wallago attu is an exceedingly voracious fish and doubtless feeds amongst other species on *Nandus marmoratus*. It is possible that the mature Distomid described from *Wallago attu* may be the adult of the young Distomid described in this paper from *Nandus marmoratus*. The principal and only obvious differences lie in the fact that in the young form of this worm the gut is not sinuous, but this may become so when the parasite becomes adult. In that case the Mahseer (*Barbus tor*) becomes a collateral host only.

An immature Trematode from the ovaries of *Nandus marmoratus*, Ham. Buch.

“*Distomum*” sp.

(Pl. ix, figs. 13—14.)

During the examination of a number of specimens of *Nandus marmoratus*, Ham. Buch., a freshwater fish seldom exceeding 7 inches in length, from the Bhagirathi river at Berhampur Court, Bengal, India, on June 30th, 1912, large numbers of immature Trematodes were discovered parasitic in the ovaries.

No examples were found in the male fish examined, the parasites being limited entirely to the females. This fish spawns in the various rivers beyond tide-marks, between the middle of June and the middle of August. The diameter of the eggs is approximately .5 mm. The parasites were found adherent by their ventral sucker to the eggs of the fish. Not more than one parasite was found attached to each egg, and roughly, not more than 10 per cent of the eggs were affected. The parasites were not easy to detect, being of exactly the same colour as the eggs of the fish, viz. yellowish brown. Other specimens of the parasite were found attached to the mesentery and to the stroma framework of the ovary. There can be no doubt but that such eggs as are attacked by this parasite are eventually destroyed, and it appears probable that the output of eggs is thus decreased by approximately 10 per cent. Infection appears to be highest when the eggs of the fish are almost ripe, and this serves the double purpose of providing a maximum of food for the parasite, as well as ensuring its protrusion and liberation with the ripe eggs. Opportunity is thus afforded the parasite of finding its final host and maturing therein.

Description of the parasite.

Length of the longest specimen	..	4 mm.
Length of the smallest specimen	..	2.8 mm.
Breadth of the longest specimen	..	1.3 mm.
Breadth of the smallest specimen	..	1 mm.

The body is superficially divided into two parts. The anterior $\frac{1}{3}$ th is subglobular and the posterior $\frac{2}{3}$ th is flat and leaf-like. They

vary slightly accordingly to the degree of contraction during preservation. The ventral surface is slightly concave and the dorsal surface convex. The curvature is usually greatest towards the anterior extremity. At this extremity there is placed terminally, a slightly muscular sucker, .4 mm. in diameter, at the base of which the mouth is situated. Owing to the curvature of the animal this sucker appears subventral rather than terminal. On the ventral surface, anteriorly, there is a second larger and more muscular sucker, having a diameter of .6 to .7 mm. and situated so that the centre of the sucker lies midway between the two superficial divisions of the body. Granular depositions occur in the skin. Anteriorly these are arranged in discontinuous concentric bands, whilst more posteriorly they become irregular, and are often concentrated at the lateral margins. The digestive apparatus represents all that is developed of the internal anatomy. As we have seen, the mouth is situated at the base of the anterior sucker. It leads into an extremely short oesophagus, and this divides immediately into the gut, which consists of two simple undivided branches running along the sides of the animal to the extreme posterior end. No pharynx was present. The two lateral branches, or rami, of the intestine are discernible to the naked eye, as broad thickened patches of a yellow colour, forming nearly the entire body of the animal. Under magnification, the walls of the intestine are seen to be puckered. Posteriorly, the two branches terminate blindly. No trace of either the reproductive or excretory system was discernible even under high magnification.

This species, which being immature, cannot at present be determined, bears a general resemblance to an immature *Distomum* obtained and figured by Linton (1) from two species of Dolphin, viz. *Coryphaena hippurus* and *Coryphaena equisetis*, common in American waters. He refers to this parasite (without naming it) as under:—

“Dimensions in millimeters, slightly compressed. Length 3.35. Diameter anterior 0.11, at ventral sucker 0.33, nearly uniform to posterior end. Oral sucker 0.10, breadth 0.08, ventral sucker circular 0.24 in diameter. These specimens are immature. There is no pharynx. The oesophagus is slender. The intestinal rami begin in a convoluted mass slightly in front of ventral sucker, and continue to the posterior end, being voluminous and apparently irregularly constricted, so as to present the appearance of a series of translucent bodies filling the post-acetabular region of the body. The intestines are filled with structureless seemingly colloid material. No trace of genitalia could be made out in any of these distomes. While they are immature there should be no difficulty experienced in recognizing these peculiar forms.”

Our species thus differs from Linton's in being much broader and in having larger suckers. His were marine, ours are freshwater. Young forms of different species are, in all probability, very similar. It seems likely that in spite of the general resemblance of Linton's species to ours, they are different. The occurrence of

his specimens, however, in a Dolphin, which had fish in its stomach, seems to indicate that his form had been derived from fish, and that the worm had either not had time to develop in the Dolphin, or that it did not do so in that host. The condition described by Linton would find a parallel here in the stomach of any predaceous animal (such as *Wallago attu*) which might eat the eggs, or the mature female of *Nandus marmoratus*. The only other form, which, as far as I have been able to ascertain, resembles our species is a larva of *D. variegatum* figured by Dr. A. Looss (2). The differences between the two are that our specimens are twice as large, and that the ventral sucker is more anterior in ours than in that figured by Looss. Looss's examples were from the lung of a frog. The life-history of the worms constituting the genus to which our young specimens belong is extraordinarily complicated. Two examples briefly outlined will serve to indicate this fact and will also illustrate how difficult it is to determine young forms.

I. There occurs in Europe a Trematode belonging to the genus *Gasterostomum*. The eggs liberated from this worm have their first larval stages in certain mussels (*Anodonta*). In this host the larvae develop into sporocysts, and redia, and cercariae are eventually formed. If infected mussels are eaten by *Belone vulgaris* (a Gar fish) the cercariae develop into young Trematodes. *Belone vulgaris* has finally to be devoured by a Dogfish or Ray before the young worms become adult.

II. Again the disease known in Europe as liver-rot in sheep is caused by a worm (*Distomum hepaticum*) of the same genus as the larvae described from *Nandus marmoratus*. The eggs from the worm causing liver-rot are liberated with the faeces of the sheep, and these attack a small snail (*Limnea truncatula*). The earlier larval, sporocyst and redia stages are passed in the tissues of the snail. The resulting cercariae leave the snail and encyst on the grass. In this condition they are again eaten by sheep and the life cycle recommences. In the case of *Distomum hepaticum* the earlier larval, sporocyst, redia, and cercaria stages all develop in one host, whilst in the case of the *Gasterostomum* already cited, the preceding stages are distributed between two hosts, namely mussels and the Gar fish.

In the case of the young worms under consideration, the earlier larval, sporocyst, redia and cercaria stages have already been passed through. These stages, or part of them, are possibly passed in the snail *Vivipara bengalensis* which occurs abundantly along the banks of most rivers in Northern India. These must needs be eaten by the fish *Nandus marmoratus* before the young forms develop. The young worms are apparently liberated with the ripe eggs of the fish. These eggs are extensively devoured by frogs and voracious fish, and it seems likely that the adult worm occurs in such an host. A limited investigation of about 60 frogs found on the banks of the Bhagirathi yielded no result, and up to the present, other probable hosts have not been examined. Linton's young *Distomum*, referred to above, was apparently from

the stomach of the Dolphin, and the Dolphin had been feeding on fish as was shown by the stomach contents. The young form might not develop into an adult in the Dolphin, as nearly every parasite has its particular host.

***Allocreadium annandalei*, sp. nov.**

(Pl. ix, figs. 15—16.)

A large number of specimens of this Trematode were obtained from the stomach of a specimen of *Rhynchobatis djeddensis* measuring 5 feet, caught in Portugal Bay, Ceylon, on February 2nd, 1911. The parasites were cylindrical in shape, slightly flattened dorso-ventrally and measured on an average 13 mm. in length (alcoholic specimens) and 3 mm. in breadth. The oral sucker is situated 5 mm. from the anterior end and is subventral. The ventral sucker is situated 5.5 mm. from the anterior extremity and is raised above the general surface of the worm. The diameter of both suckers is 1.1 mm. and each sucker is very strongly developed. The genital aperture is situated nearer the oral than the ventral sucker, and is so minute that it cannot be seen except in sections. The excretory aperture is situated at the posterior extremity, which is pointed. The portion of the worm anterior to the oral sucker is flattened dorso-ventrally, and is also pointed. The external surface of the worm is marked by a series of both annular and discontinuous concentric rings.

Viewed *in toto*, cleared in clove oil, the edges of the worm appear serrated. No spines, however, are present, the spinose appearance being due entirely to the wrinkled cuticle. The muscular system is strongly developed, the thickness of the muscular wall of the body being .3 mm. in spirit specimens.

Digestive system.—The mouth is situated at the base of the oral sucker, and leads directly into a strong muscular pharynx. The two rami of the intestine immediately succeed the pharynx and run laterally close up to the body-wall, to the extreme posterior end.

Reproductive system.—There are a pair of large testes, situated one in front of the other, at the extreme posterior end. They each measure roughly 1.4 mm. long and are squarish or oblong in shape and flattened dorso-ventrally. The vas deferens consists of a pair of extremely delicate tubes running laterally (one on each side) to a point just dorsal to the anterior rim of the ventral sucker, where they unite and open into the cirrus sac. This is large, muscular and conspicuous.

The cirrus is an irregularly coiled organ lying midway between the cirrus sac and the large seminal vesicle. The seminal vesicle abuts on the pharynx.

The ovary is single and is situated just in front of the testes in the middle line, 4.5 mm. from the posterior end. Between the ovary and the testes is the shell gland. The uterus is a coiled tube lying

between the ovary and the ventral sucker. Portions of the uterus extend forward on each side of, and dorsal to, the ventral sucker, and it eventually opens at the genital pore. The vitelline glands consist of a series of grape-like follicles, situated laterally between the ventral sucker and the extreme posterior end. The ducts connecting the follicles are clearly visible. In cross sections, the vitelline glands seem to be sunk in the muscular body-wall, and when this wall is removed the vitelline glands come away with it. The main ducts of the vitelline glands run transversely, one on each side, and, uniting in the middle line, open at the junction of the shell gland and the germarium, 4.4 mm. from the posterior extremity of the worm.

Excretory system.—As sections were not made, no details of this system could be made out.

Habitat.—The stomach of *Rhynchobatis djeddensis*. Sixty-seven specimens. Pearl Banks, Ceylon. February 2nd, 1911.

This species appears to fall naturally into the genus *Allocreadium*, Looss, of which the type species is *Distomum isoporum*, Looss. I have pleasure in naming my specimens in honour of Dr. Annandale, Superintendent of the Indian Museum.

PROVISIONAL DESCRIPTION OF A NEW GENUS AND SPECIES OF TREMATODE.

Cylindrorchis, gen. nov.

Body cylindrical. Oral and ventral suckers present, the latter being situated near the anterior extremity. Genital pore minute and situated immediately posterior to oral sucker. Intestinal rami in form of a continuous letter **S** and extending to the posterior end. Testes in front of germarium. The former are paired, cylindrical, thick, conspicuous, bent in the form of the letter **S**. They extend, one on each side, from the anterior margin of the ventral sucker to a point one-third the length of the worm from the posterior end. Germarium and shell gland single, median, and situated immediately behind posterior limit of testes. Uterus coiled and lying for the most part behind the germarium. Vitelline glands aggregated into two main masses, lateral to the germarium, and situated on the loop of the intestine, one mass on each side. Excretory pore median, terminal, posterior.

The character of the testes indicates that this genus has no close relationship with any other known genera.

Parasitic in fishes.

Cylindrorchis tenuicutis, sp. nov.

(Pl. x, figs. 17—18.)

During the examination of a number of specimens of *Tetrodon stellatus*, caught on the Ceylon Pearl Banks in 1911, a few Trematodes were found in the air-bladder. In every case where these Trematodes were obtained, the air-bladder was found to be full of a

black shiny substance having the consistency of wet clay. It is possible that this substance represents decomposed blood, the exudation of blood into the air-bladder being caused by the sucking action of the parasite. Unfortunately a sample was not kept for examination. The parasites lay embedded in this mass and measured 16 mm. long and 5.5 mm. broad. In shape they were cylindrical. The oral sucker is terminal and subventral. The ventral sucker is situated 3.5 mm. from the anterior extremity. Both suckers have a diameter of .8 mm., and are but feebly developed. The most remarkable feature of this parasite is the almost entire absence of muscles from the body-wall, the various organs being encased in an exceedingly thin diaphanous transparent cuticle. This circumstance is to be correlated with the habits of the parasite, living as it does in a medium where movement is well nigh impossible. The mouth is situated at the base of the oral sucker. This leads directly into a muscular pharynx. The oesophagus is very short. The two rami of the intestine are large sinuous tubes having a diameter of 1.1 mm. and being usually filled with a dark brown material apparently derived from the medium in which they live. Both rami of the intestine run to the extreme posterior end, where they terminate blindly.

As only a very few specimens of the parasite were obtained, it was found impossible to satisfactorily make out, with *certainty*, the precise details of the reproductive system. I am therefore not certain that the following description is absolutely correct in every detail.

The genital pore is minute and is situated ventrally, immediately posterior to the oral sucker.

The testes are a pair of very large, sinuous, cylindrical bodies situated one on each side, and extending to a point about 6 mm. from the posterior extremity. Anteriorly, each gives off a vas deferens, and these unite in the middle line. The cirrus is bent upon itself. The main mass of the vitteline glands is aggregated over a loop of the intestine, one mass on each side, immediately behind the termination of the testes. The main ducts run transversely, towards the median line, and open at the junction of the ovary and shell gland. These latter organs are situated close together, in the middle line, about 5 mm. from the posterior extremity, the shell gland being posterior to the ovary. The uterus is a coiled tube. For the first part of its length it lies posterior to the ovary, and then runs forward, sinuously, in the middle line (anterior to the ovary) to the genital pore.

The excretory pore is terminal, but no details of this system could be made out.

“*Distomum*” sp. ?

(Pl. x, fig. 19.)

Four specimens of an immature species of “*Distomum*” were obtained from the intestine of *Ophiocephalus striatus*, the same

specimen of fish in which were found specimens of *Ophryocotyle bengalensis*, n. sp. and *Bothriocephalus (Anchistrocephalus) polyptera* (Leyd.). They measured 9 mm. long and were club-shaped. The breadth at the posterior is 2.5 mm. and at the anterior extremity 1 mm. The oral sucker is .6 mm. in diameter. The ventral sucker is situated 4 mm. from the anterior extremity and has a diameter of .85 mm. The pharynx is small and no oesophagus is present. The two rami of the intestine are sinuous, terminating blindly at the posterior extremity. The inwardly directed loop of one ramus of the intestine is situated opposite to the laterally directed loop of the other ramus. Reproductive organs were not developed. It is impossible at present to identify this immature form, but it bears a strong resemblance to the immature form of *Isoparorchis trisimilitubis*, n. sp., obtained from the muscles of the Mahseer (*Barbus tor*) and already described.

Anaporrhutum largum, Lühe. (5)

This Trematode was first obtained by Prof. Herdman in Ceylon from the coelom of *Rhinoptera javanica*. He only obtained a single specimen. Large numbers of this species have since been obtained by Southwell in Ceylon, from the coelom of *Chiloscyllium indicum*, *Ginglymostoma concolor* and *Aetobatis narinari*.

A species of *Anaporrhutum* was also obtained by Dr. Jenkins from the coelom of *Stegostoma tigrina*, caught off the Orissa coast on December 15th, 1910.

It differed from the Ceylon specimens of this species in the following points:—

<i>Orissa specimens.</i>	<i>Ceylon specimens.</i>
(a) Leaf-like in outline.	(a) More circular in outline.
(b) Internal wall of the gut thrown into steep ridges.	(b) Ridges not well marked.

Besides the preceding points the testes and vitelline glands in the specimens collected by Dr. Jenkins were but feebly developed. At first, this seemed a striking difference, but I am inclined to think that the species are the same in spite of the differences named.

The three species of *Anaporrhutum*, viz. *A. largum*, *A. albidum* and *A. richiardi*, appear to be widely distributed amongst Elasmobranchs in Indian waters.

Anaporrhutum albidum, Ofenh.

Large numbers of this Trematode were obtained in 1911 from the surface of the liver of a *Chiloscyllium indicum*, caught on the Ceylon Pearl Banks. They differed from Ofenheim's description and figure (7) in (i) having the ventral sucker much larger than in Ofenheim's specimens and (ii) in having the testes less scattered. This latter fact may, however, be due to the testes not being

fully developed in our specimens. Ofenheim's specimens were from *Aetobatis narinari*.

Anaporrhutum richiardii, Lopez. (7).

About six specimens of this Trematode were obtained from the surface of the liver of *Aetobatis narinari*, caught on the Ceylon Pearl Banks in 1911.

Cricocephalus resectus, Looss. (3). *

Three specimens of this Trematode were obtained from the intestine of the land tortoise, *Testudo elegans*, caught in Ceylon in 1911. Although this parasite was obtained from a tortoise, and not from a fish, the opportunity is here taken of recording it.

LIST OF LITERATURE CITED.

A. *Trematodes*.

1. Linton, Edwin .. Parasites of fishes of Beaufort, North Carolina. *U.S. Bulletin of the Bureau of Fisheries*, vol. xxiv, 1904.
2. Looss, A. .. Die Distomen Unserer Fische und Frosche. In *Bibliotheca Zoologica*. (Leuckart and Chun) vol. vi, 1894—95.
3. „ .. Ueber neue und bekannte Trematoden aus Seeschildkroten. *Zool. Jahrb. Syst. Abth.*, vol. xvi, 1902.
4. Lühe, Max .. *Die Susswasserfauna Deutschland*, Heft 17, Trematodes, 1909.
5. „ .. Trematode Parasites. *Ceylon Pearl Oyster Reports*, part v, 1906.
6. Odhner, Theodor .. Die Trematoden des arktischen Gebietes. *Fauna Arctica*, vol. iv, 1905—06.
7. Ofenheim, E. von .. Ueber eine neue Distomidengattung. *Zeit. fur Nat.*, vol. 73, 1900—01.
8. Olsson, P. .. Bidrag till Skandinaviens Helminthfauna. *Vetenskaps Akademiens Handlingar*, vol. xxv, part ii, 1893—94.

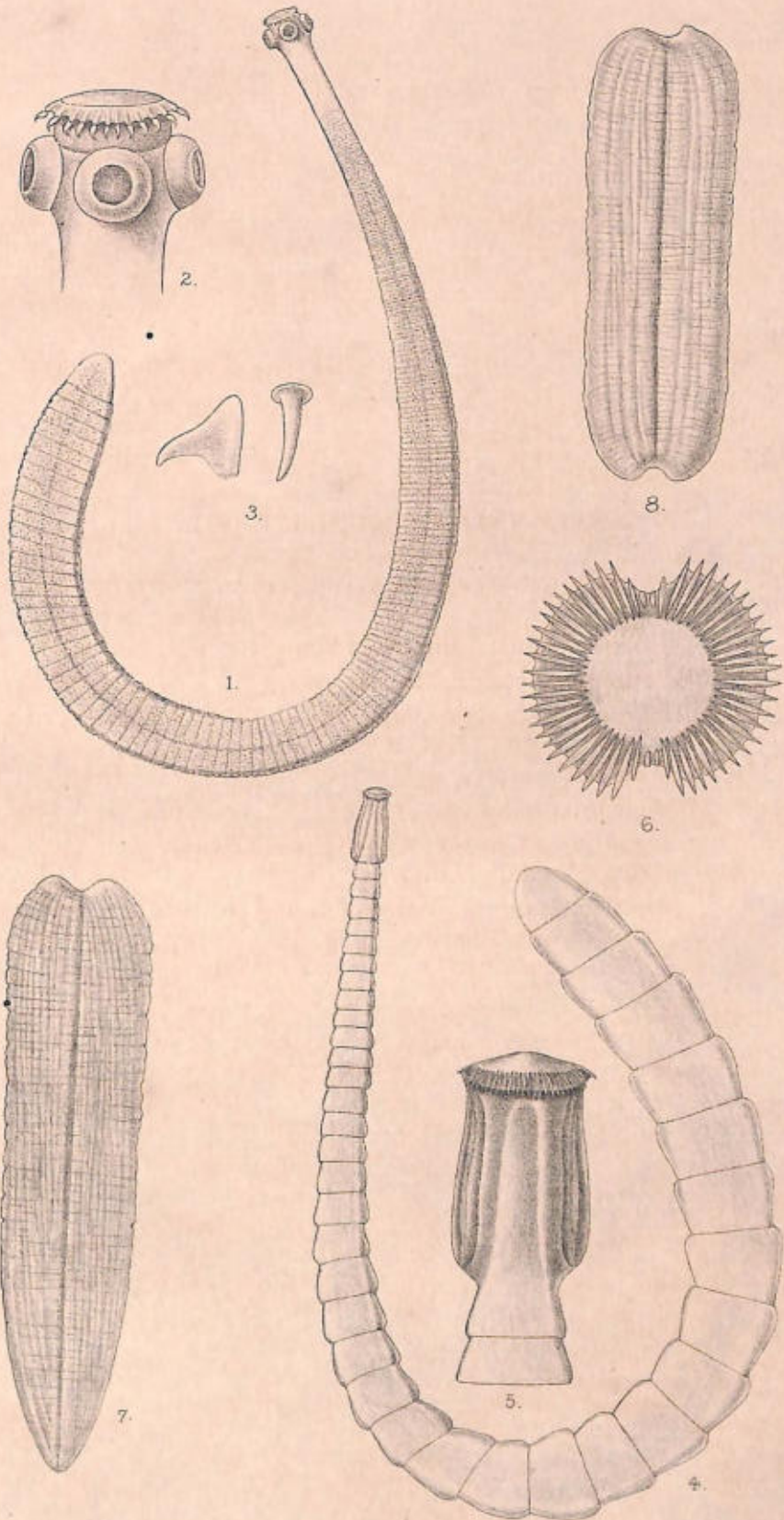
B. *Cestodes*.

9. Braun, M. .. In *Bronn's Thier-Reichs*, Cestodes, 1894—1900.
10. Diesing, C. M. .. *Systema Helminthum*, 1851.
11. Linton, Edwin .. On two species of larval *Dibothria* from the Yellowstone National Park. *Bulletin U.S. Fish Commission*, vol. ix, 1899.

12. Lönnberg, E. .. Anatomische Studien der Skandinavischen Cestoden. *Vetenskaps Akademiens Handlingar*, vol. xxiv, parts i and ii, 1890—1891.
13. „ „ .. *Bihang till K. Sv. Vet. Akad. Handl.* Band 14. Afd. iv. No. 9. Stockholm, 1889.
14. Lühe, Max .. *Die Susswasserfauna Deutschlands*, Heft 18, Cestodes, 1910.
15. Riggensbach, E. .. Das genus *Ichthyotaenia*. *Revue Suisse de Zoologie*, Bd. iv, 1896—97.
16. Rudolphi, C. A. .. *Entozoorum sive vermium intestinalium historia naturalis*, vol. ii, parts i and ii. Amstelaedami, 1809—1810.
17. Southwell, T. .. *Ceylon Marine Biological Reports*, parts v and vi, 1910—11.
18. Ward, H. B. .. Internal parasites of the Sebago Salmon. *Bull. Bureau Fisheries, Washington*, vol. xxviii, 1908.

EXPLANATION OF PLATE VII.

- FIG. 1. *Ophryocotyle bengalensis*, n. sp. Entire worm, \times about 30.
- „ 2. Scolex of same. Magnified about 100.
- „ 3. Perirostral spines. Greatly enlarged.
- „ 4. *Bothriocephalus* (*Anchistrocephalus*) *polyptera* (Leyd.). Entire worm, \times about 18.
- „ 5. Scolex of same, \times 75.
- „ 6. View of anterior end of scolex, \times about 140.
- „ 7. *Ligula simplicissima*, Rudolphi. Showing pointed posterior extremity, \times $2\frac{1}{2}$.
- „ 8. Another specimen of same showing concave anterior and posterior extremities, \times $2\frac{1}{2}$.



D. Bagchi, del.

A. Chowdhary, lith

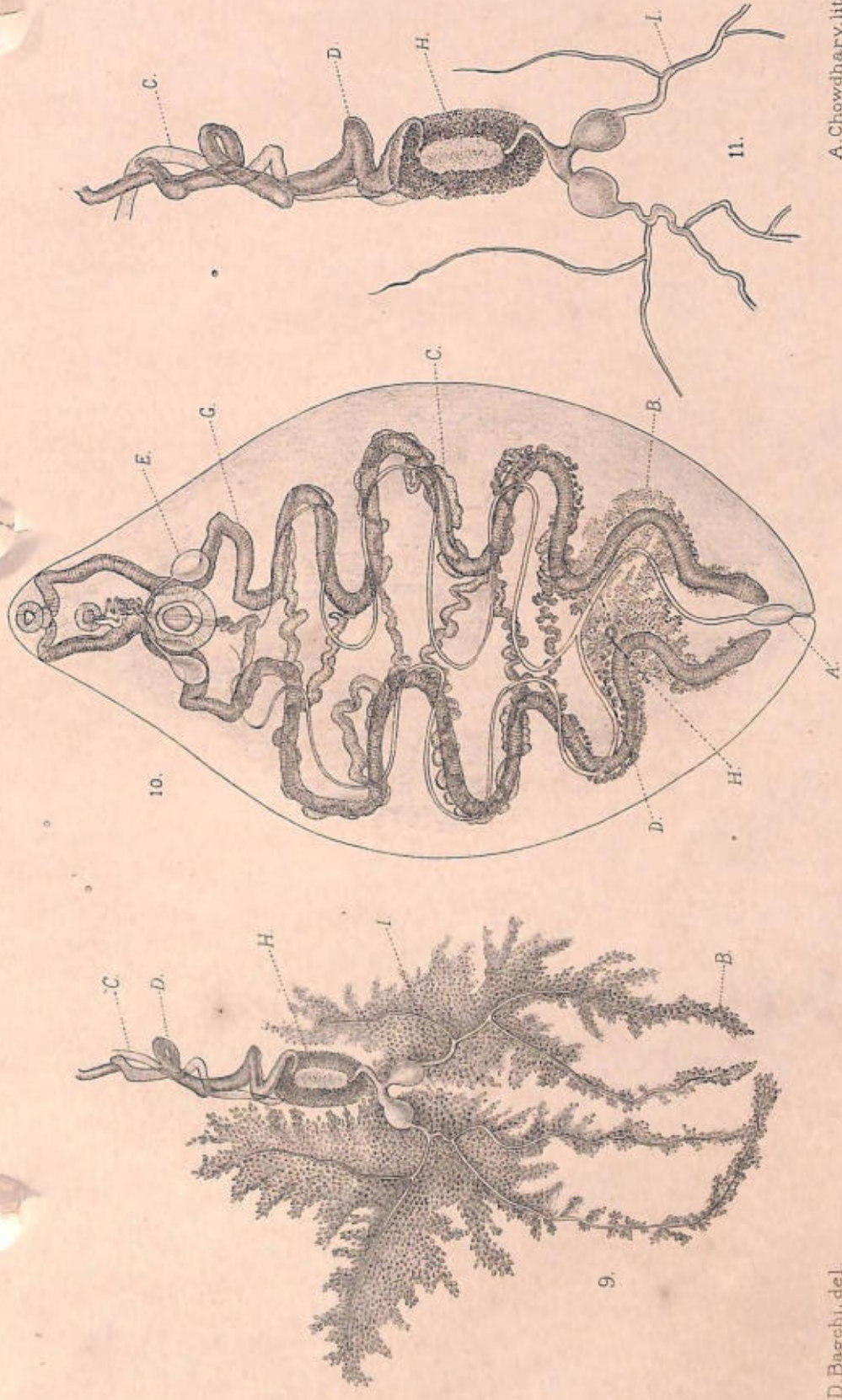
PARASITES OF INDIAN FISH.

EXPLANATION OF PLATE VIII.

- FIG. 9. *Isoparorchis trisimilitubis*. Genital organs, \times about 100.
,, 10. Animal entire; from ventral surface, cleared in clove oil, \times 4.
,, 11. Genital organs of same, \times about 150.

EXPLANATION OF LETTERING.

- | | |
|-----------------------|-------------------------------|
| A. Excretory vesicle. | E. Testes. |
| B. Vitteline glands. | G. Intestine. |
| C. Uterus. | H. Shell gland. |
| D. Germarium. | I. Ducts of vitteline glands. |



A. Chowdhary, lith.

PARASITES OF INDIAN FISH.

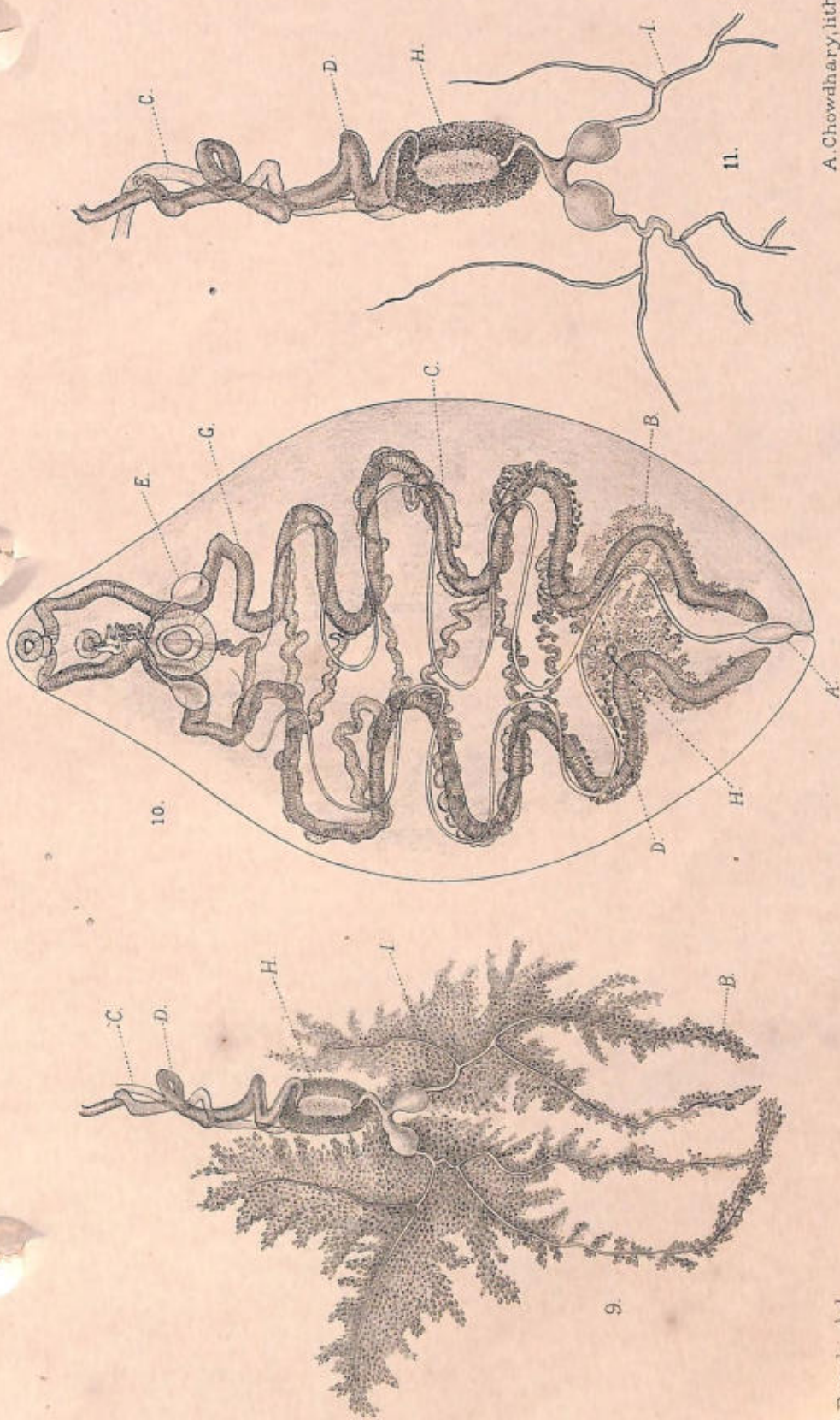
D. Bagechi, del.

EXPLANATION OF PLATE VIII.

- FIG. 9. *Isoparorchis trisimilitubis*. Genital organs, \times about 100.
,, 10. Animal entire; from ventral surface, cleared in clove
oil, \times 4.
,, 11. Genital organs of same, \times about 150.

EXPLANATION OF LETTERING.

- | | |
|-----------------------|-------------------------------|
| A. Excretory vesicle. | E. Testes. |
| B. Vitelline glands. | G. Intestine. |
| C. Uterus. | H. Shell gland. |
| D. Germarium. | I. Ducts of vitelline glands. |



A. Chowdhary, lith.

PARASITES OF INDIAN FISH.

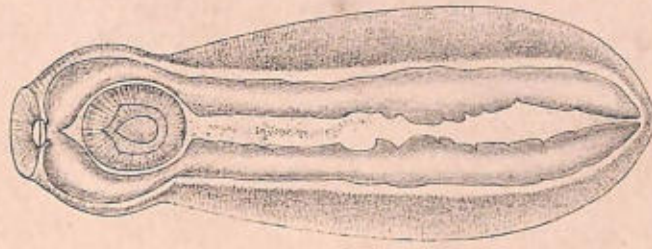
D. Bagchi, del.

EXPLANATION OF PLATE IX.

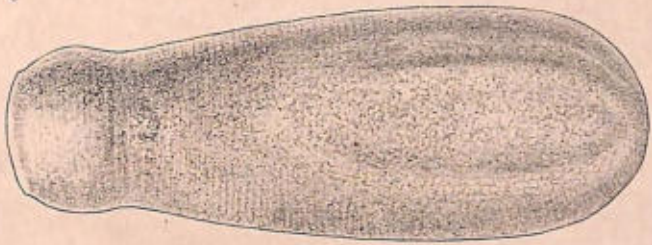
- FIG. 12. *Isoparorchis trisimilitubis*, n. sp. Animal entire, from ventral surface, $\times 2$.
,, 13. '*Distomum* sp.' Dorsal view, $\times 20$.
,, 14. Same, ventral view. Cleared in clove oil, $\times 20$.
,, 15. *Allocreadium annandalei*, n. sp. Entire worm, $\times 7$.
,, 16. Same. Compressed, and cleared in clove oil, $\times 10$.

EXPLANATION OF LETTERING.

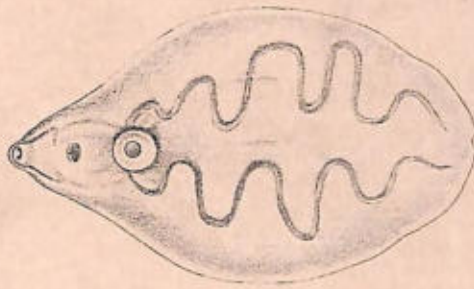
- | | |
|-----------------------|-------------------------------|
| A. Excretory vesicle. | E. Testes. |
| B. Vitelline glands. | G. Intestine. |
| C. Uterus. | H. Shell gland. |
| D. Germarium. | I. Ducts of vitelline glands. |



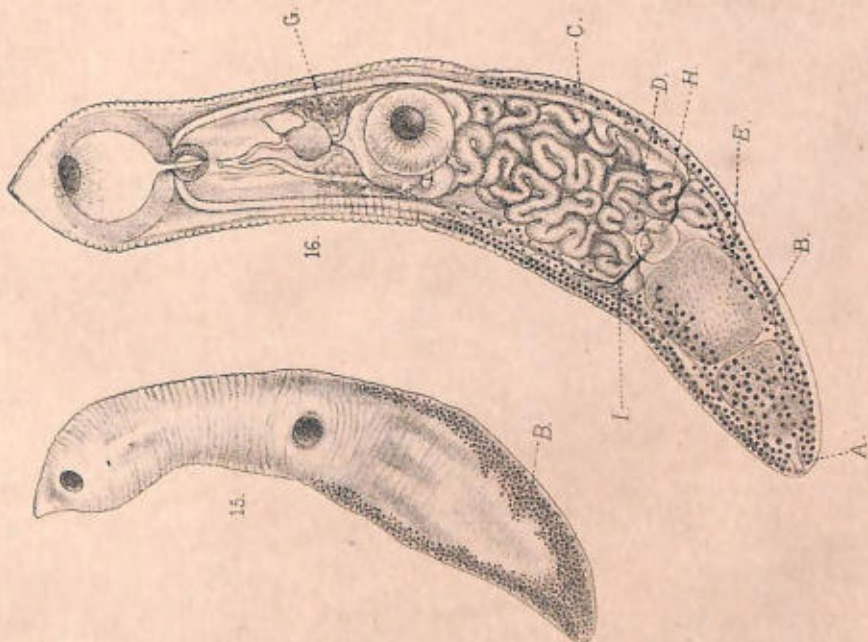
14.



13.



12.



15.

16.

A. Chowdhary, lith.

PARASITES OF INDIAN FISH.

D. Bagchi, del.

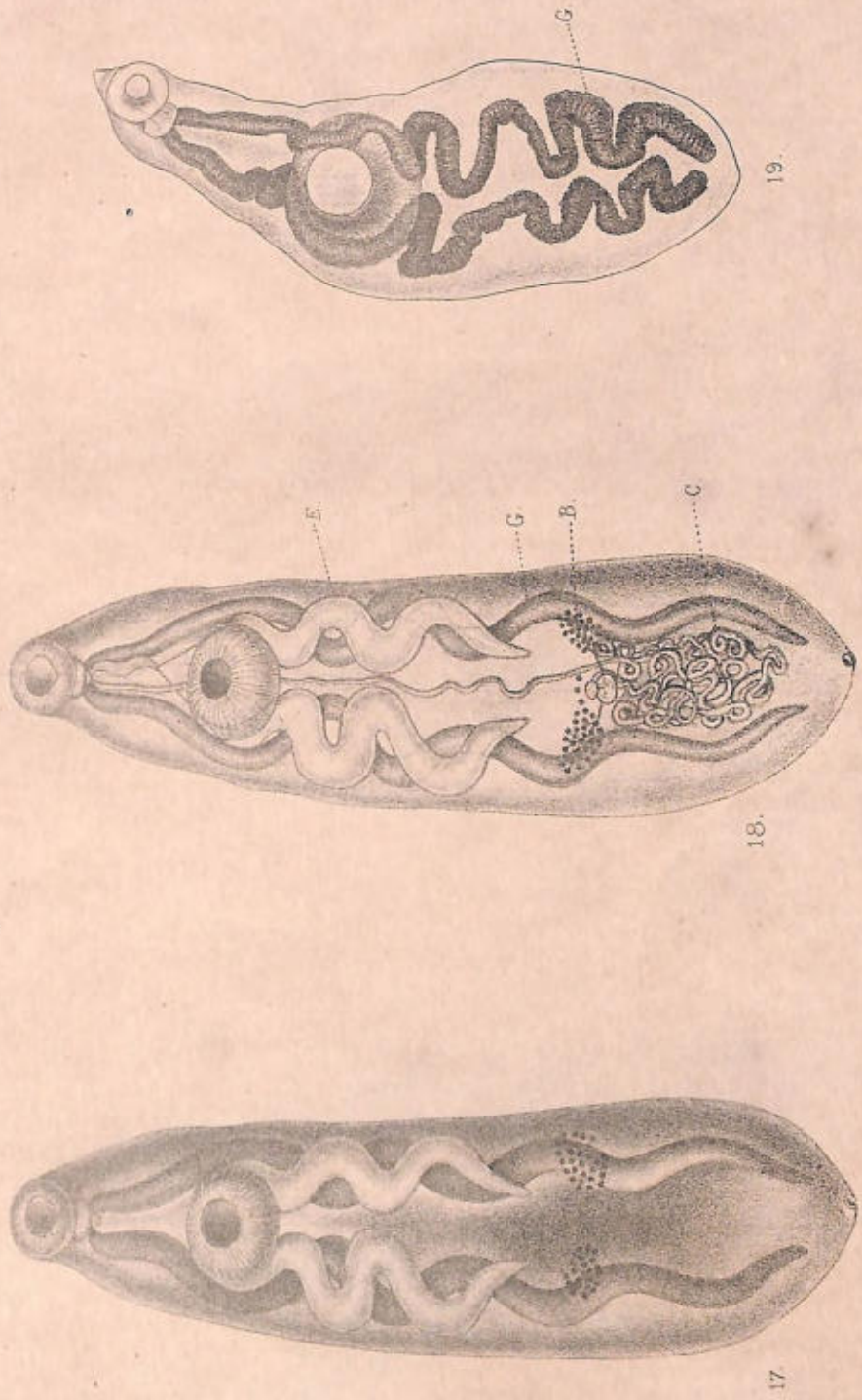
EXPLANATION OF PLATE X.

- FIG. 17. *Cylindrorchis tenuicutis*, n. sp. Entire worm, $\times 7$.
" 18. Same. From a dissection, $\times 7$.
" 19. '*Distomum* sp.' Entire worm, $\times 9.5$.

EXPLANATION OF LETTERING.

B. Vitelline glands.
C. Uterus.

E. Testes.
G. Intestine.



PARASITES OF INDIAN FISH.

A. Chowdhary, del et lith.

VII. CRYPTOSTOMES FROM THE INDIAN MUSEUM.

By S. MAULIK, F.E.S.

The present paper is based on a collection of Hispinae and Cassidinae belonging to the Indian Museum. The list contains 38 species of Cassidinae and nine of Hispinae. One new form and two new varieties of Cassidinae have been described. In many cases the generic position of previously described species has been changed. Full notes regarding variation and geographical distribution have been added.

The work has been done in the Zoological Laboratory of Cambridge University. To Professor Gardiner and Mr. Scott my thanks are due for encouragement and much assistance. I wish to express my obligations to the British Museum authorities for kindly allowing me access to the reserve collections. My acknowledgments are also due to the Indian Museum authorities for kindly sending this collection to me at Cambridge.

Fam. CHRYSOMELIDAE.

CASSIDINAE.

Genus *Calopepla*, Hope.

1. *Calopepla leayana*, Latr.

Boh., Mon. Cassid., 1850, vol. i, p. 9.

Fifty-four examples in the collection.

Localities.—Sikkim; Dam Dim; Assam; Naga Hills; N.E. Frontier; Pashok, 2800 ft., Sikkim, 13-ix-1909; Cheerapunji, Khasi Hills; Darjiling, 8000 ft., E. Himalayas; Sadon, Myitkyina district, U. Burma, 2500-3500 ft., May 1911 (*E. Colenso*); Calcutta, July; Tezpur, Assam.

There is one specimen from Poona with the following note: "*(F. Gleadow)* feeds on the leaves of shivan tree, *Gmelina arborea*, 26-ix-1893."

From these localities it may be concluded that its range is more or less the Eastern Himalayan and sub-Himalayan region. Its occurrence in Poona is interesting.

This species varies a great deal in colour. The prothorax varies between light yellow and very dark brown. The elytra are greenish bronze with a bluish violet margin. This latter colour may spread over the whole elytra. The colour of the underside and legs, except the tarsi which are dark, is always that of the

prothorax. Another form of elytral colouring may be differentiated in which there is a predominance of the bronze over the green. It may be noted that the four specimens from Poona in the collection have this shade.

Genus *Epistictia*, Boh.

The genus *Epistictia* was erected by Boheman in 1850 for the reception of three species, viz., *selecta*, Boh., *viridimaculata*, Boh., and *matronula*, Boh. The first two were from Nepal and the third from Ceylon. In 1863 (Journ. of Ent., ii, pp. 7, 8) Baly described two species, viz., *perplexa*, Baly, and *parryi*, Baly, also from the Oriental region. These two, however, were sunk by Weise into varieties of *viridimaculata*, Boh. (Deutsch. Ent. Zeitschr., 1897, p. 99). T. Kirsch published a description of a new species closely allied to *viridimaculata*, Boh., which he named *marginata*, from Malacca (Mitt. Mus. Dresd., i, p. 56, 1875). Outside the Oriental region a species was discovered in East Africa which Linell named *quadripunctata* (Proc. U.S. Mus., xviii, p. 696, 1896). I have seen two specimens in the collection of the British Museum (Natural History) named *inornata* by Waterhouse collected from Lake Nyassa (Cist. Ent., ii, p. 229). Altogether, therefore, there are only six species belonging to this genus hitherto known excluding the two species described by Baly and subsequently sunk by Weise.

Antenna gradually thickens towards the apex, first joint longer than the second; the second joint rounded; last joint bluntly pointed.

Prothorax slightly narrower than elytra, widely emarginate at apex, lateral margins slightly reflexed, base bisinuate on both sides, posterior angles acute.

Scutellum shorter than its breadth, apex rounded.

Elytra punctate.

Underside.—First abdominal segment produced in the middle into a pointed process which meets the metasternum between the hind coxae. Prosternal process expanded apically with bluntly triangular apex.

The genus is a natural one. Insects of other genera cannot be placed in it by mistake. A Cassidid from the Oriental region, in which the head, viewed dorsally, is not completely concealed under the prothorax, might belong to any of the following four genera: *Calopepla*, *Epistictia*, *Hoplionota*, *Prioptera*.

A table will easily distinguish them thus:—

- | | | |
|------------------|---|------------------------|
| A. | Body oblong or oblong-ovate. | |
| | a. Prothorax much narrower than elytra and with strongly reflexed margin | .. <i>Calopepla</i> . |
| | a ¹ . Prothorax only slightly narrower than elytra and with slightly reflexed margin | .. <i>Epistictia</i> . |
| A ¹ . | Body sub-quadrate or rotundate. | |
| | b. Antennae clubbed | .. <i>Hoplionota</i> . |
| | b ¹ . Antennae subfiliform | .. <i>Prioptera</i> . |

2. *Epistictia fulvonigra*, n. sp.

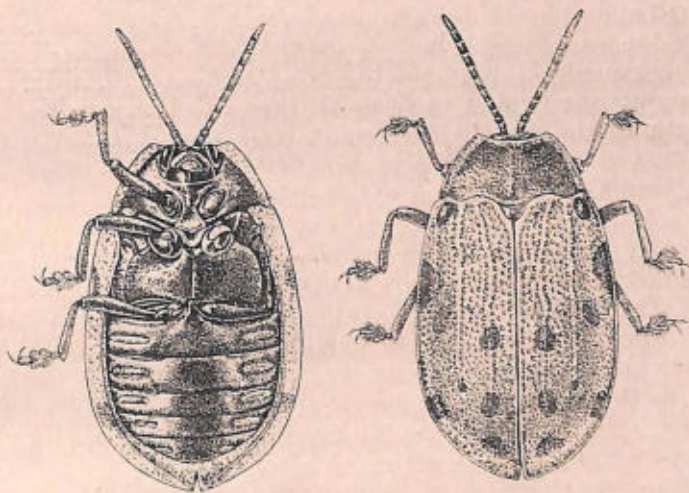
Oblong-ovate, slightly narrower in front; antennae black; prothorax coarsely punctate, black, the reflexed margin of prothorax fulvous; scutellum black shining, apex rounded; elytra dark orange-brown, sub-nitid, eight black spots on each elytron; underside and legs black and shining. Length 11 mm. (from head to apex of elytra); greatest breadth across abdomen 6.5 mm.

Locality.—Upper Shan Hills, Upper Burma (J. C. Brown).

Described from one example.

Type in Indian Museum, Calcutta.

Fuller description.—The colour and markings are completely different from all other species of the genus.



Epistictia fulvonigra, n. sp., × 4.

Head not very much projecting; rugose, coarsely punctate, depressed between the bases of antennae; black, with a small rufescent area in the middle of the front, and rufescent colour extending outwards from below the base of each antenna; labrum rufescent, especially at the base; antennae black, four basal joints finely punctate, rest of the joints finely striated; eyes oblong, moderately convex.

Prothorax black, with the reflexed lateral margin fulvous and the anterior margin narrowly fulvous; widely emarginate at apex, considerably narrowed in front with sides very slightly curved, bisinuate on either side at base which is almost as broad as that of the elytra, anterior angles obtuse and posterior angles acute; base in front of the scutellum thickened, shining and impunctate; an impunctate, shining line runs down the middle of disc up to the apex; centre of disc more finely punctate, towards the sides punctures become coarser and run into each other, forming rather deep pits.

Scutellum shorter than breadth at base, sub-quadrate, almost straight at base, apex rounded, lateral margins very slightly reflexed towards base, basal angles very acute; impunctate, black, shining.

Elytra dark orange-brown, coarsely punctate, two shining ridges run down each elytron, that closer to the suture covers about two-thirds or a little more of the length of the elytron, and is longer than the second ridge which ends at the middle. Margins slightly explanate. There are eight black spots on each elytron disposed as follows:—one on the humeral callus which is prominent, shining and impunctate; on the line of the first elytral ridge (that nearer the suture) three spots, one just beyond the middle, the second at the point where the ridge ends, the third beyond this point on the sloping apical portion of the elytron; there is a very small and almost obsolete spot at the point where the second (outer) ridge ends, and a large spot at about the middle of the elytron just outside this ridge; finally there are two on the explanate margin, one behind the humerus, the other about one third the length of the margin from the apex at the point where the margin curves inwards to the apex.

Underside.—Black shining; apex of prosternal process, inner side of middle and hind coxae, apices of tibiae, lobes and claws of tarsi, diluter, more or less rufescent; underside of prothoracic and elytral margins reddish-brown, the elytral marginal black spots showing. First abdominal segment produced in the middle into a pointed process which meets the metasternum between the hind coxae. Prosternal process margined at the sides, expanded apically, with bluntly triangular apex.

On either side of each abdominal segment is a slightly raised transverse (1 mm.) ridge surrounded by a depression; these ridges are not black, but reddish in colour.

Tarsus covered with brownish pubescence on the underside.

3. *Epistictia viridimaculata*, Boh.

• Boh., Mon. Cassid., 1850, vol. i, p. 15.

There are twenty examples in the collection, all of which except three are from Sikkim.

Localities.—Mungphu, Sikkim; Ukhrul, Manipur, 6400 ft., (*Rev. W. Pettigrew.*); Perak; Upper Tenasserim.

The colour varies from rufo-testacea to very dark red brown, almost obscuring the elytral spots.

Var. *trivandrumensis*, n. var.

One example from Trivandrum has the prothorax completely yellow without any trace of the bronze-greenish spots. All the specimens I have seen have at least a trace of them and the prothorax is never yellow. It is, therefore, a definite variety.

Genus *Prioptera*, Hope.4. *Prioptera westermanni*, Mannerh.

Boh., Mon. Cassid., 1850, vol. i, p. 45.

Six examples.

Localities.—Myawadi, Burmo-Siamese Frontier, Amherst district, 900 ft., 24—26-xi-1911 (*F. H. Gravely*); Shan Hills, Upper Burma (*J. C. Brown*); Assam.

* 5. *Prioptera impustulata* (Mannerh.).

Boh., Mon. Cassid., 1850, vol. i, p. 46.

Two examples.

Localities.—Calcutta, Nov. 18; Upper Tenasserim.

6. *Prioptera maculipennis*, Boh.

Boh., Mon. Cassid., 1850, vol. i, p. 50.

Five examples.

Localities.—Dekhut Bhuli, Nepal Terai, 30-iv-1907; Assam-Bhutan Frontier, Mangaldai district, N.E., 26-xii-1910 (*S. W. Kempf*).

7. *Prioptera 10-pustulata*, Boh.

Boh., Mon. Cassid., 1850, vol. i, p. 55.

One example.

Locality.—Misty Hollow, Dawna Hills, 400-2400 ft., 22—30-xi-1911 (*F. H. Gravely*).

8. *Prioptera decimmaculata*, Boh.

Boh., Mon. Cassid., 1850, vol. i, p. 60.

Nineteen examples.

Localities.—Siliguri, base of E. Himalayas, 1-vii-1906; Sikkim, E. Himalayas; Dam Dim, base of E. Himalayas; Cachar; Shilong, Assam Hills, 5000 ft.; Naga Hills; Sibsagar, Assam.

There is a certain amount of variation in this species. It chiefly consists in the colour which varies between light yellow and dark brown. The ultimate joints of the antennae are not always black. The spots on the thorax and elytra are fairly constant in size.

P. pallidicornis, Boh. and *P. decemsignata*, Boh. are the same as this species.

9. *Prioptera multiplagiata*, Wagn.

Wagner, Mitt. Münch. Ent. Ver., v, p. 26.

There are seven examples, all from the Andaman Islands, including two specimens of one variety. In this variety one half of the elytra is covered with a black patch, which proceeds diagonally from the humerus up to the point where the explanate margin

begins to bend towards the apex of the elytra, and here it broadens and meets a similar patch on the other elytron, at the suture, and also covers laterally a little of the explanate margin.

10. *Prioptera nigricornis*, Baly.

Jour. of Ent., 1863, vol. ii, p. 9.

There is only one example of a variety of this species from Sadon, Myitkyina district, Upper Burma, 2500-3500 ft., May 1911 (*E. Colenso*).

Genus *Aspidomorpha*, Hope.

11. *Aspidomorpha miliaris* (Fab).

Boh., Mon. Cassid., 1854, vol. ii, p. 261.

Ninety-one examples.

Localities.—Calcutta; Malda, E. Bengal; Shillong; Mungphu, Sikkim; Darjiling; Ranchi (*Irvine*); Mysore, S. India; Bangalore (*Cameron*); Tenasserim, June, 1889; Sibsagar, Assam; Perak; Andaman Islands; Sadon, Myitkyina district, Upper Burma, 2500-3500 ft., April-May 1911 (*E. Colenso*); Nilgiri Hills; Pegu, Burma; Tavoy; Sibiu, Sarawak, 2-vii-1910 (*Beebe*). It has also been recorded from Java.

Range.—From the above localities it appears that this insect has a wide distribution in the Oriental region. In India it extends from Darjiling to Mysore, South India. It ranges from Upper Burma to Borneo. It has also been taken in the Andaman Islands. It occurs at an altitude of 8000 ft. (Darjiling). In the plains also it thrives well as a great number of specimens has been collected from Calcutta and the Malda district.

Variation.—Variation in this species is mainly confined to the elytral spots and markings. Size and colour vary, but not to such an extent as do the markings. The variation of the latter is so gradual that it is difficult to describe any definite variety. From a specimen where the spots and markings are bold and prominent, they can be traced down to one on which they are almost obsolete. Five examples from Sadon, Upper Burma, exhibit this character, they are also very light in colour.

Notes.—In the Indian Museum it has been bred on *Convolvulus*, July 7th, 1886; on another specimen the following notes occur:—"Larvae received Dec. 1887; Pupae Jan. 13th, 1888; Imago Feb. 1888. E. C. C." The label of another specimen records the following note:—"Convolvulus pest. Eggs. 7-viii-86, emerged 29-vii-86 (*J. H. Jackson*)."

12. *Aspidomorpha fusconotata*, Boh.

Boh., Mon. Cassid., 1854, vol. ii, p. 279.

There is one example from the Philippine Islands. Boheman records it also from India Orientalis.

13. *Aspidomorpha St. crucis* (Fab.)

Boh., Mon. Cassid., 1854 vol. ii, p. 287.

One hundred and thirty-six examples.

Localities.—Calcutta; Sukna, E. Himalayas, 500 ft., 2-vii-1908 (*Annandale*); Kurseong, 5000 ft., E. Himalayas, 13—16-vii-1907; Sikkim; Dam Dim; Tindharia, E. Himalayas, 2822 ft.; Shillong, Assam Hills; Berhampur, Bengal; Siliguri, N. Bengal, 18—20-vii-1907; Birbhum, Bengal; Saraghat, N. Bengal; Darjiling, E. Himalayas, 8000 ft.; Cachar (*J. Wood-Mason*); Sibsagar, Assam; Dikrang Valley (*H. H. Godwin-Austen*); Buxa; Pegu, Upper Burma; Garo Hills, Assam; Tenasserim; Wynad, N. Malabar; Bangalore, S. India; Trivandrum, S. India; Shan Hills, Upper Burma (*J. C. Brown*); Is. Elephanta (?). Between Tengyueh and Tali-Fu, Yunnan, W. China, 1909-10 (*J. C. Brown*).

Range.—Bengal, Assam, Upper Burma and S. India. It occurs on the hills (8000 ft.) as well as in the plains.

14. *Aspidomorpha dorsata* (Fab.)

Boh., Mon. Cassid., 1854, vol. ii, p. 296.

Fourteen examples.

Localities.—Sibsagar, Assam; Dam Dim; Perak; Naga Hills (*Capt. Butler*); Sinkip Island; Sikkim; Khulna, E. Bengal, 9-viii-1907 (*J. Caunter*); Darjiling; Tavoy, Burma.

15. *Aspidomorpha inquinata*, Boh.

Boh., Mon. Cassid., 1854, vol. ii, p. 309.

One example from the Andamans. Boheman records it from Java.

16. *Aspidomorpha micans* (Fab.)

Boh., Mon. Cassid., 1854, vol. ii, p. 313.

Seven examples.

Localities.—Calcutta, Nov. 18; Gopkuda Island, Lake Chilka, Orissa, 7—15-viii-1907; Sadon, Myitkyina district, Upper Burma, 2500-3500 ft., May 1911 (*E. Colenso*); Bangalore (*Caméron*); Kandy, Ceylon, June 1910.

17. *Aspidomorpha amabilis* (Dej.)

Boh., Mon. Cassid., 1854, vol. ii, p. 315.

Eighteen examples.

Localities.—Calcutta, 13-vii-1895 (*W. R. Yates*); Mazbat, Mangaldai district, Assam, 11—15-x-1910 (*Kemp*); Gopkuda Island, Lake Chilka, Orissa, 7—15-viii-1907; Sukna, 500 ft., E. Himalayas, 2-vii-1908 (*Annandale*).

18. *Aspidomorpha mutilata*, Boh.

Boh., Mon. Cassid., 1854, vol. ii, p. 316.

Four examples.

Localities.—Calcutta; Gopkuda Islands, Lake Chilka, Orissa, 7—15-viii-1907; Bangalore (*Cameron*).

19. *Aspidomorpha orientalis*, Boh.

Boh., Mon. Cassid., 1862, vol. iv, p. 260.

Three examples.

Localities.—Assam; Bhim Tal, 4500 ft., Kumaon, W. Himalayas, 22—27-ix-1906 (*Annandale*).

20. *Aspidomorpha difformis*, Boh.

Boh., Mon. Cassid., 1862, vol. iv, p. 277.

Two examples.

Locality.—Calcutta, taken in a house, 14-ix.

21. *Aspidomorpha dulcicula*, Boh.

Boh., Mon. Cassid., 1862, vol. iv, p. 278.

One example.

Locality.—Ten miles south of Kuching, Sarawak, 24-vi-1910. It has been reported only from Borneo.

Genus *Sindia*, Weise.22. *Sindia clathrata* (Fab.)

Boh., Mon. Cassid., 1854, vol. ii, p. 330.

Weise, Deutsche Ent. Zeitschr., 1897, p. 105.

Fifteen examples.

Localities.—Malda, Bengal (*W. H. Irvine*); Murshidabad, Bengal (*Atkinson*); Madupur, Bengal.

It also occurs in South India.

Genus *Cassida*, Linn.23. *Cassida obscura*, Fab.

Boh., Mon. Cassid., 1854, vol. ii, p. 415.

Ten examples.

Localities.—Murshidabad, Bengal; Calcutta; Bhogaon, Purneah district, N. Bengal, 21-xii-1909 (*C. Paiva*). Gangurpur Ptiya, Naini Tal district, U. Provinces, 12—13-iv-1907.

24. *Cassida syrtica*, Boh.

Boh., Mon. Cassid., 1862, vol. iv, p. 311.

Two examples.

Localities.—Kurseong, E. Himalayas, 4700-5000 ft., 21-vi-1910 (*Annandale*); Pareshnath, W. Bengal, 4000-4400 ft., 9-iv-1909 (*Annandale*).

25. *Cassida enervis*, Boh.

Boh., Mon. Cassid., 1862, vol. iv, p. 338.

One example from Rajmehal, Bengal, 5-vii-1909 (*Annandale*).
It is reported also from Bombay.

26. *Cassida 16-maculata*, Boh.

Boh., Mon. Cassid., 1862, vol. iv, p. 290.

Four examples.

Localities.—Sikkim; Ghumti, Darjiling district, E. Himalayas, 4000 ft., vii-1911 (*F. H. Gravely*).

Genus *Lacoptera*, Boh.

27. *Lacoptera quatuordecimnotata*, Boh.

Boh., Mon. Cassid., 1855, vol. iii, p. 64.

Five examples.

Localities.—Wynad, Malabar; Nilgiri Hills; Peradeniya, Ceylon, 27-v-1910.

It is apparently confined to South India and Ceylon.

28. *Lacoptera vigintisexnotata*, Boh.

Boh., Mon. Cassid., 1855, vol. iii, p. 66.

Sixteen examples.

Localities.—Pegu, Burma; Upper Tenasserim; Shillong; Sibsagar, N.E. Assam (*S. E. Peal*); Cachar.

Its range appears to be N.-E. India and Upper Burma.

29. *Lacoptera tredecimpunctata* (Fab.)

Boh., Mon. Cassid., 1855, vol. iii, p. 73.

Seventy-six examples.

Localities.—Calcutta; Murshidabad, Bengal (*Atkinson*); Kati-
har, Purneah district, N. Bengal, 12-x-1907 (*C. A. Paiva*); Dam
Dim, foot of E. Himalayas (*Patterson*); Siliguri, foot of E. Hima-
layas; Mungphu, Sikkim, E. Himalayas, below 5000 ft.; Pusum-
bing, Darjeeling, 4700 ft., Oct.—Dec. 1906 (*H. H. Mann*); Naini
Tal (28-ix-1907), W. Himalayas; Bhim Tal, Kumaon, 4500 ft., W.
Himalayas, 22—27-ix-1906 (*Annandale*); Shillong, Assam Hills;
Sibsagar, Assam; Tavoy, U. Burma; Maymyo, Upper Burma;
Sadon, Myitkyina district, Upper Burma, 2500-3500 ft., May
1911 (*E. Colenso*); Andaman Islands.

30. *Lacoptera philippinensis*, Reiche.

Voy. Pole. Sud., iv, p. 321, t. 18, f. 14.

Boh., Mon. Cassid., vol. iii, p. 79.

Two examples.

Localities.—Mulang, Sarawak, 12-vii-1910 (*Beebe*); Kapte, Sarawak, 9-vii-1910 (*Beebe*).

Genus *Metriona*, Wiese.

Insects with the following characters are placed in the genus *Metriona* and are separated from *Coptocyclus*.

Claws with a tooth-like appendage at base, antennae *not* in grooves round the eyes, the ridge on the anterior edge of prosteronum not interrupted, 3rd joint of antenna longer than 2nd.

In *Coptocyclus* the claws are simple (Weise, Deutsche Ent. Zeitschr., 1896, p. 13).

31. *Metriona circumdata* (Herbst.)

Boh., Mon. Cassid., 1855, vol. iii, p. 279.

Weise, Deutsche Ent. Zeitschr., 1905, p. 125.

Eighty-five examples.

Localities.—Calcutta; Balighai, near Puri, Orissa, 16-20-viii-1911 (*Annandale* and *Gravelly*); Vaikam, Travancore, costal region, 5-xi-1908 (*Annandale*); Coromandel, S. India, 2500 ft., 23-x-1910; Nilgiri Hills; Dehra Dun, foot of W. Himalayas.

The varieties may be divided as follows:—

Prothorax maculate	{ colour dilute green ..	var. <i>d</i> .
	{ colour brown ..	var. <i>a</i> .
Prothorax immaculate	{ colour dilute green ..	var. <i>c</i> .
	{ colour brown { elytral vittae	var. <i>b</i> .
	{ dilute sanguinis	var. <i>e</i> .
	{ elytral vittae black	var. <i>e</i> .

Vars. *a*, *b*, *c*, were proposed by Boheman. The large number of examples before me warrants the division of this species into five colour varieties. I, therefore, propose var. *d* and *e* as is shown in the table.

In var. *a* the black mark in front of the scutellum varies in shape and size. Generally it is a line scarcely reaching up to the middle of the prothorax. The apex of this line, in some cases, thickens and is produced into two horizontal lines curving inwards. In others the black line is attenuated anteriorly, very short, and bifurcating.

Var. *dentatus*, n. var.

One example taken at Dehra Dun differs from all others in having the elytral punctures deeper. Other characters being the

same and in absence of more specimens I do not separate it, but I consider this as a definite variety having more importance than mere colour varieties.

It is brown, prothorax maculate, apical joints of antennae not black or dark.

32. *Metriona cataneta* (Dej.)=(*physodis*, Boh.)

Boh., Mon. Cassid., 1855, vol. iii, p. 262.

Speath.; Verh. Ges. Wien, 1898, p. 280.

Weise, Deutsche Ent. Zeitschr., 1892, p. 352.

Thirteen examples.

Localities.—Mungphu, Darjeeling distr., E. Himalayas, below 5000 ft.; Pegu, U. Burma; Tenasserim; Dam Dim, Jalpaiguri distr., Bengal (*G. S. Patterson*); Kanaul, 18-x-1907; Bhim Tal, 4500 ft., Kumaon, 19—22-x-1906 (*Annandale*); Sibiu, Sarawak, 2-vii-1910 (*Beebe*).

Genus *Chirida*, Chap.

Insects with the following characters are differentiated from *Coptocycla* and are classed in *Chirida*.

Claws with a tooth-like appendage at the base, antennae placed in grooves round the eyes, the ridge on the anterior edge of the prosternum is interrupted. In *Coptocycla* the claws are simple (Weise, Deutsche Ent. Zeitschr., 1896, p. 13).

33. *Chirida ornata* (Fab.)

Boh., Mon. Cassid., 1855, vol. iii, p. 134.

One example.

Locality.—Kandy, Ceylon, June 1910.

34. *Chirida promiscua* (Boh.)

Boh., Mon. Cassid., 1855, vol. iii, p. 130.

One example.

Locality.—Bangalore (*Cameron*).

35. *Chirida sexmaculata* (Dej.)

Boh., Mon. Cassid., 1855, vol. iii, p. 114.

Wiese, Deutsche Ent. Zeitschr., 1896, p. 14.

Fifty-four examples.

Localities.—Bangalore, S. India (*Cameron*); Calcutta; Chatraput, Ganjam distr., N.-E. Madras (*C. Fischer*).

36. *Chirida septemnotata* (Boh.)

Boh., Mon. Cassid., 1855, vol. iii, p. 133.

Thirteen examples.

Localities.—Sibsagar, Assam (S. E. Peal); Mungphu, Darjiling distr., E. Himalayas, below 5000 ft.; Tindharia, Darjiling distr., E. Himalayas, 2822 ft.; Calcutta, I-vii-1907.

The variation in this species is confined to the prothoracic macula. Usually it is in the form of two vertical parallel black lines in the middle of the prothorax in front of the scutellum. This may be completely absent or may be the continuation of the sutural red line going beyond the middle of the prothorax.

37. *Chirida bowringii* (Boh.)

Boh., Mon. Cassid., 1855, vol. iii, p. 123.

One example.

Locality.—Dawna Hills, 2000-3000 ft., Lower Burma, 2-3-iii-1908 (*Anmandale*).

38. *Chirida andamanica* (Dohrn).

Dohrn, Stettiner Ent. Zeitung, xli, p. 370.

Three examples from the Andaman Islands.

HISPINAE.

Genus *Botryonopa*, Blanch.

1. *Botryonopa sheppardi*, Baly.

Baly, Cat. Hisp., 1858, p. 92, t. 7, f. 4.

Weise, Stett. Ent. Zeit., 1908, lxix, p. 214.

Six examples.

Localities.—Sikkim, E. Himalayas; Sylhet; Sibsagar, N.-E. Assam (S. E. Peal).

Genus *Estigmana*, Hope.

2. *Estigmana chinensis*, Hope.

Hope, Coleopt. Man., 1840, iii, p. 175, t. 2, f. 1.

Baly, Cat. Hisp., 1858, p. 100, t. 7, f. 7.

Gest., Ann. Mus. Civ. Gen., 1897, p. 49.

Six examples.

Localities.—Calcutta, June; Cachar (*J. Wood-Mason*).

It is a widely distributed species having been reported from China, India, Sumatra, Java.

Genus *Anisodera*, Baly.

3. *Anisodera cylindrica*, Hope.

Zool. Misc., 1831, p. 27 (*Trogosita*).

Baly, Cat. Hisp., 1858, p. 106.

Gest., Ann. Mus. Civ. Gen., 1890, p. 236.

Twenty examples.

Localities.—Sikkim; Assam-Bhutan Frontier, Mangaldai distr., N.E., 31-xii-1910 (*S. W. Kemp*); Sibsagar, N.E. Assam. It has also been reported from Burma and Nepal.

4. *Anisodera excavata*, Baly.

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

Thirty-four examples.

Localities.—Sikkim; Darjiling, E. Himalayas; Cachar, Assam (*J. Wood-Mason*); Sadon, Myitkyina distr., U. Burma; 2500-3500 ft., May 1911 (*E. Colenso*).

5. *Anisodera (Lissochila) bowringi*, Baly.

Baly, *Cat. Hisp.*, 1858, p. 102.

One example.

Locality.—Dikrang valley, Nanang's (*Godwin-Austen*).

6. *Anisodera (Lissochila) guerinii*, Baly.

Baly, *Cat. Hisp.*, 1858, p. 168, t. 7, f. 8.

Gest., *Ann. Mus. Civ. Gen.*, 1885, p. 163; *l.c.*, 1890, p. 233 and 1897, p. 50.

ferruginea, Guér., *Rev. Zool.*, 1840, p. 333; Baly, *Cat. Hisp.*, p. 101.

Four examples.

Localities.—Sikkim; Shillong; Sibsagar, Assam; Purneah distr., N. Bengal (*C. Paiva*).

It has also been reported from West India, Sumatra and Java.

Genus *Lepthispa*, Baly.

7. *Lepthispa pygmaea*, Baly.

Baly, *Cat. Hisp.*, 1858, p. 2.

Lewis, *Ent. Month. Mag.*, 1888, p. 94.

Gest., *Bull. Soc. Ent. Ital.*, 1902, p. 51.

Eight examples.

Localities.—Malhawanaad, Malabar distr., S. India; Poona, 4-xii-1893.

It has also been reported from Ceylon. Apparently it is confined to S. India. It is of economic importance inasmuch as it is reported to be destructive to sugar-cane, while in Malabar it is said to attack paddy stalks.

Genus *Oncocephala*, Chev.

8. *Oncocephala quadrilobata*, Guér.

Guér., *Icon. Règne Anim. Ins.*, 1844, p. 261.

Weise, *Deut. Ent. Zeit.*, 1897, p. 121; 1905, p. 117.

Gest., *Ann. Mus. Civ. Gen.*, 1899, p. 314, f. 1.

Eight examples.

Locality.—Andaman Islands. It was not recorded from these islands before.

Genus **Gonophora**, Baly.

9. **Gonophora masoni**, Baly.

Ent. Month. Mag., 1888, p. 85.

Four examples.

Locality.—Andaman Islands. It has been reported only from the Andamans.

VIII. NOUVELLE ETUDE SUR LES CHIRONOMIDES DE L'INDIAN MUSEUM DE CALCUTTA.

Par J. J. KIEFFER, Dr. phil. nat. (Bitsch).

(Plates xi—xii).

Dans cinq travaux consécutifs¹ j'ai entrepris la description des Chironomides conservés à l'Indian Museum de Calcutta. Dans l'intervalle, d'autres récoltes d'insectes, plus abondantes encore que les précédentes, ont été faites par MM. N. Annandale, E. D'Abreu, C. W. Beebe, E. Brunetti, J. Caunter, B. L. Chaudhuri, A. D. Imms, J. T. Jenkins, S. W. Kemp, Major R. Milne et C. Paiva. Ces insectes font l'objet du présent travail. La plupart ont été recueillis aux Indes Orientales, un petit nombre provient de Birmanie, de Borneo, de Ceylan et d'Egypte. Tous les dessins ont été faits à l'aide de la camera lucida.

Tableau des Sous-Familles.

1. Tibia antérieur et intermédiaire sans peigne, tibia postérieur avec un peigne simple ou sans peigne; discoïdale simple ou aile atrophiée; thorax prolongé au-dessus de la tête; antennes du mâle ordinairement avec un panache de poils étalés 2.
- Tibia antérieur avec un peigne simple, tibia postérieur avec un double peigne, l'un grand, l'autre petit, tibia intermédiaire sans peigne; discoïdale bifurquée, sauf le genre *Brachypogon*; thorax non prolongé en avant, sauf dans 3 genres; antennes ordinairement de 14 articles (♂ ♀), celles du mâle ordinairement avec

¹ Etude sur les Chironomides des Indes Orientales, avec description de quelques nouvelles espèces d'Egypte (Mem. Ind. Mus., vol. 2, p. 181-242, pl. viii xi, 1910); Contributions to the Fauna of Yunnan (Rec. Ind. Mus., vol. 6, pp. 27-30, 1911); Description de nouveaux Chironomides de l'Indian Museum de Calcutta (*Ibid.* vol. 6, p. 113-177, pl. vi et vii); Les Chironomides de l'Himalaya et d'Assam (*Ibid.* vol. 6, p. 319-349, pl. xiv); Nouveaux Chironomides de Ceylon (*Spolia Zeylanica*, vol. 8, p. 1-24, avec 9 fig., 1912).

- un panache formé de verticilles de poils appliqués et très longs 3. CULICOIDINAE.
2. Une transversale réunit la discoïdale à la posticale, antennes ordinairement de 15 articles (σ φ), chez le mâle l'avant-dernier article ordinairement démesurément allongé, chez la femelle le dernier article est le plus long, éperons 1, 2, 2, tibia postérieur avec un peigne simple .. 2. PELOPIINAE.
- Discoïdale non réunie à la posticale par une transversale ou aile atrophiée, antennes du mâle ordinairement de 12 ou 14 articles dont le dernier est démesurément allongé, celles de la femelle ordinairement de 5 à 7 articles, éperons 1, 2 2, ou 0, 2, 2, tibia postérieur avec ou sans peigne 1. TENDIPEDINAE.

1^e Sous-Famille. TENDIPEDINAE (*Chironominae*).

Tableau des Groupes.

1. Tous les tibias dépourvus de peigne; antennes du mâle ordinairement sans panache et conformées comme chez la femelle, ailes souvent raccourcies et sans nervure 1. CLUNIONARIAE.
- Au moins les 2 tibias postérieurs avec un peigne, antennes du mâle ordinairement avec un panache, ailes toujours bien développées et à nervures distinctes 2.
2. Seulement les 2 tibias postérieurs avec un peigne formé de spinules alignées transversalement, tous les tibias aussi longs ou plus longs que le métatarse; articles basaux de la pince sans appendice ou avec un appendice unique et ordinairement court, articles terminaux de la pince ordinairement avec un stylet à l'extrémité 2. ORTHOCLADIARIAE.
- Les 4 tibias postérieurs avec un peigne qui a d'ordinaire la forme d'un anneau chitineux, crénelé ou dentelé et incomplet, tibias antérieurs plus courts, rarement aussi longs que le métatarse, les 4 tibias postérieurs plus longs que le métatarse; articles basaux de la pince avec 2 ou 3 longs appendices au côté interne, articles terminaux sans stylet .. 3. TENDIPEDARIAE.

1^{er} Groupe. *CLUNIONARIAE*.¹

Un seul représentant de ce groupe a été observé aux Indes Orientales. La plupart des espèces se trouvent sur la surface de l'eau.

Tableau des Genres.

1.	Article 5 ^e des tarsi sans prolongement à l'extrémité .. .. .	..	2.
—	Article 5 ^e des tarsi prolongé et trilobé à l'extrémité, palpes de 2 articles, antennes de 6 articles (♂ ♀) .. .. .	..	15.
2.	Scape cylindrique, pas plus gros que les articles suivants .. .. .	..	3.
—	Scape subglobuleux, beaucoup plus gros que les articles suivants .. .. .	..	5.
3.	Antennes de 11 articles (♂ ♀), yeux pubescents, ailes bien développées chez le mâle (Océan Atlantique et Méditerranée) ..	<i>Clunio</i> , Hal.	
—	Antennes de 4 ou 5 articles (♂ ♀), ailes atrophiées et sans nervure, empodium distinct (Patagonie) .. .. .	..	4.
4.	Crochets bifides, palpes de 1 article ..	<i>Jacobsiella</i> , Rübs.*	
—	Crochets simples, palpes de 3 ou 4 articles	<i>Belgica</i> , Jacobs.*	
5.	Pattes intermédiaires et postérieures grosses et courtes, les antérieures grêles et longues; antennes de 12 (♂) ou de 7 (♀) articles. (Lacs en Laponie)	<i>Corynocera</i> , Zett.	
—	Pattes grêles .. .. .	..	6.
6.	Article 4 ^e des tarsi cordiforme et plus court que le 5 ^e , métatarse antérieur plus court que le tibia, empodium long .. .. .	..	7.
—	Article 4 ^e des tarsi non cordiforme mais cylindrique; antennes sans panache .. .. .	..	9.
7.	Métatarse de toutes les pattes plus long que le tibia (Indes Orientales) ..	<i>Nepalia</i> , Kieff.	
—	Métatarse de toutes les pattes plus court que le tibia .. .. .	..	8.
8.	Antennes de 6 ou 7 articles (♂ ♀) et sans panache; palpes de 3 articles; yeux glabres (Océan Atlantique). ..	<i>Scopelodromus</i> , Chevr.*	
—	Antennes du mâle de 14 articles, avec un panache (Méditerranée). ..	<i>Thalassomyia</i> , Schin.*	
9.	Ailes à nervures bien distinctes, métatarse antérieur plus court que le tibia .. .. .	..	10.
—	Ailes raccourcies, sans nervure .. .. .	..	14.

¹ Les genres marqués d'un astérisque me sont inconnus et j'ignore si leurs tibias sont dépourvus de peigne.

10. Mesonotum traversé par un sillon longitudinal profond, antennes de 7 articles, palpes de 4 articles (Amérique du Nord). *Chasmatonotus*,
Lw.*
- Mesonotum autrement conformé 11.
11. Antennes de 13 ou 14 (♂) ou de 7 (♀) articles, dernier article grossi et ovoïdal (♂ ♀); palpes courts, de 3 articles, empodium distinct, yeux glabres (Sur les flaques d'eau en Europe) *Hydrobaenus*, Friese
(*Psilocerus*, Ruthe).*
- Antennes autrement conformées, composées de 7 ou 8 articles (♂ ♀) 12.
12. Ailes raccourcies, ne dépassant pas ou à peine le milieu de l'abdomen (Nord de l'Europe) *Smittia*, Holmgr.*
- Ailes normalement développées 13.
13. Antennes de 7 articles (♂ ♀); palpes de 4 articles; pulvilles petits mais distincts, empodium long (Ile St. Paul) *Telmatogeton*, Schin.*
- Antennes de 8 articles (♂), femelle incon- nue (Australie) *Doloplastus*, Skuse.*
14. Yeux velus; palpes de 4 articles; anten- nes de 6 articles chez le mâle, de 4 chez la femelle (Océan Pacifique) *Eretmoptera*, Kellog.*
- Yeux glabres; palpes de 2 articles; anten- nes de 6 articles (♀) (Ile de Kerguelen). *Halirhytus*,
Eaton.*
15. Scape grossi fortement, subglobuleux; ailes longues, avec la nervation de *Ten- dipes*; métatarse antérieur plus court que le tibia, articles tarsaux 2-4 cordiformes, le 5^e avec 3 lobes situés dans le même plan et formant toit au-dessus des crochets; empodium grand, large et très ramifié (Océan Pacifique) *Paraclunio*, Kieff.
- Scape non grossi, obconique; ailes rudi- mentaires, sans nervure; articles tarsaux cylindriques, le 5^e avec un lobe supérieur situé au-dessus et entre les crochets, et deux lobes latéraux situés au niveau des crochets; empodium filiforme, à deux rangées de poils bifurqués (Océan Atlan- tique) *Psamathiomyia*,
Deby.*

2^e Groupe. ORTHOCLADIARIAE.

Tableau des Genres.

1. Cubitus au maximum un peu plus long que la moitié de l'aile, son extrémité forme

- un stigma avec l'extrémité du radius, base alaire non lobée mais graduellement amincie, aile glabre 2.
- Cubitus dépassant les deux tiers de l'aile, radius et cubitus non épaissis en stigma à leur extrémité 3.
2. Yeux glabres *Corynoneura*, Winn.
- Yeux pubescents *Thienemanniella*, Kieff.
3. Article 4^e des tarsi cordiforme, beaucoup plus court que le 3^e ou le 5^e, empodium et pulvilles non distincts (Ceylon) .. *Cardiocladius*, Kieff.
- Article 4^e des tarsi cylindrique, ordinairement plus long que le 5^e 4.
4. Ailes glabres ou à soies microscopiques 5.
- Ailes poilues 16.
5. Yeux pubescents 6.
- Yeux glabres 10.
6. Tarsi sans pulvilles, empodium filiforme 7.
- Tarsi avec 2 larges pulvilles et un empodium filiforme 8.
7. Palpes de 4 articles, pince ayant de chaque côté un article terminal unique .. 1. *Trichocladius*, Kieff.
- Palpes de 3 articles, pince ayant de chaque côté deux articles terminaux (Europe) *Diplocladius*, Kieff.
8. Palpes de 4 articles 9.
- Palpes de 3 articles (Europe) *Isocladius*, Kieff.
9. Article terminal des antennes du mâle en massue, pas plus long que les 3 précédents réunis, femelle inconnue (Indes) .. *Rhopalocladius*, Kieff.
- Article terminal des antennes du mâle non en massue, aussi long ou plus long que les 12 précédents réunis 2 *Cricotopus*, V.d.W.
10. Pulvilles bien développés et larges .. *Psectrocladius*, Kieff.
- Pulvilles nuls 11.
11. Rameau inférieur de la posticale brisé en angle ou sinueux, empodium filiforme .. *Camptocladius*, V.d.W.
- Rameau inférieur de la posticale droit ou faiblement arqué 12.
12. Vertex s'élevant entre les yeux en un cône obtus et aussi long qu'un des yeux; aile sans lobe et sans transversale, empodium et pulvilles nuls (Indes) .. *Conocladius*, Kieff.

- Vertex non prolongé en cône, aile lobée à la base, transversale oblique.. .. 13.
13. Palpes de 4 articles 13^{bis}.
- Palpes de 3 articles *Trissocladius*, Kieff.
- 13^{bis}. Empodium nul ou très court, ailes glabres.. .. *Orthocladius*, V.d.W.
- Empodium long et filiforme, à poils bifurqués ou trifurqués 14.
14. Ailes nues ou ponctuées 15.
- Ailes à soies microscopiques (Europe) .. *Chaetocladus*, Kieff.
15. Ailes graduellement amincies à la base, antennes du mâle de 12 articles (Indes).. *Dolichocladus*, Kieff.
- Ailes avec un lobe basal, antennes du mâle de 14 articles *Dactylocladius*, Kieff.
16. Thorax s'avancant en pointe conique par dessus la tête, pattes grosses, tibias postérieurs élargis et densément velus (Europe) *Eurycnemus*, V.d.W.
- Thorax s'avancant au-dessus de la tête mais non en pointe, pattes grêles, tibias postérieurs non élargis 17.
17. Yeux glabres, crochets tarsaux simples, empodium filiforme, ailes non lobées à la base, antennes du mâle conformées comme d'ordinaire 18.
- Yeux pubescents, crochets tarsaux bifides, empodium filiforme, antennes du mâle de 12 articles mais conformées comme chez la femelle (Europe) *Thienemannia*, Kieff.
18. Pulvilles distincts, article terminal des forcipules de la pince bifide (Europe et États-Unis) *Brillia*, Kieff.
- Sans pulvilles distincts, article terminal des forcipules entier *Metricnemus*, V.d.W.

1^{er} Genre. *Trichocladus*, Kieff.1. *T. anomalus*, n. sp.

♂. Noir; antennes et pattes d'un brun sombre, tibias et tarsi des 4 pattes postérieures parfois blanchâtres, balanciers d'un blanc pur. Yeux paraissant pubescents, vus à la loupe. Palpes assez longs, 2^e article à peine plus long que le 4^e, 3^e plus court que le 4^e. Antennes de 15 articles, caractère qui distingue cette espèce de tous les Chironominae; articles 3-14 d'abord transversaux, puis aussi longs que gros, 15^e filiforme, deux fois aussi long que 2-14 réunis. Mesonotum brillant. Ailes hyalines,

glabres, avec un lobe basal, nervures brunâtres, 2^e longitudinale à peine plus proche du cubitus que du radius, cubitus droit, non dépassé par la costale, plus proche de la pointe alaire que le rameau supérieur de la posticale, bifurcation de la posticale sous la transversale. Tibia antérieur presque double du métatarse, éperon plus long que sa grosseur. 4^e article de toutes les pattes au moins d'un tiers plus long que le 5^e, empodium atteignant le milieu des crochets, ceux-ci obtus, extrémité avec 3 ou 4 incisions peu distinctes, pulvilles nuls. L. 2.5 mm.

Valley of Sutlej below Simla, W. Himalayas, 6-v (N. Annandale); Darjiling, 8-viii, altitude de 7000 pieds (J. T. Jenkins).

2. *T. spatulicornis*, Kieff.

Un mâle, provenant de la même localité que le type.

2^e Genre. *Cricotopus*, V. d. W.

C. brunettii, n. sp.

♂ ♀. Jaune, vertex, palpes et antennes de la femelle brun noir, antennes du mâle brunes, scape noir, pleures rousses, 3 bandes du mesonotum raccourcies et plus ou moins confluentes, séparées en arrière par un espace roux, scutellum, metanotum et mesosternum d'un noir brillant, la moitié antérieure de la bande médiane du mesonotum est subitement élargie en une tache un peu transversale d'un noir mat, ne laissant avant les bandes latérales qu'une tache jaune, milieu du pronotum également noir mat, balanciers blanchâtres; pattes d'un brun noir, tous les fémurs jaunes sauf l'extrémité de l'antérieur; abdomen du mâle jaune, tergites 1, 2, moitié postérieure du 4^e, 6^e et pince noirs, abdomen de la femelle noir mat, 1^{er} segment, base du 2^e et tout le dessous jaunes ou roux. Yeux pubescents, non amincis au vertex, arqués chez le mâle et distants de plus de leur longueur, à peine arqués chez la femelle et distants de presque 2 fois leur longueur. Antennes du mâle à articles d'abord un peu transversaux, puis allongés, le dernier aussi long que les précédents réunis, panache brunâtre. Antennes de la femelle de 6 articles, le 2^e non rétréci, 3-5 ovoïdaux, à verticilles assez longs, 6^e double du 5^e. Ailes subhyalines, irrisées, à nervures brunes, cubitus arqué, un peu plus de deux fois aussi long que le radius, dépassé longuement par la costale, qui atteint la pointe alaire, 2^e longitudinale un peu plus proche du radius que du cubitus, bifurcation de la posticale sous la transversale, rameau supérieur faiblement arqué. Fémur antérieur grossi faiblement et graduellement, les 4 autres cylindriques, tibia antérieur chez le mâle égal au métatarse, chez la femelle égal au fémur, d'un tiers plus long que le métatarse, celui-ci presque double du 2^e article, 4^e double du 5^e qui est allongé, pulvilles larges, un peu plus courts que l'empodium, celui-ci égalant les crochets. L. ♂ 2.5 mm., ♀ 2 mm.

Kurseong, Himalaya Oriental, altitude de 5000 pieds, 6-ix, 1 ♂ (*N. Annandale*); Darjiling, à une altitude de 6000 pieds, sur les herbes et à la lampe dans les habitations, 20-ix, 28-ix et 1-x, 2 ♂, 5 ♀ (*Brunetti*).

3° Groupe. *TENDIPEDARIAE* (*CHIRONOMARIAE*).

Tableau des Genres.

1.	Peigne des 4 tibias postérieurs conformé comme dans le groupe précédent, c'est-à-dire composé d'une rangée transversale de spinules, ailes glabres	2.
—	Peigne des 4 tibias postérieurs formé par un anneau crénelé	4.
2.	Sans pulvilles ni empodium; article basal des forcipules avec 3 appendices, palpes de 4 articles (Afrique Centrale)	<i>Knepperia</i> , Kieff.
—	Avec 2 larges pulvilles; article basal des forcipules avec 2 appendices; palpes courts de 1 ou 3 articles.	3.
3.	Palpes de 1 article très court, métatarse antérieur aussi long que le tibia, empodium et pulvilles longs	1. <i>Bacotendipes</i> , n.g.
—	Palpes courts, de 3 articles transversaux, métatarse antérieur égal au tibia, empodium atrophié (Indes)	<i>Halliella</i> , Kieff.
4.	Ailes glabres	5.
—	Ailes poilues au moins en partie, article basal des forcipules à 3 appendices	8.
5.	Palpes courts, de 3 articles, pulvilles grands et larges	2. <i>Tripelma</i> , n.g.
—	Palpes longs, composés de 4 articles	6.
6.	Avec 2 pulvilles grands et larges, guère plus courts que les crochets, article basal des forcipules avec 2 appendices.	3. <i>Tendipes</i> , Meig. (<i>Chironomus</i> , Meig.)
—	Pulvilles nuls ou bien petits et minces	7.
7.	Pulvilles nuls, article basal des forcipules avec 2 appendices	4. <i>Paratendipes</i> , Kieff.
—	Pulvilles filiformes, au nombre de 2, n'atteignant pas le milieu des crochets (Europe)	<i>Prochironomus</i> , Kieff.
—	Pulvilles filiformes, au nombre de 4	5. <i>Polypedilum</i> , Kieff.
8.	Métatarse antérieur plus court ou à peine aussi long que le tibia, tarse antérieur barbu chez le mâle (Europe)	<i>Lauterbornia</i> , Kieff.
—	Métatarse antérieur plus long que le tibia, tarse antérieur du mâle non barbu	9.

9. Pulvilles au nombre de 4, filiformes .. *Pentapedilum*,
Kieff.
- Pulvilles au nombre de 2 ou atrophiés.. .. 10.
10. Pulvilles subcirculaires, à peine plus
courts que l'empodium *Calopsectra*, Kieff.
- Pulvilles subfiliformes et courts, égalant
au maximum le tiers des crochets .. *Tanytarsus* subg.
Micropectra, Kieff.
- Pulvilles atrophiés *Tanytarsus*, V.d.W

1^{er} Genre. *Baeotendipes*, n. g.

(Pl. xi, fig. 1, antenne du σ ; fig. 2, peigne du tibia intermédiaire; fig. 3, moitié de la pince.)

σ . Palpes très courts, formés d'un article unique. Bouche non proéminente. Face avec une bosse longuement poilue. Yeux glabres, arqués fortement, distants supérieurement de deux fois leur largeur terminale. Antennes (fig. 1) de 10 articles, avec un panache étalé, dernier article très long. Thorax prolongé en capuchon. Ailes lobées à la base, ciliées, non poilues, nervation de *Tendipes*. Pattes antérieures beaucoup plus longues que les 4 autres, fémur, tibia et métatarse d'égale longueur; tibia antérieur comme chez *Tendipes*, c'est-à-dire, sans éperon mais avec quelques soies terminales longues et appliquées; le fémur des 4 pattes postérieures aussi long que l'antérieur, le tibia beaucoup plus court que le fémur, égalant les 5 articles tarsaux aux pattes intermédiaires ou les 4 articles tarsaux aux pattes postérieures, muni à son extrémité distale, d'un peigne composé d'une rangée transversale de spinules, comme chez *Orthocladius*, au tibia intermédiaire (fig. 2) cette rangée est plus courte qu'au tibia postérieur et n'occupe que le tiers du pourtour, éperons très courts; au tarse antérieur qui est moins large que le tibia, les articles ont la forme de demi cylindre, étant concaves ventralement, le bord de cette concavité est muni de cils arqués, crochets tarsaux simples, obtus, aussi longs que l'empodium qui est filiforme et les pulvilles qui sont obovales. Le type est:

B. brevicornis, n. sp.

σ . Tête et thorax d'un jaune pâle, y compris les palpes et scape, pattes et antennes blanchâtres, abdomen brun noir, bord postérieur des segments, le 8^e segment et la pince jaunes; mesonotum pruinéux de gris, avec 3 bandes jaunes raccourcies, dont la médiane est prolongée par une ligne jusqu'au bord postérieur. Front sans lobes. Articles antennaires 3-9 très transversaux, 4-5 fois aussi larges que longs, le 10^e trois fois aussi long que 2-9 réunis, à massue terminale et fusiforme, panache blanchâtre, étalé, peu dense et peu long. Ailes blanches, cubitus non dépassé par la costale, 2 fois plus distant de la pointe alaire que la discoidale, 2^e longitudinale beaucoup plus proche du radius que du

cubitus, posticale bifurquée sous la transversale. Pattes pubescentes, articles tarsaux graduellement raccourcis, 4^e article du tarse antérieur presque 2 fois le 5^e, celui-ci cinq fois aussi long que gros, 4^e article égalant le 5^e au tarse intermédiaire, un peu plus long que le 5^e au tarse postérieur. Lamelle de la pince (fig. 3) avec un court prolongement; article basal des forcipules avec un appendice supérieur glabre, gros, graduellement aminci, à peine arqué et dépassant à peine l'article, appendice inférieur atteignant le second tiers de l'article terminal, large, arrondi au bout, article terminal ayant sa plus grande largeur au milieu, pointu, cilié audessus du milieu du côté médian. L. 3.5 mm.

Capturé à la lumière, à bord d'un vaisseau, au Canal de Suez, Oct. (N. Annandale).

2^e Genre. *Tripelma*, n. g.

Ce genre diffère de *Tendipes* par les palpes qui sont courts et composés de trois articles. Le type est :

T. pallidum, n. sp.

♂ ♀. D'un jaune pâle; scape du mâle roux, flagellum roux brun, article 6^e de la femelle brun; mesonotum blanchâtre, avec 3 bandes vitellines raccourcies, mates chez le mâle, brillantes chez la femelle, au bord antérieur de la médiane se trouvent 2 taches allongées noires, qui manquent chez le mâle, de chaque côté du mesonotum près du bord antérieur se trouve un point noir; abdomen du mâle jaune clair, les 3 tergites antérieurs traversés par une ligne longitudinale noire, les suivants manquent, abdomen de la femelle jaune brunâtre, les deux segments antérieurs, bord postérieur des autres tergites et les sternites assombris; tibia antérieur, extrémité des articles 1-4 et les trois quarts proximaux du 1^{er} article du tarse antérieur, extrémité des 4 tibias postérieurs et 5^e article de tous les tarses brun noir. Yeux glabres, arqués, graduellement amincis au vertex où ils sont distants de leur largeur terminale. Front sans lobes. Face avec un coussinet longuement poilu. Bouche très petite. Article 1^{er} des palpes aussi gros que long, 2^e allongé, 3^e en ovoïde pointu. Antennes du mâle de 12 articles, dont le dernier est 4 fois aussi long que les 10 précédents réunis et fusiforme au bout, articles 3-11 trois fois aussi gros que longs, panache d'un gris fauve. Antennes de la femelle de 6 articles, dont le dernier est plus de deux fois aussi long que l'avant-dernier et terminé par un long stylet, articles 3-5 fusiformes, verticille de 5 soies très longues, 2-3 fois aussi longues qu'un article. Ailes hyalines, glabres, non ciliées, nervures pâles, cubitus non dépassé par la costale, droit, 2 fois plus distant de la pointe alaire que la discoïdale, 2^e longitudinale très proche du radius, posticale bifurquée sous la transversale. Aux pattes antérieures, le tibia est égal au fémur, le métatarse d'un quart plus long que le tibia, plus de 2 fois le 2^e article, qui est égal au 3^e, 4^e seulement un peu plus court que le 3^e, plus de moitié plus long que le 5^e,

articles 2-4 longuement barbus chez le mâle, métatarse postérieur avec des crochets alignés sur le dessous, sauf au tiers basal, pulvilles larges, obovales, aussi longues que l'empodium, un peu plus courts que les crochets. L. 7 mm.

Calcutta, 9-ix, 23-xi, at light, 3 ♀, 2 ♂ (*N. Annandale*).

3^e Genre. **Tendipes**, Meig. 1800 (*Chironomus*, Meig. 1803).

- | | |
|--|---------------------------------------|
| 1. Ailes avec des taches ou des bandes enfumées ou noires | 2. |
| — Ailes hyalines, sans taches.. .. . | 8. |
| 2. Métatarse antérieur un peu plus court ou à peine aussi long que le tibia, brun noir, thorax sans bandes | 1. <i>T. curtitarsis</i> , n. sp. |
| — Métatarse antérieur plus long que le tibia | 3. |
| 3. Ailes à bandes enfumées longeant les nervures | 16. <i>T. striatipennis</i> , Kieff. |
| — Ailes à bande transversale ou avec des taches | 4. |
| 4. Surface alaire avec de petites taches noires | 5. |
| — Surface alaire à taches ou bandes enfumées | 6. |
| 5. Abdomen brun roux, forcipule avec 3 appendices, front avec 2 lobes dressés. | 17. <i>T. punctatipennis</i> , Kieff. |
| — Abdomen blanc verdâtre dans sa moitié antérieure, brun dans l'autre moitié, forcipule avec 2 appendices | 18. <i>T. aegyptius</i> , n. sp. |
| 6. Nervure transversale noire.. .. . | 19. <i>T. bipunctatus</i> , Kieff. |
| — Nervure transversale pâle, corps blanchâtre, 2 ^e article des palpes le plus long | 7. |
| 7. Mesonotum sans bandes, ailes tachetées. | 2. <i>T. longipalpis</i> , n. sp. |
| — Mesonotum à 3 bandes jaunes, ailes avec une large bande transversale et des taches | 3. <i>T. brunettii</i> , n. sp. |
| 8. Mesonotum jaune, bord antérieur avec 6 grandes taches noires formant un arc ouvert en arrière | 4. <i>T. ornatissimus</i> , n. sp. |
| — Mesonotum autrement coloré | 9. |
| 9. D'un noir brillant, pince, métatarse antérieur sauf le quart distal et les 3 ou 4 premiers articles des autres tarsi sauf l'extrémité, blancs | 20. <i>T. albiforceps</i> , Kieff. |
| — Coloration autre | 10. |
| 10. Tergites 2-7 avec une verrue ellipsoïdale | 21. <i>T. verrucosus</i> , Kieff. |

—	Tergites sans verrue ellipsoïdale	11.
11.	Article 4 ^e du tarse antérieur plus long que le 3 ^e , trois fois aussi long que le 5 ^e , thorax pointu en avant, verdâtre et brillant	5. <i>T. anomalipes</i> , n. sp.
—	Article 4 ^e du tarse antérieur plus court que le 3 ^e , deux fois aussi long que le 5 ^e , thorax non pointu en avant	12.
12.	Abdomen vert au moins en partie, mesonotum avec 3 bandes	13.
—	Abdomen sans couleur verte	19.
13.	Nervure transversale noire	14.
—	Nervure transversale pâle	15.
14.	Abdomen vert, pince brune	22. <i>T. viridiventris</i> , Kieff.
—	Abdomen noir, les 3 premiers segments vert clair	23. <i>T. atrosignatus</i> , Kieff.
15.	Abdomen brun en partie	16.
—	Abdomen vert en entier	17.
16.	Tiers antérieur de l'abdomen vert, le reste brun, lamelle de la pince sans pointe	6. <i>T. nitidus</i> , n. sp.
—	Deux derniers segments et pince bruns, le reste vert, lamelle de la pince avec une pointe	24. <i>T. calligaster</i> , Kieff.
17.	Articles antennaires 3-5 de la femelle cylindriques, serrés, pas plus longs que gros, ensemble plus courts que le 6 ^e , mâle inconnu	7. <i>T. heteropterus</i> n. sp.
—	Articles antennaires 3-5 de la femelle allongés, fusiformes ou en forme de bouteille	18.
18.	Front avec 2 lobes dressés	8. <i>T. glabripes</i> , n. sp.
—	Front sans lobes	9. <i>T. tenuiforceps</i> , n. sp.
19.	Mâles	20.
—	Femelles	30.
20.	Antennes de 12 articles	21.
—	Antennes de 14 articles	29.
21.	Tarse antérieur barbu	22.
—	Tarse antérieur non barbu	26.
22.	Front avec 2 lobes dressés, taille de 9-10 mm.	25. <i>T. lobaticeps</i> , Kieff.
—	Front sans lobes	23.
23.	Taille de 7-8.5 mm., abdomen vitellin avec une bande longitudinale noire.	26. <i>T. flaviventris</i> , Kieff.
—	Taille de 4-5 mm., abdomen autrement coloré	24.
24.	Appendices des forcipules atrophiés ou nuls, mesonotum blanchâtre avec 3 bandes roussâtres	10. <i>T. atrophus</i> , n. sp.

- Appendices des forcipules bien développés 25.
25. Thorax noir en entier 27. *T. seminiger*, Kieff.
- Mesonotum clair, à 3 bandes roussâtres, appendices inférieurs atteignant presque l'extrémité de l'article terminal 28. *T. barbatitarsis*, Kieff.
26. Appendices des forcipules atrophiés ou nuls 11. *T. orissae*, n. sp.
- Appendices des forcipules bien développés 27.
27. Front avec 2 lobes dressés 12. *T. armatifrons*, n. sp.
- Front sans lobes, mesonotum avec 3 bandes rousses 28.
28. Mesonotum brillant; article terminal des forcipules non aminci dans sa moitié distale 29. *T. psilochirus*, Kieff.
- Mesonotum mat; article terminal des forcipules aminci subitement dans sa moitié distale 30. *T. leptochirus*, Kieff.
29. Article terminal des forcipules conique. 13. *T. coniger*, n. sp.
- Article terminal des forcipules non conique 31. *T. dolichogaster*, Kieff.
30. Mesonotum avec 3 bandes ferrugineuses bordées latéralement de noir 31.
- Mesonotum sans bandes ou à bandes autrement colorées 32.
31. Abdomen brun noir, bord postérieur des tergites plus clair; nervure transversale noire 32. *T. nigromarginatus*, Kieff.
- Abdomen jaune clair, tache arrondie sur les tergites 2-6 et les tergites 7 et 8 brun noir; transversale pâle 33. *T. callithorax*, Kieff.
32. Mesonotum brillant, avec 3 bandes noires, nervure transversale pâle 33.
- Mesonotum mat, nervure transversale noire 34.
33. Tarses jaunes en grande partie, fémur antérieur de $\frac{2}{3}$ plus long que le tibia. 34. *T. lamprothorax*, Kieff.
- Tarses brun noir, fémur antérieur d'un quart plus long que le tibia 35. *T. fuscitarsis*, Kieff.
34. Mesonotum cendré, avec 2 taches noires. 14. *T. erythropterus*, n. sp.
- Mesonotum avec 3 bandes plus ou moins distinctes 35.
35. Pattes glabres, mesonotum brunâtre, avec 3 bandes plus sombres et peu marquées 15. *T. glabrimanus*, n. sp.

- Pattes poilues, mesonotum à bandes bien marquées.. .. 36.
36. Mesonotum jaunâtre, à 3 bandes noires, la médiane double .. 36. *T. melanophorus*, Kieff.
- Mesonotum blanchâtre, à 3 bandes rousses, tarse antérieur très mince. 37. *T. filitarsis*, Kieff.

1. *T. curtitarsis*, n. sp.

♀. Brun noir; scape et pattes jaunes, celles-ci couvertes de poils d'un noir profond, assez denses, un peu plus longs que la grosseur des pattes, deux tiers proximaux des fémurs et tiers proximal des tibias bruns. Yeux très arqués, amincis au vertex, où ils sont séparés du double de leur largeur terminale. Palpes couverts de poils denses, articles 1 et 2 courts, 3^e à peine plus long que le 4^e. Flagellum brisé Mesonotum luisant, avec 3 sutures bien marquées et deux bandes longitudinales de poils qui sont alignés sur deux rangées à chaque bande et disposés de façon à être dirigés des deux côtés. Scutellum à poils assez longs et abondants. Ailes enfumées dans leur moitié basale jusqu' à la transversale (l'autre moitié déchirée). Tibia antérieur bien plus court que le fémur, aussi long ou à peine plus long que le métatarse, celui-ci d'un tiers plus long que le 2^e article, 2-4 graduellement et faiblement raccourcis, 4^e double du 5^e, qui est 6-8 fois aussi long que gros, pulvilles larges, à peine plus courts que les crochets; peigne des 4 tibias postérieurs occupant les $\frac{3}{4}$ du pourtour. L. 4 mm.

At light on steamer, R. Ganges, Sara Ghat, 23-iii (*N. Annandale*).

2. *T. longipalpis*, n. sp.

(Pl. xi, fig. 4, partie de la pince.)

♂. Blanchâtre; palpes noirs et longs, antennes brunes, tibia antérieur et articulations de tous les tarses à peine assombris, pince brunâtre. Front sans lobes dressés Yeux arqués fortement, amincis en haut, où ils sont distants de 2 fois leur largeur terminale. Bouche petite. Article 2^e des palpes le plus long, 3^e et 4^e subégaux. Antennes de 14 articles, dont le dernier est filiforme et de moitié plus long que 2-13 réunis, 3-13 d'abord transversaux, puis aussi longs que gros, panache blanchâtre. Thorax mat, en arrière du mesonotum se voit une trace de deux bandes jaunes. Ailes blanches, ciliées, avec des taches enfumées dont 1 sur la transversale et la base du cubitus, englobant le tiers proximal de la discoïdale, 1 presque contre celle-ci, englobant la bifurcation de la posticale et les deux tiers du rameau inférieur, en atteignant le bord alaire, 1 à l'extrémité de l'aile, allongée, située entre le cubitus et la discoïdale et englobant le tiers distal de la discoïdale, nervures blanches sauf les parties qui sont dans les taches enfumées, cubitus droit, non dépassé par la costale, posticale bifurquée sous la transversale. Tarse antérieur non barbu, le métatarse de $\frac{1}{2}$ plus long que le tibia, presque double du 2^e article, 2-4 subégaux, 4^e plus

de 2 fois le 5^e, celui-ci 6-8 fois aussi long que gros, pulvilles larges, un peu plus courts que les crochets. Article terminal des forcipules (fig. 4) en forme de lamelle repliée dans le sens de sa longueur, le quart distal seul non replié, appendice supérieur nul, appendice inférieur long, grêle, pubescent, le tiers distal renflé en une massue glabre, arquée, terminée par un long stylet noir et portant au côté externe 3 longues soies alignées, lamelle découpée en arc au bord postérieur, pointe filiforme et longue. L. 4.5 mm.

Port Canning, Lower Bengal, 24-xii (*N. Annandale*).

3. *T. brunettii*, n. sp.

♀. Blanchâtre: tête, 3 bandes raccourcies du mesonotum, metanotum, mesosternum et taches pleurales d'un jaune clair, palpes noirs, 6^e article antennaire brun noir, scutellum et hanches verts, metanotum avec 2 taches brunes, fémur antérieur sauf un large anneau avant l'extrémité et 5^e article tarsal brunâtre; tibia antérieur et extrémité des 4 premiers articles tarsaux d'un brun noir, tibia postérieur avec un anneau brunâtre près de sa base. Yeux très arqués, amincis au vertex où ils sont séparés de deux fois leur largeur terminale. Palpes longs, 2^e article le plus long, de moitié plus long que le 3^e, celui-ci égal au 4^e. Antennes de 6 articles, dont le dernier est de moitié plus long que l'avant-dernier, 3—5 en forme de bouteille, col égalant presque le renflement. Ailes blanches, avec une large bande transversale enfumée, dont la largeur s'étend de la bifurcation de la posticale jusqu' à l'extrémité du rameau inférieur, elle se prolonge proximale ment le long du bord alaire jusque vis-à-vis du milieu du pétiole de la posticale, cette bande n'atteint pas le bord antérieur mais s'arrête au cubitus et renferme entre le cubitus et la discoïdale une tache hyaline; une tache enfumée, plus claire, est située à l'extrémité alaire, entre le cubitus et la discoïdale, l'extrémité du cubitus, de la discoïdale et du rameau supérieur de la posticale est bordée d'enfumé, bifurcation de la posticale à peine distale de la transversale, nervures jaunes, sauf dans les parties enfumées. Métatarse antérieur d'un quart plus long que le tibia, les 3 articles suivants subégaux, 4^e double du 5^e, pulvilles larges, un peu plus courts que l'empodium, qui égale les crochets. L. 2 mm.

Madhupur, Bengal, 15-x, 3 ♀ (*C. Paiva*).

4. *T. ornatissimus*, n. sp.

♂ ♀. Tête et palpes blanchâtres; scape du mâle vitellin, 2^e article blanchâtre, les suivants bruns, antennes de la femelle blanchâtres, 6^e article brun noir; thorax d'un jaune vitellin, pronotum verdâtre, mesonotum mat, d'un jaune blanchâtre, à 3 bandes vitellines raccourcies, la médiane divisée, à son bord antérieur et latéral jusqu' aux ailes le mesonotum offre un reflet argenté, au-dessus duquel se trouvent 6 grandes taches d'un noir profond, se touchant presque et formant ensemble un arc ouvert en arrière et s'arrêtant peu avant les ailes, les 2 taches antérieures

sont les plus grandes, un peu ovalaires, les 4 autres sont circulaires, l'externe plus petite; deux points noirs se trouvent sur le milieu de la partie déclive du capuchon, contre le pronotum; scutellum et tiers antérieur du metanotum jaune blanchâtre, reste du metanotum brun, balanciers blanc pur; abdomen vert en entier, pince blanche; pattes d'un jaune clair, 5^e article tarsal assombri. Yeux comme chez le précédent. Les 3 derniers articles des palpes longs. Antennes du mâle de 12 articles, dont le 12^e est 2-3 fois aussi long que 2-11 réunis, 3-11 très transversaux, panache gris. Antennes de la femelle de 6 articles, dont le 2^e est rétréci fortement au milieu, en simulant 2 articles, avec 2 verticilles, 3^e et 4^e brièvement fusiformes, faiblement amincis aux 2 bouts, à peine deux fois aussi longs que gros, sans col, 5^e à col égalant la moitié du renflement, verticille à 5 soies longues, 6^e fendu longitudinalement, graduellement aminci distalement, presque double du 5^e. Ailes blanchâtres, nervures pâles, bifurcation peu distale de la transversale. Tarse antérieur du mâle non barbu, métatarse au moins de moitié plus long que le tibia, chez la femelle 2 fois aussi long que le tibia, 2½ fois le 2^e article, 2-4 graduellement et faiblement raccourcis, 4^e double du 5^e, pulvilles grands et larges. Article terminal des forcipules assez large, tiers distal aminci graduellement, appendice inférieur linéaire, dépassant le milieu de l'article terminal. L. 5 mm.

Calcutta, at light, 14-xii. Voisin de *T. sexpunctatus*, Kieff.

5. *T. anomalipes*, n. sp.

♀. Tête et antennes brunâtres, 6^e article et palpes brun noir; thorax verdâtre et brillant, avec 3 bandes faiblement brunâtres et raccourcies, la médiane plus sombre, pattes blanchâtres, tarse antérieur brun noir; abdomen brun verdâtre, 2^e et 3^e segments plus distinctement verdâtres. Antennes de 6 articles, dont le 2^e est à peine rétréci au milieu, 3^e et 4^e ellipsoïdaux, col égalant les $\frac{2}{3}$ du renflement, 5^e ellipsoïdal, col égalant la moitié, verticilles triples des articles, 6^e article de moitié plus long que le 5^e. Thorax en pointe antérieurement. Ailes hyalines, cubitus à peine 2 fois le radius, bifurcation distale de la transversale, celle-ci pâle. Fémur antérieur non grossi, presque double du tibia, métatarse plus de 2 fois le tibia, à peine double du 2^e article, qui est un peu plus long que le 3^e, 4^e distinctement plus long que le 3^e, triple du 5^e, celui-ci 6-8 fois aussi long que gros, 4 fémurs postérieurs assez fortement élargis, pulvilles grands et larges. Abdomen déprimé, rétréci au milieu. L. 3.5 mm.

Bhogaon, Purneah district, N. Bengal, 18-x (C. A. Paiva).

6. *T. nitidus*, n. sp.

(Pl. xi, fig. 5, partie de la pince.)

♂. Scape et thorax vitellins, flagellum brisé, mesonotum pâle, brillant, avec 3 bandes vitellines et raccourcies, pattes

blanchâtres ou jaunâtres, aux antérieures le tibia et le tarse, aux 4 postérieures le 5^e article tarsal d'un brun noir, abdomen vert au tiers antérieur, brun aux deux tiers postérieurs comme la pince. Les 3 derniers articles des palpes longs. Ailes blanchâtres, nervures pâles, cubitus droit, bifurcation sous la transversale. Tarse antérieur non barbu. Lamelle de la pince arrondie, sans pointe; article terminal des forcipules arrondi au bout, sans longues soies alignées, appendice supérieur mince, fortement arqué, n'atteignant pas l'extrémité de l'article basal, appendice inférieur large, arrondi au bout, atteignant le quart distal de l'article terminal (fig. 5). L. 4.5 mm.

Calcutta, 2-viii.

7. *T. heterocerus*, n. sp.

(Pl. xi, fig 6, antenne.)

♀. Tête et palpes d'un blanc sâle, antennes blanchâtres, 6^e article brun noir; thorax mat et roussâtre, mesonotum et scutellum blanchâtres 3 bandes raccourcies roussâtres, balanciers blancs, pattes blanchâtres, tibia et tarse des pattes antérieures, sauf la base du métatarse, et 5^e article des 4 tarses postérieurs brun noir; abdomen entièrement vert clair. Les 3 derniers articles des palpes longs. Yeux comme chez *curtitarsis*. Antennes (fig. 6) de 6 articles, dont le 2^e est double du 3^e et sans rétrécissement, 3-5 cylindriques, serrés, pas ou à peine plus longs que gros, verticilles composés de 3 soies, deux fois aussi longs qu'un article, 6^e article subcylindrique, plus long que les 3 précédents réunis. Ailes blanches, lobées, cubitus droit, double du radius, 2^e non marquée, bifurcation à peine distale de la transversale, nervures pâles. Fémur antérieur un peu grossi, beaucoup plus long que le tibia. Métatarse de moitié plus long que le tibia, 2½ fois le 2^e article, 2-4 graduellement raccourcis, 4^e pas deux fois le 5^e qui est seulement 3 fois aussi long que gros, pulvilles larges, à peine plus courts que l'empodium. L. 1.2-1.8 mm.

Bettiah, Champaran, Bengal, 4-iii; Calcutta, 13 et 30-i, 4-ii, 4-ix.

Remarque.—La forme des antennes et des verticilles, ainsi que la brièveté du 5^e article tarsal rapprochent cette espèce du groupe *Orthocladius*.

8. *T. glabripes*, n. sp.

♀. Tête et antennes blanchâtres, 6^e article et palpes brun noir; thorax mat, jaune roussâtre, mesonotum et scutellum jaune blanchâtre, 3 bandes raccourcies d'un jaune roussâtre, pattes jaune clair, tibia et tarse des antérieures, les 4 derniers articles tarsaux des postérieures brun noir; abdomen vert en entier. Front avec 2 petits lobes dressés. Yeux comme chez *curtitarsis*. Les 3 derniers articles des palpes longs. Antennes de 6 articles, dont le dernier est presque double de l'avant-dernier, 3-5 fusiformes. Ailes blanchâtres, nervures pâles, bifurcation sous la transversale.

Pattes glabres, métatarse antérieur de moitié plus long que le tibia, double du 2^e article, 2-4 graduellement raccourcis, 4^e double du 5^e, pulvilles larges. L. 4 mm.

Calcutta, Dec.

9. *T. tenuiforceps*, n. sp.

(Pl. xi, fig. 7, partie de la pince.)

♂ ♀. Antennes du mâle brunes, scape vitellin, articles 2-5 de la femelle blanchâtres, 6^e brun; thorax vitellin, mat, mesonotum verdâtres, à 3 bandes vitellines raccourcies, pattes antérieures jaunâtres, tibia et tarse brun noir, 4 pattes postérieures verdâtres, 5^e article tarsal brun noir; abdomen vert, pince blanche. Palpes longs. Antennes du mâle de 12 articles, dont le 12^e est 2½ fois aussi long que 2-11 réunis, 3-11 d'abord 3 fois, puis 2 fois aussi gros que longs, panache gris. Antennes de la femelle de 6 articles, dont le 6^e est double du 5^e, avec une soie distale, 3-5 en forme de bouteille, col égalant la moitié du renflement, qui est presque deux fois aussi long que gros. Ailes blanchâtres, nervures pâles. Tarse antérieur du mâle non barbu, métatarse deux fois (♂) ou presque 2 fois (♀) aussi long que le tibia, pulvilles larges. Lamelle de la pince à pointe courte; articles terminaux des forcipules grêles, arqués faiblement, également minces, à soies courtes et alignées au côté médian du quart distal; appendice supérieur en massue arquée, pubescente et dépassant peu l'article basal, appendice inférieur arqué, atteignant presque le milieu de l'article terminal, très mince sauf l'extrémité qui est renflé et obovoïdale (fig. 7). L. 3.5-4 mm.

Calcutta, Sep.—Nov.

10. *T. atrophus*, n. sp.

(Pl. xi, fig. 8, moitié de la pince.)

♂. Scape jaune, flagellum brun; thorax roussâtre, mesonotum mat, pruinéux et blanchâtre, avec 3 bandes raccourcies et roussâtres, scutellum et pattes blanchâtres, extrémité du tibia antérieur et des deux premiers articles tarsaux suivants, les 3 derniers articles du tarse antérieur et le 5^e article des autres tarsi, brun noir; abdomen blanchâtre, les tergites 2-5 ont sur le bord postérieur une tache subcirculaire brun noir et atteignant presque le milieu du tergite, tergites 6-8 et pince brun noir. Antennes de 12 articles, dont le 12^e est faiblement fusiforme au bout et trois fois aussi long que 2-11 réunis, 3-11 deux à trois fois aussi longs que gros, panache fauve. Ailes hyalines, nervures pâles. Métatarse antérieur double du tibia, plus de 2 fois le 2^e article, 2-4 graduellement raccourcis, 4^e double du 5^e, articles 2 et 3 brièvement barbus, les poils seulement 2 fois aussi longs que la grosseur des articles, pulvilles larges. Lamelle de la pince avec une longue pointe, article terminal des forcipules long, grêle, faiblement renflé dans la moitié distale, l'extrémité avec une

verru portant une courte soie, appendices atrophiés, non distincts (fig. 8). L. 4.5 mm.

Calcutta, II-viii.

II. *T. orissae*, n. sp.

♂. Blanchâtre; scape jaunâtre, flagellum brun; mesonotum prumineux avec 3 bandes raccourcies ferrugineuses, aux pattes antérieures l'extrémité du fémur, du tibia, des 3 premiers articles tarsaux et les 2 articles suivants en entier d'un brun noir. Antennes de 12 articles, dont le dernier est 2 à 3 fois aussi long que les 10 précédents réunis, 3-11 très transversaux, panache gris. Ailes hyalines, transversale pâle, bifurcation sous la transversale. Tarse antérieur non barbu, 2 fois aussi long que le tibia ou que le 2^e article, 4^e plus de 2 fois le 5^e; tibia des 4 pattes postérieures à longs poils dressés, pulvilles larges. Article terminal des forcipules grand, presque droit, graduellement et faiblement aminci en arrière, appendices non distincts à la loupe, lamelle à longue pointe. L. 5 mm.

Puri, Orissa coast, 2-iii (C. Paiva).

12. *T. armatifrons*, n. sp.

♂. Tête blanchâtre, palpes brun noir, scape prumineux de blanc, flagellum jaune blanchâtre; thorax cendré, prumineux, mat, mesonotum prumineux de blanc, avec 3 bandes ferrugineuses raccourcies, bordées de brun noir, balanciers et pattes blanchâtres; abdomen brun sombre, pince jaunâtre. Front avec 2 lobes dressés. Antennes de 12 articles, dont le 12^e est fusiforme au bout et trois fois aussi long que 2-11 réunis, 3-11 trois fois aussi gros que longs, panache gris. Ailes hyalines, transversale brune, cubitus droit, de moitié plus long que le radius, bifurcation un peu distale de la transversale. Tarse antérieur non barbu, métatarse double du tibia, celui-ci beaucoup plus court que le fémur, 2^e article tarsal égalant la moitié du 1^{er}, tibia des 4 pattes postérieures à poils deux fois aussi longs que leur grosseur. Article terminal des forcipules faiblement arqué, à peine aminci distalement, sans longues soies alignées, appendice inférieur atteignant au moins le milieu de l'article terminal, large, arrondi au bout. L. 5 mm.

Mandalay, Upper Burma, 10-iii (N. Annandale).

13. *T. coniger*, n. sp.

(Pl. xi, fig. 9, article terminal de la forcipule.)

♂. Couleur et caractères de *T. verrucosus*, sauf: Antennes de 14 articles, dont le 14^e est triple des 12 précédents réunis, 3-13 deux à trois fois aussi gros que longs, panache brun. Tarse antérieur brisé, fémur et tibia des 4 pattes postérieures sans longs poils mais seulement pubescents, pulvilles larges. Abdomen non mat comme chez *verrucosus*, mais brillant, lisse, sans verrues.

Pince (fig. 9) comme chez *verrucosus*, sauf que l'article terminal des forcipules est conique, extrémité glabre.

Mandalay, Upper Burma, 13-iii (N. Annandale).

14. *T. erythropterus*, n. sp.

♀. Brun; thorax cendré et mat, mesonotum traversé par une fine arête longitudinale et percurrente, de chaque côté de laquelle se voit, au bord antérieur, une tache noire qui se prolonge sur le bord latéral jusqu'aux écailles, avec une interruption après le milieu, antennes pâles sauf le 6^e article, pattes d'un jaune brunâtre. Antennes de 6 articles, dont le 6^e est au moins de moitié plus long que le 5^e et graduellement aminci, 3-5 fusiformes. Ailes blanchâtres, d'un rouge sang pendant la vie, nervures pâles, transversale brun noir, bifurcation distinctement distale de la transversale. Métatarse antérieur de $\frac{2}{3}$ plus long que le tibia, double du 2^e article, 2-4 graduellement et faiblement raccourcis, à poils un peu plus longs que leur grosseur, 4^e double de 5^e qui est long, pulvilles larges, tibia et tarse des 4 pattes postérieures à poils plus longs que leur grosseur. L. 4 mm.

At light in railway carriage, between Bolpore and Rampore Haut, Bengal, 3-viii (C. Paiva).

15. *T. glabrimanus*, n. sp.

♀. Semblable au précédent sauf: thorax brunâtre et mat, avec 3 bandes raccourcies, plus sombres et peu distinctes, mesonotum sans arête, balanciers blancs. Ailes non rouges pendant la vie. Pattes d'un blanc jaunâtre, glabres, métatarse antérieur presque 2 fois aussi long que le tibia, articles 2-4 à peine graduellement raccourcis, 4^e double du 5^e, celui-ci long, pulvilles larges. L. 4 mm.

Capturé à la lumière, avec le précédent.

16. *T. striatipennis*, Kieff.

Cette espèce n'était connue que de Kumaon (Memoirs Ind. Mus. 1910, vol. 2, p. 236, ♀; Records Ind. Mus. 1911, vol. 6, p. 134, ♂). On l'a observée encore dans les localités suivantes: Calcutta, 22-xii, 1 ♂; Shencottah, Madras Frontier, E. side of W. Ghats, Travancore, 25-xi, 1 ♀ (N. Annandale); Victoria Gardens, Colombo, Ceylon, 26-iv, 1 ♀ (C. Paiva). Les deux mâles ont les bandes du mesonotum d'un roux brun, comme la femelle, métatarse antérieur presque double du tibia, son extrémité et le 2^e article en entier brièvement barbus, poils deux fois aussi longs que la grosseur du tarse, les 2 pulvilles larges, un peu plus courts que l'empodium, qui égale les crochets. L. 5.5 mm.

17. *T. punctatipennis*, Kieff.

(Pl. xi, fig 10, pince.)

Front avec 2 lobes dressés et petits. Yeux fortement arqués, amincis au vertex, où ils sont distants de trois fois leur largeur

terminale. Palpes longs, 4^e article le plus long. Antennes du mâle de 12 articles; celles de la femelle de 6, dont le dernier, que j'avais pris antérieurement pour le prolongement du 5^e, est cylindrique, étroit, nettement séparé du 5^e et presque deux fois aussi long que lui, 3-5 brièvement fusiformes. Pulvilles larges, atteignant au moins le milieu des crochets. Lamelle de la pince (fig. 10) avec une pointe courte, 2-3 fois aussi longue que large et tronquée; article terminal des forcipules grêle, arqué fortement, aminci en pointe à l'extrémité qui est pubescente et munie de 3 soies peu longues; appendices au nombre de trois, le supérieur glabre, courbé médialement en arc à l'extrémité, qui est munie de 2 soies, appendice intermédiaire pas plus long que le supérieur, ne dépassant pas le quart proximal, grêle, linéaire, faiblement arqué en dehors et à longs poils, appendice inférieur atteignant le milieu de l'article terminal, très mince, courbé fortement en dehors à l'extrémité qui est un peu plus grosse et munie de longs poils incurvés. L. ♂ 3.5 mm, ♀ 2.5 mm.

Katihar, Purneah district, N. Bengal, Sep., 1 ♂, 2 ♀ (*C. Paiva*); on board launch, at light, Bosondhur, Khulna district, Ganges Delta, 29-viii, 6 ♀ (*J. T. Jenkins*); Shencottah, Madras Frontier, E. side of W. Ghats, Travancore, 25-xi, 1 ♂ (*N. Annandale*).

18. *T. aegyptius*, n. sp.

♂. Diffère du précédent par la couleur et par la forme de la pince. Tête et thorax jaunes, mesonotum sauf les 3 bandes raccourcies, scutellum et balanciers blancs, pattes blanchâtres, extrémité des fémurs, des tibias et des 3 premiers articles tarsaux noire, les articles 4 et 5 bruns; moitié antérieure de l'abdomen blanc verdâtre, moitié postérieure et pince brunâtres. Les 2 pulvilles peu larges, atteignant la moitié des crochets. Lamelle de la pince à pointe longue, atteignant l'extrémité des appendices inférieurs; article terminal des forcipules faiblement arqué, non grêle, à peine aminci distalement, appendice supérieur ne dépassant pas l'article basal, glabre, mince et à peine arqué, appendice inférieur long, atteignant presque le milieu de l'article terminal, droit, très mince, sauf l'extrémité qui est un peu grossie et dirigée en dehors. L. 3.5 mm.

Port Said, Egypte, à bord d'un vaisseau, la nuit à la lampe, 9-xi, 1 ♂ (*N. Annandale*).

19. *T. bipunctatus*, Kieff.

♀. On ne connaissait que le mâle de cette espèce. La femelle est colorée comme le mâle. Front sans lobes dressés. Palpes longs. Antennes de 6 articles, jaune roussâtre, le 6^e brun noir, cylindrique, double du 5^e, le 2^e rétréci au milieu, 3-5 formés par un renflement ovoïdal et un col un peu plus court que le renflement. Métatarse postérieur à crochets ventraux, sauf au quart basal et au quart distal, pulvilles larges. L. 4.5 mm.

Rangoon, Burma, Feb. (*N. Annandale*).

20. *T. albiforceps*, Kieff.

Pulvilles larges, atteignant le milieu des crochets.

Calcutta, 5-i, 18-v, 2-vii, ix, x, xi, xii; Dum-Dum, near Calcutta, 28-vii, 1 ♀ (*B. Lord*); Mandalay, Upper Burma, 12-iii, 1 ♀ (*N. Annandale*); Bhogaon, Purneah district, N. Bengal, 2-x, 2 ♂, 1 ♀ (*C. Paiva*); on board launch, at light, Bologhatta near Khulna, Ganges Delta, 28-viii, 1 ♀, Khulna, 27-viii, 4 ♀ (*J. T. Jenkins*).

21. *T. verrucosus*, Kieff.

(Pl. xi, fig. 11, moitié de la pince.)

La pince (fig. 11) de cet insecte a l'article terminal des forcipules grand, faiblement aminci et glabre au quart distal, sans longues soies alignées, appendice supérieur mince et faiblement arqué, ne dépassant pas l'article basal, appendice inférieur dépassant le tiers basal de l'article terminal, droit, graduellement et fortement grossi dans sa moitié distale, arrondi au bout, lamelle à pointe longue.

Bhim Tal.

22. *T. viridiventris*, Kieff.

Mandalay, Upper Burma, 12-iii (*N. Annandale*).

23. *T. atrosignatus*, Kieff.

Calcutta, Sep., ♀ (*N. Annandale*).

24. *T. calligaster*, Kieff.

(Pl. xi, fig. 12, moitié de la pince.)

♂. Pulvilles larges. Lamelle de la pince sans pointe; article terminal des forcipules assez gros, droit, à peine aminci au bout qui est pubescent et sans soies alignées, appendice supérieur arqué fortement, mince, pointu, ne dépassant pas l'article basal, appendice inférieur presque aussi large que l'article terminal, droit, arrondi au bout, atteignant presque le tiers distal de l'article terminal (fig. 12).

Port Canning, Lower Bengal, 6-xii (*N. Annandale*).

25. *T. lobaticeps*, Kieff. var. *validus*, Kieff.¹

♂ ♀. Les exemplaires des localités suivantes avaient tous le mesonotum jaunâtre, prumineux de gris, avec les 3 bandes seulement brunâtres et peu marquées.

Calcutta, 30-i, iii, iv, 5-xii; Madhupur, Bengal, Oct.; Sondagee, Ganges Delta, 6-xii, at light (extrémité des articles tarsaux brun noir); Ile Formose, ii, iii, 20 ♂ ♀ (*H. Sauter*).

¹ Kieffer, H. Sauter's Formosa-Ausbeute, Tendipedidae (Supplem. Ent. 1912, vol. I, p. 34, ♂ ♀).

26. *T. flaviventris*, Kieff.

♂. Article terminal des forcipules non aminci ou à peine aminci distalement, appendice inférieur atteignant le milieu de l'article terminal, également large partout, arrondi au bout. L. 7 mm.

Balighai, near Puri, Orissa, 26-x-1908 (*N. Annandale*).

27. *T. seminiger*, Kieff.

(Pl. xi, fig. 13, pince.)

♂. Noir brillant; abdomen jaune brunâtre, brillant, avec une ligne longitudinale et médiane, le bord postérieur des tergites et la pince noirs, pattes d'un jaune blanchâtre. Antennes de 14 articles, dont le dernier est fusiforme au bout et un peu plus de deux fois aussi long que les 12 précédents réunis. La pince offre une forme caractéristique (fig. 13); l'appendice inférieur, qui dépasse un peu l'article basal, est de forme linéaire aux deux tiers inférieurs, au tiers terminal il est subitement découpé obliquement du dedans en dehors, puis prolongé en une partie subfiliforme qui porte les longs poils incurvés et à son extrémité, une soie droite atteignant le tiers distal de l'article terminal; appendice supérieur très mince, fortement incurvé au tiers distal, n'atteignant pas l'extrémité de l'article basal, article terminal également gros, l'extrémité à peine amincie, sans longues soies alignées. L. 5 mm. Calcutta, viii.

28. *T. barbatitarsis*, Kieff.

♂ ♀. Port Canning, Lower Bengal, vii, xii, et Calcutta, viii, ix, xi, xii (variété de 6.5 mm., mesonotum pruineux de gris entre les bandes, métatarse antérieur du mâle de moitié plus long que le tibia, celui de la femelle de deux tiers plus long que le tibia). Bettiah, Champaran, Bengal, 4-iii; Ile Gopkuda, Lake Chilka, Orissa, viii.

29. *T. psilochirus*, Kieff.

(Pl. xii, fig. 14, moitié de la pince.)

♂. La pince (fig. 14) est grande; article terminal des forcipules faiblement aminci à l'extrémité qui est pubescente et dépourvue de longues soies alignées, ouvert largement sur tout le côté interne; appendice supérieur mince, arqué, ne dépassant pas l'article basal; appendice inférieur presque d'égale largeur partout, guère moins large que l'article terminal, dont il dépasse le milieu en longueur. L. 5 mm.

Calcutta, 27-xi.

30. *T. leptochirus*, Kieff.

Pulvilles grands et larges. Kumaon, Bhim Tal, à une altitude de 4500 pieds, 22-ix. ♀ (variété à articles antennaires 3-5 ellipsoï-

daux, avec un col graduellement allongé, égal au noeud au 5^e article; la tache noire de la nervure transversale s'étend sur la base du cubitus et du radius et sur la posticale. L. 3.5 mm.).

Mandalay, Upper Burma, 6-8-i; Calcutta, vii, viii, ix, xii; Port Canning, Lower Bengal, 6, 24-xii.

31. *T. dolichogaster*, Kieff.

(Pl. xii, fig. 15, moitié de la pince.)

♂ ♀. On ne connaissait de cette espèce que le mâle. Lamelle de la pince (fig. 15) avec une longue pointe; article terminal des forcipules subdroit, d'égale grosseur, à peine aminci à l'extrémité qui est pubescente et dépourvue de longues soies alignées; appendice supérieur mince, n'atteignant pas l'extrémité de l'article basal, incurvé à l'extrémité, son tiers basal porte au côté médian une dizaine de longues soies alignées; appendice inférieur mince mais moins que le supérieur, linéaire, sinueux, arrondi à l'extrémité. La femelle mesure 4.5-5 mm.; antennes sauf le dernier article qui est brun, balanciers et pattes sauf les hanches blanchâtres; thorax entièrement noir brillant; abdomen brun ou jaunâtre, bord postérieur des tergites brun noir. Front sans lobes dressés. Palpes longs, le 2^e article le plus long, 3^e et 4^e égaux. Antennes de 7 articles, dont le dernier est de moitié plus long que l'avant-dernier, avec une longue soie distale, 3-6 fusiformes, verticilles composés de 5 soies dont 2 sont courtes.

Calcutta, ii, viii.

32. *T. nigromarginatus*, Kieff.

♀. Calcutta, Jan.; Kawkareik, Amherst district, Lower Burma, 5-iii; Port Canning, Lower Bengal, 21-vii (*N. Annandale*).

33. *T. callithorax*, Kieff.

♂. At light in railway carriage, Sonarpur, Lower Bengal, 24-xii (*N. Annandale*).

34. *T. lamprothorax*, Kieff.

♀. At light, Puri, Orissa coast, 24-ii (*C. Paiva*); Port Canning, Lower Bengal, vii (*N. Annandale*); Katihar, Purneah District, viii; Calcutta, vii, viii, ix, xi, xii.

35. *T. fuscitarsis*, Kieff.

♀. Calcutta, 20-viii. Probablement seulement une variété de *lamprothorax*.

36. *T. melanophorus*, Kieff., var.

♀. Antennes jaunâtres, 6^e article brun noir, thorax mat et jaunâtre, 4 bandes raccourcies sur le mesonotum, scutellum et metanotum noirs, balanciers blanchâtres, pattes jaunâtres, base du tibia antérieur et extrémité des articles des 4 autres tarsi assombrie, tarse antérieur brisé. Palpes longs et clairs. Antennes de 6 articles, dont le dernier est au moins deux fois aussi long que l'avant-dernier, 3-5 ellipsoïdaux, avec un col égalant presque le noeud. Ailes hyalines, cubitus distinctement arqué, nervures pâles, transversale brun noir. Tibia antérieur un peu plus court que le fémur. L. 4.5 mm.

Rajshahi, eastern Bengal, Feb. (*N. Annandale*).

37. *T. filitarsis*, Kieff.

♀. On ne connaissait que le mâle de cette espèce. La femelle offre la coloration du mâle, sauf que les antennes sont brunes, 6^e article noir, l'extrémité des tibias et des 4 premiers articles tarsaux brun noir, abdomen d'un brun uniforme. Antennes de 6 articles, dont le 6^e est de moitié plus long que le 5^e, 3-5 ovoïdaux, avec un col égal au noeud. Tarse antérieur très mince comme chez le mâle. L. 3.5-4.2 mm.

Calcutta, 26-vii; Port Canning, Lower Bengal, July (*N. Annandale*); Purneah, N. Bengal (*C. Paiva*); Katihar, Purneah District, Aug.; Moulmein, Lower Burma, 28-ii (*N. Annandale*).

4 Genre. *Paratendipes*, Kieff.

Il faut encore rapporter à ce genre *T. digraphis*, Kieff. et *T. melanothorax*, Kieff. de l'Himalaya.

- | | | |
|--|----|---------------------------------|
| 1. Ailes sans tache ni bande | .. | 1. <i>P. pelargus</i> , n. sp. |
| — Ailes avec deux bandes transversales | .. | 2. <i>P. ditaenius</i> , n. sp. |
| — d'un roux brun | .. | 2. |
| — Ailes avec des taches enfumées | .. | 2. |
| 2. Noir mat, sauf les pattes | .. | 4. <i>P. dolens</i> , Kieff. |
| — Mesonotum cendré, à 3 bandes | .. | 3. <i>P. caunteri</i> , n. sp. |

1. *P. pelargus*, n. sp.

(Pl. xii, fig. 16, deux derniers articles antennaires de la femelle.)

♂ ♀. Le mâle a le thorax noir mat, palpes, bouche, balanciers, pattes et abdomen blanc pur, 8^e segment abdominal noir, forcipules blanches, antennes blanchâtres. La femelle est blanchâtre en entier sauf le thorax roussâtre, mesonotum blanchâtre, avec 3 bandes roussâtres et plus ou moins confluentes. Antennes de 14 articles, dont le 3^e et le 4^e transversaux, 5-13 aussi longs que gros, 14^e un peu plus long que 2-13 réunis, panache gris. Antennes de la femelle (fig. 16) de 5 articles, dont le 2^e est allongé, non

rétréci au milieu, à col très court, 3-5 en forme de bouteille, col égal au renflement, verticille de 7 soies dont 4 très longues, trois fois aussi longues qu'un article, 5° à base ellipsoïdale et munie d'un verticille semblable à celui des articles précédents, le reste de l'article est mince, subcylindrique, triple du renflement ellipsoïdal. Ailes hyalines, densément pointillées, pas distinctement lobées, cubitus arqué, double du radius, non dépassé par la costale, proche de la pointe alaire, transversale pâle, bifurcation de la posticale notablement distale de la transversale. Métatarse antérieur double du tibia (σ ♀), celui-ci un peu plus court que le 2° article tarsal, 2-4 graduellement raccourcis, 4° presque double du 5°, empodium un peu plus court que les crochets, pulvilles non distincts. Les 4 pattes postérieures et l'abdomen du mâle à poils blancs et assez longs, tarse antérieur pubescent. Article terminal des forcipules long et grêle, appendice inférieur dépassant l'article basal et juxtaposé l'un à l'autre. L. σ 2.5 mm., ♀ 2 mm.

Calcutta, viii, xii.

2. *P. ditaenius*, n. sp.

♀. Brun noir; mesonotum brun avec une trace de 3 bandes plus sombres, antennes et pattes blanchâtres, fémurs brunâtres, 6° article antennaire brun, palpes noirs, les 3 derniers articles longs. Antennes de 6 articles, dont le 6° n'est pas plus long que le 2°, celui-ci long, 3° et 4° subcylindriques, sans col, 5° ellipsoïdal et sans col, verticilles peu longs. Ailes blanches, ciliées, avec 2 bandes transversales d'un roux brun et bien délimitées, dont la plus mince a comme limite distale l'origine du cubitus, elle commence à la tige de la discoïdale et s'arrête un peu avant le bord inférieur de l'aile; la 2° commence au bord antérieur de l'aile et traverse la fourche de la posticale sans atteindre le bord inférieur; aile non lobée, graduellement amincie proximale, sans transversale, cubitus rapproché du bord et parallèle à lui, non dépassé par la costale, aboutissant près de la pointe alaire, bifurcation de la posticale très distale de la transversale. Fémur antérieur légèrement renflé dans sa moitié distale, à peine plus long que le tibia; peigne des 4 tibias postérieurs à dentelures aiguës, métatarse antérieur à peine plus long que le tibia ($\frac{1}{2}$ ou $\frac{1}{3}$), double du 2° article, 4° double du 5° qui est 4-5 fois aussi long que gros, tarses sans longs poils, empodium n'atteignant pas le milieu des crochets, pulvilles non distincts. L. 1.2 mm.

Katihar, Purneah District, N. Bengal, 14-x (*C. Paiva*).

3. *P. caunteri*, n. sp.

♀. Brun sombre; antennes sauf le 1° et le 6° article blanchâtres; mesonotum cendré, avec 3 bandes raccourcies dont la médiane est roux sombre, les 2 latérales pruinées de blanc ou de gris, pattes blanchâtres sauf le 5° article tarsal, tous les fémurs et le tibia intermédiaire un peu brunis. Antennes de 6 articles, dont le 6° est double du 5° et muni de 3 longues soies distales, 3-5 pres-

que fusiformes, à peine deux fois aussi longs que gros, verticilles de 7 soies, 3 fois aussi longs qu'un article. Thorax sans sutures proéminentes dessus. Ailes blanches avec 8 taches enfumées dont 3 sont alignées entre le cubitus et la discoïdale, la 1^e à la base du cubitus, la 2^e parfois bilobée distalement, sous le milieu du cubitus, la 3^e en forme de L à l'extrémité alaire; la 4^e et la 5^e tache sont situées sous l'extrémité de la discoïdale et du rameau supérieur de la posticale, elles sont parfois reliées l'une à l'autre, ne laissant entre elles qu'un espace blanc et circulaire libre; la 6^e et la 7^e sont situées l'une à la bifurcation de la posticale, l'autre à l'extrémité du rameau inférieur; la 8^e, plus grande, entre le bord postérieur et le milieu de la tige de la posticale; nervures jaunâtres, bifurcation de la posticale à peine distale de la transversale. Métatarse antérieur presque double du tibia, empodium atteignant un tiers des crochets, pulvilles non distincts, métatarse postérieur avec crochets ventraux au tiers distal. L. 2.5-2.8 mm.

Rajmahal, Bengal, 5-vii, at light (*N. Annandale*); on board launch, at light, Bosondhur, Khulna District, Ganges Delta, 29-viii (*J. T. Jenkins*); Chennia, 24 Perghs., Sunderbunds 10-ix (*Jenkins*); Balighai, near Puri, Orissa, 23-x (*N. Annandale*).

4. *P. dolens*, Kieff.

(Pl. xii, fig. 17, moitié de la pince.)

♂ ♀. On ne connaissait de cette espèce que la femelle. Le mâle offre la coloration de la femelle, sauf que le mesonotum a une bande médiane roux sombre, au tiers antérieur; antennes brunes, de 14 articles, dont le dernier est pointu et deux fois aussi long que 2-13 réunis, 3-13 deux à trois fois aussi gros que longs, panache jaunâtre. Surface alaire ponctuée. Métatarse antérieur d'un tiers plus long que le tibia, articles 3 et 4 à poils dressés mais guère plus longs que la grosseur du tarse, empodium égalant le tiers des crochets, pulvilles non distincts. Lamelle de la pince (fig. 17) avec une longue pointe; article terminal des forcipules arqué, un peu plus large à l'extrémité qu'à la base et en forme de lamelle velue et transparente, la moitié basale en cylindre ouvert médialement, d'égale largeur; appendice supérieur mince, assez long, courbé presque en angle près de sa base, appendice inférieur peu large, linéaire, pointu à l'extrémité, qui est munie d'une longue soie droite, outre les poils incurvés. L. 4.5 mm. La femelle a les antennes de 6 articles et non pas de 5; ce que j'avais considéré à la loupe comme étant le prolongement du 5^e article, est le 6^e article, qui est nettement séparé du 5^e, et presque deux fois aussi long que lui, avec 2 longues soies distales, brun, tandis que les précédents sont blanchâtres, 2^e rétréci au milieu, 3-5 fusiformes, verticilles à 5 soies égales et fort longues.

Calcutta, ii, viii, xi, xii; Bettiah, Champaran, Bengal, iii; Puri, Orissa, coast, 2-iii (*C. Paiva*); at light in railway carriage, Sonapur, Bengal, 24-xii; Katihar, Purneah District, N. Bengal, Oct. (*C. Paiva*).

5^e Genre. *Polypedilum*, Kieff.

- | | | |
|---|--------------------------------------|----|
| 1. Tergites 2-7 avec une crête médiane et longitudinale | 1. <i>P. cristatum</i> , n. sp. | 2. |
| — Tergites sans crête .. .. . | .. .. . | 2. |
| 2. Ailes hyalines, sans tache | 2. <i>P. kempi</i> , n. sp. | |
| — Ailes avec une bande transversale | 7. <i>P. fasciatipenne</i> , Kieff. | |
| — Ailes tachetées .. .. . | .. .. . | 3. |
| 3. Tarse antérieur du mâle barbu, antennes de la femelle de 6 articles.. | 8. <i>P. tripartitum</i> , Kieff. | |
| — Tarse antérieur du mâle non barbu, antennes de la femelle de 5 articles.. | .. .. . | 4. |
| 4. Fémurs et tibias bruns ou clairs en entier (♂) .. .. . | .. .. . | 5. |
| — Fémurs et tibias annelés, ou bien bruns avec le tiers distal ou basal jaune (♂ ♀) .. .. . | .. .. . | 8. |
| 5. Article terminal des forcipules grêle et long, pas distinctement aminci distalement, tibia antérieur avec un éperon | 3. <i>P. angustiforceps</i> , n. sp. | |
| — Article terminal des forcipules distinctement aminci dans sa moitié distale .. .. . | .. .. . | 6. |
| 6. Tarses blancs, moitié basale des articles 1-4 et le 5 ^e noirs | 4. <i>P. milnei</i> , n. sp. | |
| — Tarses entièrement blancs | 5. <i>P. purimanus</i> , n. sp. | |
| 8. Tibias à 2 anneaux bruns, fémurs avec un anneau, col des articles antennaires 3 et 4 plus court que le noeud | 9. <i>P. annulatipes</i> , Kieff. | |
| — Fémur et tibia des 4 pattes postérieures bruns, tiers basal du tibia et tiers distal du fémur jaunes, tibia antérieur sans éperon; col des articles antennaires 3 et 4 aussi long que le renflement | 6. <i>P. brumale</i> , n. sp. | |

1. *P. cristatum*, n. sp.

♂ ♀. Brun sombre, palpes et scape brun noir, flagellum brunâtre, balanciers blancs, scutellum jaunâtre, fémur antérieur brun noir, moitié basale plus claire, 4 fémurs postérieurs brun noir avec un large anneau jaunâtre avant l'extrémité, tous les tibias blancs avec l'extrémité noire tarses blancs, extrémité des 4 premiers articles et le 5^e noirs, côtés de l'abdomen brun jaune, les tergites avec une tache jaunâtre avant le bord postérieur, pince blanche ou jaunâtre, lamelle brune. Yeux glabres, arqués

fortement, amincis au vertex où ils sont distants de leur largeur terminale. Articles 2-4 des palpes longs, 4° presque double du 3°. Antennes du mâle de 14 articles, dont le 14° est de moitié plus long que 2-13 réunis, 3-13 d'abord un peu transversaux, puis aussi longs que gros. Article 2° des antennes de la femelle un peu rétréci au milieu, à col aussi long que gros, 3° en forme de bouteille, à col allongé, les suivants brisés. Ailes blanches, ponctuées, avec des taches enfumées, dont 3 entre le cubitus et la discoïdale, la 1° à la base du cubitus, la 2° cordiforme, sous le milieu et la 3° sous l'extrémité du cubitus; deux entre la discoïdale et le rameau supérieur de la posticale, correspondant à la 2° et à la 3° de la première série; trois presque ponctiformes entre les rameaux de la posticale; une grande géminée entre le rameau inférieur et la tige de la posticale; cubitus droit, double du radius, 2° nervure très proche du radius, transversale oblique, bifurcation de la posticale distale de la transversale. Tarse antérieur du mâle non barbu, métatarse $2\frac{1}{2}$ fois aussi long que le tibia, celui-ci avec un éperon aussi long que sa grosseur (σ φ), fémur antérieur aminci dans sa moitié basale, les 4 pulvilles aussi longs et aussi minces que l'empodium. Tergites 2-7 parcourus dans les deux tiers antérieurs par une crête médiane, longitudinale, poilue de noir, par suite l'abdomen, vu de profil, paraît crénelé. Lamelle de la pince avec une longue pointe élargie au bout, article terminal des forcipules arqué en dehors, droit au côté médian, aminci graduellement au quart distal; appendice supérieur n'atteignant pas l'extrémité de l'article basal, pubescent et élargi dans la moitié proximale, très aminci, un peu arqué dans la moitié distale, qui porte 3 soies au côté externe et 2 au côté médian; appendice inférieur large, droit, atteignant le 2° tiers de l'article terminal, arrondi au bout. L. σ 3 mm., φ 2 mm.

Katihar, Purneah District, N. Bengal; ix, 19 σ , 11 φ (*C. Paiva*); Port Canning, Lower Bengal, 6-xii, 1 σ ; south end of Lake Chilka, N. E. Madras, iii, 2 σ (*N. Annandale*).

2. *P. kempî*, n. sp.

(Pl. xii, fig. 18, antenne.)

φ . Jaune; 6° article antennaire assombri. Yeux glabres, arqués, amincis au vertex où ils sont distants de toute leur longueur. Palpes longs. Antennes (fig. 18) de 6 articles, dont le 2° est allongé, non rétréci, 3-5 ellipsoïdaux, à peine de moitié plus longs que gros et sans col, verticille presque deux fois aussi long qu'un article, 6° article un peu plus de deux fois le 5°. Ailes ponctuées, lobées, cubitus non dépassé par la costale, plus de deux fois le radius, tous deux avec des soies, bifurcation de la posticale un peu distale de la transversale. Tibia antérieur sans éperon mais avec une écaille transversale, comme chez *Tendipes*, fémur antérieur au moins de moitié plus long que le tibia, tarse antérieur brisé, 4° article des tarsi intermédiaires un peu plus court que le 5°, aux pattes postérieures il est égal au 5°, empodium à peine plus long

que les pulvilles, ceux-ci filiformes, probablement seulement à deux, à poils longs. L. 1.2 mm.

Puri, Orissa Coast, 13-xi (S. W. Kemp).

Remarque.—A cause de la forme des yeux, des antennes et du nombre des pulvilles cette espèce devra probablement former un genre à part.

3. *P. angustiforceps*, n. sp.

(Pl. xii, fig. 19, pince.)

♂. Palpes, scape et pattes jaunes, thorax brun sombre, avec une trace de 3 bandes raccourcies plus sombres, abdomen jaune brunâtre. Flagellum et tous les tarses brisés. Ailes blanches, avec des taches enfumées, dont 3 alignées entre le cubitus et la discoïdale, la 2^e est subcirculaire et repose sur un trait longitudinal de même couleur; une bande longitudinale enfumée réunit la discoïdale et la rameau supérieur de la posticale, depuis la 1^e tache jusqu'à la 2^e; une 4^e tache est sous l'extrémité de la discoïdale, une 5^e et une 6^e l'une au-dessus, l'autre au-dessous de l'extrémité du rameau supérieur de la posticale, une 7^e allongée dans la bifurcation de la posticale, 8^e et 9^e sous le rameau inférieur, l'une à la base, l'autre à l'extrémité, 10^e géminée entre le bord inférieur de l'aile et le milieu du pétiole de la posticale; nervures jaunes. Tibia antérieur beaucoup plus court que le fémur, avec un éperon aussi long que la grosseur du tibia. Pince (fig. 19) grêle; lamelle avec une longue pointe, article terminal des forcipules long, mince, à peine aminci à l'extrême bout, son côté médian avec de longs poils alignés, sauf à la base; appendice supérieur arqué, assez gros, puis aminci subitement en un long bec, partie dorsale avec une forte soie; appendice inférieur aussi large que l'article terminal, dont il ne dépasse pas le tiers, presque linéaire, arrondi au bout, L. 2.5 mm.

Katihar, Purneah District, N. Bengal, ix (C. Paiva).

4. *P. milnei*, n. sp.

♂. Tête et thorax roux brunâtre, scape jaunâtre, flagellum brun, balanciers brunâtres, pattes blanchâtres, tiers basal du métatarse, moitié basale des articles 2-4 et le 5^e en entier brun noir. Antennes de 14 articles, dont le 14^e est double des 12 précédents réunis, 3-13 d'abord aussi longs, puis un peu plus longs que gros, panaché brun noir. Ailes blanches, à nervures jaunes, avec des taches enfumées, dont 3 alignées entre le cubitus et la discoïdale, la 2^e cordiforme, la 1^e et la 3^e en trait longitudinal, une 4^e entre la tige de la posticale et la discoïdale, une mince bande longitudinale sur toute la longueur du bord inférieur de la discoïdale, sauf le pétiole, au bord alaire elle s'élargit et rejoint proximement, en longeant le bord alaire, la 5^e tache située à l'extrémité du rameau antérieur de la posticale, une 6^e tache dans la bifurcation de la posticale traverse encore le rameau inférieur, une 7^e est située sous le milieu du pétiole de la posticale; cubitus à peine

plus de moitié plus long que le radius, 2^e très proche du radius, bifurcation de la posticale distale de la transversale, base alaire lobée à angle droit. Métatarse antérieur presque double du tibia, articles 2-4 graduellement raccourcis, les 4 pulvilles filiformes, aussi longs que l'empodium, égalant les 2 tiers des crochets. Article terminal des forcipules graduellement aminci en pointe à partir du milieu, appendice inférieur également large partout, atteignant presque le milieu de l'article terminal. L. 3.5 mm.

Berhampur Murshidabad District, Bengal, xii (R. Milne).

5. *P. purimanus*, n. sp.

♂. Brun noir; flagellum brun clair, pétiole des balanciers blanchâtre, fémurs brunâtres, tibias et tarses blancs. Antennes de 14 articles, dont le 14^e est double des 12 précédents réunis, 3-13 aussi longs que gros, panache brun noir. Ailes blanches, avec des taches enfumées et irisées, dont 3 alignées entre le cubitus et la discoïdale, l'une à l'origine, l'autre au milieu, la 3^e à l'extrémité du cubitus; une bande longitudinale enfumée relie la discoïdale au rameau supérieur de la posticale depuis la 1^{re} tache jusqu'à la 2^e; une 4^e tache est dans la bifurcation de la posticale et traverse le rameau inférieur, en atteignant le bord alaire; une très petite tache ponctiforme sous l'origine du rameau inférieur; une tache géminée sous le milieu du pétiole de la posticale; cubitus droit, presque double du radius, bifurcation de la posticale distale de la transversale. Métatarse antérieur non barbu, presque double du tibia, 4 pulvilles étroits et aussi longs que l'empodium. Article terminal des forcipules graduellement et faiblement aminci dans sa moitié distale, appendice inférieur dépassant un peu l'article basal. L. 1.5 mm.

Calcutta, ix (R. E. Lloyd).

6. *P. brumale*, n. sp.

(Pl. xii, fig. 20, antenne.)

♀. Brun; tête, antennes, pattes antérieures (tarse brisé) et lamelles jaunes, toutes les hanches et les 4 pattes postérieures brunes, tiers distal du fémur et tiers basal du tibia jaunes, tarse blanc, un large anneau au milieu du métatarse, tiers ou moitié basale des 3 articles suivants et le 5^e brun noir. Yeux séparés de leur largeur terminale. Palpes un peu plus longs que les antennes, articles 2-4 graduellement allongés, 4^e double du 3^e. Antennes (fig. 20) de 5 articles, dont le 2^e est rétréci au milieu, à col un peu plus long que gros, 3^e et 4^e en forme de bouteille, col égalant le renflement, 5^e à base ellipsoïdale et munie d'un verticille, la partie distale $2\frac{1}{2}$ fois aussi longue que le renflement, verticilles à 5 ou 6 soies inégales, les longues presque triples des petites, qui ne sont guère plus longues qu'un article. Ailes ponctuées, avec des taches enfumées, dont 3 alignées entre le cubitus et la discoïdale, la 1^{re}

plus grande est située à la base du cubitus, la 2^e repose sur un trait longitudinal; une bande longitudinale unit la discoïdale au rameau supérieur de la postcale depuis la 1^e tache jusqu' à la 2^e; une tache ronde à l'extrémité de la discoïdale; une grande tache traverse le rameau inférieur jusqu'au bord postérieur et forme avec la 1^e tache et la bande longitudinale une bande transversale; cubitus avec de longues soies, presque double du radius, bifurcation très distale de la transversale; nervures jaunes. Poils des 4 pattes postérieures 2-3 fois aussi longs que la grosseur des pattes, tibia antérieur plus court que le fémur, extrémité avec de longues soies appliquées et une écaille hyaline, comme chez *Tendipes*, métatarse postérieur à crochets ventraux dans sa moitié distale, 4^e article de moitié plus long que le 5^e, celui-ci 2 fois aussi long que gros, empodium à peine plus court que les crochets, pulvilles probablement seulement à 2, minces, un peu plus courts que l'empodium. L. 1.8-2 mm.

Giridih, Bengal, 7-xi (S. W. Kemp).

7. *P. fasciatipenne*, Kieff.

♀. Les antennes sont ici de 6 articles et non de 5; le 2^e article non rétréci au milieu, 3^e et 4^e en forme de bouteille, à long col, 5^e subfusiforme et sans col distinct, verticilles à 5 ou 6 soies longues, 6^e article double du 5^e, subcylindrique, mince, brun, avec 2 soies distales de moitié aussi longues que lui. Les 4 pulvilles minces et aussi longs que l'empodium.

Calcutta, vi et xii.

8. *P. tripartitum*, Kieff.

♂ ♀. La femelle a également les antennes de 6 et non de 5 articles, 2^e long, rétréci au milieu, 3-5 faiblement amincis aux deux bouts, deux fois aussi longs que gros, à verticilles de 7 soies trois fois aussi longues que l'article, 6^e subcylindrique et mince, double du 5^e, avec 3 longues soies distales. Métatarse antérieur du mâle à peine de moitié plus long que le tibia, articles 2 et 3 longuement barbus, les 4 pulvilles aussi longs et aussi minces que l'empodium, atteignant le milieu des crochets. Article terminal des forcipules à peine arqué sur la ligne externe, à peine aminci au bout; appendice inférieur linéaire, très mince, ne dépassant pas l'article terminal, lamelle avec une pointe peu longue. L. ♂ 3-3.5 mm., ♀ 2.5-3 mm.

Kuching, Sarawak, Borneo, 16-vi, 1 ♀ (C. W. Beebe); Balugaon, Puri District, Orissa, 14-i, 1 ♂, 3 ♀ (J. Caunter); Satpara, Puri District, Orissa, 8-xii, 3 ♂, 6 ♀ (J. Caunter); Madhupur, Bengal, 17-x, 3 ♀, at light (C. Paiva); Poradah, eastern Bengal, in railway carriage, 26-vi, 1 ♀ (J. T. Jenkins); Bosondhur, Khulna District, Ganges Delta, 29-viii, on board launch, at light (J. T. Jenkins).

9. *P. annulatipes*, Kieff.

(Pl. xii, fig. 21, moitié de la pince.)

♂ ♀. La femelle seule était connue pour cette espèce. Le mâle a la couleur de la femelle, flagellum brun, pince blanchâtre, moitié postérieure de l'article terminal des forcipules brune. Les 3 derniers articles des palpes longs. Antennes du mâle de 14 articles, dont le 14 égale les 12 précédents réunis, 3-13 d'abord un peu transversaux, puis un peu plus longs que gros. Antennes de la femelle de 5 articles, dont le 2° est fortement rétréci au milieu, 3° et 4° en forme de bouteille, à col un peu plus court que le renflement, celui-ci subglobuleux, à peine plus long que gros, verticilles un peu plus de 2 fois aussi longs que le renflement, 5° article avec un renflement basal ellipsoïdal et orné d'un long verticille, la partie distale et amincie est presque triple du renflement, extrémité avec 3 longues soies. Article terminal des forcipules (fig. 21) arqué sur la ligne externe, quart distal glabre et graduellement aminci; appendice supérieur pubescent, plus large que l'article terminal, obovale; appendice inférieur un peu plus mince que l'article terminal dont il atteint le milieu, linéaire, sauf à l'extrémité qui est pointue. L. ♂ 2.5 mm., ♀ 2 mm.

South end of Lake Chilka, N.E. Madras, at light, iii, 7♂ 3♀ (N. Annandale).

6° Genre. *Tanytarsus*, V. d. W.

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|---|----------------------------------|
| 1. Tête avec 2 proéminences coniques au-dessus des antennes | 1. <i>T. bicornutus</i> , n. sp. |
| — Tête sans proéminence au-dessus des antennes | 2. |
| 2. Antennes de la femelle de 5 articles, abdomen jaune | 2. <i>T. pentatomus</i> , n. sp. |
| — Antennes de la femelle de 6 articles, abdomen vert | 3. <i>T. viridis</i> , Kieff. |

1. *T. bicornutus*, n. sp.

♀. D'un brun jaunâtre; tête, palpes, antennes, hanches et pattes jaunes. Tête avec 2 proéminences coniques et pubescentes, situées au-dessus des antennes. Yeux très arqués, amincis au vertex où ils sont distants de leur demi longueur. Palpes de longueur médiocre, 4° article le plus long. Antennes de 5 articles (2 exemplaires), dont le 2° est allongé, sans retrécissement au milieu, avec 2 verticilles; 3° subglobuleux avec un col aussi gros que long, 4° brièvement fusiforme, 5° double du 4°, très faiblement renflé au-dessus de la base et muni, à cet endroit, d'un long verticille, extrémité avec une longue soie; verticilles des articles 3 et 4 trois fois aussi long que l'article. Ailes sans lobe et sans transversale, ponctuées, tiers distal avec des poils appliqués le long du bord inférieur et le long de toutes les nervures, bifurcation un peu distale de la transversale, les 2 rameaux peu divergents, l'antéri-

eur presque trois fois plus distant de la pointe alaire que le cubitus, celui-ci non dépassé par la costale, presque double du radius. Tibia antérieur à peine plus long que la moitié du fémur, avec un éperon aussi long que sa grosseur; aux 4 pattes postérieures la pilosité est 2 fois aussi longue que leur grosseur, peigne du tibia crénelé, divisé en 2 parties courtes, éperons égalant sa grosseur, articles tarsaux graduellement raccourcis, pulvilles non distincts, empodium atteignant à peine le milieu des crochets; aux pattes intermédiaires le fémur est plus long que le tibia, égal au tarse, métatarse à crochets ventraux sauf au tiers basal, 4^e article à peine égal au 5^e; aux pattes postérieures le tibia égale le fémur et dépasse un peu la longueur des 2 premiers articles tarsaux réunis, métatarse sans crochets ventraux, 4^e article à peine plus long que le 5^e. L. 18 mm.

Giridih, Bengal, 2-xi (S. W. Kemp).

2. *T. pentatomus*, n. sp.

(Pl. xii, fig. 22, antenne.)

♀. Jaune clair; mesonotum avec 3 bandes raccourcies et brunes, mesosternum un peu assombri. Yeux glabres, ovalaires, non arqués ni amincis, distants de plus de leur longueur. Palpes plus longs que les antennes, articles 2-4 graduellement allongés. Antennes (fig. 22) de 5 articles (sur 3 exemplaires), dont le 2^e est double du 3^e, sans rétrécissement au milieu, 3^e en ellipse courte, 4^e de moitié plus long que le 3^e, faiblement renflé au milieu, verticille presque double de l'article, 5^e article double du 4^e, un peu renflé au-dessous du milieu et portant à cet endroit un verticille qui dépasse un peu son extrémité. Ailes sans lobe et sans transversale, ponctuées, avec 2 lignes longitudinales de soies entre la discoïdale et le rameau supérieur de la posticale; cubitus, radius, discoïdale sauf le pétiole, avec soies; cubitus double du radius, non dépassé par la costale. Tibia antérieur avec un éperon un peu plus court que sa grosseur, métatarse double du tibia ou du 2^e article, aux 4 pattes postérieures les 2 éperons sont plus courts que la grosseur du tibia, le peigne est divisé en 2 parties courtes, métatarse postérieur à crochets ventraux sur les trois quarts distaux, empodium ne dépassant pas le tiers des crochets, pulvilles non distincts. Lamelles circulaires et pubescentes. L. 1 mm.

Puri, Orissa coast, 13-xi, 3 ♀ (S. W. Kemp).

3. *T. viridis*, Kieff., var.

♂ ♀. Tête et palpes blanchâtres, antennes brunâtres, thorax brun (♂) ou roux (♀), mesonotum à 3 bandes raccourcies plus sombres, balanciers et pattes blanchâtres, abdomen vert clair, pince blanchâtre. Antennes du mâle de 14 articles, dont le 14^e est à peine plus long que les 12 précédents réunis, 3^e et 4^e un peu transversaux, 5-13 plus longs que gros, panache fauve. Antennes de la femelle comme chez le type. Métatarse antérieur du mâle

double du tibia ou du 2^e article, 2-4 graduellement raccourcis, 4^e double du 5^e, qui est 6-8 fois aussi long que gros, empodium plus court que les crochets, pulvilles non distincts; 4 tibias postérieurs à pilosité 2-3 fois aussi longue que leur grosseur. Sur l'aile du mâle, le radius, le cubitus, la discoïdale et les 2 rameaux de la posticale ont des soies. Article terminal des forcipules assez large distalement; appendice supérieur très mince, arqué, court; appendice inférieur ne dépassant pas le tiers basal de l'article terminal, dont il atteint la largeur basale, droit, arrondi au bout; un autre appendice très court porte un faisceau de poils. L. 1.5 mm.

Puri, Orissa coast, 19-i, 24-ii, 2-iii (*C. Paiva*).

2^e Sous-Famille. PELOPIINAE.

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|----|--|----------------------------|----|
| 1. | Discoïdale et posticale bifurquées; antennes du mâle de 9 articles, dépourvues de panache, antennes de la femelle de 8 articles (Amérique du Nord) .. | <i>Eutanyptus</i> , Coq. | 2. |
| — | Discoïdale simple, posticale bifurquée .. | .. | 2. |
| 2. | Antennes du mâle sans panache, à articles graduellement allongés, le dernier en ellipse allongée; femelle inconnue (Europe) .. | <i>Adiamesa</i> , Kieff. | 3. |
| — | Antennes du mâle avec un panache .. | .. | 3. |
| 3. | Antennes du mâle de 14 articles, dont le dernier est aussi long ou plus long que tous les précédents réunis, celles de la femelle de 7 ou 8 articles, pulvilles non distincts .. | .. | 4. |
| — | Antennes de 12 à 15 articles dans les deux sexes, celles du mâle ont l'avant-dernier article plus long que les autres réunis, celles de la femelle ont le dernier article le plus long; radius tantôt distinctement bifurqué, tantôt à rameau peu distinct ou nul .. | .. | 5. |
| 4. | Article 4 ^e de tous les tarses cordiforme et beaucoup plus court que le 5 ^e ; yeux pubescents (Europe). .. | <i>Diamesa</i> , Meig. | .. |
| — | Article 4 ^e de tous les tarses cylindrique et plus long que le 5 ^e ; yeux glabres (Europe) .. | <i>Prodiamesa</i> , Kieff. | .. |
| 5. | Bifurcation de la posticale distante distalement de la transversale, fourche par suite pétiolée, pulvilles indistincts .. | .. | 6. |
| — | Bifurcation de la posticale distante proximale de la transversale, fourche sessile .. | .. | 8. |

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|-----|--|--|
| 6. | Surface alaire avec des poils longs et appliqués | 1. <i>Trichotanypus</i> , Kieff. |
| — | Surface alaire sans poils | 7. |
| 7. | Article 4 ^e des tarsi cylindrique et plus long ou aussi long que le 5 ^e | 2. <i>Procladius</i> , Skuse. |
| — | Article 4 ^e des tarsi plus court que le 5 ^e et tronqué obliquement à l'extrémité distale | 3. <i>Clinotanypus</i> , n. g. |
| 8. | Surface alaire à poils longs et appliqués | 9. |
| — | Surface alaire sans poils appliqués | 10. |
| 9. | Pulvilles larges et longs (Europe) | <i>Psectrotanypus</i> , Kieff. |
| — | Pulvilles non distincts | 4. <i>Pelopia</i> , Meig. |
| 10. | Article 4 ^e des tarsi obcordiforme et plus court que le 5 ^e (Amérique du Nord et Cuba) | <i>Coelotanypus</i> , n. g. ¹ |
| — | Article 4 ^e des tarsi cylindrique et plus long que le 5 ^e | <i>Anatopynia</i> , Joh. 1905
(<i>Protanypus</i> , Kieff. 1906 ; ² <i>Paradiamesa</i> , Brêthes). |

1^{er} Genre. *Trichotanypus*, Kieff.1. *T. photophilus*, Kieff.

On ne connaissait que le mâle de cette espèce. La femelle a les antennes jaunes, le 15^e article assombri, mesonotum roussâtre ou brunâtre, avec trois bandes plus sombres et raccourcies dont la médiane est parcourue par une ligne d'un brun noir et s'élargissant en arrière en une tache elliptique. Articles 2-14 des antennes d'abord un peu transversaux, puis à peine plus longs que gros, cylindriques et serrés, le 2^e et le 3^e peu distinctement séparés, verticilles deux fois aussi longs que la grosseur des articles, 15^e article gros, en ovoïde pointu, 2-3 fois aussi long que le 14^e. Aile poilue dans le tiers distal et le long des nervures, les taches enfumées sont plus grandes que chez le mâle et plus ou moins confluentes, celles entre le cubitus et la discoidale sont au nombre de 5, rarement seulement de 4, la proximale étant très petite et parfois nulle; elles ne sont pas plus sombres que les autres, tandis que chez le mâle, ces 4 ou 5 taches comme la bordure de la transversale sont d'un brun noir. Articles tarsaux 1-5 graduellement raccourcis, cylindriques. L. 2 mm.

Calcutta, 16-ix, at light, 1 ♂ 6 ♀, 21-vi, 18-vi, 11-vii, 14-viii (N. Annandale); Asansol, Bengal, 14-ii, 4 ♀ (C. Paiva and J. Caunter); Ernakulam, Cochin State, Malabar, 4-xi, 2 ♀ (N. Annandale); Shencottah, Madras Frontier, east side of W. Ghats, Travancore, 25-xi, 3 ♀ (N. Annandale); on board ship, 10 miles off Masulipatam, Madras Coast, 5-vi, 1 ♀ (C. Paiva).

¹ Le type est: *Procladius humeralis*. H. Loew.

² Les trois genres décrits par Philippi, à savoir *Pentaneura*, *Heptagyia* et *Podonomus* n'ont pas trouvé place dans ce tableau parce qu'ils sont insuffisamment décrits et indéchiffrables.

2. *T. microcerus*, Kieff., var.

♀. Brunâtre, antennes sauf le dernier article, jaunâtres, mesonotum et scutellum blanchâtres, trois bandes raccourcies du mesonotum d'un brun noir, pattes blanchâtres, derniers articles tarsaux graduellement assombris. Ailes subhyalines, poilues sauf dans les cellules basales, poils épars, les deux transversales sont noires et bordées de noir, cubitus longuement dépassé par la costale, pétiole de la posticale aussi long que le rameau inférieur de la fourche. Articles tarsaux cylindriques, graduellement raccourcis. L. 2 mm.

Naini Tal, Kumaon, altitude de 6-7000 pieds (R. E. Lloyd).

2° Genre. *Procladius*, Skuse.

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|---|------------------------------------|
| 1. Pronotum profondément bilobé | 1. <i>P. bilobatus</i> , n. sp. |
| — Pronotum non distinctement bilobé | 2. |
| 2. Antennes de 10 ou 11 articles, verticilles n'atteignant pas l'extrémité de l'article suivant, dernier article sans verticille. | |
| | 2. <i>P. inconspicuus</i> , n. sp. |
| — Antennes de 14 articles, verticilles dépassant l'extrémité de l'article suivant, dernier article avec un verticille | 3. <i>P. pallidus</i> , n. sp. |

1. *P. bilobatus*, n. sp.

♂ ♀. D'un brun roux; mesonotum cendré, avec trois bandes raccourcies et d'un brun noir, la médiane traversée par une ligne longitudinale noire, pattes d'un jaune brunâtre, extrémité des fémurs, des tibias, des 4 premiers articles tarsaux et le 5^e en entier brun noir. Antennes du mâle de 13 articles, 3-11 fortement transversaux, 12^e trois fois aussi long que les 10 précédents réunis, 13^e cône, panache brun. Antennes de la femelle de 15 articles, 3-14 subcylindriques, aussi longs que gros. Pronotum découpé profondément en triangle, par suite bilobé. Ailes blanchâtres, glabres, avec beaucoup de taches enfumées, nervures brunes, les 2 transversales noires; entre le cubitus et la discoïdale se trouvent 5 taches alignées et subcirculaires, la distale peu avant l'extrémité du cubitus; 3 autres taches, correspondant aux taches 2, 3 et 4 de la première série, se trouvent entre la discoïdale et le rameau supérieur de la posticale; 2 taches sont situées entre les deux rameaux de la posticale; 4 ou 5 grandes taches plus ou moins confluentes se voient entre la tige de la posticale et le bord inférieur de l'aile; cubitus longuement dépassé par la costale, arqué, un peu plus rapproché de la pointe alaire que le rameau supérieur de la posticale, radius bifurqué, la 2^e longitudinale aussi rapprochée du radius que du cubitus, tige de la posticale de moitié plus longue que la transversale, rameau inférieur fortement courbé au quart distal. Métatarse de toutes les pattes à peine plus court que le tibia, articles 2-5 graduellement raccourcis, cylindriques, grêles, le 4^e de moitié plus long que le 5^e, qui est 5-6 fois aussi

long que gros, empodium court, n'atteignant pas le milieu des crochets qui, chez le mâle, sont peu arqués, extrémité obtuse et dentelée, pulvilles nuls. Article terminal de la pince jaune, pubescent, arqué, subcylindrique, tiers distal graduellement aminci en pointe. L. ♂ 5-6 mm., ♀ 4.5 mm.

Asansol, Bengal, 13-ii (C. Paiva and J. Caunter).

2. *P. inconspicuus*, n. sp.

(Pl. xii, fig. 23, antenne ♀.)

♀. Brun noir; antennes d'un brun roux, pattes blanchâtres, extrémité des tibias et trois derniers articles tarsaux assombris. Antennes (fig. 23) de 10 articles, dont le 2° est un peu plus de deux fois aussi long que le 3°, et paraît formé de deux articles connés, 3-9 ovoïdaux, verticilles un peu plus courts que les organes sensoriels, ne dépassant pas le milieu de l'article suivant, 10° sans verticille, terminé en pointe, un peu plus long que les 3 articles précédents réunis. Ailes hyalines, glabres, cubitus, radius et transversale bruns, radius bifurqué, cubitus arqué, dépassé longuement par la costale qui atteint la pointe alaire, pétiole de la posticale un peu plus long que le rameau inférieur, celui-ci arqué. Tibia antérieur dépassant de trois quarts la longueur du métatarse, celui-ci égalant les 3 articles suivants réunis, 4° et 5° égaux, à peine deux fois aussi longs que gros; crochets pointus, avec 2 soies basales, empodium atteignant le milieu des crochets; éperons noirs, munis de 3 dents à chaque côté du tiers basal. L. 1 mm.

Moulmein, Lower Burma, 26-ii (N. Annandale).

3. *P. pallidus*, n. sp.

♀. Jaune brunâtre et mat; antennes, scutellum, pattes et abdomen plus clairs. Antennes de 14 articles, dont le 2° est un peu plus long que le 3°, articles 3-13 cylindriques, serrés, d'abord faiblement transversaux, 6-12 aussi longs que gros, 13° plus long que gros, verticilles beaucoup plus longs que les organes sensoriels, dépassant le milieu du 2° article suivant, 14° article avec un verticille basal, grossi, graduellement aminci en stylet, aussi long que les 3 articles précédents réunis. Ailes subhyalines, nervures jaunâtres, les 2 transversales noires, radius bifurqué, plus rapproché de la pointe alaire que le rameau inférieur de la posticale, cubitus longuement dépassé par la costale qui atteint presque la pointe alaire, pétiole de la posticale égalant les trois quarts du rameau inférieur. Tibia antérieur de deux tiers plus long que le métatarse, celui-ci égalant les 3 articles suivants réunis, 4° article de tous les tarsi pas distinctement plus long que le 5°, cylindrique, crochets tarsaux pointus, avec 2 soies basales, empodium atteignant le milieu des crochets, tiers proximal du métatarse postérieur avec des crochets ventraux, éperons noirs avec 3 dents de chaque côté de leur base. L. 1.5 mm.

Mandalay, Upper Burma, 10-iii, 2 ♀ (N. Annandale).

3^e Genre. *Clinotanypus*, n. g.

Ce genre diffère du précédent par le 4^e article tarsal qui est plus court que le 5^e et tronqué obliquement à l'extrémité. Il faut y rapporter les espèces suivantes: *Procladius atratus*, Kieff., *P. fumipennis*, Kieff., *P. fuscognatus*, Kieff., *P. novempunctatus*, Kieff., *P. ornatisimus*, Kieff., *P. paivai*, Kieff.

1. *C. fuscognatus*, Kieff. var. *vulgaris*, nov.

♀. Tête et thorax roux jaune, glabres et brillants, parfois mesonotum avec trace de 4 bandes raccourcies d'un roux plus sombre, metanotum et abdomen noirs, antennes jaunes, graduellement assombries distalement, balanciers blanchâtres, hanches et pattes jaunes, extrémité du tibia antérieur ou la moitié basale ou tout le tibia antérieur et les 4 derniers articles des tarsi assombris. Corps gros et trapu. Yeux arqués, peu amincis au vertex où ils sont distants de $\frac{2}{3}$ de leur longueur. Palpes noirs, 4 article le plus long et le plus mince. Antennes de 14 articles, 3-13 distinctement plus longs que gros, subcylindriques, verticilles atteignant l'extrémité de l'article suivant, 14^e triple du 13^e, avec un verticille basal plus long que celui des autres articles. Ailes brunes, moitié inférieure moins brune que la supérieure, quart distal subhyalin, radius bifurqué, cubitus arqué, un peu dépassé par la costale, transversale supérieure noire et bordée de noir, distante de l'inférieure de toute sa longueur, celle-ci perpendiculaire, la supérieure à peine oblique, tige de la posticale à peine plus longue que la transversale, rameau supérieur fortement arqué à la base, l'inférieur continue la direction de la tige; surface alaire à soies microscopiques et denses. Tibia antérieur au moins de moitié plus long que le métatarse, celui-ci de deux tiers plus long que le 2^e article, 3^e plus court que le 2^e, 3-4 fois plus long que le 4^e, celui-ci aussi gros que le long, plus court que le 5^e, obliquement tronqué au bout. L. 2.5-3 mm.

Madhupur, Bengal, x, 13 ♀ (*C. Paiva*); Calcutta, 17-vii, 13-viii, 22-ix, 4 ♀ (*N. Annandale*); Balighai, near Puri, Orissa, 26-x, 2 ♀ (*N. Annandale*); Kankondigee, 24 Perghs., Sunderbunds, at light on board launch, 14-xi (*J. T. Jenkins*); on board ship, 10 miles off Masulipatam, Madras Coast, 4-vi (*C. Paiva*); Tinpahar, near Rajmahal, Bengal, 7-vii; Bhogaon, Purneah District, N. Bengal, 22-iii, 3 ♀ (*C. Paiva*); Bosondhur, Khulna District, Ganges Delta, on board launch, at light, 29-viii (*J. T. Jenkins*).

Forme à mesonotum avec 4 bandes noires et raccourcies. L. ♀: 2.5 mm.—Madhupur, Bengal.

2. *C. fuscognatus*, Kieff. var. *jenkinsi*, n. var.

♀. Tête et thorax roux et brillant; mesonotum avec 4 bandes noires et raccourcies, milieu du bord postérieur avec 2 taches noires juxtaposées, hanches, pattes et abdomen brun noir, trochanters, tibia antérieur sauf le $\frac{1}{3}$ basal et l'extrême bout

distal, un large anneau au milieu des 4 autres tibias, tarsi sauf les 4 derniers articles du tarse antérieur, jaunâtres ou blanchâtres. Yeux distants du tiers de leur longueur. Articles antennaires 3-13 subglobuleux. Ailes à peine teintées, ayant sur la transversale supérieure une tache carrée d'un brun noir et à la bifurcation du radius une bande transversale et arquée d'un brun noir, qui part du radius et dépasse un peu la discoïdale, transversale supérieure épaisse, noire, très oblique, distante de toute sa longueur de l'inférieure, qui est perpendiculaire et un peu plus courte que le pétiole de la posticale, rameau supérieur de la posticale arqué sur tout son parcours. Tibia antérieur de deux tiers plus long que le métatarse. Pour le reste, semblable au précédent. L. 2.5 mm.

Calcutta, 18-ix; Bosondhur, Khulna District, Ganges Delta, on board launch, at light, 29-viii, 3 ♀ (*J. T. Jenkins*); Balighai, near Puri, Orissa Coast, 25-x (*N. Annandale*); Shasthancottah, 12 miles N.N.E. of Quilon, Travancore, 6-xi (*N. Annandale*).

3. *C. fuscognatus*, Kieff., var.

♀. Tête, antennes et thorax roux, mesonotum avec 4 bandes raccourcies d'un brun noir, pattes d'un roux jaune, dessus du tibia antérieur et 4 derniers articles de tous les tarsi assombrés, abdomen brun noir. Ailes subhyalines, sans tache, mais avec une bande longitudinale brune qui occupe le bord supérieur jusqu'à l'extrémité du radius et descend jusqu'à la bifurcation de la posticale, les 2 transversales noires. L. 2.5 mm.

On board ship 10 miles off Masulipatam, Madras Coast, 4-vi (*C. Paiva*).

4. *C. ornatissimus*, Kieff.

(Pl. xii, fig. 24, pince.)

♂. Pince grosse, articles terminaux courts, pubescents dans leur moitié proximale, qui fait un angle droit avec la moitié distale, celle-ci très amincie, subcylindrique et glabre.

Calcutta, 21-vii, 19-viii (*N. Annandale*); Kushtea, Bengal, 7-x, 4♂ (*J. T. Jenkins*); Madhupur, Bengal, 16-x, 2♂, 20-x, at light, 1♂ (*C. Paiva*); Nedumangad, 10 miles N.E. of Trivandrum, Travancore, 14-xi (*N. Annandale*); Victoria Gardens, Colombo, Ceylon, 26-iv (*C. Paiva*).

5. *C. novempunctatus*, Kieff.

→. Calcutta, at light, 2-viii, 14-viii, 12-ix (*N. Annandale*).

4^e Genre. *Pelopia*, Meig., 1800.

(*Tanytus*, Meig., 1803; *Isoplastus*, Skuse; *Ablabesmyia*, Johannsen; *Perilaphreus*, Becker). Les antennes du mâle sont de 13 à 15 articles, celles de la femelle de 12, rarement de 13-15 articles.

1. *P. birmanensis*, n. sp.

♂. Blanchâtre; thorax roussâtre, mesonotum blanchâtre, avec 3 bandes roussâtres et confluentes, segments abdominaux 2-4 et 6-8 avec une large bande transversale d'un brun noir, antennes brunâtres, scape roux. Antennes de 13 articles, dont l'avant-dernier est à peine plus long que les articles 2-11 réunis, 3-11 un peu plus longs que gros; panache gris. Ailes sans tache, cubitus graduellement rapproché du bord, un peu dépassé par la costale. Fémur et tibia des 4 pattes postérieures à longs poils. Article terminal des forcipules très mince, graduellement aminci, arqué, aussi long que l'article basal, terminé par un stylet noir. L. 2.5 mm

Mandalay, Upper Burma, 11-iii (N. Annandale).

2. *P. macrochaeta*, n. sp.

(Pl. xii, fig. 25, antenne ♀.)

♀. Blanchâtre; palpes brunâtres, balanciers d'un blanc pur, dernier article antennaire, extrémité du fémur antérieur, tibia et tarse des pattes antérieures un peu assombris, 4 bandes raccourcies sur le mesonotum, metanotum, taches pleurales, bande transversale sur les tergites 2-6 et le 7^e en entier d'un brun roux. Yeux fortement sinueux, distants de moins de leur largeur terminale. Antennes de 12 articles (fig. 25), dont le 2^e est plus du double du 3^e, 3-11 subcylindriques, graduellement un peu plus longs, le 3^e aussi gros que long, le 11^e de moitié plus long, verticilles composés de 5 à 6 soies très longues, 6 fois aussi longues qu'un article, 12^e article conique, plus de 2 fois le 11^e, avec un verticille basal, sans stylet. Ailes dépassant de beaucoup l'abdomen, densément poilues, blanches, tiers proximal un peu assombri, extrémité distale et une bande transversale traversant la bifurcation de la posticale, enfumées mais peu distinctement, les 2 transversales noires, les autres nervures blanchâtres, radius pas distinctement bifurqué, cubitus graduellement rapproché de la costale, plus éloigné de la pointe alaire que le rameau antérieur de la posticale, dépassé longuement par la costale qui atteint presque la pointe alaire. Métatarse antérieur pas ou à peine plus court que le tibia, articles tarsaux 2-5 graduellement raccourcis, 4^e cylindrique, double du 5^e. L. 1.8 mm.

Kurseong, Himalaya Oriental, altitude de 5000 pieds, 27-iii (N. Annandale).

3. *P. paivai*, Kieff.

♂ ♀. Le mâle seul de cette espèce était connu. La femelle est brunâtre, les antennes jaunâtres, pattes comme chez le mâle. Articles antennaires serrés, subcylindriques sauf le dernier, verticilles 3-4 fois aussi longs qu'un article. L. 2 mm.

Madhupur, Bengal, 14-x (C. Paiva).

Un mâle diffère du type par la couleur plus claire du corps: antennes et panache blanchâtres, thorax roux brunâtre, scutellum

et mesonotum blanchâtres, celui-ci avec 3 bandes raccourcies et rousses, abdomen blanchâtre avec quelques petites taches assombries, tiers postérieur un peu brunâtre, pince d'un blanc brunâtre. Pattes et ailes comme chez le type. L. 2.5 mm.

On sandbank, Maniharighat, R. Ganges, N. Bengal, 17-ii (B. L. Chaudhuri).

4. *P. pulchripes*, Kieff.

♀. Calcutta, xii (N. Annandale); Sonarpur, Lower Bengal, at light, 24-xii.

5. *P. macrocera*, Kieff., var.

♀. Blanchâtre; thorax d'un blanc roussâtre. Antennes de 12 articles, 3-11 allongés, de $1\frac{1}{2}$ à 2 fois aussi longs que gros, à verticilles très longs, ceux des articles 3-5 sont cinq fois aussi longs qu'un article, 12^e grossi, en ovoïde pointu, de moitié plus long que le 11^e, avec un verticille basal et court, qui ne dépasse pas l'extrémité de l'article. Ailes sans tache, très poilues, cubitus un peu plus de $1\frac{1}{2}$ fois aussi long que le radius, faiblement arqué, rapproché du bord. Article 4^e des tarsi plus long que le 5^e. L. 1.2 mm.

Puri, Orissa, 18-i (N. Annandale).

6. *P. ornatipes*, Kieff.

♂ ♀. On ne connaissait de cette espèce que la femelle. Le mâle est également noir et mat, antennes brunâtres, abdomen y compris la pince, brun ou blanc brunâtre, balanciers et pattes blancs, extrémité des fémurs, des tibias et des 4 premiers articles tarsaux, trois autres anneaux sur les tibias et un sur le milieu du métatarse noirs. Antennes de 15 articles, dont le 2^e et le 3^e sont peu distinctement séparés, 3-13 un peu transversaux, 14^e de moitié plus long que 2-13 réunis, 15 conique; panache gris, avec 2 taches brun noir séparées par une tache blanche. Cubitus deux fois aussi loin de la pointe alaire que la discoïdale. Abdomen avec des poils blanchâtres, longs et assez denses; pince grosse, article terminal des forcipules très mince, subcylindrique, à peine arqué, pubescent, atteignant le tiers proximal de l'article basal, extrémité glabre et faiblement amincie, sans stylet. La tache noire qui est située sur la base du cubitus et s'étend jusqu'à la transversale inférieure incidemment, est parfois interrompre au milieu. L. 2.5 mm.

Balighai, near Puri, Orissa, 25-x, 6♂, 13♀ (N. Annandale); Madhupur, Bengal 14-x, 7♀, at light (C. Paiva); Berhampore Court, Bengal, 12-iv, 1♀ (S. W. K.); Sonadigee, Ganges Delta, 6-xii, at light, 1♀ (Jenkins); Calcutta, 16-ix, 1♀; Ernakulam, Cochin State, Malabar, 4-xi, 1♂ (N. Annandale).

Variété. ♀. Diffère du type par 5 taches noires, qui sont situées une sur chacune des 3 nervures transversales et trois au bord antérieur de l'aile, dont 1 à l'extrémité du radius, 1 à l'extré-

mité de la 2^e longitudinale et 1 à l'extrémité du cubitus; les taches enfumées sont grandes et plus ou moins confluentes. L. 2 mm.

Allahabad, 27-iii, 3 ♀ (A. D. Imms).

7. *P. oriplana*, Kieff.

♀. On ne connaissait que le mâle de cette espèce. La femelle a la couleur du mâle sauf que l'abdomen est brunâtre. Antennes jaunâtres, composées de 15 articles, dont le dernier est un peu plus long que les deux précédents réunis et prolongé en un stylet, articles 3-14 aussi longs que gros, puis graduellement un peu allongés, verticilles 2-3 fois aussi longs que les articles. L. 3.5 mm.

Simla, iv, à une altitude de 7000 pieds.

3^e Sous-Famille CULICOIDINAE (*Ceratopogoninae*).

Tableau des Genres.

- | | | | |
|----|---|-----------------------------------|---------------------------------|
| 1. | Thorax prolongé en capuchon et recouvrant la tête; aile étroite et très longue | .. .. | 2. |
| — | Thorax non prolongé au-dessus de la tête | .. .. | 5. |
| 2. | Cubitus relié au radius par une transversale, formant ainsi deux cellules radiales | 2. <i>Jenkinsia</i> , n. g. | |
| — | Cubitus non relié au radius, cellule radiale unique | .. .. | 3. |
| 3. | Transversale située vers le milieu de l'aile, cubitus s'arrêtant bien avant la pointe alaire | .. .. | 4. |
| — | Transversale située au tiers distal de l'aile, cubitus aboutissant à la pointe alaire, extrémité de l'aile arrondie, antennes du mâle sans panache, à poils courts comme chez la femelle, fémur non en massue, tarses postérieurs de la femelle guère plus longs que le tibia, crochets tarsaux simples (Afrique) | | <i>Macroptilum</i> , Beck. |
| 4. | Crochets tarsaux avec une dent basale (♂ ♀), tarse postérieur démesurément allongé chez la femelle, fémur antérieur en massue, antennes du mâle avec panache, aile couverte de soies microscopiques, pointue à l'extrémité, radius à peine indiqué | .. .. | 1. <i>Calyptopogon</i> , Kieff. |

- Crochets tarsaux simples, tarse postérieur de la femelle guère plus long que le tibia, fémur antérieur non en massue, aile arrondie au bout, radius bien développé (Brésil) *Paryphoconus*, End.
5. Empodium bien développé, à peu près aussi long que les crochets et à longs poils; palpes de 4 articles, fémurs et 5^e article des tarses inermes 6.
- Empodium atrophié, n'atteignant pas le milieu des crochets, brièvement velu 9.
6. Yeux pubescents, ailes à soies dressées et microscopiques
5. *Dasyhelea*, Kieff. subg. *Kempia*, nov.
- Yeux glabres, 4^e article tarsal cylindrique 7.
7. Ailes à poils longs et appliqués 8.
- Ailes à soies dressées et microscopiques 4. *Atrichopogon*, Kieff.
8. Métatarse postérieur plus court ou seulement aussi long que le 2^e article .. 3. *Forcipomyia*, Meg. subg. *Prohelea*, Kieff.
- Métatarse postérieur plus long que le 2^e article 3. *Forcipomyia*, Meg.
9. Discoïdale non reliée par une transversale au cubitus, surface alaire sans longs poils appliqués, entre le cubitus et la discoïdale se trouve une nervure simple, sortant de la base alaire 10.
- Discoïdale reliée au cubitus par une transversale; entre le cubitus et la discoïdale l'aile n'offre pas de nervure longitudinale sauf parfois la "fourche intercalée" qui n'existe qu'au tiers distal 12.
10. Palpes de 4 articles; costale ne dépassant pas le cubitus qui sort de la base alaire et aboutit avant le milieu en s'élargissant fortement, une mince transversale unit le radius au cubitus avant son extrémité, rameau inférieur de la discoïdale oblitéré dans sa base (Australie) *Leptoconops*, Skuse.
- Palpes de 3 articles; costale atteignant la pointe alaire, cubitus sortant de la base alaire, un peu

- plus long que le radius, aboutissant avant le milieu de l'aile, surface alaire à soies microscopiques II.
11. Cubitus relié au radius par une transversale, pattes spinuleuses, crochets tarsaux de la femelle avec une dent basale ou une forte soie, ceux du mâle inégaux, les antérieurs avec une longue dent sinueuse, les postérieurs avec une courte dent arquée (Italie) *Mycterotypus*, Noë.
- Cubitus non relié au radius par une transversale, pattes inermes (New Mexico) *Tersesthes*, Towns.
12. Fémur antérieur très grossi, armé de spinules sur le dessous, tibia arqué et appliqué contre le bord inférieur du fémur 13.
- Fémur et tibia des pattes antérieures autrement conformés 14.
13. Cubitus réuni au radius par une transversale 7. *Heteromyia*, Say.
- Cubitus non réuni au radius par une transversale, surface alaire avec des soies microscopiques *Pachyleptus*, Arrib. (Walk.?)
14. Cubitus relié au radius par une transversale ou soudé au radius entièrement ou en partie, par suite ordinairement 2 cellules radiales 15.
- Cubitus non relié au radius, cellule radiale unique 22.
15. Yeux pubescents 16.
- Yeux glabres 17.
16. Surface alaire à soies microscopiques et dressées
5. *Dasyhelea*, Kieff. subg. *Prokempha*, nov.
- Surfaces alaire à poils longs et appliqués 5. *Dasyhelea*, Kieff.
17. Au moins l'extrémité alaire avec des soies microscopiques et dressées, cubitus ne dépassant pas ou à peine le milieu de l'aile, empodium peu distinct, n'atteignant pas le milieu des crochets, ceux-ci simples, égaux, avec une longue soie basale, pattes inermes 6. *Culicoides*, Latr.
- Ailes nues, rarement avec des soies microscopiques mais alors le cubitus atteint le tiers ou le quart distal ou bien les pattes ont le

- fémur ou le 5^e article tarsal armé de grosses spinules noires 18.
18. Nervure discoïdale simple .. *Brachypogon*, Kieff. .. 18.
- Discoïdale bifurquée 19.
19. Fémur postérieur fortement renflé et spinuleux, surface alaire nue .. *Serromyia*, Meg. in Meig. .. 19.
- Fémur postérieur non fortement renflé 20.
20. La 1^e cellule radiale en aréole, pas plus longue que haute, bifurcation de la discoïdale distale de la transversale, surface alaire à soies microscopiques .. 8. *Stilobezzia*, Kieff. .. 20.
- La 1^e cellule radiale allongée 21.
21. Fémurs inermes; chez le type, le 5^e article tarsal porte une ou plusieurs paires de spinules noires et cylindriques .. 9. *Sphaeromyias*, Curt. .. 21.
- Fémurs, au moins en partie avec de grosses spinules noires 10. *Palpomomyia*, Meg. in Meig. .. 22.
22. Bord postérieur de l'aile de la femelle avec une costale qui est plus fine et moins marquée que celle du bord antérieur, rameau inférieur de la discoïdale fortement courbé vers la base alaire à son origine, sous-costale confondue avec le pétiole de la discoïdale; nervation du mâle comme chez *Bezzia*; vertex enfoncé (Amérique) *Stenoxenus*, Coq.¹ .. 23.
- Bord postérieur de l'aile sans costale, rameau inférieur de la discoïdale non dirigé vers la base alaire à son origine, vertex non enfoncé 23.
23. Sous-costale confondue avec la costale dans sa moitié distale, radius indistinct, confondu avec la costale, aile nue, pointue, beaucoup plus longue que le corps .. 11. *Haasiella*, n. g. .. 24.
- Sous-costale et radius séparés de la costale 24.
24. Surface alaire à poils écailleux, antennes du mâle un peu plus velues que celles de la femelle .. *Oecacta*, Poey. .. 25.
- Surface alaire glabre 25.

¹ Coquillett a établi sur cet insecte la famille des *Stenoxenidae*, que j'ai placée autrefois comme sous-famille parmi les *Chironomidae*; ayant examiné les deux sexes de *Stenoxenus*, j'ai constaté qu'il ne s'agit que d'un genre très voisin de *Bezzia*.

25. Abdomen pétiolé 12. *Dibezzia*, Kieff.
 — Abdomen non pétiolé.. 26.
 26. Tête semi-globuleuse, tarsi pos-
 térieurs démesurément allongés
 chez la femelle, antennes du mâle
 sans panache *Macropeza*, Meig.
 — Tête non semi-globuleuse, presque
 aplatie en avant, antennes du mâle
 avec un panache 27.
 27. Fémurs inermes
 13. *Bezzia*, Kieff. sous-genre *Probezzia*, Kieff.
 — Au moins le fémur antérieur armé
 de grosses spinules 13. *Bezzia*.¹

1^{er} Genre. *Calyptopogon*, Kieff.

Le type de ce genre, *C. albitarsis*, Kieff., a été signalé pour Calcutta et Katihar. On l'a encore recueilli dans les localités suivantes: Madhupur, Bengal, x, 5 ♀; Monghyr, Bengal, 22-ix (*J. T. Jenkins*); at light, on board steamer, Damukdia Ghat, E. Bengal, 30-vi (1 ♀); South end of Lake Chilka, N.E. Madras, 5-iii; Puri, Orissa Coast, at light, 1 ♀. Les pattes antérieures sont toujours plus courtes que les autres, leur fémur renflé en massue au tiers distal, le tibia grossi sur toute sa longueur, les 4 pattes postérieures ont le fémur et le tibia moins gros et subcylindriques. La nervure anale offre une trace de bifurcation à sa base.

2^e Genre. *Jenkinsia*, n. g.

Thorax en capuchon, prolongé en cône obtus au-dessus de la tête qu'il dépasse un peu, peu convexe dorsalement, de moitié plus long que haut. Ailes à nervation de *Palpomyia*, donc avec deux cellules radiales et un radius bien distinct, aussi éloigné de la costale que du cubitus. Ce genre est dédié à Monsieur J. T. Jenkins, qui a recueilli beaucoup de Chironomides dans les Indes. Le type est:

J. setosipennis, n. sp.

♀. Tête rousse, antennes d'un jaune roussâtre, les cinq derniers articles un peu assombrés, tiers distal des articles 2-9 brun noir; thorax cendré, balanciers bruns, pattes jaunâtres; abdomen tantôt jaune, tantôt d'un roux carné. Yeux glabres, arqués, longuement séparés au vertex. Bouche en suçoir, égalant le tiers de la hauteur de la tête. Article 2^e des palpes long, 3^e et 4^e courts. Antennes de 14 articles, dont les cinq derniers sont cylindriques, ensemble aussi longs que les 8 précédents réunis, à poils disposés sans ordre et un peu plus courts qu'un article; les articles 2-9 sont presque cylindriques, un peu amincis au tiers distal, trois fois

¹ Les genres *Psychophaena*, Phil., *Tetrastoma*, Phil., et *Didymorphlebs*, Weyenb. paraissent être synonymes de *Culicoides* ou de *Forcipomyia*; ils sont trop sommairement décrits pour qu'on puisse les identifier.

aussi longs que gros, verticille aussi long qu'un article. Ailes hyalines, larges, couvertes de soies assez longues. nervures pâles sauf la transversale qui est d'un brun noir; radius dépassant le milieu du bord antérieur, réuni au cubitus, peu avant son extrémité, par une transversale, cubitus arqué, plus de deux fois aussi long que le radius, aboutissant aussi près de la pointe alaire que le rameau supérieur de la posticale, longuement dépassé par la costale; bifurcation de la discoïdale proximale de la transversale, mais distale de la bifurcation de la posticale, anale simple. Fémurs inermes, un peu plus gros que les tibias, l'antérieur aussi long que le tibia, celui-ci avec un éperon et un peigne simple, un peu plus long que le tarse, dont le premier article est aussi long que les quatre suivants réunis; 2^e article aussi long que les deux suivants réunis, 3^e et 4^e faiblement transversaux, le 4^e est cordiforme et, vu de dessus, beaucoup plus large qu'un des autres articles, 5^e fusiforme, un peu plus long que le 2^e, glabre sur le dessous où il est armé d'une spinule unique, crochets de longueur médiocre, élargis vers le milieu, armés d'une dent basale à leur côté externe; 4^e article de tous les tarses conformé comme à l'antérieur; aux 2 pattes postérieures le tibia n'est pas plus long que les 2 premiers articles du tarse, métatarse un peu plus du double du 2^e article, qui est égal aux 3 suivants réunis, 4^e un peu plus court que le 3^e, à peine plus long que gros, 5^e aminci, égal aux 2 précédents réunis, avec 3 ou 4 paires de spinules noires et obtuses, crochets simples, atteignant les trois quarts de la longueur du 5^e article tarsal; au tarse intermédiaire le 5^e article n'a que deux paires de spinules et les crochets comme au tarse postérieur. Abdomen gros, non déprimé, faiblement cône. L. 2.5 mm.

Calcutta, 17-ix-1909 (C. Paiva); Bhogaon, Purneah District, (C. Paiva).

3^e Genre. **Forcipomyia**, Meg. in Meig. (*Ceratopogon*,
Meig. part. 1803).

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|----|--|---------------------------------|--------------------------------|
| 1. | Métatarse postérieur plus court que l'article suivant; articles antennaires 3-9 de la femelle subglobuleux ou brièvement côneux (<i>Prohelea</i> , Kieff.) | | 2. |
| — | Métatarse postérieur aussi long ou plus long que l'article suivant | .. .. . | 10. |
| 2. | Front avec une proéminence en cône obtus | .. .. . | 1. <i>F. conigera</i> , n. sp. |
| — | Front sans proéminence, bord antérieur de l'aile avec une ou plusieurs taches noires | .. .. . | 3. |
| 3. | Mesonotum ayant, outre les poils dressés et longs, des poils d'un jaune d'or, courts et appliqués, métatarse antérieur plus long que le 2 ^e article.. | 2. <i>F. trinotata</i> , n. sp. | |

- Mesonotum sans poils appliqués d'un jaune d'or, métatarse antérieur plus court que le 2^e article 4.
4. Bord antérieur de l'aile avec 3 taches d'un brun noir séparées par deux taches blanches, allongées et minces 3. *F. tristicta*, n. sp.
- Bord antérieur ayant au maximum une tache noire 5.
5. Bord antérieur de l'aile avec une tache noire, sans tache blanche; thorax et abdomen d'un noir mat ou brun noir 6.
- Bord antérieur de l'aile avec une tache blanche, avec ou sans tache noire; thorax brun, abdomen brun clair ou bien noir et jaune 7.
6. Corps d'un noir mat, pattes d'un jaune clair 4. *F. psychasta*, n. sp.
- Tête jaune, thorax et abdomen d'un brun noir, côtés de l'abdomen blanchâtres et couverts de poils écailleux noirs, pattes jaunes, fémur et tibia des pattes postérieures avec un large anneau brun 5. *F. confluens*, n. sp.
7. Article 11^e des antennes du mâle aussi long que les 3 suivants réunis; bord antérieur de l'aile blanchâtre, avec une tache d'un blanc pur suivie d'une tache noire 6. *F. monticola*, n. sp.
- Article 11^e des antennes du mâle de moitié plus long que le 12^e, bord antérieur de l'aile avec une tache blanche, précédée d'une tache sombre ou sans tache sombre 8.
8. Pattes postérieures jaunes et sans tache; bord antérieur de l'aile avec une petite tache blanche à l'extrémité du cubitus, précédée d'une tache sombre et peu distincte, cubitus n'atteignant pas le milieu de l'aile.
7. *F. albosignata*, Kieff. var. *asticta*, nov.
- Pattes postérieures jaunes, moitié distale du fémur et tiers basal du tibia d'un brun noir 9.
9. Pattes intermédiaires jaunes, sans tache, tarse postérieur jaune sombre; bord antérieur de l'aile avec une tache blanche, subcarrée, située à l'extrémité du cubitus, sans tache

- assombrie, cubitus atteignant le milieu de l'aile *F. albosignata*, Kieff.
- Pattes intermédiaires jaunes, base du tibia et le métatarse d'un brun noir, tarse postérieur jaune, métatarse brun noir, bord antérieur de l'aile avec un point blanc à l'extrémité du cubitus, suivi d'une longue bande assombrie, cubitus n'atteignant pas le milieu de l'aile.
8. *F. albosignata*, Kieff. var. *variicrus*, nov.
10. Articles antennaires 3-9 de la femelle très allongés, en forme de bouteille; métatarse postérieur bien plus long que le 2^e article 11. *F. heterocera*, n. sp.
- Articles antennaires 3-9 de la femelle subglobuleux ou brièvement coniques; métatarse postérieur pas distinctement plus long que le 2^e article II.
11. Articles antennaires 10-14 de la femelle ensemble plus courts 2-9 réunis, chacun d'eux à peine plus long que le 9^e 9. *F. macrothrix*, Kieff., var.
- Articles antennaires 10-14 de la femelle ensemble aussi longs que 2-9 réunis, chacun d'eux au moins de moitié plus long que le 9^e.
10. *F. macrothrix*, Kieff. var. *flaviceps*, nov.

I. *F. conigera*, n. sp.

♂. D'un brun noir; pleures blanchâtres avec des taches brunes, balanciers et bord postérieur des 5 premiers tergites blanchâtres, pattes jaunes, les pattes postérieures ont un anneau près de l'extrémité du fémur et la base du tibia bruns. Yeux glabres, séparés par une ligne brune, entre cette ligne et les deux scapes se voit une proéminence en cône obtus moins haute et moins large qu'un des scapes. Article 2^e des palpes plus long que le 3^e et le 4^e réunis, grossi au milieu, son tiers distal aminci en col, 4^e le plus court. Article 2^e des antennes avec un verticille dressé, 3-10 d'abord globuleux puis graduellement un peu plus longs, subglobuleux ou ovoïdaux, le 10^e deux fois aussi long que gros, 11-14 cylindriques, ensemble à peine plus longs que 2-10 réunis, le 11^e égalant les 4 précédents réunis ou les 2 suivants réunis, 12^e plus long que le 13^e, 14^e égal au 13^e, avec un stylet dressé, 11-13 avec un verticille dressé à leur base; panache d'un brun noir. Mesonotum glabre. Ailes à poils longs, denses et appliqués, une tache noire au bord antérieur couvre le radius et le cubitus, celui-ci soudé au radius et atteignant le milieu de l'aile, bifurcation de

la discoïdale située sous la transversale, bifurcation de la posticale sous l'extrémité du radius. Fémurs et tibiais gros, à poils très longs et épars, métatarse de toutes les pattes atteignant au maximum le tiers du 2^e article, crochets arqués en demi cercle, égalant l'empodium. Article terminal de la pince grêle, aciculé, glabre, tiers basal faiblement pubescent dessus. L. 2.8 mm.

Giridih, Bengal, 7-xi (S. W. Kemp).

2. *F. trinotata*, n. sp.

♂ ♀. Brun noir ou noir, mat, mesonotum parfois brillant, balanciers d'un blanc pur, genoux d'un blanc jaunâtre. Yeux confluent. Articles 3-10 des antennes du mâle d'abord globuleux, puis ovoïdaux ou subconiques, mais guère plus longs que gros; articles 11-14 réunis un peu plus longs que 2-10 ensemble, le 11^e aussi long que les trois suivants réunis, excentrique, globuleux à la base puis cylindrique comme les suivants, 12^e trois fois aussi long que gros, 13^e un peu plus court que le 12^e, égal au 14^e. Les antennes de la femelle ont les articles 2-9 en forme de bouteille, à col aussi long que gros, à verticille composé de 15 ou 16 soies 2-3 fois aussi longues que la grosseur d'un article, appendices sensoriels larges et hyalins, faisant défaut aux articles 10-14, ceux-ci cylindriques, deux fois aussi longs que gros, ensemble plus courts que les articles 2-9 réunis, le 14^e avec un stylet. Mesonotum et scutellum avec des poils d'un jaune d'or courts, appliqués et denses, tous deux sont en outre parsemés de longs poils noirs et dressés. Ailes grisâtres, densément poilues, bord antérieur avec deux taches noires séparées l'une de l'autre par une tache d'un blanc de lait; cubitus guère plus long que la transversale, aboutissant distinctement avant le milieu de l'aile, juxtaposé au radius et guère plus long que lui; bifurcation de la discoïdale située sous la transversale, celle de la posticale située un peu distalement de l'extrémité du cubitus; fourche intercalée non marquée. Fémurs et tibiais grossis, pattes à poils noirs, dressés et très longs; métatarse antérieur plus long que le 2^e article, aux pattes postérieures le métatarse atteint à peine la moitié du 2^e article, 2-5 graduellement raccourcis et cylindriques; empodium à peine plus court que les crochets, longuement poilu. Abdomen à longs poils dressés et noirs, article terminal de la pince grêle, presque aciculé. L. ♂ 2.5-3.2 mm., ♀ 1.5 mm.

Naini Tal, Kumaon, à une hauteur de 6000 à 7000 pieds, 3♂ 1♀ (R. E. Lloyd); Kurseong, Himalaya Oriental, à une hauteur de 5000 pieds, 4-vii et 5-ix, 2 ♀ (N. Annandale); Simla, à une altitude de 7000 pieds, 9-v, 1♂ (N. Annandale).

3. *F. tristicta*, n. sp.

♂. Tête et thorax bruns, abdomen blanc jaunâtre, bord antérieur des segments, les trois derniers segments presque en entier et la pince d'un brun noir, balanciers blancs, pattes blanchâtres, trois derniers articles des tarsi d'un brun noir, scape

roussâtre, flagellum brun. Tête, thorax, abdomen et 4 pattes postérieures avec de longs poils dressés et jaunes. Articles antennaires 2-10 subglobuleux, 11-14 ensemble un peu plus courts que 2-10 réunis, 11^e aussi long que le 12^e et le 13^e réunis ou que les trois précédents réunis, globuleux à sa base, 13^e un peu plus court que le 14^e, qui est à peine plus court que le 12^e; panache brun noir, extrémité blanchâtre. Ailes blanchâtres, densément poilues; bord antérieur avec 3 taches d'un brun noir, séparées l'une de l'autre par 2 taches blanches, minces et allongées, la 1^e tache brune est mince, allongée et commence près de la base alaire, la 2^e est presque carrée et englobe le radius et le cubitus, la 3^e est aussi subcarrée et se trouve vis-à-vis de l'extrémité du rameau supérieur de la posticale; cubitus juxtaposé au radius, aboutissant au milieu de l'aile, trois fois aussi long que la transversale, bifurcation de la discoïdale située sous la transversale, bifurcation de la posticale située sous l'extrémité du cubitus; sans fourche intercalée. Métatarse postérieur égal au quart du 2^e article. L. 2 mm.

Kurseong, Himalaya Oriental, à une altitude de 5000 pieds, 6-iii (N. Annandale).

4. *F. psychasta*, n. sp.

♂ ♀. Noir et mat; balanciers blancs, hanches et pattes d'un jaune clair; chez le mâle, les pleures et l'abdomen sont d'un brun jaunâtre. Yeux confluent. Bouche aussi longue que la tête. Article 2^e des palpes très élargi au milieu. Antennes du mâle brunes, articles 3-10 subglobuleux, 11-14 cylindriques, aussi longs que les articles 2-10 réunis, panache brun noir. Antennes de la femelle blanchâtres, scape brun, articles 2-9 globuleux puis ovoïdaux, verticille un peu plus long que l'article, 10-14 ensemble un peu plus longs que 2-9 réunis, cylindriques, chacun deux fois le 9^e. Vertex et mesonotum à longs poils jaunes et dressés. Ailes à poils appliqués et denses, bord antérieur avec une tache noire, allongée chez la femelle, subcirculaire chez le mâle, couvrant le radius et le cubitus; ceux-ci juxtaposés, le cubitus dépasse un peu le milieu de l'aile, sans fourche intercalée, bifurcation de la discoïdale située sous la transversale, bifurcation de la posticale un peu distale de la transversale, rameau supérieur continuant la direction du pétiole. Fémurs et tibias grossis, les 4 tibias postérieurs à longs poils dressés et épars, métatarse antérieur égalant la moitié du 2^e article, aux 4 pattes postérieures le métatarse égale la moitié du 2^e article chez le mâle, le tiers chez la femelle, 2^e article aussi long que les trois suivants réunis, 4^e un peu plus long que le 5^e. Abdomen à longs poils jaunes et dressés, article terminal de la pince aciculé. L. ♂ 2.4 mm., ♀ 2 mm.

Kurseong, Himalaya Oriental, à une altitude de 5000 pieds, 4 et 5-vii (N. Annandale).

5. *F. confluens*, n. sp.

♀. Tête et antennes jaunes, palpes brunâtres, 5 derniers articles des antennes, vertex et thorax brun noir, pleures blan-

châtres, balanciers blancs, pattes jaunes, avec un large anneau près de l'extrémité du fémur postérieur et un autre près de la base du tibia postérieur bruns; abdomen brun noir, côtés blanchâtres, couverts de longs poils écailleux, noirs, appliqués, lancéolés et striés, lamelles blanches. Yeux confluent. Trompe aussi longue que la hauteur de la tête. Article 2^e des palpes très grossi au milieu, aussi long que les deux suivants réunis, 3^e plus de deux fois le 4^e, celui-ci très court. Articles antennaires 3-9 d'abord globuleux, puis un peu plus longs que gros, 10-14 ensemble de deux tiers plus longs que 2-9, cylindriques, 3-4 fois aussi longs que gros. Mesonotum avec une pubescence jaune. Ailes à poils longs et appliqués, bord antérieur avec une tache noire qui couvre le radius et le cubitus, celui-ci soudé au radius et deux fois aussi long, dépassant à peine le milieu de l'aile, sa moitié distale forme avec la costale une cellule linéaire ét étroite, bifurcation de la discoïdale à peine distale de la transversale, celle de la posticale à peine proximale de l'extrémité du radius, fourche intercalée indiquée par une trace, rameau supérieur de la posticale continuant la direction du pétiole, l'inférieur formant avec lui un angle de 45°. Fémurs et tibias gros, poils du tibia antérieur 4-6 fois aussi longs que son épaisseur, métatarse antérieur égalant la moitié du 2^e article, métatarse postérieur égal au tiers du 2^e article. L. 2.5 mm.

Kurseong, Himalaya Oriental, à une altitude de 5000 pieds, Juillet (*E. D'Abreu*).

6. *F. monticola*, n. sp.

♂. Tête et thorax bruns, abdomen brun clair, sternum avec une grande tache noire, scape jaune, flagellum brun, balanciers d'un blanc pur, pattes d'un jaune blanchâtre. Articles antennaires 3-10 globuleux, 11^e excentrique, aussi long que les 5 précédents ou que les 3 suivants réunis, subcylindrique, sa base faiblement renflée en massue, également excentrique, munie d'un verticille comme les articles précédents, 12-14 plus gros que le 11^e, un peu plus de deux fois aussi longs que gros; panache d'un brun noir. Ailes poilues en entier, bord antérieur blanchâtre, avec une tache noire, subquadrangulaire, un peu allongée, située à l'extrémité du cubitus, avant elle se trouve une tache d'un blanc de lait et un peu plus longue qu'elle, rameau inférieur de la posticale bordé de brun noir; cubitus soudé au radius et guère plus long que lui, aboutissant au milieu de l'aile, bifurcation de la discoïdale située sous la transversale, la posticale se bifurque sous la tache noire. Pattes à poils longs et dressés, tarsi plus minces que le fémur et le tibia, métatarse postérieur atteignant les deux tiers du 2^e article, qui est aussi long que les trois suivants réunis, 4^e un peu plus long que le 5^e, métatarse antérieur un peu plus court que le 2^e article. Article terminal de la pince aciculé. L. 2 mm.

Kurseong, Himalaya Oriental, à une altitude de 5000 pieds, 4-vii (*N. Annandale*).

7. *F. albosignata*, Kieff. var. *asticta*, nov.

♀. Vertex assombri, thorax et abdomen blanchâtres, dessus du thorax et larges bandes transversales sur l'abdomen d'un brun noir, ces bandes ne laissent que le bord postérieur des tergites libre, sternites avec une tache médiane brune, pattes jaunes. Article 2^e des palpes grossi au milieu, 3^e double du 4^e, celui-ci guère plus long que gros. Yeux confluent. Articles antennaires 2-9 coniques, de moitié plus longs que gros, ensemble de moitié plus longs que 10-14 réunis, ceux-ci cylindriques, chacun d'eux pas plus long que le 9^e, 14^e avec un stylet. Ailes à poils appliqués et longs, avec une petite tache blanche située à l'extrémité du cubitus, précédée d'une tache sombre et peu distincte, qui couvre le radius et le cubitus, celui-ci aboutissant distinctement avant le milieu de l'aile, juxtaposé au radius qu'il dépasse d'un tiers, bifurcation de la discoïdale à peine distale de la transversale, celle de la posticale un peu distale de l'extrémité du cubitus, rameau supérieur continuant la direction de la tige, l'inférieur divergeant à un angle de 45°. Métatarse postérieur égalant les deux tiers du 2^e article. L. 1.8 mm.

Kurseong, E. Himalaya, altitude de 5000 pieds, vii (E. D'Abreu).

8. *F. albosignata*, Kieff. var. *variicrus*, nov.

♂. Brun luisant; abdomen noir, annelé de jaune, scape jaune, flagellum brun, balanciers blancs, pattes d'un jaune clair, les postérieures ont la moitié distale du fémur, le tiers basal du tibia et le métatarse d'un brun noir, les intermédiaires ont la base du tibia et le métatarse d'un brun noir, palpes noirs. Articles antennaires 3-10 globuleux, avec un col très court, 11-14 ensemble plus courts que 2-10 réunis, le 11^e globuleux à sa base, puis excentrique et cylindrique, de moitié plus long que le 12^e, qui est deux fois aussi long que gros, 13^e égal au 12^e, guère plus court que le 14^e, panache d'un brun noir. Mesonotum avec une pubescence faible et jaunâtre, parsemé en outre de poils dressés. Ailes poilues, subhyalines, bord antérieur noir, avec un point blanc à l'extrémité du cubitus, suivi d'une longue bande assombrie qui suit le bord antérieur, cubitus juxtaposé au radius et à peine plus long, aboutissant un peu avant le milieu de l'aile, discoïdale bifurquée sous la transversale, bifurcation de la posticale distale de l'extrémité du cubitus. Fémurs et tibias plus gros que les tarsi, pattes à longs poils dressés, métatarse antérieur un peu plus court que le 2^e article, métatarse postérieur guère plus long que la moitié du 2^e article. Article terminal de la pince aciculé. L. 1.8 mm.

Port Canning, Lower Bengal, 5-ii (N. Annandale.)

9. *F. macrothrix*, Kieff., var.

♀. Brun noir; mesonotum brun, balanciers blancs, lanches et pattes blanchâtres. Articles antennaires 2-9 d'abord sub-

globuleux, puis en cône court, 10-14 cylindriques, ensemble plus courts que 2-9, chacun à peine plus long que le 9^e, deux fois aussi long que gros. Métatarse antérieur plus long que le 2^e article, métatarse postérieur égal au 2^e article. L. 1.5 mm.

Kurseong, Himalaya Oriental, à une altitude de 5000 pieds, 4-vii, 2 ♀ (*N. Annandale*).

10. *F. macrothrix*, Kieff. var. *flaviceps*, nov.

♀. Tête et pattes jaunes, antennes et dessus du thorax brun noir, reste du thorax brun clair, balanciers blancs, abdomen blanchâtre, brun sur le dessus. Yeux confluent. Bouche aussi longue que la hauteur de la tête, lobes buccaux aussi longs que les mandibules. Article 2^e des palpes grossi au milieu. Articles antennaires 3-9 d'abord globuleux, puis à peine plus longs que gros, ensemble aussi longs que 10-14 réunis, ceux-ci subcylindriques, chacun au moins de moitié plus long que le 9^e, le 14^e avec un stylet. Ailes sans tache, poils longs et appliqués, cubitus atteignant le milieu, presque double du radius auquel il est juxtaposé, bifurcation de la discoïdale à peine distale de la transversale, celle de la posticale à peine proximale de l'extrémité du cubitus, fourche intercalée peu distincte. Fémurs et tibias gros, avec quelques longs poils, les trois premiers articles de tous les tarses ont sur le dessous, de fortes soies bulbeuses, au tarse antérieur ces soies sont brunes et spinuliformes métatarse postérieur égal au 2^e article ou à peine plus long, métatarse antérieur au moins de moitié plus long que l'article suivant; empodium hyalin, pas plus gros que les crochets et aussi long qu'eux, à poils longs et denses. L. 1.5 mm.

Kurseong, Himalaya Oriental, à une altitude de 5000 pieds, vii (*E. D'Abreu*).

11. *F. heterocera*, n. sp.

♀. Brun; antennes et pattes brunâtres, genoux et extrémité des articles tarseaux plus clairs. Articles antennaires 3-9 très allongés, en forme de bouteille, trois fois aussi longs que gros à la base, verticille atteignant l'extrémité de l'article suivant, articles 10-14 ensemble un peu plus courts que 2-9 réunis, chacun de moitié plus long que le 9^e, subcylindrique, poilu et avec un verticille à la base, 14^e avec un court stylet. Thorax plus haut que long, à poils jaunes, dressés, et longs, surtout au scutellum. Ailes densément poilues, jaunâtres, avec de grandes taches enfumées, confluentes et peu délimitées, les trois les plus distinctes se trouvent sur le bord antérieur, la 1^e qui est la plus grande, couvre le radius et le cubitus, la 3^e qui est la plus petite, se trouve très près de la pointe alaire; cubitus soudé au radius et un peu plus long que lui, dépassant peu le milieu de l'aile, bifurcation de la discoïdale sous la transversale, celle de la posticale est également distante de l'extrémité du cubitus et de la transversale. Pattes à poils sombres, dressés, 4 fois aussi longs que la grosseur du tibia, en outre avec des écailles sombres, spatuliformes ou lancéolées,

appliquées, ciliées ou pubescentes, tarsi bien plus minces que les fémurs et les tibias, métatarse antérieur aussi long que les articles 2 et 3 réunis, métatarse postérieur égalant le 2^e article avec la moitié du 3^e, 4^e article double du 5^e, qui est de moitié plus long que gros, empodium large, égalant les crochets. Abdomen manqué. L. environ 2.5 mm., tête et thorax : 1 mm.

Darjiling, à une altitude de 7000 pieds, 8-viii (C. Paiva).

4^e Genre. *Atrichopogon*, Kieff.

Ce genre, que j'ai considéré antérieurement comme sous-genre de *Forcipomyia*, en diffère par les caractères suivants : ailes paraissant glabres, avec des soies courtes et visibles seulement au microscope, entremêlées souvent de soies plus longues, mais sans longs poils appliqués ; fémurs et tibias grêles, pas distinctement plus gros que les tarsi et ordinairement sans longs poils dressés ; chez toutes les espèces connues, le métatarse postérieur est environ aussi long que les 3 ou 4 articles suivants réunis ; la forme de l'empodium, qui est comme chez *Forcipomyia*, distingue ces deux genres de tous les autres.

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|----|---|----|--------------------------------|
| 1. | Bifurcation de la posticale située sous l'origine du cubitus .. | 9. | <i>A. brevistilus</i> , n. sp. |
| — | Bifurcation de la posticale distale de l'origine du cubitus, atteignant au moins le milieu du radius .. | .. | 2. |
| 2. | Surface alaire couverte de soies microscopiques et égales, glabre chez le mâle .. | .. | 3. |
| — | Seulement le tiers distal de l'aile avec des soies ou bien ailes à soies très courtes, tiers distal avec des soies plus longues .. | .. | 4. |
| 3. | Articles antennaires 2-9 de la femelle globuleux, corps brun .. | 1. | <i>A. xanthopus</i> , n. sp. |
| — | Articles antennaires 2-9 de la femelle un peu transversaux, corps d'un roux marron .. | 2. | <i>A. flavipalpis</i> , n. sp. |
| 4. | Les deux rameaux de la posticale presque droits, continuant presque la direction du pétiole, le supérieur moins distant de la pointe alaire que le cubitus .. | 3. | <i>A. origenus</i> , n. sp. |
| — | Au moins le rameau inférieur de la posticale formant presque un angle droit avec le pétiole .. | .. | 5. |
| 5. | Rameau supérieur de la posticale plus distant de la pointe alaire que le cubitus .. | .. | 6. |
| — | Rameau supérieur de la posticale pas plus distant de la pointe alaire que le cubitus .. | .. | 7. |

6. Corps brun noir, ailes à soies, tiers distal à soies plus longues 4. *A. sublimatus*, n. sp.
 — Corps jaune clair, ailes glabres, quart distal avec des soies 5. *A. flavellus*, n. sp.
 7. Rameau supérieur de la posticale plus rapproché de la pointe alaire que le cubitus 6. *A. spurius*, n. sp.
 — Rameau supérieur de la posticale aussi rapproché de la pointe alaire que le cubitus 8.
 8. Noir profond, mesonotum brillant, ailes glabres, avec des soies au tiers distal 7. *A. aterrimus*, n. sp.
 — Brun sombre, mesonotum mat, ailes à soies denses, tiers distal à soies plus longues 8. *A. setosipennis*, n. sp.

1. *A. xanthopus*, n. sp.

♀. Brun; scape roussâtre, flagellum brun noir, face et bouche d'un jaune brunâtre, hanches et pattes d'un jaune clair, balanciers d'un blanc pur. Yeux confluent. Articles antennaires 3-9 globuleux, 10-14 plus longs que 2-9 réunis, chacun trois fois aussi long que le 9°. Mesonotum mat et grisâtre. Ailes subhyalines, à soies microscopiques; radius aboutissant un peu avant le milieu, 2° cellule radiale 3-4 fois aussi longue que la 1°, toutes deux linéaires, la 1° deux fois aussi longue que large, cubitus un peu plus distant de la pointe alaire que le rameau supérieur de la posticale; bifurcation de la posticale située sous l'extrémité du radius, celle de la discoïdale à peine distale de la transversale, fourche intercalée pétiolée. Pattes subglabres, métatarse de toutes les pattes égalant les 4 articles suivants réunis, ceux-ci subégaux et pas distinctement plus longs que gros. L. 1 mm.
 South end of Lake Chilka, N.E. Madras, 4-iii (N. Annandale).

2. *A. flavipalpis*, n. sp.

♂ ♀. D'un roux marron; tête, palpes, scape, scutellum de la femelle, pattes et pince d'un jaune clair, flagellum du mâle brun. Bouche en suçoir, aussi longue que la hauteur de la tête. Article 2° des palpes le plus long. Articles 3-11 des antennes du mâle globuleux, avec un col aussi long que gros, le col du 11° est distinctement plus long que gros, les 3 derniers articles très allongés, cylindriques, ensemble de moitié plus longs que 2-11 réunis, le 12° égal aux 5 précédents réunis, un peu plus long que le 13°, 14° avec un stylet; 3-11 avec un verticille long et appliqué, qui forme un panache d'un brun noir, 12-14 ornés à leur base, d'un verticille dressé et plus court. Articles antennaires 2-9 de la femelle un peu transversaux, 10-14 ensemble presque deux fois aussi longs que

2-9 réunis, chacun 3-4 fois le 9°. Mesonotum luisant, à peine pubescent. Ailes hyalines, glabres chez le mâle, couvertes de soies microscopiques chez la femelle; nervation et pattes comme chez le précédent. Article terminal de la pince aciculé. L. ♂ 2 mm., ♀ 1.8 mm.

Rajmahal, Bengal, 5-vii, 1 ♂ (*N. Annandale*); Adra, Manbhum District, 12-x, 1 ♀ (*Jenkins*).

3. *A. origenus*, n. sp.

♀. Noir ou brun noir; balanciers blancs, pattes d'un jaune brunâtre. Articles 3-9 des antennes globuleux, verticilles guère plus longs que les articles; 10-14 ensemble de moitié plus longs que 2-9, chacun 3 fois le 9°. Mesonotum luisant et glabre. Ailes subhyalines, tiers distal avec des soies microscopiques, on voit encore des soies alignées par endroits sur le reste de la surface; nervures brunes, radius aboutissant avant le milieu, cubitus atteignant le tiers distal, plus de trois fois aussi long que le radius, les 2 cellules radiales linéaires, fourche intercalée pétiolée et aussi bien marquée que les autres nervures, bifurcation de la discoïdale à peine distale de la transversale, bifurcation de la posticale sous l'extrémité du radius, les 2 rameaux à peine arqués, légèrement obliques, continuant presque la direction du pétiole, le supérieur distinctement plus rapproché de la pointe alaire que le cubitus. Pattes finement pubescentes, grêles, tibias postérieurs ciliés brièvement, métatarse de toutes les pattes aussi long que les 4 articles suivants réunis, 3° et 4° subégaux. L. 1.5 mm.

Kurseong, Himalaya Oriental, à une altitude de 5000 pieds, 9-ix (*N. Annandale*).

4. *A. sublimatus*, n. sp.

♀. Brun noir; face, bouche et scape d'un roux brun, scutellum, balanciers, hanches et pattes d'un jaune clair, mesonotum cendré, mat, à pubescence claire, éparse. Yeux confluent. Articles antennaires 2-9 subglobuleux, verticille atteignant le milieu ou l'extrémité de l'article suivant, 10-14 ensemble deux fois aussi longs que 2-9 réunis, chacun 3-4 fois le 9°, cylindrique. Ailes subhyalines, à soies microscopiques, ces soies sont plus longues au tiers distal et le long du bord postérieur; radius aboutissant un peu avant le milieu, les 2 cellules radiales linéaires, la 2° presque triple de la 1°, atteignant le quart distal de l'aile, fourche intercalée pétiolée, bifurcation de la discoïdale peu marquée, à peine distale de la transversale, bifurcation de la posticale située sous le milieu du radius, rameau inférieur formant presque un angle droit avec le pétiole, rameau supérieur beaucoup plus éloigné de la pointe alaire que le cubitus. Pattes comme chez le précédent, crochets courbés en faucille. L. 2 mm.

Kurseong, Himalaya Oriental, altitude de 5000 pieds, 6-ix (*N. Annandale*).

5. *A. flavellus*, n. sp.

♂ ♀. D'un jaune vitellin, tête et pattes plus claires, flagellum brun. balanciers blancs. Yeux confluent (♂ ♀). Suçoir égalant les deux tiers de la hauteur de la tête. Article 2^e des palpes grossi au milieu, aussi long que le 3^e et le 4^e réunis. Articles 3-10 des antennes du mâle subglobuleux, transversaux, le 2^e avec un verticille dressé, les suivants à poils appliqués et formant panache, avec un col un peu transversal, en outre les articles 2-10 ont chacun deux appendices sensoriels dressés et atteignant l'extrémité de l'article suivant; 11-14 cylindriques, ensemble presque deux fois aussi longs que 2-10 réunis, 11^e excentrique, trois fois aussi long que gros, 12^e triple du 11^e, égal au 14^e, de moitié plus long que le 13^e, 12-14 avec un verticille basal et dressé, en outre avec des poils épars, 14^e avec un stylet terminal; panache jaune dans sa moitié basale, brun noir dans sa moitié distale. Articles 3-9 des antennes de la femelle globuleux, organes sensoriels à peine arqués et à peine plus courts que les verticilles; 10-14 cylindriques, graduellement allongés, ensemble deux fois aussi longs que 2-9 réunis, le 14^e avec un stylet. Thorax aussi haut que long, mesonotum glabre et luisant. Ailes hyalines; celles du mâle ont des soies très petites et denses, le cubitus soudé au radius et 3-4 fois aussi long que lui, distant de la pointe alaire de toute sa longueur, bifurcation de la discoïdale un peu distale de la transversale, bifurcation de la posticale située sous le milieu du cubitus, rameau supérieur continuant la direction du pétiole, bien plus rapproché de la pointe alaire que le cubitus, rameau inférieur presque à angle droit, fourche intercalée bien marqué et pétiolée. L'aile de la femelle a, outre les soies courtes, des soies plus longues, occupant le tiers ou le quart distal, les rameaux de la posticale et de la discoïdale, et un large espace longeant le bord postérieur; le radius est séparé du cubitus et forme une 1^e cellule qui est de moitié aussi large que la 2^e. Pattes grêles, tibias et fémurs postérieurs à poils 2-3 fois aussi longs que leur grosseur, métatarse égalant les 4 articles suivants réunis, crochets en faucille, ceux du mâle ont l'extrémité peu distinctement fendue, empodium mince, à longs poils. Article terminal de la pince grêle, pubescent, peu arqué, graduellement en pointe, lamelle arrondie, dépassant l'article basal. L. ♂ 2.5 mm., ♀ 1.8-2 mm.

Maddathoray, west base of W. Ghats, Travancore, 18-xi, plusieurs centaines d'exemplaires, mâles rares; Jungle at base of Dawna Hills, Lower Burma, 1-iii; Bangalore, S. India, à une altitude de 3000 pieds, couvrant les feuilles des arbres, en nombre prodigieux; parmi plusieurs centaines d'exemplaires envoyés, il n'y avait que peu de mâles (*N. Annandale*).

6. *A. spurius*, n. sp.

♀. Tête, scape et palpes d'un jaune roussâtre, thorax et abdomen d'un brun clair, pattes d'un jaune pâle, balanciers blancs. Radius et cubitus d'un brun noir; rameau supérieur de la post-

calé fortement arqué, distinctement plus rapproché de la pointe alaire que le cubitus, rameau inférieur formant presque un angle droit avec le pétiole. Pour tout le reste, semblable à *A. origenus*. L. 1.5 mm.

Madhupur, Bengal, 15-x (*C. Paiva*)

7. *A. aterrimus*, n. sp.

♀. D'un noir profond; scape et pattes d'un jaune blanchâtre, balanciers d'un blanc pur, extrémité du tibia postérieur et 5^e article de tous les tarses d'un brun noir. Articles antennaires 3-9 globuleux ou à peine transversaux, 10-14 ensemble presque 2 fois aussi longs que 2-9 réunis, cylindriques, chacun 3 fois le 9^e. Mesonotum brillant, à pubescence éparsée et peu distincte. Ailes hyalines, avec des soies microscopiques au tiers distal et le long du bord inférieur, en outre avec quelques lignes longitudinales de soies; radius aboutissant un peu avant le milieu, 2^e cellule radiale presque triple de la 1^e, toutes 2 linéaires, cubitus atteignant presque le quart distal de l'aile, fourche intercalée pétiolée, bifurcation de la discoïdale un peu distale de la transversale, celle de la posticale est située sous l'extrémité du radius, rameau supérieur aussi éloigné de la pointe alaire que le cubitus, rameau inférieur formant presque un angle droit avec le pétiole. Pattes comme chez le précédent. Abdomen mat. L. 1.5 mm.

Darjiling, à une altitude de 7000 pieds, 8-viii (*J. T. Jenkins*).

8. *A. setosipennis*, n. sp.

♀. D'un brun sombre; antennes noires, pattes d'un brun clair. Articles antennaires 3-9 transversaux, 10-14 ensemble distinctement plus longs que 1-9 réunis, subcylindriques, chacun deux fois aussi long que gros. Mesonotum mat, à pubescence peu distincte. Ailes subhyalines, à soies denses et courtes, au bout extrême et le long des nervures les soies sont plus longues; radius dépassant un peu le milieu, cubitus 2½ fois aussi long que le radius, atteignant le tiers distal de l'aile, bifurcation de la discoïdale à peine distale de la transversale, peu marquée, bifurcation de la posticale à peine proximale de l'extrémité du radius, rameau supérieur aussi éloigné de la pointe alaire que le cubitus, rameau inférieur formant presque un angle droit avec le pétiole, fourche intercalée bien marquée et pétiolée. Pattes comme chez le précédent. L. 1 mm.

Madhupur, Bengal, 16-x (*C. Paiva*).

9. *A. brevistilus*, n. sp.

♀. Tête jaune, thorax d'un brun clair, plus sombre dorsalement, abdomen blanchâtre, tergites et une courte bande transversale sur les sternites d'un brun noir, antennes d'un brun noir, balanciers blancs pattes jaunâtres. Articles 2^e et 4^e des palpes

égaux, non renflés, le 3^e plus court que le 4^e. Articles antennaires 2-9 transversaux, verticilles un peu plus courts que les organes sensoriels qui atteignent l'extrémité de l'article suivant, articles 10-14 ensemble deux fois et demie aussi longs que 2-9 réunis chacun 4 fois aussi long que le 9^e, cylindrique, à poils épars, sans verticille. Mesonotum luisant, pubescence faible et grise. Ailes à soies longues; cubitus atteignant le tiers distal de l'aile, les deux cellules radiales linéaires, la 2^e trois fois et demie aussi longue que la 1^e, fourche intercalée bien marquée et pétiolée, bifurcation de la discoïdale et de la posticale à peine distale de la transversale, située sous l'origine du cubitus, le rameau supérieur de la posticale continue la direction du pétiole, l'inférieur diverge en angle de 45°. Métatarse de toutes les pattes égal aux 4 articles suivants réunis, empodium large, au moins aussi long que les crochets. L. 1.5 mm.

Kurseong, Himalaya Oriental, à une altitude de 5000 pieds, vii (E. D'Abreu).

10. *A. rivicola*, Kieff.

Darjiling, à une altitude de 7000 pieds, 24-ix, 1 ♀, 2.5 mm. (E. Brunetti).

5^e Genre. *Dasyhelea*, Kieff.

Ce genre est voisin d'*Atrichopogon*, de *Forcipomyia* et de *Culicoides*; il a les ailes couvertes de soies microscopiques ou de poils appliqués, comme les représentants de ces trois genres, mais il diffère de tous par les yeux qui sont pubescents. Le type est *D. halophila*, Kieff., dont la larve vit dans l'eau de mer.

- | | | |
|----|---|------------------------------------|
| 1. | Ailes couvertes de poils appliqués
(Sous-genre <i>Dasyhelea</i> , Kieff.). | |
| — | Ailes avec des soies microscopiques
et dressées | 2. |
| 2. | Empodium très court, ne dépassant
pas la base des crochets (Sous-genre
<i>Prokempia</i> , n. subg.) | 3. |
| — | Empodium filiforme, aussi long ou
presque aussi long que les crochets,
à poils longs et simples; les 5 derniers
articles antennaires de la femelle sont
allongés (Sous-genre <i>Kempia</i> , n.
subg.) | 4. |
| 3. | Jaune clair; articles antennaires 3-13
de la femelle subégaux, globuleux ou
subglobuleux, 2-9 avec des organes
sensoriels incurvés en faucille | 1. <i>D. ornaticornis</i> , n. sp. |
| — | Brun; articles antennaires 3-13 de
la femelle coniques | 2. <i>D. longicornis</i> , n. sp. |

- Noir; articles antennaires 2-13 du mâle ornés d'arêtes ou de stries à leur base 3. *D. minima*, n. sp.
- 4. D'un roux jaune, empodium plus court que les crochets .. 4. *D. calcuttensis*, n. sp.
- D'un noir brillant, abdomen carné, empodium égalant les crochets .. 5. *D. perplexa*, n. sp.

1. *D. (Prokempia) ornaticornis*, n. sp.

♀. Tête et thorax d'un jaune clair, abdomen blanchâtre antennes, trois bandes raccourcies du mesonotum et tergites bruns, pattes blanchâtres, articulations assombries, vertex brunâtre. Yeux confluent et pubescents. Articles des palpes subégaux. Articles antennaires 2-13 subégaux, d'abord globuleux, puis graduellement un peu plus longs que gros, subglobuleux, avec un verticille dépassant le milieu de l'article suivant, 2-9 à organes, sensoriels plus longs que le verticille et fortement incurvés en faucille, 10-14 parsemés de verrues hyalines, guère plus grosses qu'une soie et deux fois aussi hautes que larges, 14^e article plus de deux fois aussi long que le 13^e, dépourvu de verticille. Ailes ponctuées et hyalines, des soies assez fortes se voient à l'extrémité distale, le long du bord postérieur et en lignes longitudinales dans les deux tiers distaux de l'aile; cubitus soudé au radius, atteignant le milieu de l'aile, bifurcation de la discoïdale un peu distale de la transversale, bifurcation de la posticale située sous l'extrémité du cubitus, rameau inférieur formant presque un angle droit avec le pétiole. Métatarse de toutes les pattes aussi long que les trois articles suivants réunis, 5^e article plus long que le 4^e, empodium très court, ne dépassant pas la base des crochets. L. 1 mm.

Puri, côte d'Orissa, 13-ix (S. W. Kemp).

2. *D. (Prokempia) longicornis*, n. sp.

♀. D'un brun clair; trois bandes plus sombres sur le mesonotum, pattes brunâtres, abdomen blanc brunâtre, tergites et une courte bande transversale sur les sternites d'un brun noir. Yeux pubescents. Suçoir égalant les deux tiers de la hauteur de la tête. Article 2^e des palpes pas plus gros que les autres, aussi long que le 3^e et le 4^e réunis, ceux-ci subégaux. Articles 2-13 des antennes subégaux, d'abord ovoïdaux, puis coniques, à organes sensoriels faiblement incurvés, 14^e article de moitié plus long que le 13^e. Ailes ponctuées, moitié distale parsemée de soies longues, dressées, souvent alignées, surtout sur les nervures; cubitus soudé au radius, plusieurs fois aussi long que la transversale et atteignant le milieu de l'aile, bifurcation de la discoïdale à peine distale de la transversale, bifurcation de la posticale située sous l'extrémité du cubitus, le rameau supérieur de la posticale continue la direction du pétiole, l'inférieur forme un angle de 45° avec le supérieur. Métatarse antérieur égalant les 3 articles suivants réunis, métatarse posté-

rieur aussi long que les 2 articles suivants réunis, empodium atrophié, ne dépassant pas la base des crochets, qui ont une longue soie à leur base. L. 1.2 mm.

Katihar, Purneah District, N. Bengal, 24-ix (C. Paiva).

3. *D. (Prokempia) minima*, n. sp.

♂. Noir; face, bouche, antennes et pattes d'un brun clair, balanciers blancs. Yeux brièvement pubescents et très arqués. Articles antennaires 3-10 ensemble aussi longs que 11-14 réunis, ellipsoïdaux, leur moitié proximale est traversée par des stries ou arêtes longitudinales et denses; articles 11-14 allongés, chacun plus de deux fois aussi long que le 9^e, avec un verticille dressé et des stries à leur base, sauf le 14^e article qui est dépourvu de verticille et de stries; panache brun noir. Ailes ponctuées, extrémité et nervures de la moitié distale avec des soies longues et dressés, ou voit encore quelques lignes longitudinales de soies dans la moitié distale de l'aile; cubitus soudé au radius, guère plus long que la transversale et n'atteignant pas le milieu de l'aile, bifurcation de la discoïdale à peine distale de la transversale, bifurcation de la posticale distale de l'extrémité du cubitus de toute la longueur de ce dernier. Pattes à longs poils dressés. Métatarse postérieure égalant les 3 articles suivants réunis, 4^e et 5^e articles subégaux, empodium atrophié, base des crochets avec une longue soie. Article terminal de la pince grêle, aciculé, faiblement pubescent. L. 0.8 mm.

Calcutta, 29-i, 5 ♂.

4. *D. (Kempia) calcuttensis*, n. sp.

♀. D'un roux jaune, mesonotum un peu plus sombre, antennes d'un brun noir, hanches et pattes d'un jaune brunâtre, balanciers blancs. Yeux densément pubescents. Suçoir aussi long que la tête. Article 2^e des palpes renflé. Articles antennaires 2-9 subglobuleux, à verticille atteignant le milieu de l'article suivant, en outre couverts de minimes soies dressées et rangées transversalement, 10-14 subcylindriques, graduellement plus longs, le 10^e double du 9^e; organes sensoriels pas plus gros que les soies. Ailes avec des soies microscopiques et denses, cubitus dépassant le milieu, triple du radius auquel il est juxtaposé, tous deux jaunâtres, fourche intercalée bien marquée et pétiolée, bifurcation de la discoïdale à peine distale de la transversale, la posticale se bifurque sous l'extrémité du radius, le rameau supérieur continue la direction du pétiole, l'inférieur forme presque un angle droit avec lui. Pattes sans longs poils, métatarse postérieure aussi long que les 3 articles suivants réunis, empodium mince, dépassant à peine le milieu des crochets, avec de longs poils. Corps subglabre. L. 0.8 mm.

Calcutta, 20-viii (N. Annandale).

5. *D. (Kempia) perplexa*, n. sp.

♀. D'un noir brillant; balanciers blancs, abdomen d'un roux de chair, hanches et pattes blanchâtres, antennes d'un brun clair. Yeux confluent, plus brièvement pubescents que chez le précédent. Suçoir plus court que la hauteur de la tête. Articles antennaires 2-9 transversaux, organes sensoriels obtus, plus gros que les soies et aussi longs qu'elles, 10-14 subcylindriques, chacun triple du 9, ensemble au moins 2 fois aussi longs que 2-9 réunis. Ailes comme chez le précédent, sauf que le cubitus et le radius sont d'un brun noir. Pattes sans longs poils, métatarse postérieur égalant les 3 articles suivants réunis, empodium mince, aussi long que les crochets, à longs poils. Corps subglabre. L. 0.8 mm.

Calcutta, 20-viii

6^e Genre. *Culicoides*, Latr.

Yeux glabres. Ailes avec des soies dressées, ou bien avec des soies microscopiques entremêlées de soies plus longues; cubitus soudé au radius ou réuni à lui par une transversale. Empodium atrophié, ne dépassant pas ou à peine la base des crochets, celle-ci avec une ou deux fortes soies, fémurs et tarses inermes.

1. Ailes avec 3 petites taches noires I. *C. xanthocoma*, n. sp.

— Ailes avec 2 taches noires et des taches enfumées 2. *C. odiosus*, Kieff

1. *C. xanthocoma*, n. sp.

♂. D'un brun sombre; antennes jaunes sauf le scape et les 3 derniers articles qui sont bruns, abdomen blanchâtre, avec de petites taches brunes, pince brune, pattes d'un brun noir, extrême base des fémurs, un anneau avant l'extrémité des fémurs et des tibias ainsi qu'un anneau près de la base des tibias jaunes, tarses jaunâtres, extrémité des articles brune. Yeux arqués, glabres, amincis en haut, où ils sont séparés par une ligne. Articles des palpes subgêaux, le 4^e à peine plus long. Articles antennaires 2-11 ensemble beaucoup plus longs que 12-14 réunis, d'abord ovoïdaux puis coniques, les poils du panache sont insérés sur une ligne transversale oblique et manquent sur le côté interne, ainsi qu'aux trois derniers articles, 11^e article d'un quart plus long que le 10^e, 12-14 cylindriques, allongés, chacun deux fois aussi long que le 10^e, la base du 12^e et du 13^e porte un verticille de poils dressés; panache jaune. Thorax plus haut que long. Ailes blanches, avec 3 petites taches noires situées l'une sur la transversale, l'autre sur l'extrémité du cubitus, la 3^e forme un trait longeant la base du rameau inférieur de la discoïdale, surface nue, sans ponctuation, avec quelques soies alignées le long du bord distal; cubitus soudé au radius, à peine plus long que lui et aboutissant avant le milieu de l'aile, bifurcation de la discoïdale située sous l'extrémité du cubitus, à peine proximale de la bifurcation de la posticale. Pattes grêles, sans longs poils, tarse anté-

rieur aussi long que le tibia, métatarse de toutes les pattes un peu plus long que les 2 articles suivants réunis, au tarse postérieur le métatarse seul porte des soies bulbeuses fortes et très dense, 4^e article tronqué obliquement au bout, plus court mais plus gros que le 5^e, empodium atrophié, ne dépassant pas la base des crochets, qui sont dépourvus de longue soie. Article terminal de la pince grêle, faiblement arqué, aminci au milieu, glabre sauf au tiers basal qui est pubescent et un peu grossi, lamelle n'atteignant que le milieu des articles basaux, découpé en arc au bord postérieur, avec un stylet à chaque angle. L. 1.5 mm.

Puri, côte d'Orissa, 13-xi (S. W. Kemp)

2. *C. odiosus*, Kieff.

♀. Les 5 derniers articles antennaires réunis sont un peu plus longs que les 8 précédents ensemble. Bifurcation de la posticale située sous l'extrémité du cubitus, rameau supérieur fortement arqué des sa base, le rameau inférieur continue la direction du pétiole. Les tibias antérieurs ont un peigne, comme tous les représentants de cette tribu, crochets avec une soie basale arquée et aussi longue qu'eux, empodium atrophié, ne dépassant pas la base des crochets. L. 1.5 mm.

Kurseong, Himalaya Oriental, à une altitude de 5000 pieds, vii (E. D'Abreu).

7^e Genre. *Heteromyia*, Say.

Selon Say, le cubitus de *Heteromyia* ne serait pas relié au radius par une transversale, mais Johannsen qui a examiné le type de *Heteromyia*, a constaté la présence de deux cellules radiales et que par suite Say a fait erreur. D'autre part la description que Walker donne du genre *Pachyleptus* concorde avec celle de *Heteromyia*, sauf qu'il ne fait pas autrement mention de la nervation que par les mots: "veins like those of *Ceratopogon*." Il n'en est pas de même de la description donnée plus tard par Arribalzaga pour le genre *Pachyleptus*; d'après cet auteur, le thorax serait armé de spinules en avant et le radius non relié au cubitus par une transversale. Les deux espèces à femur antérieur grossi que j'ai eu occasion d'observer, proviennent, l'une de Iles Seychelles,¹ l'autre des Indes Orientales; cette dernière a deux cellules radiales, le radius étant relié au cubitus par une transversale; elle fait donc partie du genre *Heteromyia*, Say; la première n'a qu'une cellule radiale et la surface alaire avec des soies microscopiques, elle rentre donc dans le genre *Pachyleptus*, Arrib. (Walk.?)

H. indica, n. sp.

♀. Noir, mat et glabre; scape roussâtre, articles antennaires 2-10, tibia antérieur, tiers distal du tibia intermédiaire et tous les tarses blanchâtres, balanciers brunâtres. Yeux glabres,

¹ The Percy Sladen Trust Expedition to the Indian Ocean in 1905, Vol. 3, No. xv, Chironomidae, p. 347 (1911).

arqués, occupant presque toute la tête, confluent au vertex. Bouche pointue, petite, plus courte que les palpes. Articles 2^e et 4^e des palpes longs. Articles antennaires 2-9 subcylindriques, 2-3 fois aussi longs que gros, verticilles un peu plus longs qu'un article, 10-14 cylindriques, minces, chacun presque triple du 9^e, ensemble beaucoup plus longs que 2-9, poils dressés, épars et deux fois aussi longs que ceux du verticille des articles 2-9. Thorax plus haut que long, très convexe, bord antérieur du mesonotum avec une dent courte et aiguë. Ailes paraissant glabres étant vues à la loupe, faiblement enfumées et irrisées sauf au quart distal qui est blanchâtre et non irrisé, nervures d'un brun noir, partie proximale du radius de moitié plus longue que la partie distale, cubitus droit, atteignant le quart distal, 2^e cellule radiale trois fois aussi longue que la 1^e, toutes deux sont linéaires, bifurcation de la discoïdale à peine proximale de la transversale, bifurcation de la posticale située sous la transversale, anale bifurquée au tiers proximal. Fémur antérieur très grossi, au moins trois fois aussi gros que le tibia, droit, à peine pubescent, brillant, parsemé de spinules sur toute la partie ventrale qui est traversée par un sillon longitudinal; tibia faiblement arqué, placé dans le sillon du fémur au repos; métatarse n'atteignant pas la moitié du tibia, égalant les trois articles suivants réunis, 2^e égal aux 3^e et 4^e réunis, ceux-ci à peine plus longs que gros, le 4^e cordiforme, 5^e plus mince, un peu arqué, égalant le 2^e, avec 5 paires de spinules noires et cylindriques; crochets inégaux, le grand est simple, égalant la moitié de l'article tarsal, l'autre un peu plus court, avec une dent basale arquée et atteignant le tiers de sa longueur; les 4 pattes postérieures sont plus longues que les antérieures, leurs fémurs inermes, non grossis sauf le tiers distal du fémur postérieur qui est faiblement grossi, tibia postérieur cilié, d'un tiers plus long que le métatarse, celui-ci un peu plus long que les 4 articles suivants réunis, les deux premiers à soies bulbeuses sur le dessous, 3^e presque double du 4^e, le 4^e et le 5^e ainsi que les crochets sont conformés aux 4 pattes postérieures comme aux antérieures. Abdomen brillant, faiblement déprimé, rétréci dans presque la moitié antérieure, graduellement élargi, 1^{er} segment aussi long que large, 2^e allongé, les suivants un peu transversaux. L. 3.5 mm.

Maddathoray, base of W. Ghats, Travancore, 17-xi, 1 ♀ (N. Annandale).

8^e Genre. *Stilobezzia*, Kieff.

Dans ce genre, la 1^e cellule radiale n'est pas plus longue que haute et souvent tellement petite, surtout chez le mâle, qu'elle paraît être ponctiforme, offrant ainsi une transition vers le genre *Bezzia*; la bifurcation de la discoïdale est bien distale de la transversale, la fourche par suite pétiolée (d'où le nom de *Stilobezzia*); surface alaire avec des soies microscopiques. L'espèce suivante diffère de toutes les autres par la fourche de la discoïdale qui est très brièvement pétiolée.

1. *S. lineata*, n. sp.

♂ ♀. Le mâle est brun noir, scape jaune, abdomen brun verdâtre, bord postérieur des tergites à reflet argenté, pince jaunâtre, pattes jaunes ou blanchâtres, anneau au dessus du milieu du fémur antérieur, extrémité de tous les tibias et des 4 premiers articles tarsaux et le 5^e article tarsal noirs; chez la femelle, la tête et les articles antennaires 10-14 sont d'un brun noir, articles antennaires 2-9 blanchâtres, thorax d'un jaune brunâtre, plus clair dessus, pattes comme chez le mâle, abdomen d'un jaune clair, tergites 2-6 traversés par une ligne médiane et longitudinale d'un brun noir, côtés de l'abdomen brun noir. Yeux arqués, confluent. Suçoir égalant les deux tiers de la hauteur de la tête. Article 2^e des palpes un peu plus long que le 4^e, celui-ci plus long que le 3^e. Article 2^e des antennes du mâle allongé, avec 2 verticilles de poils appliqués, très longs et formant le panache, 3-11 cylindriques, avec l'extrême base amincie, d'abord de moitié, puis 2 à 3 fois aussi longs que gros, avec un verticille appliqué et formant le panache, le 11^e de moitié plus long que le 10^e mais de même conformation et à verticille appliqué, les 3 derniers articles très allongés, minces, cylindriques, ensemble aussi longs que 2-11 réunis, le 12^e de moitié plus long que le 11^e, avec un verticille basal dressé et peu long; 13^e presque double du 12^e, 14^e égalant le 12^e et le 13^e réunis, terminé par un stylet; panache d'un brun noir. Articles antennaires 3 et 4 de la femelle subcylindriques et de moitié plus longs que gros, 5-9 graduellement allongés, amincis distalement, le 9^e trois fois aussi long que gros, verticille aussi long que l'article, 10-14 ensemble aussi longs que 2-9 réunis, chacun moins de deux fois le 9^e, cylindrique. Thorax un peu plus long que haut, faiblement pruineux, parsemé de rares poils sur le mesonotum et le scutellum. Ailes blanchâtres, à soies microscopiques, avec 7 petites taches noires, mieux marquées chez la femelle que chez le mâle, les trois taches les plus grandes sont situées au bord antérieur, la 1^e couvre la transversale, la 1^e cellule radiale et la partie distale du radius jusqu'au bord; la 2^e, un peu transversale, est à l'extrémité du cubitus, la 3^e, transversale aussi, est entre le cubitus et la pointe alaire; les 4 autres taches ont chacune la forme d'un minime trait et sont sur le bord postérieur de l'aile, à savoir sur la partie extrême des deux rameaux de la discoïdale et des deux rameaux de la posticale; 1^e cellule radiale très petite, à peine formée, seulement ponctiforme chez le mâle, un peu distale du milieu de l'aile, partie distale du radius plus longue que la proximale mais un peu plus courte que la transversale, extrémité du cubitus un peu épaissie, subitement courbée sur la costale, aussi distante de la pointe alaire que le rameau supérieur de la posticale, bifurcation de la discoïdale distale de la transversale, pétiole de la fourche pas plus long que la transversale, bifurcation de la posticale située sous la transversale, anale peu distincte; la transversale à la base alaire est noire. Fémurs inermes et à peine plus gros que les tibias; métatarse antérieur plus long que la moitié du tibia, plus

de 2 fois le 2^e article, 4^e un peu plus court que le 3^e, transversal, prolongé apicalement sur le dessous et bilobé, 5^e inerme, égal aux 3^e et 4^e réunis, relevé; crochets égaux, simples¹ et petits chez le mâle, inégaux chez la femelle, le grand égale les trois quarts de l'article, le petit dépasse à peine le tiers du grand et a une dent basale obtuse; aux 4 tarses postérieurs, le 3^e article est double du 4^e, mais le 4^e, le 5^e et les crochets sont conformés comme aux antérieurs; métatarse de toutes les pattes avec une spinule noire, pointue, située près de la base de la partie ventrale, au moins chez le mâle. Abdomen déprimé. Article terminal de la pince grêle, subcylindrique, faiblement pubescent dessus, pointu. L. ♂ 1.8-2.5 mm., ♀ 2 mm.

Madhupur, Bengal, 13-x, 18-x, 3 ♀ (*C. Paiva*); Giridih, Bengal, 7-xi, 1 ♂ (*S. W. Kemp*); Karmatar, Bengal, 23-x, 1 ♀ (*C. Paiva*).

2. *S. festiva*, Kieff.

Une variété à abdomen brun noir dans sa moitié postérieure; les taches de la moitié antérieure peu marquées.

Madhupur, Bengal, 13-x, at light, 2 ♂.

9^e Genre. *Sphaeromyias*, Curt. (*non* Walk.)

Ce genre ne diffère de *Palpomyia* que par les fémurs dépourvus de spinules. Il a comme synonymes: *Ceratopogon*, Meigen (*partim*), *Ceratolophus*, Kieffer (*partim*), *Sphaeromyias*, Johannsen, et *Johannseniella*, Williston.

S. inermicrus, n. sp.

♀. Tête et les 9 premiers articles antennaires d'un roux jaune, les 5 derniers articles et balanciers brun noir, thorax d'un noir brillant, pattes sauf les hanches rousses (les pattes postérieures et l'abdomen manquent). Yeux séparés par une ligne. Suçoir égalant la moitié de la hauteur de la tête. Articles antennaires 3-9 deux fois aussi longs que gros, à poils épars, 10-14 cylindriques, chacun trois fois aussi long que le 9^e. Ailes hyalines, les 3 nervures antérieures brunes, 1^e cellule radiale seulement deux fois aussi longue que large, 2^e cellule 4-5 fois plus longue que la 1^e, presque deux fois plus près de la pointe alaire que le rameau inférieur de la discoïdale, bifurcation de la discoïdale située sous la transversale, celle de la posticale un peu proximale de la transversale. Thorax glabre et densément ponctué. Fémurs inermes, les antérieurs deux fois aussi gros que les tibias, sinueux dorsalement, n'atteignant pas la surface du mesonotum, 3^e article tarsal un peu plus long que le 4^e, celui-ci aussi gros que long, 5^e égal aux 3^e et 4^e réunis, armé de 4 paires de spinules noires et cylindriques, crochets des tarses antérieurs égaux, grands, atteignant les trois quarts de la longueur de l'article, chacun avec une

¹ L'extrémité paraît fendue étant vue d'en haut.

dent basale au côté externe, crochets des tarsi intermédiaires inégaux, le grand avec une dent basale, le petit bifide et n'ayant que le tiers de la longueur du grand. L. environ 3 mm.
Rajmahal, Bengal, vii, 1 ♀ (*N. Annandale*).

10^e Genre. *Palpomyia*, Megerle in Meigen.

- | | | |
|---|----------------------------------|----|
| 1. Yeux confluents, tous les fémurs armés de spinules, bifurcation de la posticale distale de la transversale .. | .. | 2. |
| — Yeux séparés par une ligne .. | .. | 4. |
| 2. Crochets tarsaux égaux, simples, presque aussi long que l'article .. | .. | 3. |
| — Crochets tarsaux inégaux et simples, le grand égal à l'article, d'un tiers plus long que le petit .. | 1. <i>P. albinervis</i> , n. sp. | |
| 3. Cubitus plus de 2 fois plus près de la pointe alaire que le rameau inférieur de la discoïdale .. | 2. <i>P. photophila</i> , n. sp. | |
| — Cubitus seulement un peu plus près de la pointe alaire que le rameau inférieur de la posticale .. | 5. <i>P. distincta</i> , Kieff. | |
| 4. Tous les fémurs avec 3 petites spinules au tiers distal; bifurcation de la posticale distale de la transversale .. | 3. <i>P. abjecta</i> , n. sp. | |
| — Fémurs intermédiaires inermes; bifurcation de la posticale proximale de la transversale .. | .. | 5. |
| 5. Petit crochet des 4 tarsi postérieurs bifide .. | 4. <i>P. disjuncta</i> , n. sp. | |
| — Petit crochet des 4 tarsi postérieurs avec une dent basale .. | 6. <i>P. interrupta</i> , Kieff. | |

1. *P. albinervis*, n. sp.

♀. Roussâtre, couvert d'une pruinosité grise qui laisse à peine paraître la couleur du fond; scape et articulation des 8 articles suivants d'un roux jaune, balanciers blancs, pattes d'un brun clair, tarsi blanchâtres, extrémité des 4 premiers articles et le 5^e noirs. Yeux confluents. Articles antennaires 3-9 de moitié plus longs que gros, puis presque deux fois, 10-14 ensemble aussi longs que 3-9 réunis, chacun moins de deux fois le 9^e, poils moins de deux fois aussi longs que la grosseur des articles. Thorax subglobuleux et glabre. Ailes blanches, nervures blanchâtres, partie proximale du radius double de la partie distale, les deux cellules radiales sont linéaires, la 1^e 4-5 fois aussi longue que large, la distale trois fois plus longue que la proximale, cubitus un peu plus près de la pointe alaire que le rameau inférieur de la discoïdale, bifurcation de la discoïdale située sous la transversale, bifurcation de la posticale située sous le milieu de la 1^e cellule radiale, anale bifurquée près de sa base. Tous les fémurs spinu-

leux, sauf au quart basal, pattes antérieures plus courtes que les 4 postérieures, le 4^e article de tous les tarse est à peine plus long que gros, un peu plus court que le 3^e, 5^e plus de deux fois le 3^e et le 4^e réunis, inerte, crochets simples et inégaux, le grand presque aussi long que l'article, d'un tiers plus long que le petit; tibia postérieur cilié dorsalement, de moitié plus long que le métatarse L. 3 mm.

Pallode, 20 miles N.E. of Trivandrum, Travancore, 15-xi, 2 ♀ (N. Annandale).

2. *P. photophila*, n. sp.

♀. Noir; front, 9 premiers articles antennaires et pattes sauf les hanches, d'un roux jaunâtre, face d'un jaunâtre pruinéux, thorax mat et cendré, mesonotum avec 3 bandes noires, dont les latérales sont raccourcies en avant, la médiane s'élargit vers le milieu des latérales avec lesquelles elle est confluyente jusqu'au bord postérieur, balanciers blancs, tous les genoux, un anneau au-dessus du milieu des fémurs antérieurs et intermédiaires, un anneau plus large, occupant le tiers au-dessus du milieu des fémurs postérieurs et plus de la moitié distale des tibias postérieurs noirs, abdomen brillant et glabre. Yeux confluentes. Articles antennaires 3-9 deux fois aussi longs que gros, poils épars, pas deux fois aussi longs qu'un article, 10-14 ensemble beaucoup plus longs que 2-9, minces et cylindriques, le 10^e presque 3 fois le 9^e. Thorax aussi haut que long, bord antérieur du mesonotum avec une dent très courte, tantôt très distincte, tantôt à peine perceptible et subnulle. Ailes hyalines, transversale et origine du cubitus noirs, partie proximale du radius presque double de la distale, les 2 cellules radiales allongées, sublinéaires, la distale plus de trois fois la proximale, cubitus arqué, très rapproché du bord, plus de 2 fois plus près de la pointe alaire que le rameau inférieur de la discoïdale, bifurcation de la posticale située sous le milieu de la partie proximale du radius. Fémur antérieur beaucoup plus long que la hauteur du thorax, un peu arqué par en bas au milieu, à peine plus gros que l'intermédiaire et pas plus court, subcylindrique, sa moitié distale avec de nombreuses spinules ventrales noires, tibia antérieur égal au fémur, plus de deux fois aussi long que le métatarse. celui-ci d'un tiers plus long que le 2^e, 3^e presque double du 4^e, celui-ci moins de 2 fois aussi long que gros, 5^e égal aux deux précédents réunis, à peine plus court que le 2^e, avec 5 paires de spinules noires et cylindriques, crochets simples, égaux, très longs, aussi longs que l'article tarsal; fémurs intermédiaires et postérieurs graduellement un peu grossis de la base au sommet, les intermédiaires avec de nombreuses spinules au tiers distal, les postérieurs spinuleux dans leur moitié distale; tibias postérieurs presque doubles du métatarse, celui-ci plus de 2 fois le 2^e; 4 derniers articles des tarse intermédiaires et postérieurs, ainsi que les crochets, comme aux antérieurs; pilosité épars, un peu plus longue que la grosseur des pattes. Abdomen déprimé, d'égale largeur. L. 3⁵/₅ mm.

Madhupur, Bengal, at light, x, 5 ♀ (*C. Paiva*); Calcutta, at light, vi, 1 ♀.

3. *P. abjuncta*, n. sp.

♀. Tête et thorax cendrés et glabres, scutellum jaune, metanotum d'un brun noir, balanciers blancs, abdomen jaunâtre, les 4 premiers tergites brun noir au milieu, antennes jaunes, les 5 derniers articles d'un brun sombre, pattes brunâtres, tibias intermédiaires et les 4 premiers articles de tous les tarses blanchâtres. Yeux séparés par une ligne. Antennes courtes, articles 3-9 subglobuleux, 10-14 ensemble à peine aussi longs que 2-9 réunis, cylindriques, chacun de moitié plus long que le 9^e. Thorax sans spinule. Ailes et nervures blanches, partie distale du radius un peu plus courte que la partie proximale, cellules radiales linéaires, la 1^e trois fois aussi longue que large, égale au tiers de la 2^e, cubitus arqué, deux fois plus rapproché de la pointe alaire que le rameau inférieur de la discoïdale, bifurcation de la discoïdale située sous la transversale, celle de la posticale un peu distale de la transversale, anale bifurquée près de la base. Tous les fémurs ont au tiers distal 3 petites spinules, fémur antérieur n'atteignant pas la hauteur du mesonotum, tibia postérieur un peu plus court que le fémur, presque double du métatarse, 4^e article de tous les tarses à peine plus long que gros, un peu plus court que le 3^e, 5^e plus long que 3 et 4 réunis, avec 1 ou 2 paires de spinules noires et cylindriques à sa base, crochets simples, égaux, égalant les $\frac{1}{3}$ de l'article. Abdomen déprimé. L. 2.5 mm.

Calcutta, 14-ix, at light (*C. Paiva*).

4. *P. disjuncta*, n. sp.

♀. Noir; tête, antennes sauf les 5 derniers articles et pattes sauf les hanches, d'un roux jaune, balanciers bruns, tiers proximal du tibia postérieur et tous les genoux noirs, tarses blanchâtres, 5^e article assombri. Yeux séparés par une ligne. Suçoir atteignant la moitié de la hauteur de la tête. Articles antennaires 3-9 deux fois aussi longs que gros, poils moins de deux fois aussi longs qu'un article, 10-14 ensemble deux fois aussi longs que 2-9 réunis, chacun 4 fois le 9^e, filiforme. Thorax plus haut que long, très convexe, luisant, glabre et densément ponctué, avec une spinule à peine distincte au bord antérieur. Ailes hyalines, les 3 premières nervures d'un brun noir, 1^e cellule radiale élargie au milieu, 2-3 fois aussi longue que large, ayant le tiers de la 2^e, qui atteint le quart distal de l'aile et est à peine plus près de la pointe alaire que le rameau inférieur de la discoïdale, celle-ci bifurquée sous la transversale, bifurcation de la posticale un peu proximale de la transversale, anale bifurquée. Fémur antérieur deux fois aussi gros que le tibia, sinueux dorsalement, n'atteignant pas la surface du mesonotum, avec 2 très petites spinules près du bout distal, tibia de $\frac{2}{3}$ plus long que le métatarse, celui-ci plus long que les 3 articles suivants réunis, 4^e un peu plus court que le 3^e, aussi gros que long,

5^e plus long que 3 et 4 réunis, avec 4 paires de spinules cylindriques, crochets grands, atteignant les trois quarts de l'article, chacun avec une dent basale au côté externe; fémur intermédiaire inerme; pattes postérieures un peu plus longues que les 4 antérieures, fémur grossi graduellement et faiblement par en haut, avec 2-3 minimes spinules près du bout distal, tibia un peu plus long que le métatarse, celui-ci au moins égal aux 4 suivants réunis; aux 4 tarses postérieurs, les 3 derniers articles sont conformés comme aux antérieurs crochets inégaux, le grand a une dent basale, le petit est bifide et ne dépasse pas le tiers du grand. Abdomen brillant et subspatuliforme. L. 3.5 mm.

Bhogaon, Purneah District, N. Bengal, x, 3 ♀ (C. Paiva).

5. *P. disticta*, Kieff.

L'abdomen de cette espèce est parfois jaunâtre, prumineux de gris. Dum Dum, near Calcutta, 28-vii (B. Lord); Madhupur, Bengal, x, at light, 7 ♀; Calcutta, 3-ix, at light (C. Paiva); Khustea, Bengal, x (Jenkins); Jalpaiguri, N. Bengal, ix, at light; Allahabad, United Provinces, viii (B. Lord); Chennai, 24 Perghs., Sunderbunds, xi, at light on board launch (Jenkins); Bhogaon, Purneah District, 2-x (C. Paiva).

6. *P. interrupta*, Kieff.

Calcutta, 13-ix (N. Annandale).

11^e Genre. *Haasiella*, n. g.

♀. Ce genre, dédié au Rév. P. A. Haas, professeur à Trichinopoly, est voisin de *Calyptopogon*, dont il diffère surtout par le thorax tronqué en avant et non prolongé au-dessus de la tête. Ailes très longues, pointues à l'extrémité; radius non relié au cubitus par une transversale; sous-costale confondue avec la costale dans sa moitié distale, radius indistinct, confondu avec la costale, pas deux fois aussi long que la transversale. Antennes de 14 articles, sans verticille. Le type est:

H. semiflava, n. sp.

♀. Jaune, glabre et brillant; flagellum, abdomen et 5^e article tarsal noirs et mats. Yeux glabres, arqués, largement séparés au vertex. Suçoir aussi long que les joues. Dernier article des palpes court. Articles antennaires 2-9 de moitié plus longs que gros, à soies courtes, plus courtes qu'un article, denses, appliquées et raides, presque spinuliformes, articles 10-14 plus minces, cylindriques, chacun trois fois aussi long que le 9^e, ensemble plus longs que 2-9, poils épars et peu longs. Thorax presque deux fois aussi long que haut, presque plan dorsalement. Ailes beaucoup plus longues que le corps, paraissant glabres à la loupe,

pointues, sous costale et radius confondus avec la costale, cubitus arqué, rapproché du bord, dépassé par la costale qui atteint la pointe alaire, celle-ci également distante du cubitus et du rameau antérieur de la discoïdale, bifurcation de la discoïdale proximale de la transversale, celle de la posticale est proximale de la transversale de trois fois la longueur de celle-ci, anale avec un vestige de bifurcation au tiers basal. Fémurs non grossis, subcylindriques, pattes antérieures les plus courtes, pattes postérieures plus longues que les 4 antérieures, tibias aussi longs que les fémurs et à peine moins gros, l'antérieur presque double du métatarse, tibia postérieur cilié, de moitié plus long que le métatarse, celui-ci plus long que les 4 articles suivants réunis, 2° article plus long que 3 et 4 réunis, 3° triple du 4°, celui-ci aussi gros que long, tronqué obliquement à l'extrémité et prolongé ventralement, 5° article à peine plus court que le 3°, avec 3 paires de spinules cylindriques et noires, les deux premiers articles avec des soies bulbeuses; crochets tarsaux égaux, petits, chacun avec une dent basale au côté externe, qui atteint le quart de sa longueur; les articles tarsaux et les crochets sont conformés aux 4 pattes antérieures comme aux pattes postérieures, sauf que le 5° article est inerme. Abdomen faiblement déprimé, à peine aminci en arrière. L. 3.5 mm.

Tinpahar, near Rajmahal, Bengal, 7-vii-1909, 1 ♀ (N. Anandale).

12° Genre. *Dibezzia*, Kieff.

Ce genre ne diffère de *Bezzia* que par la forme de l'abdomen.

D. pictipennis, n. sp.

♀. Tête et pattes d'un jaune roussâtre, antennes et tarses blanchâtres, palpes, extrémité des 5 articles du tarse postérieur noire, thorax roux et brillant, metanotum brun, balanciers blancs, abdomen noir et brillant. Yeux glabres, très amincis au vertex, où ils se touchent à peine. Trompe égalant le quart de la hauteur de la tête. Articles 2° et 4° des palpes longs. Articles antennaires 3-9 cylindriques, au moins 2 fois aussi longs que gros, verticilles très longs, mesurant 3-4 fois la longueur d'un article, 10-14 ensemble à peine plus longs que 2-9 réunis, cylindriques, à poils ayant la longueur d'un article, 10° et 11° chacun deux fois aussi long que le 9°, chacun des 3 suivants plus long que le 11°. Thorax aussi long que haut, convexe, mesonotum avec une minime spinule au milieu du bord antérieur. Ailes blanchâtres et ponctuées, avec 2 bandes transversales brun noir, la plus large occupe un peu plus du tiers proximal du cubitus, l'autre le cinquième distal du cubitus; en outre entre le milieu de la tige de la posticale et le bord inférieur se trouve une grande tache noirâtre; cubitus 4 fois plus long que le radius, arqué, aboutissant près de la pointe alaire. Fémurs et 5° article des tarses inermes, sauf 2 minimes spinules au tiers distal des fémurs antérieurs; aux 4 pattes antérieures le fémur n'est pas grossi, le tibia égal au

tarse, un peu plus de deux fois le métatarse, 2^e article égal aux 3^e et 4^e réunis, ceux-ci à peine plus longs que gros, le 4^e prolongé ventralement à l'extrémité distale, 5^e un peu plus long que le 2^e, crochets inégaux, le grand atteint les trois quarts de l'article, 3-4 fois aussi long que le petit, chacun avec une petite proéminence basale; pattes intermédiaires un peu plus longues que les antérieures, leur métatarse un peu plus long que la moitié du tibia, plus long que les 4 articles suivants réunis, à poils bulbeux ventralement, le reste comme aux antérieures; pattes postérieures à fémur renflé au tiers distal et notablement plus long que les intermédiaires, tibia aussi long que le fémur, deux fois aussi gros que le tarse, celui-ci filiforme et plus de deux fois aussi long que le tibia, métatarse à soies bulbeuses, d'un tiers plus long que le 2^e article, 3^e et 4^e presque égaux, chacun 8-10 fois aussi long que gros, 5^e un peu plus long que le 4^e, crochets simples et inégaux, le grand arqué en faucille, égalant presque la longueur de l'article tarsal, trois fois aussi grand que le grand crochet des 4 pattes antérieures petit crochet égal au quart du grand. Abdomen lisse, 1^{er} segment en forme de pétiote, cylindrique, un peu plus long que gros, 2^e graduellement élargi, un peu plus long que le 1^{er}, 3-5 larges, 6^e et 7 graduellement amincis. L. 3.5 mm.

Shasthancottah, 12 miles N. N. E. of Quilon, Travancore, 8-xi-1908 (N. Annandale).

13^e Genre. *Bezzia*, Kieff.

- | | |
|--|----|
| 1. Tous les fémurs inermes (Sous-Genre <i>Probezzia</i> , Kieff.) | 2. |
| — Fémurs au moins en partie armés de spinules (<i>Bezzia</i>). 11. <i>B. kempi</i> , n. sp. | |
| 2. Article 5 ^e des tarses avec plusieurs paires de spinules noires et cylindriques, crochets tarsaux très longs, avec une dent basale, yeux confluent | 3. |
| — Article 5 ^e des tarses inerme, crochets petits et simples | 7. |
| 3. Cubitus de moitié plus long que le radius 1. <i>B. (P.) nigricans</i> , Kieff. | |
| — Cubitus au minimum deux fois aussi long que le radius | 4 |
| 4. Pattes rousses, les 2 postérieures noires en partie 2. <i>B. (P.) allotropica</i> , n. sp. | |
| — Pattes noires ou d'un brun noir, tarses blancs en majeure partie | 5. |
| 5. Tibia antérieur droit 3. <i>B. (P.) hamifera</i> , n. sp. | |
| — Tibia antérieur faiblement arqué au tiers distal | 6. |
| 6. Ailes blanches 5. <i>B. (P.) albipennis</i> , Kieff. | |
| — Ailes hyalines 4. <i>B. (P.) hamifera</i> var. <i>arcuatipes</i> , nov. | |

7. Cubitus, au maximum, de moitié plus long que le radius 8.
 — Cubitus plus de deux fois aussi long que le radius 9.
 8. Article 5^e des tarsi de la femelle avec plusieurs paires de spiracles noirs, inerme chez le mâle 1. *B. (P.) nigricans*, Kieff.
 — Articles 5^e des tarsi de la femelle inerme, mâle inconnu 6. *B. (P.) calcuttensis*, n. sp.
 9. Yeux confluent, pattes jaunes sauf les hanches 7. *B. (P.) eucera*, Kieff.
 — Yeux séparés par une ligne au vertex 10.
 10. Abdomen noir, segment anal roux, antennes d'un jaune clair.
 8. *B. (P.) gracilipes*, Kieff. var. *analis*, nov.
 — Abdomen roux ou jaune, antennes brunes ou noires 11.
 11. Roux marron, yeux à peine séparés au vertex 9. *B. (P.) gracilipes* var. *bengalensis*, nov.
 — Jaune grisâtre, yeux séparés par une ligne assez large.
 10. *B. (P.) gracilipes* var. *flavescens*, nov.

1. *B. (P.) nigricans*, Kieff.

♂. On ne connaissait de cette espèce que la femelle, à laquelle j'ai assigné comme caractère: "cubitus de moitié plus long que le radius."¹ Plus tard, dans une remarque,² j'ai écrit de cette espèce, que "le cubitus est 2½ fois aussi long que le radius et non pas de moitié." C'est par erreur que j'ai corrigé la première indication, qui était exacte.

Le mâle de cette espèce est noir mat comme la femelle; antennes brunâtres, les 4 derniers articles noirs, balanciers blancs, hanches et pattes brunâtres, les tarsi blanc brunâtre, le 5^e article noir. Articles antennaires 3-10 subglobuleux, 11-14 cylindriques, chacun 3-4 fois aussi long que le 10^e, panache blanchâtre. Radius dépassant le milieu de l'aile, cubitus seulement de moitié plus long que le radius, plus près de la pointe alaire que le rameau supérieur de la discoidale. Pattes inermes, différant de celles de la femelle par le 5^e article tarsal qui est inerme, et par les crochets tarsaux qui sont simples et petits. L. 1.8 mm.
 Balighai, near Puri, Orissa Coast, 24-x (*N. Annandale*).

2. *B. (P.) allotropica*, n. sp.

♀. Noir, mat et glabre; balanciers blanchâtres, pattes sauf les hanches, d'un roux jaunâtre, 5^e article de tous les tarsi, fémur et moitié proximale du tibia des pattes postérieures, extré-

¹ Memoirs of the Indian Museum, 1910, vol. 2, p. 207.
² Records of the Indian Museum, 1911, vol. 6, p. 124.

mité des 4 premiers articles tarsaux et le 5^e article en entier brun noir, balanciers blanchâtres, scutellum quelquefois brun roux. Yeux confluent, front enfoncé et carré, face linéaire, en bosse. Articles antennaires 3-9 d'abord $1\frac{1}{2}$, puis plus de 2 fois aussi longs que gros, 10-14 de moitié plus longs que les 8 précédents réunis, chacun 2 à 3 fois aussi long que le 9^e, 5 à 6 fois aussi long que gros. Thorax inerme, à peine plus long que haut. Mesonotum luisant ou pruneux. Ailes hyalines, nervures pâles, cubitus 2 fois aussi long que le radius, atteignant le quart distal de l'aile, un peu plus rapproché de la pointe alaire que le rameau supérieur de la posticale, bifurcation de la discoïdale à peine proximale de la transversale, celle de la posticale un peu distale de la transversale, le rameau supérieur continue la direction de la tige. Fémurs inermes, l'antérieur droit, n'atteignant pas la hauteur du mesonotum, aussi long que le tibia, celui-ci plus de 2 fois le métatarse, pattes postérieures un peu plus longues que les 4 antérieures, leur fémur distinctement plus long que le tibia, celui-ci d'un tiers plus long que le métatarse, cilié en dehors, les 2 premiers articles du tarse à soies bulbeuses sur le dessous, métatarse égalant presque les 4 articles suivants réunis, 4^e article de tous les tarses un peu plus long que gros, cylindrique, non prolongé ventralement, 5 article un peu plus long que le 3^e et le 4^e réunis, armé de 4 5 paires de spinules noires et cylindriques, crochets tarsaux égaux, courbés en hameçon, atteignant les trois quarts de l'article, chacun avec une petite dent basale. Abdomen sublinéaire, long, parfois un peu rétréci à la base. L. 3-3 5 mm.

At light on board launch, Fraserganj, 24 Perghs., Sunderbunds, 12-xi, 23 ♀ et Basanti, 24 Perghs., Sunderbunds, 16-xi, 1 ♀ (*J. T. Jenkins*); at light on board launch, Bologhatta, near Khulna, Ganges Delta, 28-viii, 9 ♀ (*J. T. Jenkins*); at light on board launch, Bosondhur, Khulna District, 29 viii, 2 ♀ (*J. T. Jenkins*).

3. *B. (P.) hamifera*, n. sp.

♀. Noir, glabre; scape et palpes bruns, scutellum jaunâtre, balanciers blanc de lait, tarses blancs sauf le 5^e article et l'extrémité des 4 premiers. Yeux confluent. Articles antennaires 3-9 à peine 2 fois, puis 3 fois aussi longs que gros, cylindriques, verticilles un peu plus longs qu'un article, 10-14 ensemble un peu plus longs que 2-9 réunis, chacun $2\frac{1}{2}$ fois aussi long que le 9^e, cylindrique, à poils épars égalant la moitié de leur longueur. Thorax un peu plus haut que long, mat, pruneux de gris, sans spinule. Scutellum avec une ligne transversale de soies assez longues. Ailes et nervures blanchâtres, radius dépassant le milieu, cubitus deux fois aussi long que le radius, distant de sa moitié de la pointe alaire, bifurcation de la discoïdale un peu proximale de la transversale, rameau inférieur à peine plus près de la pointe alaire que le cubitus, bifurcation de la posticale un peu distale de la transversale. Fémurs inermes, non grossis, tibias et tarses à soies alignées en dehors, fémur antérieur droit, n'atteignant pas la hauteur du

mesonotum, tibia antérieur double du métatarse, celui-ci égal aux 4 suivants réunis, 5^e article de toutes les pattes égal aux 3^e et 4^e réunis, armé de 5 ou 6 paires de spinules obtuses et noires, crochets égaux, courbés en hameçon, égalant les $\frac{3}{4}$ de l'article, munis d'une dent basale très courte, qui n'atteint que le $\frac{1}{2}$ de leur longueur, métatarse postérieur dépassant un peu la moitié du tibia, égalant les 3 articles suivants réunis. Abdomen luisant, déprime. L. 2.8-3 mm.

Madhupur, Bengal, 15-x, 3 ♀, at light (C. Paiva); Balighai, near Puri, Orissa, 25-x, 2 ♀ (N. Annandale).

Remarque.—Cette espèce est voisine de *B. vaga* dont les crochets sont bifides, la petite dent atteint le tiers de la grande.

4. *B. (P.) hamifera* var. *arcuatipes*, nov.

♀. Noir mat; front, face et scape d'un roux brun, pattes brun noir avec les 4 premiers articles tarsaux blanchâtres ou pattes entièrement jaune brunâtre sauf le 5^e article tarsal, balanciers blanchâtres. Articles antennaires 3-9 cylindriques, de moitié plus longs que gros, 10-14 ensemble de moitié plus longs que 2-9, chacun double du 9^e, cylindrique. Ailes hyalines. Fémur antérieur faiblement sinueux au tiers distal, plus court que l'intermédiaire. Quant au reste, semblable au type. L. 2.5 mm.

Madhupur, Bengal, 14, 16, 18-x, at light (C. Paiva); Jalpaiguri, N. Bengal, at light in railway carriage, 10-ix (N. Annandale); Sara Ghat, E. Bengal, 11-ix (N. Annandale); Balighai, near Puri, Orissa, 24-x et 25-x, 6 ♀; Shencottah, Madras Frontier, E. side of W. Ghats, Travancore, 25-x; Quilon, Travancore Coast, 9-xi; Kulattupuzha, S.W. base of W. Ghats, Travancore, 19-xi; Noalpur, Nepal, 22-ii; Igatpuri, W. Ghats, Bombay Presidency, 20-xi (N. Annandale).

5. *B. (P.) albipennis*, Kieff.

♀. Abdomen parfois roussâtre. Articles antennaires 3-9 d'abord $1\frac{1}{2}$ plus 2 fois aussi longs que gros, 10-14 ensemble de moitié plus longs que le 9^e, chacun 5 fois aussi long que gros. Ailes blanches. Fémur antérieur atteignant la hauteur du mesonotum, peu distinctement sinueux au tiers distal. L. 1.8-2 mm.

Madhupur, Bengal, 16-x, 3 ♀ (C. Paiva); Sara Ghat, Ganges, E. Bengal, 11-ix (N. Annandale); Balighai, near Puri, Orissa, 25-x (N. Annandale).

6. *B. (P.) calcuttensis*, n. sp.

♀. Noir, mat, glabre; antennes et pattes brunes, tibias et tarsi blanchâtres, anneau médian et extrémité des tibias bruns. Articles antennaires 3-9 subarrondis, de moitié plus longs que gros, 10-14 ensemble à peine plus longs que 2-9 réunis, chacun double du 9^e, cylindrique, à longs poils épars. Ailes hyalines,

cubitus parallèle au radius et guère plus long que lui, dépassant peu le 2^e tiers alaire, bifurcation de la discoïdale située sous la transversale, celle de la posticale un peu distale de la transversale. Fémurs et 5^e article des tarsi inermes, métatarse postérieur un peu plus long que la moitié du tibia, égalant les 3 articles suivants réunis, 4^e à peine plus long que gros, tronqué obliquement, 5^e mince, égalant le 3^e et le 4^e réunis, crochets tarsaux simples et petits. L. 1.2 mm.

Calcutta, 13-ix (N. Annandale).

7. **B. (P.) eucera**, Kieff.

♀. Yeux confluent. Articles 10-14 des antennes presque 2 fois aussi longs que le 9^e. D'un brun noir, scape jaune, face et flagellum bruns, pattes jaunes sauf les hanches. L. 3 mm.

Trivandrum, Travancore, 14-xi (N. Annandale).

8. **B. (P.) gracilipes**, Kieff. var. *analis*, nov.

♀. Diffère du type par l'abdomen noir et mat, segment anal et lamelles d'un roux marron, antennes d'un jaune clair. Cubitus plus de 2 fois aussi long que le radius, plus rapproché de la pointe alaire que le rameau supérieur de la posticale. Pattes courtes, fémur postérieur ne dépassant pas la hauteur du scutellum. Abdomen gros, aussi large que le thorax, à peine 1½ fois aussi long que la tête et le thorax réunis. L. 2.5 mm.

Balighai, near Puri, Orissa, 24-x (N. Annandale).

9. **B. (P.) gracilipes**, Kieff. var. *bengalensis*, nov.

♀. D'un roux marron, abdomen plus sombre, flagellum brunâtre, pattes d'un jaune clair, 3 derniers articles tarsaux brun noir, balanciers blanchâtres. Yeux à peine séparés au vertex. Articles antennaires 3-9 cylindriques, d'abord un peu plus longs, puis 2 fois aussi longs que gros, 10-14 deux fois aussi longs que le 9^e. Ailes hyalines, cubitus 2½ fois aussi long que le radius, bifurcation de la discoïdale et de la posticale sous la transversale, rameau supérieur de la posticale beaucoup plus éloigné de la pointe alaire que le cubitus. Pattes longues, le fémur postérieur dépasse notablement la hauteur du scutellum. Abdomen linéaire, grêle, deux fois aussi long que le reste du corps. L. 3 mm.

Madhupur, Bengal, 16-x (C. Paiva).

10. **B. (P.) gracilipes**, Kieff. var. *flavescens*, nov.

♀. D'un jaune grisâtre et mat; scape et pattes un peu plus clairs. Yeux séparés au vertex par une ligne jaune assez large. Articles antennaires 3-9 plus longs que gros, à la fin 2 fois aussi longs que gros, à verticilles 4 fois aussi longs que leur grosseur, 10-14 cylindriques, ensemble un peu plus longs que 2-9 réunis, 10^e

de moitié plus long que le 9^e, 11-14 chacun 2 fois le 9^e. Thorax subglabre. Ailes hyalines, dépassant de beaucoup l'abdomen, nervures jaunâtres, radius dépassant le milieu, cubitus plus de 2 fois aussi long que le radius, plus près de la pointe alaire que le rameau inférieur de la posticale, bifurcation de la discoïdale et de la posticale sous la transversale. Fémurs et 5^e article des tarses inermes; pattes grêles, tibia postérieur cilié en dehors, métatarse postérieur égalant les 4 articles suivants réunis, 4^e article guère plus long que gros, tronqué obliquement, 5^e égal aux 3^e et 4^e réunis, crochets tarsaux simples et petits. L. 3 mm.

Madhupur, Bengal, 13-x (*C. Paiva*).

11. *B. kempi*, n. sp.

♀. Brun noir; articles antennaires 2-9 et bouche jaune brunâtre, base des tibias et large anneau avant leur extrémité, base des fémurs et tarses sauf le 5^e article, jaunâtres. Yeux confluent; palpes courts, articles 2^e et 3^e deux fois aussi longs que gros, les autres plus courts. Articles antennaires 2-9 ensemble à peine plus longs que 10-14, ellipsoïdaux, de moitié plus longs que gros, 10-14 cylindriques, deux fois aussi longs que gros. Ailes hyalines, fortement ponctuées, cubitus double du radius, dépassant le milieu de l'aile, distant de la pointe alaire de presque toute sa longueur, bifurcation de la discoïdale située sous la transversale, celle de la posticale un peu distale de la transversale. Fémur antérieur avec 4 spinules noires, tous les métatarses aussi longs que les 3 articles suivants réunis, 5^e article plus long et plus mince que le 4^e, au tarse postérieur les trois premiers articles ont des soies bulbeuses, crochets petits et simples. L. 1.5 mm.

Puri, Orissa Coast, 13-xi (*S. W. Kemp*).

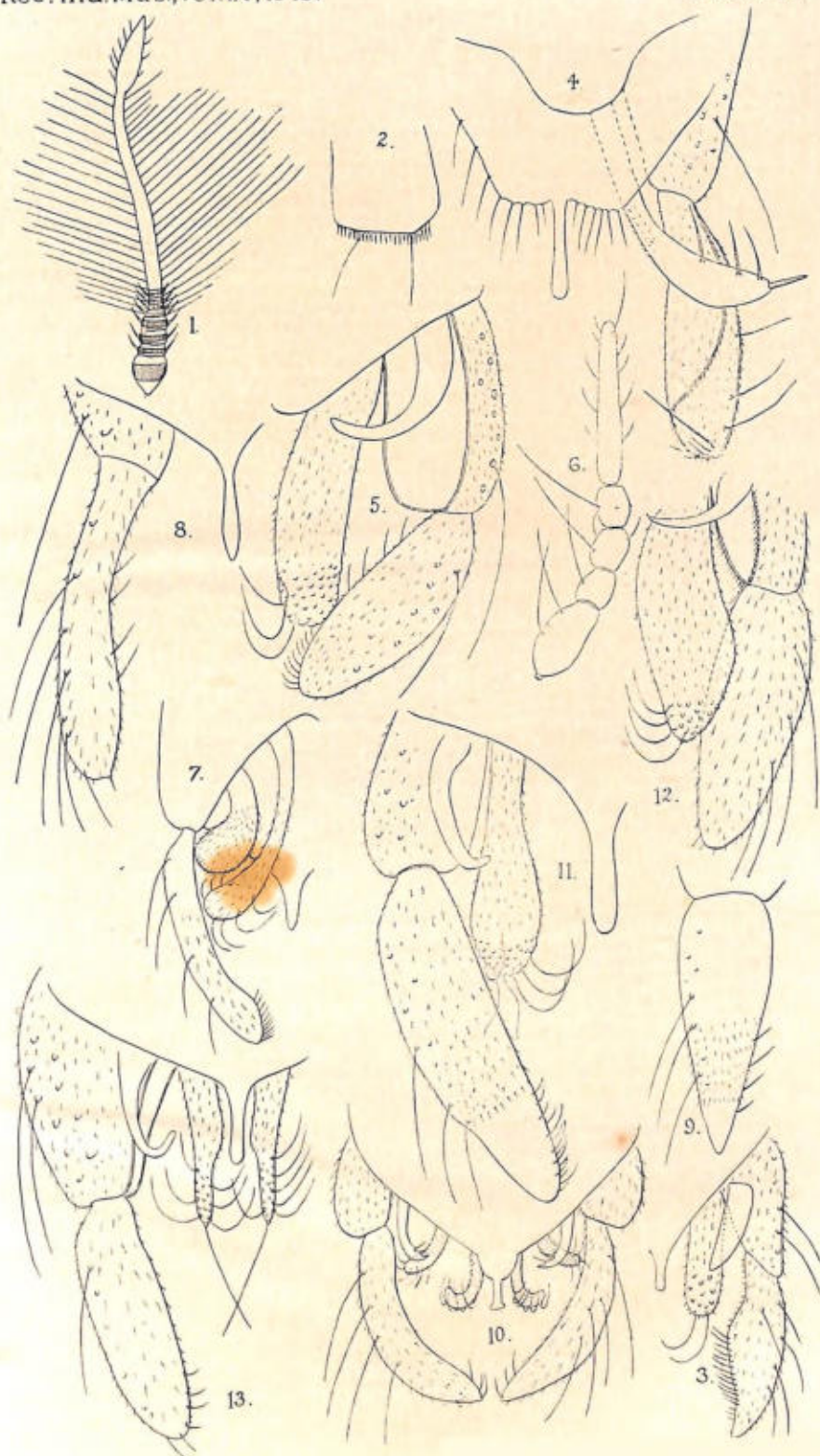
REMARQUE.—J'ai examiné les deux sexes de *Belgica antarctica*, Jacobs, recueillis par Gain, au cours de l'expédition du Pourquoi-Pas. Ces insectes ont les yeux velus et les tibias postérieurs munis d'un peigne comme chez *Orthocladius*; ils appartiennent donc au groupe des *Orthocladiariae* et non pas à celui des *Clunionariae*.

Tendipes verrucosus, Kieff., dont il est fait mention à la page 140 de ce travail, revient au genre *Glyptotendipes*, Kieff., dont le type est *G. sigillatus*, Kieff. de France et dont les caractères sont: Tergites 2-6 ou 2-7 ayant au bord antérieur une verrue ellipsoïdale ou allongée et diversement conformée; pour le reste, semblable à *Tendipes*.

Tanytarsus tenuis, Kieff. (*Bull. Soc. Metz*, 1911, vol. 27, p. 54) est une espèce nouvelle que je nomme *T. Hydra*, n. sp.

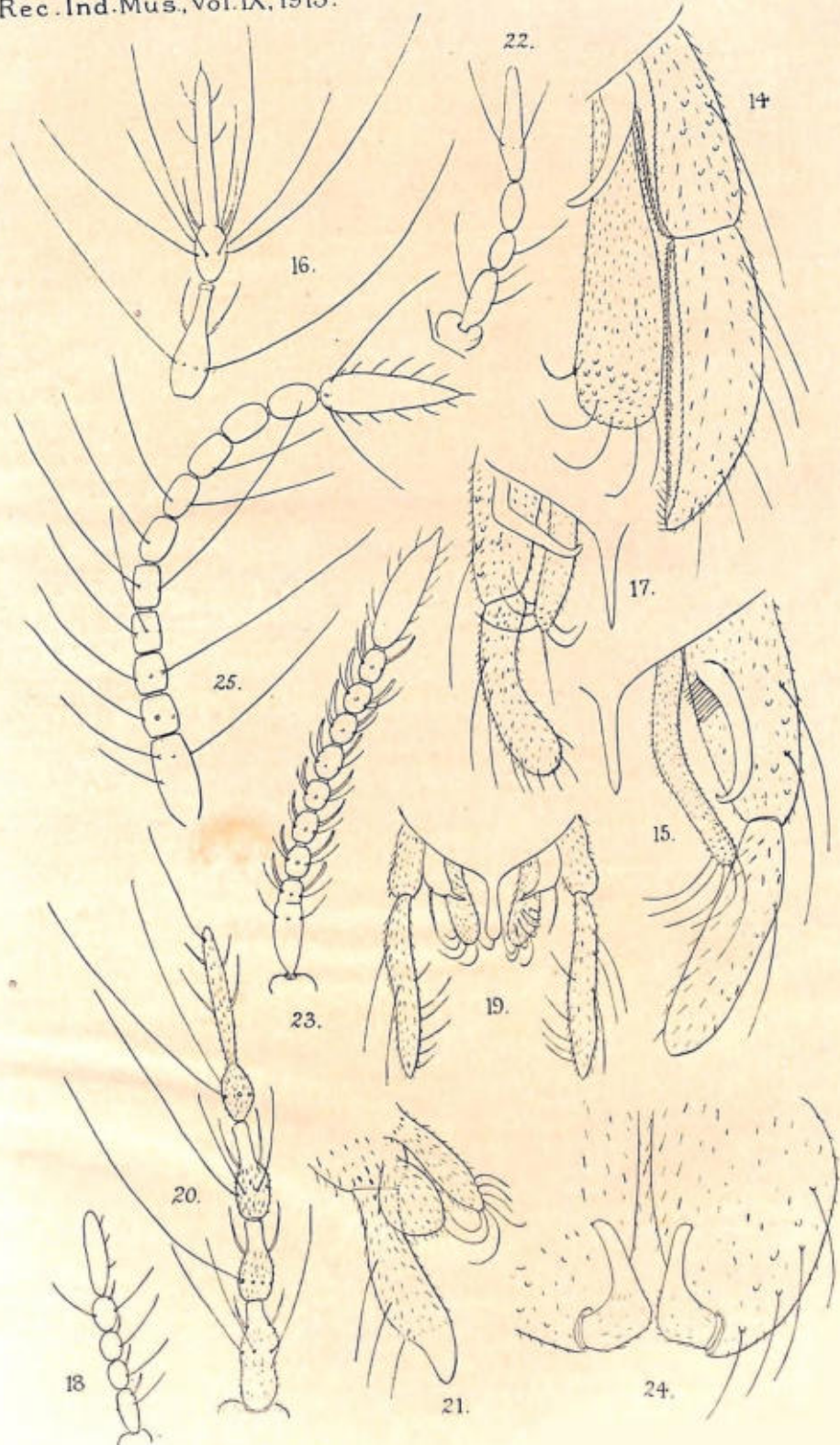
EXPLICATION DE LA PLANCHE XI.

- FIG. 1.—Antenne de *Baeotendipes brevicornis* ♂.
,, 2.—Peigne du tibia intermédiaire du même.
,, 3.—Moitié de la pince du même (♂).
,, 4.—Moitié de la pince de *Tendipes longipalpis*.
,, 5.—Pince de *Tendipes nitidus*.
,, 6.—Antenne de *Tendipes heterocerus* ♀.
,, 7.—Pince de *Tendipes tenuiforceps*.
,, 8.—Moitié de la pince de *Tendipes atrophus*.
,, 9.—Article terminal de la forcipule de *Tendipes coniger*.
,, 10.—Pince de *Tendipes punctatissimus*.
,, 11.—Pince de *Tendipes verrucosus*.
,, 12.—Moitié de la pince de *Tendipes calligaster*.
,, 13.—Pince de *Tendipes seminiger*.



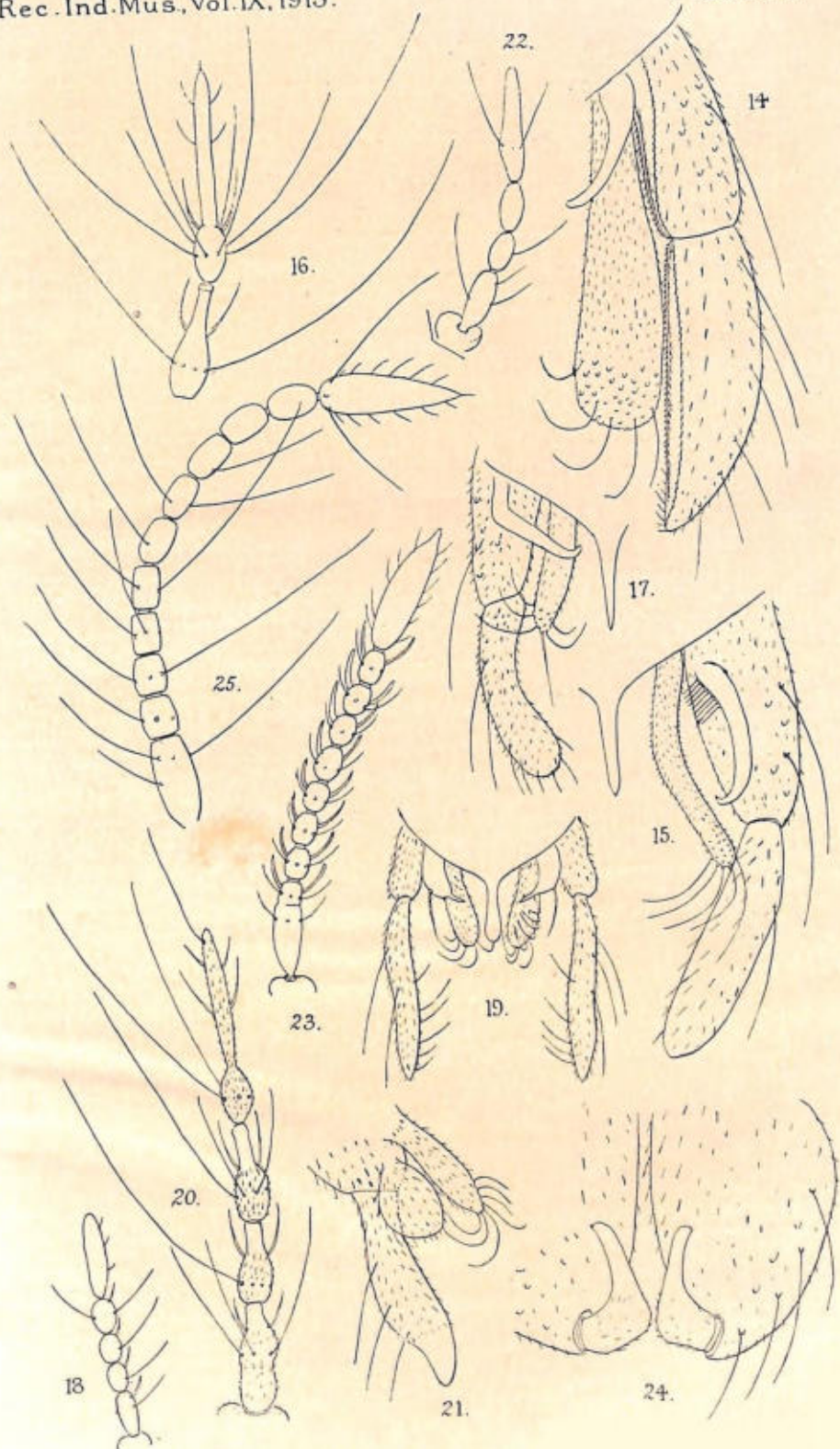
EXPLICATION DE LA PLANCHE XII.

- FIG. 14.—Moitié de la pince de *Tendipes psilochirus*.
,, 15.—Moitié de la pince de *Tendipes dolichogaster*.
,, 16.—Deux derniers articles antennaires de *Paratendipes pelargus* ♀.
,, 17.—Moitié de la pince de *Paratendipes dolens*.
,, 18.—Antenne de *Polypedilum kempfi* ♀.
,, 19.—Pince de *Polypedilum angustiforceps*.
,, 20.—Antenne de *Polypedilum brumalis* ♀.
,, 21.—Moitié de la pince de *Polypedilum annulatipes*.
,, 22.—Antenne de *Tanytarsus pentatomus* ♀.
,, 23.—Antenne de *Procladius inconspicuus* ♀.
,, 24.—Pince de *Clinotanytus ornatissimus*.
,, 25.—Antenne de *Pelopia macrochaeta* ♀



EXPLICATION DE LA PLANCHE XII.

- FIG. 14.—Moitié de la pince de *Tendipes psilochirus*.
,, 15.—Moitié de la pince de *Tendipes dolichogaster*.
,, 16.—Deux derniers articles antennaires de *Paratendipes pelargus* ♀.
,, 17.—Moitié de la pince de *Paratendipes dolens*.
,, 18.—Antenne de *Polypedilum kempfi* ♀.
,, 19.—Pince de *Polypedilum angustiforceps*.
,, 20.—Antenne de *Polypedilum brumalis* ♀.
,, 21.—Moitié de la pince de *Polypedilum annulatipes*.
,, 22.—Antenne de *Tanytarsus pentatomus* ♀.
,, 23.—Antenne de *Procladius inconspicuus* ♀.
,, 24.—Pince de *Clinotanypus ornatissimus*.
,, 25.—Antenne de *Pelopia macrochaeta* ♀



IX. DESCRIPTION DE QUELQUES NOUVELLES CÉCIDOMYIES DES INDES.

Par J. J. KIEFFER, Dr. Phil., Professeur (Bitsch).

Trichoperrisia pipericola, n. g. et n. sp.

Cet insecte a été obtenu de galles foliaires de *Piper nigrum*; les sept exemplaires qui m'ont été envoyés, étaient tous des mâles. La nymphe et la larve me sont demeurées inconnues.

♂. D'un jaune vitellin; flagellum brun. Palpes de quatre articles. Yeux confluent au vertex. Antennes de 18 articles; les deux premiers articles du flagellum sont soudés, les suivants à peine plus longs que gros, à col gros, pas plus long que gros; poils verticillés couvrant presque toute la surface, ceux du milieu des articles sont au côté *ventral* arqués à la base et deux fois aussi longs que ceux de la partie *dorsale*; deux verticilles de filets arqués et appliqués comme chez *Dasyneura*. Bord antérieur de l'aile sans poils mais avec des écailles appliquées et noires; cubitus droit, aboutissant à peine avant la pointe alaire, rameau distal de la posticale relevé à sa base. Tibias et tarsi non poilus mais couverts d'écailles fusiformes, striées en long et en travers, noires et appliquées; crochets tarsaux bifides, un peu plus longs que l'empodium. Abdomen *poilu* comme le thorax, *dépouillé d'écailles*, caractère par lequel cet insecte diffère des *Dasyneura*. Article terminal des forcipules assez grêle, glabre, sauf quelques courtes soies, ongle gros et conique; les deux lamelles profondément bilobées, un peu plus courtes que les appendices ventraux avec le stylet. L. 1.8-2 mm.

Ceylon: Peradenya.

Oribremia multifida, n. g. et n. sp.

♂. D'un jaune brunâtre, flagellum brun. Palpes de quatre articles. Yeux confluent au vertex. Antennes de quatorze articles, dont les deux premiers du flagellum sont connés, les suivants se composent d'une nodosité basale subglobuleuse et d'une nodosité distale allongée; la nodosité basale est ornée d'un verticille de filets arqués, dont les boucles sont d'un tiers plus courtes que le verticille de poils, col de moitié plus long que la nodosité; la nodosité distale est fortement rétrécie au-dessous du milieu, composée ainsi d'un noeud basal subglobuleux avec un verticille de filets arqués et un de poils qui est plus long, et d'un noeud distal en ellipse, orné de trois verticilles, à savoir un verticille de filets arqués qui atteint la base de l'article suivant, un verticille

de poils un peu plus long et situé un peu plus bas, enfin un verticille situé eu-dessous du milieu et composé de longs poils courbés par en bas dès leur origine, incurvés à leur partie distale et formant ainsi un arc ouvert par en haut, col presque aussi long que la nodosité; le dernier article est terminé par un long stylet pubescent. Ailes poilues; cubitus arqué, aboutissant un peu en arrière de la pointe alaire, rameau distal de la posticale continuant presque la direction du pétiole, le rameau proximal formant presque un angle droit avec le pétiole. Pattes poilues, sans écailles; crochets des tarsi antérieurs bifides, courbés presque à angle droit, empodium rudimentaire. Article terminal des forcipules gros, seulement deux fois aussi long que gros, convexe en dehors, presque droit au côté médian, ongle noir; lamelle supérieure divisée par une incision aiguë, en deux lobes subtriangulaires; lamelle inférieure pas plus longue que la supérieure, étroite et arrondie à l'extrémité; stylet chitineux, arqué fortement, divisé dès sa base, en deux branches qui se divisent elles-mêmes chacune en un rameau dressé verticalement et graduellement aminci, et en un rameau distal arqué et bifurqué en deux pièces subfiliformes dont la proximale est plus longue et courbée en arrière à l'extrémité, tandis que la distale a l'extrémité courbée en avant et à angle droit. L. 2. mm.

Capturé par A. D. Imms, à une altitude de 5700 pieds, près de Bhowali, Kumaon (Himalaya). Ce genre est voisin de *Bremia* et diffère de tous les *Diplosariae* par la forme de la pince.

Epidosis indicus, n. sp.

♂. Jaunâtre; nodosités du flagellum brunâtres, pattes brunes, les deux derniers articles tarsaux et l'extrémité du précédent sont blancs, dessus de l'abdomen avec des bandes transversales noires. Palpes de quatre articles. Antennes de quinze articles, dont ceux du flagellum sont subcylindriques, presque deux fois aussi longs que gros, le premier non conné avec le second; col presque deux fois aussi long que l'article; trois verticilles de poils dont l'inférieur est court et oblique, l'intermédiaire, qui est situé au milieu, est très long et étalé à angle droit, le supérieur long et parallèle au grand axe de l'article. Cubitus conformé comme d'ordinaire dans ce genre, sa partie distale fortement arquée, aboutissant en arrière de la pointe alaire. Crochets bifides, peu arqués, longs, dépassant un peu l'empodium. Article terminal des forcipules en forme de massue pubescente et avec quelques poils longs; ongle glabre, en forme de lamelle transversale et transparente; les deux lamelles de la pince sont profondément bilobées, les lobes arrondis au bout; sur le dessous se voient deux tiges filiformes, brunes, courbées en crochet à l'extrémité. L. 3 mm.

Kalighat, à une altitude de 6000 pieds.

X. DESCRIPTION D'UN NOUVEAU MYMARIDE DES INDES ORIENTALES.

Par J. J. KIEFFER (*Bitsch*).

L'insecte décrit dans les lignes suivantes provient de Puri, côte d'Orissa, où il a été recueilli sur le carreau d'une fenêtre, le 13 Novembre 1910, par S. W. Kemp.

Gonatocerus longicrus, n. sp

♀. Brun; vertex, hanches, pattes angles postérieurs du pronotum, mesonotum sauf la moitié antérieure du lobe médian et l'extrémité antérieure des lobes latéraux, scutellum sauf le bord antérieur qui longe le mesonotum, pétiole, moitié antérieure de l'abdomen et segment anal jaunes. Tête beaucoup plus large que le thorax, un peu transversale. Vertex quadrangulaire, bordé latéralement par une arête qui le sépare de l'oeil. Yeux glabres. Ocelles en triangle, plus éloignés des yeux que l'un de l'autre. Joues faiblement striées, ayant la moitié de la longueur des yeux. Bouche petite. Entre chaque oeil et le vertex se trouvent deux fortes soies. Antennes insérées plus près des yeux que l'une de l'autre, composées de 11 articles, dont le 9^e et le 10^e sont parcourus par deux arêtes sensoriels, les 2 premiers grossis, le scape de moitié plus long que le pédicule, celui-ci obconique et de moitié plus long que gros; les 6 suivants d'égale grosseur et d'égale longueur, le 1^{er} en cône renversé, les suivants cylindriques, deux fois aussi longs que gros, 9^e et 10^e à peine plus longs que les précédents mais grossis, de moitié plus longs que gros, 11^e un peu plus gros que le 10^e et quatre fois aussi long, pointu à l'extrémité. Thorax deux fois aussi long que large; des soies grosses et peu longues se répartissent une à chaque angle postérieur du pronotum, une à l'angle postérieur de chaque lobe latéral du mesonotum et une de chaque côté en avant du lobe médian; le scutellum, le metanotum et le segment médian en sont dépourvus. Pronotum fortement découpé au milieu postérieurement, ses lobes s'arrêtent peu avant les écailles. Mesonotum triangulaire, un peu transversal, trois fois aussi long que le pronotum; sillons parapsidaux percurrents, très divergents en avant. Scutellum transversal, atteignant les $\frac{2}{3}$ du mesonotum. Segment médian aussi long que le mesonotum. Aile antérieure graduellement amincie proximale-ment, arrondie à l'extrémité, avec des soies denses et petites, les cils ne dépassent guère en longueur le tiers de la plus grande largeur de l'aile. Aile postérieure linéaire, amincie à l'extrémité, 20 fois aussi longue que large, munie d'un pétiole ayant le tiers de

sa longueur, cils du bord supérieur à peine 2 fois aussi longs que sa largeur, cils du bord inférieur 5-6 fois aussi longs que sa largeur. Les 4 hanches postérieures se touchent; trochanters distinctement biarticulés; tous les fémurs renflés en massue, moins gros distalement, deux fois aussi gros que les tibias, l'antérieur un peu plus court que le tibia, les 4 postérieurs dépassant à peine la moitié du tibia; éperon antérieur bilobé, métatarse antérieur avec un peigne; tarsi de 5 articles subégaux, métatarse postérieur dépassant peu la longueur de l'éperon du tibia. Pétiole un peu transversal; les tergites suivants portent de chaque côté 3 soies, au tergite anal les 2 soies externes des deux rangées sont 3-4 fois aussi longues que les autres. Tarière sortant de la base du 2^e tergite et ne dépassant pas l'abdomen. L. 0.9 mm.

XI. THE ANTHRIBIDAE IN THE INDIAN MUSEUM.

By K. JORDAN, *Ph.D.*

The Anthribidae of continental India are but little known. The majority of the species of this family being of small size and, as a rule, of a cryptic colouration, it requires some skill and experience in order to be successful in collecting these beetles. The number of species described from the Malayan Islands is much larger than that of forms known from India. Fewer Anthribidae have been recorded from continental India inclusive of Burma and Tenasserim than from Perak, for instance. The superiority in Anthribidae of the Malayan countries over India is, I think, more apparent, however, than real, being mainly due to the better exploration by experienced collectors of the Malay Peninsula and the Sunda Islands.

As many of the Indian species are of large or medium size, we may safely assume that the species recorded fall far short in number of the species actually existing, especially in the case of small forms. Although the family is very poorly represented in the Palaearctic Region and therefore cannot be expected to occur in abundance at the higher altitudes in the Himalayas, the foot-hills and plains undoubtedly harbour a much larger number than have as yet been found. There are a few dozen of still undescribed Indian Anthribidae in the British Museum, particularly in the Fry collection, which contains a first set of the Coleoptera collected by W. Doherty in Assam and Burma. But even with these included the total remains excessively small.

Besides the forms here enumerated the Indian Museum contains nine species which are only represented by unique specimens (some badly preserved) and which, for various reasons, cannot be identified or described at present.

The types of the new forms, if not otherwise stated, are in the Indian Museum.

Eugigas, Thoms. (1857).

The buccal plate (or labiophore) bears a large median tooth.

1. *Eugigas goliathus*, Thoms. (1857).

Eugigas goliathus, Thoms., Arch. Ent. 1, p. 436, t. 17, fig. 2, ♀ (1857) (Java).

One ♂ from Sinkip Is., off Sumatra (*Moti Ram*).

Meganthribus, Jord. (1913).

Labiophore without median tooth, and tarsal claws simple.
Both this and the preceding genus are purely Oriental.

2. **Meganthribus sulphureus**, Waterh. (1876).

Mecocerus sulphureus, Waterh., Trans. Ent. Soc. Lond. p. 24 (1876)
(Andamans; "Cambodia" *alia spec.*).

A series from the Andamans.

3. **Meganthribus harmandi tessellatus**, Jord. (1895).

Eugigas tessellatus, Jord., Stett. Ent. Zeit. p. 369 no. 2 (1895)
(Assam; Calcutta; Darjiling).
Sikkim.

Mecocerus, Schönh. (1833).

Restricted to the tropics of Africa and Asia; not known from the Malagassic and Papuan subregions, Sumbawa being the most eastern point from which *Mecocerus* has been received and South India the most western.

Some of the species are apparently very common.

4. **Mecocerus allectus elegans**, Jord. (1906).

Mecocerus allectus elegans, Jord., Nov. Zool. p. 408, no. 1 (1906)
(South India).

Malabar.

5. **Mecocerus allectus maculatus**, Jord. (1884).

Mecocerus allectus ab. *maculatus*, Jord., *l.c.* p. 599 sub no. 11
(1894) (Burma).

Tavoy; Thingannyinaung to Sukli, Dawna Hills, 900—2000 ft., 23—27-xi-1911 (*F. H. Gravely*).

6. **Mecocerus gazella guttatus**, Jord. (1894).

Mecocerus gazella ab. *guttatus*, Jord., *l.c.* p. 598 sub no. 9 (1894)
(Perak; Sumatra; Bunguran).

Johore, Mal. Pen., and Sinkip Is., off Sumatra (*Moti Ram*).

7. **Mecocerus asmenus**, sp. nov.

♂ ♀. *Niger, olivaceo-tomentosus, luteo-ochraceo et nigro signatus, fronte carinata, spinis pectoris (♂) furcatis.*

One ♂ from Cachar (*J. Wood-Mason*); a ♀ from Sadiya, North-East Assam (*W. Doherty*) in the British Museum from the Fry collection.

The buff-ochraceous and black markings are prominent and well defined. The rostrum bears a buff-ochraceous median stripe

which is continued by two stripes on the head; a short streak below the eye, a stripe on the upperside of the first and second segments of the σ -antenna and the entire segments 7 and 8 of the ♀ -antenna of the same colour (segments 6—11 of the antenna missing in the σ). The two stripes of the head are continued over the thorax in an oblique direction and each is divided in the middle of the thorax into two stripes, between which there are two velvety black spots, one a short distance in front of and the other behind the carina; a third black spot at the outer side of the undivided apical portion of the stripe, and a vestige of a fourth coupled with a small buff-ochraceous dot laterally behind the middle. The four buff-ochraceous stripes of the basal half of the pronotum are continued on to the elytra, the lateral ones turning laterad behind the humeral callosities, and the central ones terminating on a level with the former. The alternate interspaces of the elytra are conspicuously chequered with buff-ochraceous and black, there being a round spot on the feebly convex subbasal callosity and another between stripes 1 and 5 in the centre both being much larger than the other spots; interspaces 2, 4, 6 and 8 not spotted, and wider than 1, 3, 5, 7 and 9. Pygidium with a thin median stripe and a lateral one buff-ochraceous.

Underside with sharply marked buff ochraceous spots; the mesosternal process, a spot on the coxae, one on the fore- and midfemora and two on the hindfemur, a small basal ring and a larger median one on the tibiae, the first tarsal segment with the exception of its apex, and a spot on the fourth segment also buff-ochraceous

The prosternal groove of the σ deep, longer than broad; the spine, which stands at each side of it and is separated from the coxal cavity by a very narrow interspace, is divided at the apex into two short obtuse branches, which are almost horizontal, the anterior branch being longer than the posterior one. The velvety median patch of the metasternum (σ) is very large.

Physopterus, Lac. (1866).

For the synonymy etc. *cf.* Nov. Zool. 1913, p. 261.

8. *Physopterus agrestis*, Boh. (1833).

Phloeophilus agrestis, Boh., in Schönh., Gen. Curc. I, p. 157 (1833) (Bengal).

One ♀ from Calcutta (*J. Wood-Mason*).

This species is not represented in the collection of the Tring Museum.

Acorynus, Schönh. (1833).

This genus and the following one, although but very scantily represented in the Indian Museum, are excessively numerous in species. They appear to be less abundant, however, in Northern

India than in the Malayan subregion. The species of *Acorynus* may be recognized by the slender club of the antenna having the tenth segment short. There are still many undescribed species in collections.

9. *Acorynus striolatus*, Jord. (1894).

Acorynus striolatus, Jord., Nov. Zool. p. 618, no. 44 (1894) (Perak).

One ♂ from Perak ex Mus. Tring.

10. *Acorynus cylindricus*, Jord. (1894).

Acorynus cylindricus, Jord., l.c. p. 619, no. 46 (1894) (Perak).

One ♂ from Perak ex Mus. Tring.

11. *Acorynus passerinus*, Pasc. (1860).

Litocerus passerinus, Pasc., Ann. Mag. Nat. Hist. (3) 5, p. 45 (1860) (Borneo).

One ♀ from Peradeniya, Ceylon, 18-v-1910.

Litocerus, Schönh. (1833).

The tenth segment of the antenna is long. Judging from the material in the collections of the British and Tring Museums, *Litocerus* is more abundantly represented in continental India than *Acorynus*.

12. *Litocerus macrophthalmus luteus*, subsp. nov.

♂ ♀. *L. m. crucicollis similis*, sed pedibus pro maxima parte ut antenarum basi rufis, angulo prothoracis carinae minus rotundato.

Andamans, four ♂♂ and one ♀ in the Tring Museum and two ♂♂ in the Indian Museum; type at Tring.

The pronotum bears a clayish ochraceous cross, the stem of which is again dilated right and left into a spur in front of the carina. The clayish ochraceous sides of the pronotum bear two black spots. The angle of the carina is a little over 90° with the extreme tip slightly rounded off. The elytra are characterized by a round black spot on the subbasal callosities, and by the clayish ochraceous postmedian band being oblique from stripe 3 and produced forward in interspaces 2 and 3 to nearly the oblong sutural antemedian spot, which the projections often join. The band is not connected with the antemedian limbal spot. The sterna and abdomen are without brown spots. The antennae are rufescent brown, with the proximal segments, sometimes the whole shaft, pale rufous. The legs also are rufous, the centre of the femora, the apex of the tibiae and the first tarsal segment being usually more or less brownish.

13. *Litocerus paviei*, Lesne (1891).

Litocerus paviei, Lesne, Bull. Soc. Ent. Fr. p. 91 (1891) (Siam).

Kawkareik, Amherst district, Lower Burma, 19—20-xi-1911
(F. H. Gravely).

14. *Litocerus moestus andamanicus*, subsp. nov.

♂. *Elytrorum maculis luteis minus numerosis quam in L. m. moest.*

Andamans, two ♂♂ in the Tring Museum (type) and a discoloured ♀ in the Indian Museum.

The eighth segment of the ♂-antenna is as long as the tenth. The elytra bear each 12 to 14 spots, some of them being very minute, and an antemedian sutural spot, which is placed at the end of the scutellar stripe, occupies the sutural interspace and is as large as, or larger than, the postmedian spot placed across the fourth interspace.

15. *Litocerus khasianus*, Jord. (1903).

Litocerus khasianus, Jord., Nov. Zool., p. 424, no. 28 (1903) (Khasi Hills).

One ♂ from the Khasi Hills, Assam, ex Mus. Tring.

Straboscopus, Lac. (1866).

A few Indian and Malayan species are placed here which come so close in structure to *Nessiara* and *Apatenia*, particularly the former, that the generic distinctness is doubtful.

16. *Straboscopus riehli*, Lac. (1866).

Straboscopus riehli, Lac., Gen. Col. vii, p. 534 footnote (1866) (Ceylon).

Matale, Ceylon.

Sintor, Schönh. (1839).

An Indo-Malayan genus, of which several species are known from continental India (*S. biplaga*, Jord. (1903), *S. suturalis*, Jord. (1903), *S. andrewsi*, Jord. (1906)].

17. *Sintor biplaga*, Jord. (1903).

Sintor biplaga, Jord., Nov. Zool. p. 416, no. 7 (1903) (Khasi Hills).

One ♂ from Sikkim.

The species was described from a unique ♀. The ♂ from Sikkim differs in the pubescence of the light areas being less reddish, and, of course, in the longer antenna.

Habrissus, Pasc. (1859).

Recognized by the very thin antennae bearing long dispersed bristles, the rostrum being short and the eyes oblique.

18. Habrissus heros, Pasc. (1871).

Habrissus heros, Pasc. Ann. Mag. Nat. Hist. (4) 8, p. 359, pl. 14, fig. 5 (1871) (Labuan).

One ♂ from Sinkip Is., off Sumatra (*Moti Ram*).

Mecotropis, Lac. (1866).

Distributed from Ceylon to New Guinea. One species is known from Ceylon and South India, *M. bipunctatus*, Lac. (1866) and another from Assam, *M. vitticollis*, Jord. (1895). We add here two conspicuous new species, both from the Andamans.

19. Mecotropis xanthomelas, sp. nov.

♂ ♀. *Niger, fronte cum rostro sulcata, oculis intergris; vitta mediana ab occipite ad pronoti basin, extensa, maculis duabus magnis suturalibus sinuatis, atque fere tota prona facie fulvis. Long (cap. excl.) ♀ 20 mm., ♂ 13 mm.*

Andamans, one pair (type ♀) the ♂ much damaged. Also in the British Museum.

The species is in colouring unlike anything hitherto described. The legs and antennae have no grey or light-coloured pubescence. The upperside bears an orange-fulvous stripe from the occiput to the apex of the elytra. The stripe has two dots in the centre of the pronotum, one on each side of the median line, and is interrupted in the middle of the elytra. The proximal portion of the elytral stripe expands posteriorly to beyond the fourth line of punctures, is excised at the sides and somewhat rounded anteriorly, being half as wide in front as behind. The posterior portion of the stripe is as broad in front as the anterior portion is behind, the sides being excised down to the first line of punctures. Behind the sinus the patch widens out again about to the third line of punctures and then narrows almost gradually. A large lateral patch on the prosternum and the remainder of the under-surface with the exception of a broad median stripe is also orange-fulvous, the last ventral segment of the ♀, however, being black at the sides as well as in the centre.

The pronotum is strongly depressed posteriorly, particularly at the carina, the depression occupying posteriorly rather more than one-third of the surface.

20. Mecotropis ephippium, sp. nov.

♂ ♀. *Niger, fronte cum rostro sulcata, oculis integris; vitta mediana ab apice rostri ad apicem elytrorum extensa atque fere tota prona facie*

griseo-sulfureis, vitta in elytris latissima, pone medium ad striam punctorum primam usque excisa vel anguste interrupta. Long. (cap. excl.) ♂ 12 mm., ♀ 9-11 mm.

Andamans, two pairs; also in the British Museum.

The median groove of the rostrum is less broad than in *M. xanthomelas*. The apex of segments 3 and 4 of the ♂-antenna, the tip of segment 6 and the entire segments 7 and 8 of the ♀-antenna, a spot in the middle of the tibiae and a larger one at or near the base of the first tarsal segment greyish white, the femora and the greater part of the underside of the tibiae being grey. The tibiae and tarsi and segments 5-9 of the ♂-antenna are slightly rufescent. The median vitta of the pronotum is very little wider in the centre than at both ends, occupying about one-third of the surface of the pronotum. On the black sides of the pronotum there is a minute yellowish dot in one of the ♀♀. The two portions of the sutural vitta are rounded at the sides, expanding to the sixth interspace, the vitta having about the same width at the base of the elytra as at the base of the pronotum.

The centre of the prosternum and the entire last sternite appear grey instead of yellowish on account of being more thinly pubescent.

Xenocerus, Schönh. (1833).

A very prominent genus of the Oriental Region, to which it is restricted. The species, which are very numerous, are easily recognized as belonging here by the structure of the rostrum and head.

21. **Xenocerus andamanensis**, Jord. (1894).

Xenocerus andamanensis, Jord., Nov. Zool. p. 637, no. 77 (1894) (Andamans).

A series from the Andamans.

22. **Xenocerus mesosternalis**, Jord. (1894).

Xenocerus mesosternalis, Jord., l. c., p. 638, no. 78 (1894) ("Java" *err. loci*).

One ♂ from Ceylon.

When describing this species I gave Java as the locality whence the type came. The specimen was in the Felder collection and bore like all Felder's beetles a minute coloured label indicating the locality. The colours used for different places were in several instances so similar that it was not possible to distinguish them, particularly if the small labels had become dusty or crumpled up, or had otherwise suffered. The colours for Java and Ceylon were practically the same; hence the mistake of assigning to *mesosternalis* Java as patria. The species comes from Ceylon. Besides the ♂ in the Indian Museum I have seen several other specimens from Ceylon.

23. *Xenocerus variabilis*, Pasc. (1860).

Xenocerus variabilis, Pasc., Ann. Mag. Nat. Hist. (3) 5, p. 36 (1860) (Borneo).

Three ♂♂ from Johore, Mal. Pen. (*Moti Ram*).

24. *Xenocerus callimus*, Jord. (1911).

Xenocerus callimus, Jord., *l. c.*, p. 94, no. 6 (1911) (Andamans).

Three ♂♂ and one ♀ from the Andamans. The sexes agree in pattern.

25. *Xenocerus rectilineatus*, Jord. (1894).

Xenocerus rectilineatus, Jord., *l. c.*, p. 638, no. 79 (1894) (Burma).

Cachar (*J. Wood-Mason*); Sylhet; Sibsagar; Kandy, Ceylon, 21-v-1910.

Xylinades, Latr. (1825).

The species are numerous and not always easy to distinguish. The genus is restricted to the tropics of the Eastern Hemisphere, occurring from West Africa to the Aru Islands, one species extending northward to Japan. Although a number of species are known from Africa and several from Southern India and Ceylon, the genus does not appear to be represented in Madagascar.

26. *Xylinades andamanensis*, Jord. (1895).

Xylinades andamanensis, Jord., Stett. Ent. Zeit. p. 255, no. 13 (1895) (Andamans).

Appears to be common in the Andamans. A series in the Indian Museum.

27. *Xylinades annulipes*, Jord. (1895).

Xylinades annulipes, Jord., *l. c.* no. 16 (1895) (Khasi Hills).

Two specimens without locality. Known to me from Calcutta, the Khasi Hills, Shan States and Tonkin.

28. *Xylinades foveatus*, Jord. (1895).

Xylinades foveatus, Jord., *l. c.* p. 257, no. 18 (1895) (Khasia Hills).

Two ♂♂ from Sibsagar.

29. *Xylinades plagiatus*, Jord. (1895).

Xylinades plagiatus, Jord., *l. c.* no. 17 (1895) (Khasi Hills).

Dikrang valley, Assam; Sibsagar, North-East Assam.

30. *Xylinades sulcifrons*, Jord. (1895).

Xylinades sulcifrons, Jord., *l.c.* p. 263, no. 25 (1895) (Khasi Hills).

One ♂ from Maldah, Bengal, and a pair from the Khasi Hills (ex Mus. Tring).

Eucorynus, Schönh. (1826).

In the *Catalogue des Anthribides* (1905) by A. Bovie nine species are enumerated under this generic term. The large material which I have from the Oriental Region convinces me that seven of them are not specifically distinct from *E. crassicornis*, F. (1801). The remaining two, *marmoratus*, Montr. (1856) and *variolosus*, Motsch (1874) have not yet been identified. Since *marmoratus* is described as having the club of the antenna three-jointed, it is certainly not a species of *Eucorynus*, but should provisionally be placed under *Dendrotrogus*, being possibly the same as *D. colligens papuanus*, Jord. (1904). As regards *variolosus*, described from Siam I am inclined to think that it is likewise a species of *Dendrotrogus*. It is said to be more ochraceous than *Eucorynus crassicornis*, with the legs unicolorous and the last segment of the antenna white. If the last characteristic is not due to an error of observation, *variolosus* is distinct from the species of *Dendrotrogus* with which I am acquainted.

Eucorynus crassicornis, F. (1801).

Distributed from Mauritius to the Solomon Islands in several geographical races, of which one is represented in the Indian Museum.

31. *Eucorynus crassicornis crassicornis*, F. (1801).

Anthribus crassicornis, F., Syst. Eleuth. 2, p. 407, no. 12 (1801) (Sumatra).

Eucorynus setulosus, Pasc., Ann. Mag. Nat. Hist. (3) 4, p. 434 (1859) (Philippines).

Eucorynus clavator, Fairm., Rev. d'Ent. p. 43 (1893) (Mauritius).
Sikkim; Sibsagar (*Moti Ram*); Andamans; Sarawak.

Dendrotrogus, Jekel (1855).

Differs from *Eucorynus* in the apex of the rostrum being more strongly excised, the club of the antenna consisting of three instead of four segments, the lateral carina of the prothorax extending to near the apical margin, etc. Apparently a purely Oriental genus.

32. *Dendrotrogus perfolicornis*, F. (1801).

Anthribus perfolicornis, F., Syst. Eleuth. 2, p. 407, no. 13 (1801) (Sumatra).

A fairly common Indo-Malayan species. In the Indian Museum a series from the Andamans, a new record.

33. *Dendrotrogus hypocrita*, Jekel (1855).

Dendrotrogus hypocrita, Jekel, Ins. Saund. 1, p. 82, t. 2. fig. 1. a (1855) (Hab. ?).

Dendrotrogus fallax, id., l.c. (indescr.).

A very common Malayan species. The tibiae are unicolorous, and the ♂ bears no pilose spot on the underside of the abdomen. Johore, Mal. Pen. (*Moti Ram*); Sinkip Is.

34. *Dendrotrogus angustipennis*, Jord. (1895).

Dendrotrogus angustipennis, Jord., Stett. Ent. Zeit. p. 191, no. 81 (1895) (Burma).

Tibiae unicolorous, rostrum with shallow median depression at the base; abdomen of ♂ with a pilose patch on the first and second segments.

Sinkip Is.; Johore, Mal. Pen. (*Moti Ram*); Kurseong, E. Himalayas 4700—5000 ft., 22-vi-1910 (*N. Annandale*).

35. *Dendrotrogus feae*, Jord. (1895).

Dendrotrogus feae, Jord., l.c. p. 192, no. 82 (1895) (Burma).

Tibiae ringed with brown; abdomen of ♂ without pilose patches.

Sibsagar, North-East Assam (*Moti Ram*).

Rawasia, Roel. (1880).

Distinguished from *Eucorynus* and *Dendrotrogus* by the very broad third tarsal segment. Known from West Africa to Celebes. Three species have been found in Northern India.

36. *Rawasia ritsemae*, Roel. (1880).

Rawasia ritsemae, Roel., Notes Leyd. Mus. p. 204 (1880) (Sumatra).

A series from the Andamans. Distributed from North India to Java and Borneo.

37. *Rawasia communis*, Jord. (1895).

Rawasia communis, Jord., Stett. Ent. Zeit. p. 188, no. 79 (1895) (Khasi Hills).

A pair ex Mus. Tring from the Khasi Hills.

This species and the preceding one bear three sharp teeth on the labiophore (=false mentum), whereas the third species known from North India [*R. annulipes*, Jord. (1895)] is devoid of this buccal armature.

Anthribus, F. (1792).

Besides the European *A. albinus*, L. (1758) and the Japanese *daimio*, Sharp (1891) the genus contains some African and three

Oriental species, the American species formerly included in *Anthribus* having been separated by me as *Neanthribus* in 1906.

38. *Anthribus wallacei malaicus*, Jord. (1904).

Anthribus wallacei malaicus, Jord., Nov. Zool. p. 230, no. 14 (1904)
(Borneo; Sumatra; Malacca).

A ♀ from Borneo ex Mus. Tring.

This subspecies may be expected to occur northward to Burma.

39. *Anthribus macrocerus macrocerus*, Jord. (1904).

Anthribus macrocerus, Jord., l.c. p. 235, no. 15 (1904) (Sikkim).

A ♂ from Sikkim ex Mus. Tring.

40. *Anthribus macrocerus andamanensis*, subsp. nov.

♂ ♀. *Capite, pronoto elytrisque in dorso pube luteo-grisca vestitis, lateribus magis infuscatis.*

Several specimens of both sexes from the Andamans.

The light-coloured pubescence of the frons, the centre of the occiput and pronotum and of the interspaces 1, 3, 5 and 7 of the elytra contrasts strongly with the dark coloured sides.

Phloeobius, Schönh. (1826).

Distributed over the tropics of the Eastern Hemisphere from West Africa to New Guinea and presumably the Solomon Islands, one species extending northward to Japan. Some of the species are among the most abundant Anthribids.

A. SPECIES WITH THE THIRD TARSAL SEGMENT ENLARGED.

41. *Phloeobius alternans*, Wied. (1819).

Anthribus alternans, Wied., Zool. Mag. 1. 3, p. 172, no. 22 (1819)
(Bengal).

Anthribus apicalis, Walk., Ann. Mag. Nat. Hist. (3) 3, p. 262 (1859)
(Ceylon).

The largest Oriental species of this genus and one of the commonest.

Calcutta; Sibsagar (*S. E. Peal*); Dacca district (*H. E. Stapleton*); Maldah, Bengal; Kandy and Kalutara, Ceylon, i-1908; Andaman Is.

42. *Phloeobius lutosus*, sp. nov.

♂ ♀. *A Phloeobio alternante differt tarsorum articulo tertio latiore. Typus ex insula Java in Mus. Tring.*

Distributed from Sikkim to Sumba and Buru. In the Indian Museum two specimens from the Andamans and one ex Mus. Tring from Java.

On the whole more ochraceous than *P. alternans*, with the black tessellation of the elytra less distinct. The luteous central area of the pronotum anteriorly narrower, the two pale dots placed at each side of it usually rather prominent, and the apical patch of the elytra darker. The second and third tarsal segments are much broader than in *P. alternans*, the third being as broad as the first segment is long.

43. **Phloeobius albimaculatus**, Allard (1895).

Phloeobius (!) *albimaculatus*, Allard, Bull. Soc. Ent. Fr. p. 104, no. 2 (1895) (Therawaddy).

Rangoon (*C. J. Blight*), one ♀.

B. SPECIES WITH THE THIRD TARSAL SEGMENT
COMPARATIVELY SMALL.

44. **Phloeobius pilipes**, Jord. (1895).

Phloeobius pallipes ab. *pilipes*, Jord., Stett. Ent. Zeit. p. 198 (1895) (Sumatra).

A small ♂ from the Andamans, a new locality for this species.

45. **Phloeobius pallipes**, Jord. (1895).

Phloeobius pallipes, Jord., *l.c.* p. 197, no. 90 (1895) (Perak, Sumatra).

A series from the Andamans, a new record.

The species was originally described from a small ♂ and a ♀. The antenna of this ♂ is short, approaching the ♀ antenna in proportions. In larger ♂♂ the antenna resembles that of the ♂ of *P. gigas*, whereas in the ♂ of *P. pilipes* the end-segment is much straighter. *P. pilipes* further differs from *pallipes* in the frons being broader and bearing a blackish transverse mark, the upper lobe of the eye being somewhat narrower, the pronotum bearing centrally light and dark semicircular arcs, and the pubescence of the tibiae being longer.

46. **Phloeobius gigas nigroungulatus**, Gylh. (1833).

Anthrribus nigroungulatus, Gylh., in Schönh., Gen. Curc. 1, p. 133, no. 6 (1833) (China).

A pair without locality, and a ♀ from Kurseong, 5000 ft.

I have only seen a limited number of specimens of *nigroungulatus* (inclusive of the type-specimen) and am not yet certain about its range of variation. *P. pallipes* may possibly be a form of *nigroungulatus* with particularly large black tufts.

Basitropis, Jekel (1855).

An Oriental genus which extends to the Malagassic subregion, if *coquereli*, Faim. (1880), *tessellata*, Boh. (1859) and *tuberidorsis*,

Fairm. (1897) really belong to *Basitropis*. It is replaced in Africa by *Gynandrocerus*, Lac. (1866), and in America by *Eugonus*, Schönh. (1833).

The species are easily recognized by the secondary sexual characters of the ♂♂ found in the antennae, abdomen and the legs.

47. *Basitropis hamata*, Jord. (1903).

Basitropis hamata, Jord., Nov. Zool. p. 432, no. 51 (1903) (Calcutta).

Andaman Is., a new record.

The foretibia of the ♂ bears a broad tooth at the apex.

48. *Basitropis affinis*, Jord. (1903).

Basitropis affinis, Jord., l.c. no. 52 (1903) (Andamans; Sumatra; Celebes).

Johore, Mal. Pen. (*Moti Ram*) and Andamans.

Foretibia of ♂ without tooth at the apex, last ventral segment sinuate.

49. *Basitropis nitidicutis*, Jekel (1855).

Basitropis nitidicutis, Jekel, Ins. Saund. 1, p. 92, t. 2, fig. 2, 2a (1855) (Java; India).

The commonest Indo-Malayan species of the genus.

Andamans; Chatrapur, Ganjam district, Madras; Calcutta, 1-vi-1907; Peradeniya, Ceylon, 30-vi-1910.

Ozotomerus, Perr. (1853).

The species of this genus require revising. The distinctness of some of them appears to me to be very doubtful. The material in the Tring Museum is but scanty apart from the specimens from New Guinea and Australia.

50. *Ozotomerus maculosus*, Perr. (1853).

Ozotomerus maculosus, Perr., Ann. Soc. Linn. Lyon 2, 1, p. 406 (1853) (Calcutta).

A small series of both sexes from the Andamans. All these examples bear a black patch behind the middle of each elytrum, the patch being large in seven specimens and small in one. None of them have a large black subapical spot on each elytrum, as mentioned in Perroud's description and indicated in the figure given in Lacordaire's Atlas, and for that reason I refer the Andaman examples with some doubt to *maculosus*.

Araecerus, Schönh. (1833).

An essentially Oriental genus extending to Madagascar, one of the species being distributed throughout the tropics.

51. *Araecerus fasciculatus*, Degeer (1775).

Curculio fasciculatus, Degeer, Mem. Hist. Ins. 5, p. 276, no. 10, t. 16, fig. 2 (1775) (Surinam).

Degeer's figure does not resemble the insect generally identified as *fasciculatus*.

Some specimens from Peradeniya, Ceylon, 5-vi-1910, and Calcutta. At the latter place the larva was found tunnelling in betel-nut (*Areca catechu*).

XII. DESCRIPTION OF A NEW SAND-BOA FROM THE PERSIAN GULF.

By N. ANNANDALE, D.Sc., F.A.S.B., Superintendent,
Indian Museum.

Some years ago Capt. R. E. Lloyd, I.M.S. while Surgeon-Naturalist to the Indian Marine Survey, obtained a single specimen of an undescribed *Eryx* which has been awaiting description in the Indian Museum since he brought it to Calcutta. Its diagnosis is as follows:—

Eryx fodiens, sp. nov.

This species is allied to *E. jayakari*, Boulenger, but may be distinguished at sight by its prominent upper jaw. It does not appear to be very closely related to *E. persicus*, Nikolski, which it resembles in its projecting and trenchant rostral.

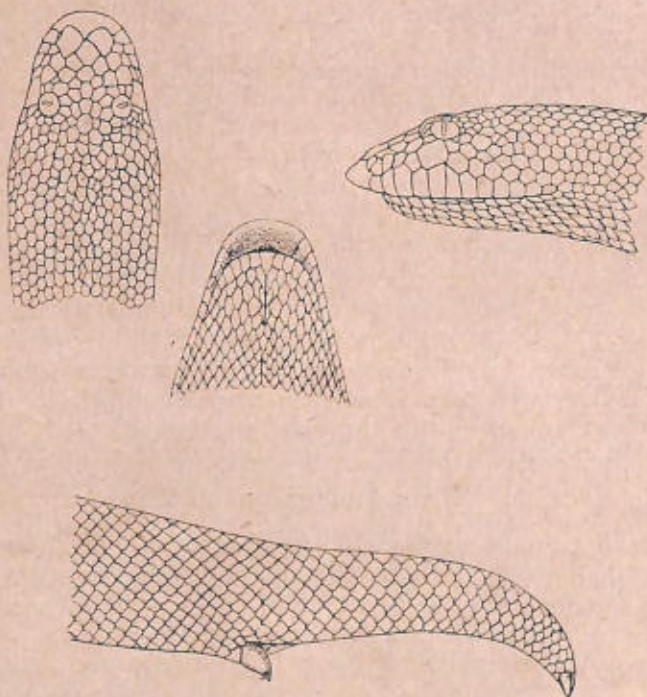
The eyes are small and situated almost entirely on the dorsal surface of the head. They are separated one from the other by 5 rows of scales, surrounded by 11 scales, and separated from the labials by 3 scales arranged as follows—one large scale in front and two superimposed smaller scales behind it. The rostral is very large and prominent, the portion visible from above being as long as one of the internasals; its posterior end is strongly angulate, its lateral margins are prominent and trenchant and its ventral surface is concave at the base. The internasals, the rostral and a small scale behind them meet together and form an X-shaped suture. There are 10 upper labials. A short mental groove is present. The upper jaw, although very prominent, is truncated in front as seen from above.

The body-scales are smooth, arranged in 37 rows. The ventrals are small, between 180 and 190 in number; there are 18 subcaudals.

The tail is pointed and ends in a spur. The hind limbs, which are unusually long, are provided with a well-developed claw.

The colour of the dorsal surface is dark brown with numerous narrow, irregular zig-zag cross-bars of a dirty cream-colour. The lower part of the sides and the ventral surface are yellowish white. The head is pale olivaceous above, obscurely vermiculated with dark brown on the occipital region.

Habitat. The single specimen was found at Koweit on the Persian Gulf. It was dug up from a depth of about a foot in sand near the sea.



Head and tail of *Eryx fodiens*, $\times 2$.

Type. No. 17187 *Rept. Ind. Mus.* The specimen is a male and was cut into two pieces at its capture. Otherwise it is in good condition.

XIII. A NOTE ON CERTAIN OPHIUROIDS
IN THE INDIAN MUSEUM.

By T. L. BOMFORD, *Capt., I.M.S., Officiating Surgeon-
Naturalist on the R.I.M.S. "Investigator."*

(Plate xiii.)

This note deals with four species obtained by the R.I.M.S. "Investigator." Three are members of the Gorgonocephalinae, while the fourth is a *Trichaster*. The generic names employed are in accordance with the definitions given by Professor Döderlein in his recent review of the Euryalae (5).

Astrodendrum laevigatum (Koehler), 1897.

This specimen (Regd. no. ZEV $\frac{1415}{7}$), from Station No. 284, is considerably larger than the type described and figured by

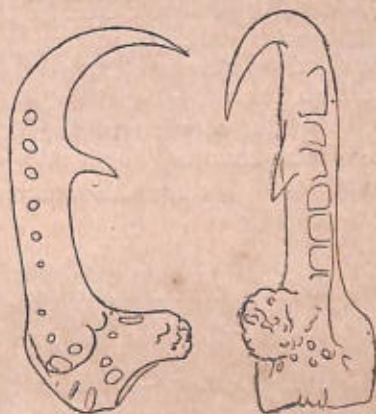


FIG. 1.—Girdle hooks of *Astrodendrum laevigatum*, $\times 200$.

Koehler (3) as *Gorgonocephalus laevigatus*. It was obtained off the east coast of Ceylon from a depth of 506 fathoms.

The radial shields on the dorsum of the disc are developed irregularly, and some are imperfect. In addition they are bent, forming a dorsal loop (resembling in outline a Geometrid caterpillar): this, being probably due to the shrinkage of the disc after immersion in spirit, indicates the weakness of the shields.

The madreporite plate is very evident, standing up as a prominent convexity from the general surface, and projecting so as partially to occupy the soft inter-brachial space.

This species is readily distinguished from the following by the complete absence of small granular ossicles on the dorsal surface of the disc and by the much greater relative size of the openings of the genital bursae, which, in this specimen which has a disc 60 mm. in diameter, measure from 16 to 18 mm.

The form of the girdle hooks is seen in text-fig. 1.

Astrodendrum sagaminum (Döderlein), 1902.

I include under this name two small specimens from Station 333 (Regd. no. ZEV $\frac{2135}{7}$).

The larger of these has a disc measuring 12.5 mm. in diameter, the smaller is clinging to the larger specimen and its disc measures 5.8 mm.

The skin of the disc is very nearly transparent, and contains numerous small granules, which are also present on the upper surface of the radial shields. The upper surfaces of the arms also are finely granular.

The apertures of the genital bursae, though relatively smaller than those of *A. laevigatum*, are comparatively larger than in the example of *A. sagaminum* which is figured by Döderlein (5). They measure 2 mm. in the larger and 0.9 mm. in the smaller specimen. But it may well be that the relative sizes of these apertures and the disc would be subject to alteration during growth up to the attainment of maturity. These are both young specimens and their discs are small, so that the basal end of each arm is quite free from the disc: in a dorsal view of the larger specimen two arm segments, and of the smaller four arm segments, are visible beyond the disc margin and before the occurrence of the first bifurcation of the arms.

Astrocladus dofleini, Döderlein, 1910.

(Pl. xiii, fig. 1.)

One specimen (Regd. no. ZEV $\frac{5533}{7}$) from Station 467, at a depth of between 42 and 75 fathoms, off the west coast of the south of India. This specimen, though the disc is complete, has all its arms fractured just beyond their first bifurcation.

The disc, measuring from the end of a radial shield to the opposite inter-brachial margin, has a diameter of 28 mm. The skin on the upper surface of the disc is opaque and finely granular, the shields being indicated by radiating ridges. Besides the fine granulations there are tuberosities which are very regular in their arrangement. In the centre of the disc they form a cluster of small round tubercles of various sizes. In each inter-radial and inter-brachial depression many of these tubercles are rather larger than

those in the centre, and distinctly conical. On the radial shields these conical tuberosities attain their greatest development: there are three or four on each shield and they are separated by intervals; at the outer end of each shield, except on one, are two large cones in contact at their bases. The outermost of these cones is the larger and measures 4 mm. in height.

Each inter-brachial space forms a semicircular bight in the disc margin. The thick, but unsupported skin of this space is bounded above by four or five tuberosities, not distinct from those on the dorsum of the disc, and there may be a feeble indication of a few small tubercles under the skin of this region. At the sides of this space are the openings of the genital bursae. The skin of the space forms a valve-like flap which closes the upper and outer ends of these openings, reducing the aperture to a curved slit, but leaves a wider piriform opening below. The length of the bursal slit is 4 mm.

The madreporite does not project into the soft inter-brachial

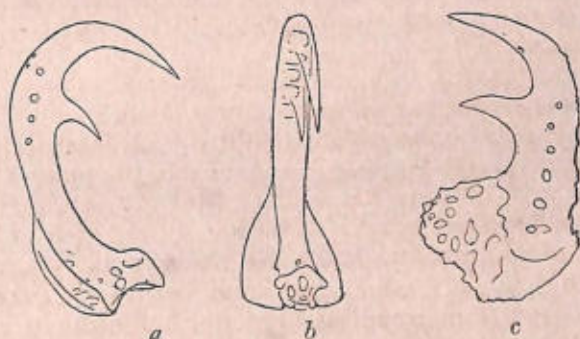


FIG. 2.—Girdle and tentacle hooks of *Astrocladus dofeini*, $\times 200$.

area, but is wholly situated on the firm skeleton of the under side of the disc. It forms an almost circular area, about 1.2 mm. in diameter, and is slightly concave.

The skin on the under side of the disc is also thick and finely granular.

The teeth and mouth papillae are spiniform but not so slender as in the genus *Astrodendrum*. The arms divide at the disc margin, the primary divisions being equally well developed. Each primary division begins to branch at a distance of 10 mm. from the disc, and the branching is unequal as in *Astrocladus exiguus* (Lamarck).

The dorsum of the arms is beset with tuberosities, like those on the disc; there are generally two on each segment. At the proximal part of the arm they form blunt cones, on bases measuring 1 mm. or more. These tuberosities, diminishing in size, can be traced beyond the ninth division of each arm.

Tentacle papillae begin at the second bifurcation of the arms, and form three rough rounded knobs close together. In the more

distal parts of the arms there are two tentacle papillae close to each tentacle. Text-fig. 2c shows a tentacle hook from the thinner part of the arm. A girdle hook is shown in text-fig. 2a-b.

It is one of my misfortunes that I have only been able to compare this specimen with one other member of this genus, namely with *A. exiguus* (Lamarck)=*G. cornutus*, Koehler (3). From this it differs in having more than one conical tuberosity on each radial shield. From *A. euryale* (Retzius), it differs in having numerous tuberosities in the inter-brachial regions on the dorsum of the disc.¹

The specimen examined shows points of resemblance to *A. ludwigi* (Döderlein) (4). Both have well developed tuberosities on the radial shields. *A. ludwigi*, however, differs in having no tuberosities on the arms and having its madreporite projecting into the soft inter-brachial area. But for these differences (which might not obtain in an example of *A. ludwigi* which measured more than 7 mm. in the diameter of the disc) I feel inclined to include this specimen in that species. But it agrees sufficiently well with that variety of *A. dofleini*, Döderlein, which has conical tuberosities. It shows a general resemblance to the example Döderlein figures in his review of Japanese Ophiuroids (5, plate 4, fig. 4), but has the tuberosities on the disc much more prominent.

Trichaster elegans, Ludwig, 1878.

(Pl. xiii, figs. 3-4.)

This species (Regd. no. ZEV $\frac{5480}{7}$), founded on a single specimen from the Bay of Bengal, has apparently not been met with since Ludwig (2) published his description. Döderlein (5) has concluded that Ludwig's specimen was but a young example of *T. palmiferus* (Lamarck). For these two reasons it may be well to give a short description of a specimen recently obtained by the R.I.M.S. "Investigator" in the neighbourhood of the Mergui Archipelago (Station No. 533. Lat. 12°55'50" N., Long. 96°51'50" E.).

This example is considerably larger than the one described by Ludwig, its linear measurements being nearly twice as great. It was living on a sandy bottom at 58 fathoms depth, and its general colour was a sandy grey on the upper and almost white on the lower surface. The centre of the disc, however, was of a very dark olive green, and this same colour extended as a band to each inter-brachial margin of the disc, and also in the same manner along the dorsum of each arm. On the arms the intensity of the colour gradually diminished through brown into the general grey colour, so that after the first bifurcation, the dark streak was hardly noticeable.

¹ The only figure of this species with which I have been able to compare the specimen is that given by L. Agassiz (1) under the name of *Gorgonocephalus verrucosus*.

The upper surface of the disc was even, and not elevated above the level of the upper surface of the arms: since its immersion in spirit the soft parts have somewhat collapsed in the centre (as can be seen in plate xiii, fig. 4), and the radial shields of the disc, and the lateral arm plates also, are now clearly distinguishable.

I have been able to compare this specimen with an example of *T. palmiferus* (Lam.) (Regd. no. ZEV $\frac{5481}{7}$) presented to the Museum many years ago by Dr. Hungerford, who obtained it in Hong Kong.

The following features serve to distinguish the two species:—

- (1) In comparison with the size of the disc, the inter-brachial spaces in *T. elegans* are much wider than in *T. palmiferus*; or, in other words, the arms at their bases are narrower.
- (2) The arms of *T. elegans* are much more slender: not only

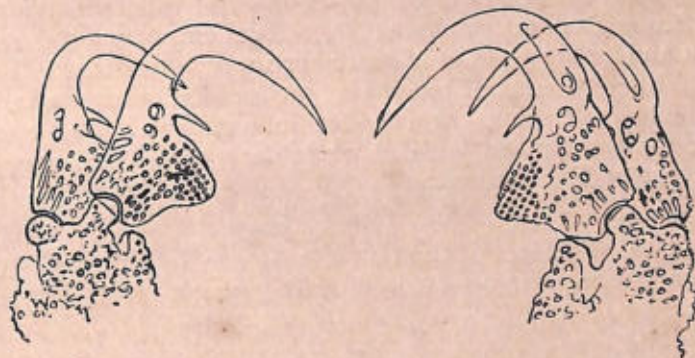


FIG. 3.

Trichaster elegans, × 107.

Trichaster palmiferus, × 107.

are they relatively narrow at their bases, but at the first bifurcation their breadth has diminished to less than one fourth part, while in *T. palmiferus* the breadth at this point is one third of the breadth at the base of the arms.

- (3) The apertures of the genital bursae are much more widely separated in *T. elegans*. In the specimen of *T. palmiferus* from Hong Kong, the two apertures in each inter-brachial space practically unite to form one and the surface that should intervene is drawn in, and forms an almost linear septum. This difference, which is illustrated in plate xiii, figs. 2 and 3, is the consequence of the reduced size of the inter-brachial space.
- (4) The radial shields on the disc, at their outer end, and the lateral arm plates, at their upper ends, are only slightly expanded: the latter nowhere form conical elevations.

- (5) The upper ends of the lateral plates on opposite sides of an arm are not closely approximated, so that, in *T. elegans*, there is a wide dorsal surface (or shallow furrow in a spirit specimen) on the upper surface of the arms. In other words, the arm is more quadrangular in section, while in *T. palmiferus*, the approximation of the upper ends of these plates makes the arm almost triangular in section. (This point of difference only refers to the proximal part of the arm—in the more distal parts the arm remains flat below, while the dorsum and sides form a continuous curve.)
- (6) The talons borne on the tentacle papillae (text-fig. 3) show no great difference. Those of *T. palmiferus* generally show a fluted appearance, and the outlines of the convex surface are different.

I have been able to count six bifurcations of an arm in this example.

Though I do not think that the actual number of segments in an arm and its branches are of any particular importance, for they vary in different arms of the same specimen, yet I have included some facts concerning them in the following table of measurements, for comparison with other tables giving these particulars in the case of *T. palmiferus*.

Diameter of disc	..	28 mm.
Vertical diameter of the bursal aperture	..	2 mm.
Interval between a pair of bursal apertures	..	2.5 mm.

Arms:—

	<i>Breadth.</i>	<i>Height.</i>
At base	.. 13 mm.	.. 10 mm.
At 20th segment	.. 6.7 mm.	.. 7 mm.
At 40th segment	.. 4.0 mm.	.. 3.5 mm.

	<i>Length.</i>	<i>No. of segments.</i>
From base to 1st bifurcation..	90 to 112 mm.	.. 39 to 52
From 1st to 2nd ..	16 to 30 mm.	.. 17 to 26
From 2nd to 3rd ..	15 to 17 mm.	.. about 18
From 3rd to 4th ..	14 to 17 mm.	.. about 16

Beyond the 4th bifurcation I have not unravelled the fine branches to take measurements.

REFERENCES.

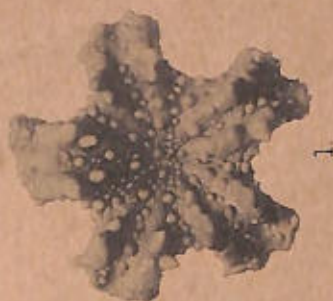
1. Agassiz, L. Mém. Soc. des Sci. Nat. de Neuchâtel, vol. ii, 1839.
2. Ludwig, H. Zeit. Wiss. Zool., vol. 31, 1878.

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3. Koehler, R. .. Deep Sea Ophiuroidea collected by R.I.M.S. "Investigator." Calcutta, 1899.
4. Döderlein, L. .. Jenaische Denkschriften, vol. 8, 1896.
5. ,, .. Abh. Ak. Wiss. Munchen, II (5), 1912.

EXPLANATION OF PLATE XIII.

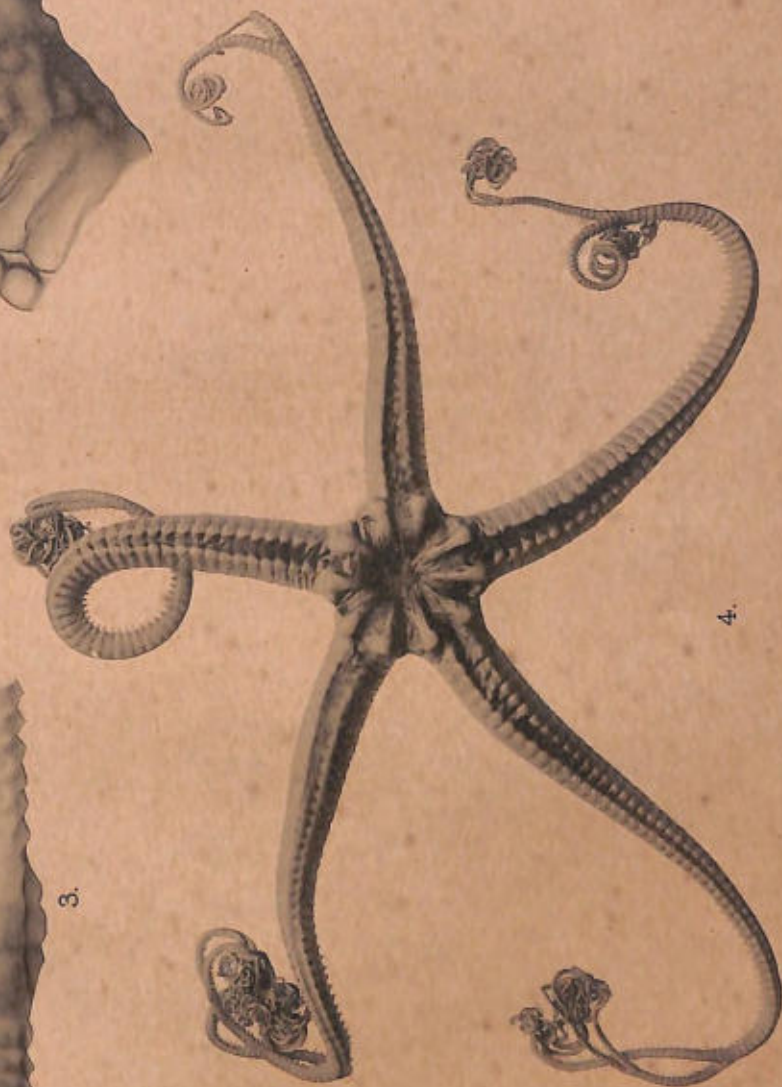
- FIG. 1.—*Astrocladus dofleini*, Döderlein.
Upper surface of disc.
- „ 2.—*Trichaster palmiferus* (Lamarck).
Lateral view of an inter-brachial space, $\times 1\frac{1}{2}$.
- „ 3.—*Trichaster elegans*, Ludwig.
Lateral view of an inter-brachial space, $\times 2$.
- „ 4.—*Trichaster elegans*, Ludwig.
Entire animal: dorsal view, $\times \frac{3}{4}$.



1.



2.



4.



3.

XIV. THE INDIAN BARNACLES OF THE SUBGENUS SCALPELLUM.

By N. ANNANDALE, D.Sc., F.A.S.B., Superintendent of the Indian
Museum.

In a former paper¹ I have discussed the subdivision of the genus *Scalpellum* and reviewed the indigenous species assigned to the subgenus *Smilium*. At present I propose to consider the remaining Indian species of the genus, that is to say those which fall into Hoek's² divisions *Arcoscalpellum* and *Mesoscalpellum* or into the subgenera recognized by Pilsbry³ under the names *Arcoscalpellum* and *Scalpellum*. It seems to me unnecessary to assign to these species more than subgeneric rank and I therefore include all under the common designation *Scalpellum* (s.s.) or subgenus *Scalpellum*.

To this subgenus 12 Indian species are here attributed, one of them not having as yet been described. This and three others are only known from the seas of British India; four are known from the Malay Archipelago (one of them also from the western part of the Indian Ocean) and one from the Mid-Pacific; one is found in the deeper parts of the western Pacific and the southern Atlantic as well as those of the Indian Ocean; one is identical with a species described from the northern Atlantic off the American coast, and one has an extended distribution in both the Atlantic and the Indian Oceans. All are deep-sea forms only found, at any rate in tropical waters, at depths greater than one hundred fathoms. It is possible that the *Scalpellum*-fauna of the seas of British India will ultimately be proved capable of division into three geographical groups, of which one has a very restricted range, one is distributed in the deeper parts of the Indian and the western Pacific Oceans, while the third is scattered in the Indian and Atlantic Oceans at great or considerable depths. Most of the species are, however, as yet known from but few specimens and it is therefore not surprising that the distribution often seems to be extraordinarily discontinuous. This fact also makes it impossible to be dogmatic as regards specific limits, for variation is great in some species that are well known.

The following list gives the names of the species as yet recorded from the Bay of Bengal and the Arabian Sea, and also a general statement as to the known range of each:—

¹ *Rec. Ind. Mus.* V, p. 145, 1910.

² *Siboga-Exped.*, Mon. XXXIa, p. 58, 1907.

³ *Proc. Acad. Nat. Sci. Philadelphia*, p. 104, 1908.

1. *Scalpellum alcockianum*, Annandale.
Off Ceylon : 859—880 fathoms.
2. *S. velutinum*, Hoek.
Indian and Atlantic Oceans : 35 to over 1200 fathoms.
3. *S. trapezoideum*, Hoek.
Off Ceylon and in the Malay Archipelago : 590 to 1508 fathoms.
4. *S. pacificum*, Pilsbry.
Arabian Sea and seas of Hawaii : 222 to 1299 fathoms.
5. *S. novae-zelandiae*, Hoek.
Pacific, Indian and Atlantic Oceans : 490 to 1520 fathoms.
6. *S. woodmasoni*, Annandale.
Arabian Sea : 890 fathoms.
7. *S. albatrossianum*, Pilsbry.
N. Atlantic and B. of Bengal : 1997 and 2045 fathoms.
8. *S. gruevelii*, Annandale.
Indian Ocean : 434 to 1200 fathoms.
9. *S. curiosum*, Hoek.
Off C. Comorin and in the Malay Archipelago : 269 to 595 fathoms.
10. *S. lambda*, Annandale.
B. of Bengal : 643 fathoms.
11. *S. longius*, sp. nov.
Off Andaman Is. : 130—250 fathoms.
12. *S. laccadivicum*, Annandale.
Arabian and Laccadive Seas and in the Malay Archipelago : 434 to 1154 fathoms.

KEY TO THE INDIAN SPECIES OF *SCALPELLUM* (S.S.).

- I. Umbo of carina apical; the whole valve simply arched.
 - A. Capitulum with paired valves relatively small (though almost complete), widely separated and almost entirely concealed by an opaque membrane; margins of tergum not excavated .. *S. alcockianum*, p. 229.
 - B. Paired valves relatively large, always in contact or almost so at certain points; membrane never opaque
 1. Carinal latera meeting behind *below* the base of the carina.
 - a. Carinal latera very prominent, projecting outwards as well as backwards; valves of lower whorl imbricate .. *S. velutinum*, p. 229.
 - b. Carinal latera moderately prominent, projecting backwards but not outwards; all valves adjacent .. *S. trapezoideum*, p. 230.
 2. Carinal latera meeting behind *over* the base of the carina.
 - a. Posterior basal part of carinal latera with strong radiating ridges .. *S. pacificum*, p. 230.
 - b. Posterior basal part of carinal latera smooth .. *S. novae-zelandiae*, p. 231.
- II. Umbo of carina forming a distinct projection on the dorsum of the valve, never apical.
 - A. Valves stout, complete, conspicuously striated.
 1. Inframedian latus pointed above, moniliform .. *S. woodmasoni*, p. 232

2. Inframedian latus truncated above, not moniliform *S. albatrossianum*, p. 232.
- B. Valves delicate, almost smooth, often incomplete.
1. Umbo of carina widely separated from apex of valve.
- a. Carinal latera projecting far beyond dorsum of carina *S. gruevelli*, p. 232.
- b. Carinal latera barely projecting beyond dorsum of carina *S. curiosum*, p. 233.
2. Umbo of carina subapical.
- a. Occludent latus much wider than high at its inner end *S. laccadivicum*, p. 235.
- b. Occludent latus as high as wide in lateral view.
- a. Posterior basal part of carinal latera smooth, meeting *over* base of carina *S. lambda*, p. 234.
- b. Posterior basal part of carinal latera irregularly corrugated, meeting *below* base of carina *S. longius*, p. 234.

I. *Scalpellum alcockianum*, Annandale.

Ann. Mag. Nat. Hist. (7) XVII, p. 392 (1906); *Ill. Zool. 'Investigator'*, Crust. Ent., pl. I, fig. 2; pl. II, figs. 2, 2a, 2b (1907).

In my original description of this species I failed to notice the rostrum, which is concealed by the membrane and by the band-like rostral latera. It is a small transverse hexagonal plate pointed at either end and with the upper and lower margins elongate and parallel. The labrum is prominent and bullate.

The types are from 'Investigator' station 277 to the S. of Ceylon: 5°48'15" N., 80°56' E.; 859 to 880 fathoms.

S. alcockianum is related to the N. Atlantic *S. giganteum*, Gruvel, several of the peculiar features of which it possesses in an exaggerated degree. Varieties may be expected to occur in which the valves occupy a much greater part of the capitular area than in the typical form, if we may judge from the analogy of *S. stearnsi* Pilsbry, a somewhat similar Malaysian species. The great length of the anal appendages is a noteworthy character, but the exact length and the number of segments of these structures is variable within wide limits.

Type No. 2343 Crust. Ind. Mus.

2. *Scalpellum velutinum*, Hoek.

Scalpellum velutinum, Hoek. 'Challenger' *Zool. Rep.* VIII (Cirripedia), p. 96, pls. IV, figs. 10, 11, and IX, figs. 7, 8, 9 (1883); Pilsbry, *U. S. Nat. Mus. Bull.* 60, p. 26, pl. III, figs. 2, 3 (1907); Annandale, *Ill. Zool. 'Investigator'*, Crust. Ent., pl. IV, fig. 7 (1908); *Ann. Mag. Nat. Hist.* (8) VII, p. 588 (1911).

Scalpellum eximium, Hoek, *op. cit.*, p. 100, pls. IV, figs. 6, 7, and IX, figs. 10, 10* (1883).

Scalpellum sordidum, Aurivillius, *Bull. Soc. Zool. France* XXIII, p. 190 (1898).

Scalpellum alatum, Gruvel, *Rep. 'Travailleur' et 'Talisman,'*
Cirrihipèdes, p. 57 (1902).

Specimens from 'Investigator' station 232: $7^{\circ}17'30''$ N., $76^{\circ}54'30''$ E. (430 fathoms) and others from Indian seas labelled simply "deep sea" agree in every respect with examples from off the south-west of Ireland that I have recently examined.

The spines on the degenerate male (see Hoek's fig. 10* on plate IX in the first part of his 'Challenger' report) have a very characteristic form, but the whole specimen of that sex figured under the name *S. eximium* on the same plate was certainly distorted.

S. velutinum is one of the most widely distributed of the deep-sea Cirripedia. It occurs on both sides of the N. Atlantic and off Tristan d'Acunha; there are specimens in the British Museum taken from a cable lying in 1200 fathoms in Lat. $12^{\circ}20'$ N., Long. $52^{\circ}30'$ E.

The bathymetric range is from 35 to over 1200 fathoms. As Pilsbry points out, the species is closely related to *S. formae*, Alessandri, of the Italian Miocene.

Type in the British Museum.

3. *Scalpellum trapezoideum*, Hoek.

Scalpellum trapezoideum, Hoek, *Siboga-Expeditie*, Mon. XXXIa (Cirripedia Pedunculata), p. 102, pl. VIII, fig. 6 (1907); Annandale, *Ill. Zool. 'Investigator,'* Crust. Ent., pl. IV, fig. 9 (1908).

? *Scalpellum truncatum*, Annandale in Herdman's *Pearl Oyster Fisheries* (Roy. Soc. Lond.), part V, Suppl. XXXI, p. 142 (1906).

A specimen, dredged by the 'Investigator' at station 317 from 590 fathoms in the Gulf of Manaar ($7^{\circ}4'$ N., $79^{\circ}32'$ E.) agrees with Hoek's description and figures. It was identified by me as (?) *Scalpellum truncatum*, Hoek, in Professor Herdman's report on the Ceylon Pearl Fisheries, but clearly belongs to the species to which it is assigned in the 'Investigator' Illustrations. It is attached to a piece of coal.

The species was originally described from Lat. $6^{\circ}30'$ S., Long. $12^{\circ}55'$ E. and from a depth of 2796 m. (=1508 fathoms).

Type in the Amsterdam Museum.

4. *Scalpellum pacificum*, Pilsbry.

Scalpellum pacificum, Pilsbry, *Bull. Bur. Fish. U.S.A.* No. 617, p. 182, pl. IV, figs. 3, 4 (1907).

Scalpellum tenue, Annandale (*nec* Hoek), *Herdman's Pearl Oyster Fisheries*, V, p. 142 (1906).

Cirri colourless, moderate. The anterior ramus of the first cirrus flattened and expanded, especially in the 4th, 5th, and 6th segments; the last (9th) segment much narrower than the others,

bearing numerous stout bristles; posterior ramus slender, slightly longer than anterior ramus.

Mouth-parts moderate. Mandible wide, with four subequal teeth of moderate size; the first widely separated from the others; the fourth (inner angle) pointed. The second maxilla moderately wide; its cutting edge nearly straight but bearing a very narrow incisure separated from the outer edge by three large and one small bristle; the stoutest of these bristles not much larger than those on the edge within the incisure.

Anal cirri short, cylindrical, slender, with 5 segments, of which the basal (1st) is much the longest; 2nd and 5th segments subequal, shorter than 3rd and 4th; four long subequal bristles at apex; one long and one moderate bristle at apex of 4th segment posteriorly; at least two shorter bristles in same position on the 3rd segment.

Penis absent.

Type in the U.S. Nat. Mus.

Distribution. 'Investigator' stations 299 and 268: Arabian Sea, 23°43' N., 58°51'30" E.; 1299 fathoms, and south of Cape Comorin, 7°36' N., 78°5' E.; 556—589 fathoms; Hawaiian seas; 315 and 222 to 498 fathoms ('Albatross').

S. pacificum is allied to *S. novae-zelandiae*, Hoek, from which it may be distinguished by its stouter and more closely set valves, by the greater breadth of the rostral latus and especially by the formation of the posterior basal part of the carinal latera. Its closest ally, however, is probably *S. albatrossianum*, Pilsbry, although the two species fall technically into different subdivisions of the subgenus in the system here provisionally adopted.

5. *Scalpellum novae-zelandiae*, Hoek.

Hoek, 'Challenger' *Zool. Rep.* VIII (Cirripedia), p. 124, pl. V, figs. 7, 8 (1883); Gruvel, *Rep. 'Travailleur' et 'Talisman,'* Cirripèdes, p. 54, pl. II, figs. 12, 13, 15 (1902); Annandale, *Ill. Zool. 'Investigator,'* Crust. Ent., pl. V, fig. 7 (1908).

Two Indian specimens are in our collection obtained by the 'Investigator', one from the Andaman Sea (490 fathoms) and one from Lat. 6°18' N., Long. 90°40' E. (1520 fathoms). They agree fairly well with Hoek's original figure, but vary in certain characters, notably in the exact form of the valves of the lower whorl. In one the inframedian latus is shaped like an hourglass; and in the other it is barely constricted at all.

Scalpellum novae-zelandiae was originally obtained off New Zealand by the 'Challenger' in 700 fathoms. The 'Travailleur' took three specimens in Lat. 38°8' N., Long. 12°3' E. in between 1314 and 1370 fathoms. The species, everywhere scarce, has thus an even wider known range than *S. velutinum*, occurring in the Pacific, Indian and Atlantic Oceans.

Type in the British Museum.

6. *Scalpellum woodmasoni*, Annandale.

Ann. Mag. Nat. Hist. (7) XVII, p. 39 (1906); *Ill. Zool. 'Investigator,'* Crust. Ent., pl. I, fig. 7 (1907).

Only the type-specimen is known. It is from 'Investigator' station 183 in the Arabian Sea: Lat. $23^{\circ}8'22''$ N., Long. $65^{\circ}49'45''$ E.; 890 fathoms.

Type No. $\frac{138}{10}$ Crust. Ind. Mus.

7. *Scalpellum albatrossianum*, Pilsbry.

Pilsbry, *U. S. Nat. Mus. Bull.* 60, p. 54, fig. 19 (1907); Annandale, *Ill. Zool. 'Investigator,'* Crust. Ent., pl. III, fig. 10 (1908).

Only two specimens of this species are known; the type, which was taken in the N. Atlantic off Cape Hatteras in 2045 fathoms by the 'Albatross', and one taken by the 'Investigator' in 1997 fathoms at station 110 in the Bay of Bengal: Lat. $9^{\circ}34'$ N., Long. $85^{\circ}43'15''$ E.

So far as I can judge from Pilsbry's figure, there is hardly any difference between the specimens, but he says that the carinal umbo is apical, while I class it as subapical. In the Indian specimen this umbo, as Pilsbry says was the case with the American one, is in contact with the terga and, therefore, appears to be terminal. There is, however, a short continuation of the valve hidden between the terga. The species is closely related to *S. woodmasoni*, from which it may be distinguished by its broader scutum and hourglass-shaped inframedian latus.

The cirri and mouth-parts closely resemble those of *S. pacificum*, but the anterior ramus of the first cirrus is relatively broader, the outer tooth of the mandible is relatively larger and the two inner teeth of the appendage lie closer together. The anal appendages of the two species are also closely similar, but those of *S. albatrossianum* bear a larger bunch of bristles at the apex. In spite of the fact that *S. pacificum* falls into a different section of the sub-genus technically, I see no difficulty in believing it to be closely allied to *S. albatrossianum*.

The figure in the 'Investigator' Illustrations was prepared from the Indian specimen, before it was realised that the species was identical with the American one.

Type in the U. S. Nat. Mus.

8. *Scalpellum gruvellii*, Annandale.

Scalpellum gruvellii and var. *quadratum*, Annandale, *Ann. Mag. Nat. Hist.* (7) XVII, p. 390 (1906); *Ill. Zool. 'Investigator,'* Crust. Ent., pl. I, fig. 1; pl. II, figs. 1, 1a and 3 (1907); Herdman's *Rep. Pearl Oyster Fisheries*, V,

p. 141, fig 4 (1906); Stewart, *Mem. Ind. Mus.* III, p. 33, pl. VII, fig 5 (male); 1911.

Scalpellum chitinosum, Hoek, *Sib.-Exp.*, Mon. XXXIa, p. 73, pl. VII, fig. 4 (1907).

This is a variable species, like all those in which the valves are sometimes incomplete; the "complete" form, if it exists, is unknown. Pilsbry's *S. imperfectum*¹ and *S. sanctaebarbarae*¹ are very closely allied and may be only varieties or local races. I have seen a specimen of the former. *S. chitinosum*, Hoek, is certainly identical. The exact position of the carinal umbo is one of the variable characters.

Stewart (*op. cit. supra*) has given a detailed and excellent account of the male and of the later development of both sexes.

Scalpellum gruevii has been taken by the 'Investigator' at the following stations:—

Sta. 249: Laccadive Sea, 7° N., 76°36'15" E.; 1022 fathoms (Types).

„ 276: Laccadive Sea, 7°11' N., 76°35'30" E.; 1006 fathoms.

„ 277: S. of Ceylon, 5°48'15" N., 80°56' E.; 859—880 fathoms.

“ 306: Laccadive Sea, 9°20' N., 75°24' E.; 930 fathoms.

There are specimens in the British Museum from a cable laid at 1200 fathoms in the Indian Ocean in Lat. 14°20' N., Long. 52°30' E. They were accompanied by *Scalpellum velutinum* and *S. (Smilium) acutum*, Hoek. *S. chitinosum* was taken off Sumbawa and the Kei Is. in the Malay Archipelago in 794 and 1788 m. (=434 and 977 fathoms). *S. imperfectum* is from the N. Atlantic and *S. sanctaebarbarae* from off the coast of California. The type of the former was attached to a specimen of *S. velutinum*. It was taken in 781 fathoms and others of the same form were taken in 852 and 1230 fathoms. *S. sanctaebarbarae* was dredged from 414 and 603 fathoms.

Type No. $\frac{333}{10}$ Crust. Ind. Mus.

9. *Scalpellum curiosum*, Hoek.

Scalpellum curiosum, Hoek, *Sib.-Exp.*, Mon. XXXIa, p. 79, pl. VI, figs 8, 8a, 8b (1907); Annandale, *Ill. Zool. 'Investigator'*, Crust. Ent., pl. IV, fig. 8 (1908);

Scalbellum japonicum, *id. (nec Hoek)*, Herdman's *Pearl Oyster Fisheries*, V, p. 141 (1906).

A specimen dredged by the 'Investigator' at station 268 (S. of Cape Comorin, Lat. 7°36' N., Long. 78°5' E.) in between 556

¹ U. S. Nat. Mus. Bull. 60, pp. 75 and 77, figs. 30 and 31 (1907).

and 595 fathoms, only differs from Hoek's figure in having the capitulum a little broader, the carina more strongly arched, the valves of the lower whorl more incomplete and the peduncular plates broader. In these "incomplete" species great variation must be expected, and without further material I hesitate to regard the Indian form as distinct.

Type in the Amsterdam Museum.

10. *Scalpellum lambda*, Annandale.

Rec. Ind. Mus. V, p. 115 (1910).

Type No. $\frac{5633}{10}$ Crust. Ind. Mus., from 'Investigator' station 372: 13°54'15" N., 94°2'15" E.; 643 fathoms.

11. *Scalpellum longius*, sp. nov.

Capitulum narrowly ovoid, more than twice as high as broad, bearing 13 (or 14) thin, smooth, translucent white valves, which cover its surface almost completely; external membrane thin, colourless, transparent, smooth.

Carina regularly and moderately curved; umbo subapical; sides moderately broad, distinctly concave; dorsum concave, with well-defined lateral borders; apex of valve far removed from apex of capitulum.

Tergum very large, triangular, extending for about $\frac{1}{3}$ of its length above the apex of the carina, sharply pointed and somewhat retroverted at the upper end; occludent margin convex; lower margin straight, sloping upwards and outwards from the carina; carinal margin straight, much the longest of the three, sloping upwards and outwards along the carina, with a distinct tooth just above the carinal apex and distinctly sinuous beyond it.

Scutum smaller than tergum, irregularly triangular; apex retroverted from occludent edge of capitulum, sharply pointed; occludent margin as a whole convex, vertical; tergal margin short, markedly concave, with a prominent tooth at either extremity; inner margin almost as long as occludent margin, very strongly sinuous.

Median (upper) latus having the form of an oblique isosceles triangle with each basal angle broadly, obliquely, equally truncated, in such a way that the whole outline is pentagonal; tergal and scutal margins equal, the latter slightly concave, the former slightly convex; carinal and lower margins equal, straight; suture with carinal latus longer than either, straight, slanting.

Carinal latus quadrilateral, high but narrow, by no means prominent behind; inner and outer margins straight, vertical subparallel; upper margin much shorter, straight, sloping downwards from carina; lower margin straight, sloping downwards from inframedian latus; posterior basal part meeting its fellow below the base of the carina and forming a short vertical suture with it, irregularly triangular, corrugated.

Inframedian latus high, moderately narrow, pointed below, angular above, where it is nearly as wide as the carinal latus.

Rostral latus triangular, pointed below at the aperture, by no means prominent.

Rostrum minute, almost entirely concealed; possibly sometimes absent.

Peduncle cylindrical, much shorter than capitulum, covered with prominent, transverse, alternating scales closely compacted.

I have dissected out the appendages of a specimen but can find no difference in them likely to be constant from those of *S. lambda*, except in the following points:—the two rami of the first cirrus are equal (possibly a variable character) and the anal appendages consist of only 6 segments instead of about 8.

The mandibles are perhaps abnormal; the three outer teeth are subequal and equidistant, but the inner angle is produced and forms a projecting portion of relatively large size and with nearly parallel but somewhat irregular edges; at its extremity it bears two teeth, of which the inner tooth is bent towards the outer one.

Type No. ⁵⁰⁴³/₁₀ Crust. Ind. Mus.

Locality. Andamans; 130—250 fathoms.

Males not observed.

Measurements:—

	Capitulum.	Peduncle.
Height	.. 8.5 mm.	1.5 mm.
Breadth	.. 4.0 ,,	1.5 ,,

Possibly *Scalpellum longius* as here described is merely a complete form of *S. lambda*, but the structure and position of the posterior basal parts of the carinal latera of the two forms are very different; in *S. lambda* these meet over the base of the carina and have the shape of regular isosceles triangles in contact for the whole of their bases, and their surface is smooth. Unless or until intermediate specimens are obtained, the two must, therefore, be regarded as specifically distinct. The greater relative height of the capitulum is quite probably an inconstant feature.

S. longius will be figured, with *S. lambda*, in an account of the Indian species of the families Scalpellidae (=Pollicipedidae, mihi, 1909¹) and Iblidae which is now in the course of preparation but will not be ready for publication for some little time.

12. *Scalpellum laccadivicum*, Annandale.

Scalpellum laccadivicum and var. *investigatoris*, Annandale, *Ann. Mag. Nat. Hist.* (7) XVII, p. 393 (1906); *Ill. Zool. 'Investigator,'* Crust. Ent., pl. I, figs. 3, 4 (1907).

Scalpellum subflavum, *id.*, *ibid.*, p. 397 (1906) and pl. I, fig. 6 (1907).

¹ "An account of the Indian Cirripedia Pedunculata, Part 1.—Family Lepadidae (*sensu stricto*)," *Mem. Ind. Mus.* II, p. 63 (1907).

Scalpellum polymorphum, Hoek, *Sib.-Exp.*, Mon. XXXIa, p. 80, pl. VII, figs. 9-11 (1907).

I have now no doubt that all the forms mentioned in the above synonymy represent a single very variable species, the valves of which may be practically complete, or very incomplete indeed, or exhibit various intermediate stages. Some specimens of my *S. subflavum* are identical with Hoek's figure of his *S. polymorphum* form C, while the types of *S. laccadivicum* and its variety *investigatoris* are somewhat less complete as regards the valves of the upper whorl than any of the specimens obtained by the 'Siboga.' Their capitulum is also broader, but there is considerable variation in this respect, as there is also in the length of the peduncle. My description of the appendages, drawn up at a time at which I had little experience, was incorrect in several particulars. They agree well with those described by Hoek, allowance being made for the very considerable individual variation that certainly exists. The rostrum is rudimentary or absent.

Scalpellum laccadivicum has been taken by the 'Investigator' at the following stations:—

- Sat. 297: Gulf of Oman, 25°11' 30" N., 57°15' E.; 689-700 fathoms.
 ,, 298: Arabian Sea, 23°48' 30" N., 58°33' 45" E.; 337-398 fathoms.
 ,, 317: W. of Ceylon, 7°4' N., 79°32' E.; 590 fathoms (Types).
 ,, 319: Laccadive Sea, 12°2' N., 73°46' E.; 1154 fathoms.
 ,, 358: Arabian Sea, 15°55' 30" N., 52°38' 30" E.; 585 fathoms.

At station 319 only the typical form and the form *investigatoris* were obtained; at all the others, and also at an unrecorded point in the Andaman Sea (173 fathoms), only the form *subflavum*. The 'Siboga' specimens were taken off the Kei Is. and off Sumbawa in 397 m. (= 220 fathoms).

Type No. $\frac{5040}{10}$ Crust. Ind. Mus.

XV. NOTES ON FRESHWATER SPONGES.

By N. ANNANDALE, D.Sc., F.A.S.B., Superintendent, Indian Museum.

NO. XV.—SPONGES FROM SHELLS OF THE GENUS *Aetheria*.

The curious shells of the genus *Aetheria* ("Freshwater Oysters," as Reeve has aptly called them) offer on their roughened and often corrugated surface a favourable nidus for the growth of sponges, while the fact that, like the true oysters (*Ostrea*), they are firmly fixed by the lower valve to solid bodies, renders them still more suitable in this respect. The genus is confined to tropical Africa and is represented in the collection of the Indian Museum by only two lots of shells, one of which is labelled as being from the Nile, while the other is of uncertain *provenance*. The former represents a form of *A. caillaudi*, Fér., the species to which the latter, which has been examined by Mr. H. B. Preston, also in all probability belongs. This species is found only in the basin of the Nile, from which the first of the two sponges here described certainly and the second probably, therefore, comes.

At least one freshwater sponge (*Corvospongilla loricata*, Welter) has already been described from a shell of *Aetheria*, and I have little doubt that others would be discovered in the same position if a careful examination were to be made of the shells of this genus already preserved in museums.

The only Indian species of the family Aetheriidae (*Mulleria dalyi*, Smith) is found in the tributaries of the R. Kistna. It was originally described from Mysore and has recently been collected in the Western Ghats by Mr. F. H. Gravely. I have examined specimens from both localities, but, although the shells closely resemble those of *Aetheria* in external characters, I can find on them no trace of either sponges or polyzoa.

Spongilla (*Eunapius*) *aetheriae*, sp. nov.

Sponge.—Only the basal part of the sponge remains and even from it all but the gemmules and their dense cage of spicules has disappeared. It was, however, evidently an encrusting form.

Skeleton.—All that remains of the skeleton is a dense but quite irregular network of macroscleres enclosing the gemmules. No trace of spicule fibres can be detected in it.

Spicules.—The skeleton-spicules are smooth, slender, sharply pointed amphioxi, on an average about 0.296 mm. long by 0.0136 mm. in greatest transverse diameter. The gemmule-spicules

resemble them in every respect except that they are smaller and relatively more slender, their corresponding average measurements being 0.136 mm. by 0.004 mm., and that they show a greater tendency to irregularity, a considerable proportion of them being either somewhat sinuous as a whole or else bearing a globular swelling in the middle, or exhibiting both peculiarities.

Gemmules.—The gemmules form a pavement-layer which adheres to the shell by means of a basal membrane and of the cage of macroscleres in which they are included. Each has a single straight bottle-shaped vertical tubule in the middle of the upper surface, which is usually free to some extent from the investing macroscleres. The cellular pneumatic layer is thick and well developed and its polygonal compartments are large and distinct. The gemmule-spicules form a single somewhat irregular layer which lies on and near the surface of the pneumatic layer; some spicules being entirely, others partially embedded in it, and some lying on the surface.

Type.—No. Z. E. V. 6034/7 *Ind. Mus.* (microscope-slide).

Habitat.—On shell of *Aetheria caillaudi* from the Nile.

This sponge is an interesting one as it is intermediate between the widely distributed *Spongilla carteri* of Asia, E. Europe, Mauritius and possibly tropical Africa and my own *S. ambigua* from S. Africa, resembling the former in the shape of its gemmule-spicules and the latter in the structure of its gemmules. It is one of the very few Spongillidae that have smooth amphioxous microscleres.

Together with the gemmules of *S. aetheriae* were others belonging to a species of *Stratospongilla* or *Corvospongilla* (more probably the latter) which the new species had evidently overwhelmed by its growth. These gemmules and their spicules resemble those of *C. burmanica* (Kirk.), but I cannot find a single macrosclere or free microsclere other than those of *S. aetheriae* associated with them. It is evident that they represent neither *C. loricata*, Weltner, which was originally found on a shell of the same genus, nor *C. scabrispiculis*, which is described below.

Statoblasts of *Plumatella* occur in considerable numbers on the shell on which the type of *S. aetheriae* were found, and also the remains of a Ctenostomatous polyzoon probably belonging to the genus *Hislopia*, which has not hitherto been recorded from Africa although it is widely distributed in Asia.

Corvospongilla scabrispiculis, sp. nov.

Sponge.—The external form, etc., of the sponge is unknown. It encrusted shells of a mollusc of the genus *Aetheria* and was apparently hard but friable and of a dark colour. A stout basal chitinous membrane is present.

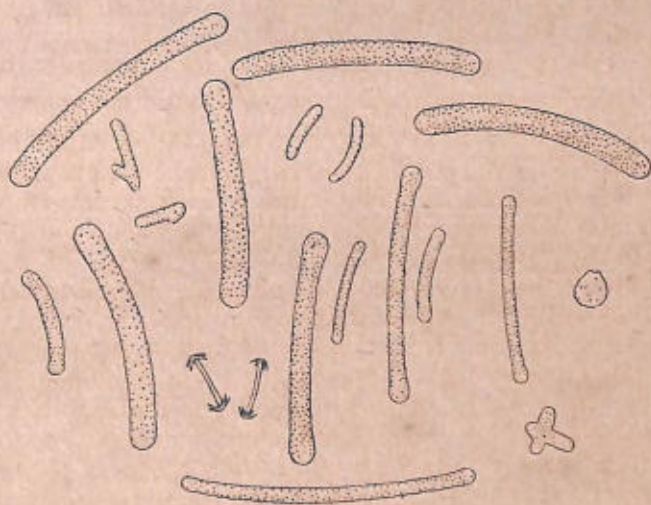
Skeleton.—The only part of the skeleton that can be described is the basal part. The structure of this is that of a stout network formed of spicules enclosed in a chitinous membrane continuous

with the basal membrane, which also contains spicules in considerable numbers.

Spicules.—The macroscleres are small and moderately slender, varying greatly in size but not exceeding 0.147 mm. \times 0.0168 mm. Their ends are blunt and often more or less inflated. Their surface is covered uniformly with minute rounded prominences, but they do not bear sharp outstanding spines. As a rule the main axis is curved, but never very strongly.

The gemmule-spicules are very like those of the skeleton but smaller, and as a rule relatively less slender. They are never more than 0.0842 mm. long by 0.0126 mm. broad but vary greatly in size and proportions. Deformed spicules and irregular spheres are not uncommon among them.

The only free spicules are the minute amphidiscs characteristic



Spicules of *Corvospongilla scabrispiculis*, \times 240.

of the genus. Their shafts are very slender, either straight or curved and as a rule about 0.025 mm. long. The terminal spines are fairly short and less retroverted than in some species.

Gemmules.—The gemmules, which are very numerous, form, together with the cages in which they are held, a regular pavement-layer and adhere firmly. Each is enclosed in a separate loculus which has a roof of spicules and membrane and a floor formed of the basal membrane of the sponge. The walls and roof are composed of two layers of macroscleres lying parallel to the surface of the sponge and crossing one another without protruding from the membrane. There is a circular aperture in the roof through which the foraminal tubule of the gemmule protrudes. Each gemmule has a thick chitinous outer coat in which its proper spicules are embedded horizontally and somewhat sparsely; it bears a single

straight, vertical tubule and is itself spherical or subspherical and from 0.23 to 0.35 mm. in diameter. It is of a bright golden colour when clean but with its cage appears of a dirty brown. The diameter of the cavity of each cage is about 0.5 mm. and there is no pneumatic substance between the walls and the gemmule.

Type.—No. Z.E.V. 5504/7 *Ind. Mus.*

Habitat.—Tropical Africa, probably the Nile basin.

The new species differs from most of its congeners in having rough instead of smooth skeleton-spicules, and also in their small size. In these characters it agrees with *C. micramphidiscoides*, Weltner,¹ from Central Africa; but the spicules of that species are of different shape and proportions and the macroscleres sometimes bear long spines, while amphioxi as well as amphidiscs occur free in the parenchyma. A noteworthy feature of *C. scabri-spiculis* is the tendency displayed by both skeleton- and gemmule-spicules to be inflated at the extremities. A similar tendency occurs in some of the gemmule-spicules of the type-species of the genus, *C. loricata* (Weltner);² but I have not observed it displayed to anything like the same extent in the macroscleres of any species in which the macroscleres are smooth, although it occasionally occurs in a slighter degree.

¹ "Süßwasserschwämme (Spongillidae)" in *Wiss. Ergebn. Deutsch. Zentral-Afrika-Exp.* 1907-1908, vol. IV (Zool. ii), pp. 477-481, figs. 1-11 (1913).

² Kirkpatrick, *Rec. Ind. Mus.*, vol. II, pp. 97-99, pl. ix, fig. 9a (1908).

XVI. PRELIMINARY NOTE ON A NEW
GENUS OF ONYCHOPHORA FROM
THE N.E. FRONTIER OF INDIA.

By STANLEY KEMP, *Assistant Superintendent, Indian Museum.*

The discovery of a species of *Peripatus* in the Abor country during the military expedition of 1911-12 is of interest in that it is the first occasion on which a member of the group has been found within the limits of the Indian Empire. The form proves to belong to a genus and species hitherto undescribed and, inasmuch as some time must still elapse before the complete account can be published,¹ I have thought it advisable to give a brief preliminary account of its more important characters.

The main features of the different geographical groups or genera of *Onychophora* have been clearly stated by the late Prof. Sedgwick,² and in the preparation of this note I have followed the lines which he has adopted in his definitions.

***Typhloperipatus williamsoni*, gen. et sp. nov.**

The species is blind and on external examination no trace of the eyes can be found. The ocular lobe is well developed but is provided with a rudimentary nerve. A loosely compacted irregular and non-cellular structure found within the lobe appears to represent the remains of retinal rods, but no trace of any other visual structure remains.

The legs vary in number from 19 to 20; in adult specimens there seem to be invariably 19 in the male and 20 in the female.

The outer jaw is provided with two, less commonly with three minor teeth; the inner has three minor teeth and a series of eight or ten small denticles separated from the others by a short diastema.

The legs have four spinous pads and in the fourth and fifth pairs the nephridial openings are situated on the third pad. The feet bear two distal papillae, one anterior and one posterior.

The genital opening, in both sexes, is situated between the legs of the penultimate pair.

In the female the ovaries are fused, but there does not appear to be any communication between the oviducts. Receptacula ovarum do not appear to exist, but large receptacula seminis are present, each communicating with the oviduct by means of two

¹ A detailed description with figures will be published in Vol. VIII of the Records of the Indian Museum.

² Sedgwick, *Quart. Journ. Microsc. Sci.*, LII, p. 379 (1908).

ducts. The ovary is exogenous. The ova are large and heavily charged with yolk and measure from 1.5 to 2 mm. in their longest diameter. The uterine embryos are of all ages and do not possess a trophic vesicle.

In the male the testes are tubular; the vesiculae seminales are of very large size and occupy the greater part of the body-cavity between the tenth and thirteenth pairs of legs. The unpaired part of the vas deferens is of enormous length, reaching in one specimen as far as the fifth leg, in another to the interspace between the seventh and eighth pairs. The spermatophore is very long and is provided with a horny cap in front. The accessory glands of the male consist of convoluted tubes which open separately in front of the anus. Of crural glands there is a single pair in each of the legs preceding the genital opening.

The skin pigment is slowly extracted by alcohol. Living specimens were dorsally of a deep raw umber brown colour with the ends of the antennae and the tips of some of the primary tubercles pale buff. Ventrally the animal was entirely pale.

The specimens were all found in the vicinity of Rotung, on the banks of the Dihang river, living under stones at altitudes varying from 1200—2500 feet.

MISCELLANEA.

TUNICATA.

SOME SALPS TAKEN BY R.I.M.S.S. "INVESTIGATOR" IN THE BAY OF BENGAL AND ANDAMAN SEA.—Hitherto, the Salpidae of Indian seas have not received much attention, but of late years owing to a more systematic use of the tow-net, and the introduction of a mid-water net on board the "Investigator," a foundation has been laid for future work.

The following remarks are merely intended to record the presence of certain species in the Andaman Sea and Bay of Bengal. The species were all obtained during the months from October to April that comprise the survey seasons of successive years: the data are quite insufficient to give any idea of the distribution or relative abundance of each species.

1. *Cyclosalpa bakeri*, Ritter, 1905.

Of this I have only found one specimen of the solitary generation, obtained in a surface tow-net near Preparis North Channel ($15^{\circ}25' N.$, $93^{\circ}45' E.$) on 16th November, 1909.

This is a small example measuring only 5.4 mm. It agrees very closely with Ritter's description (Publ. Univ. Calif., vol. 2) having muscle C and all the body muscles¹ interrupted dorsally. But the "lateral organs" number only four on each side, there being none between muscles 1 and 2. Muscle 6 also does not seem to be continued into a longitudinal band near the mid-dorsal line. In all other characters, such as the ventral inclination of the anterior end, the structure of the brain, hypophysis and viscera, the arrangement of the muscles at the branchial and atrial orifices, it exactly agrees with Ritter's description. It is evidently quite a young specimen, still possessing placenta and elaeoblast.

2. *Salpa fusiformis*, Cuvier.

A few examples of the aggregate generation, all of the typical variety, were obtained at the same locality as the previous specimen.

3. *Salpa cylindrica*, Cuvier.

Both the solitary and aggregate generations are extremely common in the neighbourhood of the Mergui Archipelago. They

¹ In the lettering and numbering of the particular muscles I have followed the designations given by Dr. Ihle in *Das Tierreich*, May, 1912

were also obtained in the northern part of the Andaman Sea in 1897-98. The shape of the test of the solitary form has been noted by W. K. Brooks ("The Genus *Salpa*": Mem. Biol. Lab. John Hopkins Univ.) but the dorso-lateral keel does not seem to be prolonged posteriorly to the same extent as he indicates.

The firm part of the test ends abruptly posteriorly and is here of a triangular sectional form, the angles being formed by the two dorso-lateral and the mid-ventral keel. On either side there are on the test two other ridges, one above the dorso-lateral keel, and one between the dorso-lateral and the ventral keel. These ridges terminate posteriorly a little in front of the posterior termination of the firm part of the test.

In the aggregate generation, the ventral ends of muscle X, on the under side of the atrial aperture, come into contact one with another and then, diverging, pass forwards a short distance in the ventral wall of the atrial siphon.

4. *Salpa hexagona*, Q. and G.

One very fine example of the solitary generation was obtained in a mid-water net at station 393 ($7^{\circ}21'6''$ N., $85^{\circ}7'15''$ E.) This measures 73 mm. from branchial to atrial apertures, the posterior processes of the test adding another 13 mm. to the length.

No specimens of the aggregate generation have been met with.

5. *Salpa confoederata*, Forskål.

Numerous specimens, both of the solitary and the aggregate generations, were obtained near Preparis North Channel ($15^{\circ}25'$ N., $93^{\circ}45'$ E.) on 16th November, 1909.

6. *Salpa multitentaculata*, Q. and G.

A few of the aggregate generation were obtained in a mid-water net at station 461 ($10^{\circ}15'$ N., $90^{\circ}15'$ E.) on 19th April, 1912. Except for their contained embryos none of the solitary generation have been found.

7. *Salpa democratica*, Forskål.

These have been found in the northern part of the Andaman Sea and at numerous stations among the Islands of the Mergui Archipelago. The individuals are much smaller than some specimens from Plymouth, England, that are in the Indian Museum, the largest specimen of the solitary form that I have measured being only 11 mm. long. The posterior processes of the test are also relatively shorter than in those from English waters. During the last survey season, spent in the Mergui Archipelago, the only species I obtained were *S. democratica* and *S. cylindrica*. These generally occurred together, but opposite the town of Mergui, in the Tenasserim R., only the former was obtained.

8. *Salpa zonaria* (Pallas).

Both generations have been found in the northern part of the Andaman Sea and the solitary generation was found at station 393, in a mid-water net.

The German deep-sea expedition on the "Valdivia" visited neighbouring waters, passing from Sumatra to the Nicobar Is., and thence to Ceylon in February, 1899. In this region they did not find *C. bakeri*, *S. cylindrica*, *S. confederata* or *S. multitentaculata*. On the other hand, they obtained *C. pinnata*, *C. affinis*, *C. floridana*, *S. fusiformis aspera*, and *S. amboinensis*.

It appears therefore that much work remains to be done, both in studying the forms that inhabit Indian waters, and in noticing the seasonal occurrence of particular species many of which have an almost world-wide distribution.

T. L. BOMFORD.

INSECTS.

ADAPTATION IN THE HABITS OF A TABANID FLY.—In Miss Ricardo's description of the Tabanid *Haematopota litoralis* from Puri in Orissa (*Ann. Mag. Nat. Hist.* (8), ii, p. 546, 1911) it is stated that the species is common on cactus hedges in the daytime. The case is one of considerable interest from a biological point of view and I have only waited for the publication of the description to give the facts in full. In August, 1910, I found both sexes of the fly abundant on a hedge of Prickly Pear (*Opuntia elatior*, Mill.) running parallel to and some hundred yards distant from the sea. In the heat of the day they sat quietly at the base of the bunches of thorns scattered over the flattened and laterally expanded stems of this cactus, and were easily captured by inserting a small glass tube over them, except when, as was often the case, the position of the thorns rendered this manoeuvre impossible. Like other Indian species of the genus, *H. litoralis* is as a rule matutinal and crepuscular in habits, only becoming active in the morning and evening. The other species with which I am acquainted rest on rocks, walls or the bark of trees, on which their mottled wings render them extremely inconspicuous. *H. litoralis* is by no means inconspicuous on the green cactus stems, for its colouration is not markedly different from that of its allies. Its peculiar habits, moreover, expose it to another danger than those which might arise, were it not protected by the thorns, from being conspicuous; for in the high winds that often prevail on the east coast of India flies making their way on the wing to the protection of the thorns are liable to be impaled upon them. This often occurs. Doubtless, however, the advantage gained from the adoption of the habit is greater than its inherent risk, for it would be very difficult for any enemy, except of course a microscopic one, to attack the fly at the base of the thorns. The most interesting feature of the case lies in the fact that the habit must have been adopted recently, for *Opuntia elatior* was only

introduced into India at the beginning of the nineteenth century (see Burkill, *Rec. Bot. Surv. India* IV, No. 6, p. 297; 1911) and there is no plant with similarly arranged thorns indigenous in Orissa. I failed to find a single individual of the fly on walls near the cactus hedge on which it was common, and it was absent even from stems of the (imported) cactus *Cereus* and of an indigenous thorny Euphorbiaceous plant; the bunches of thorns on these plants being arranged in vertical lines on a polygonal stem instead of being scattered on a flattened and expanded one.

N. ANNANDALE.

INDIAN BLOOD-SUCKING MIDGES.—If we restrict the term "midges," as seems legitimate, to the subfamily Culicoidinae or Ceratopogoninae of the family Chironomidae or Tendipedidae, the number of blood-sucking midges for which the habit has been authenticated in India is extremely small, and all that have been proved to exercise it in this country belong to the genus *Culicoides*, Latr., in which the mouth parts are similarly developed in the two sexes. Dr. Kieffer has recently described a considerable number of Indian and Ceylonese representatives of the genus in the *Memoirs* (vol. ii; 1910) and *Records of the Indian Museum* (vols. vi; 1911 and ix; 1913) and in vol. viii of *Spolia Zeylanica* (1912). Of these species only the following are actually known to suck mammalian blood:—

- | | |
|--|--|
| 1. <i>Culicoides molestus</i> , ¹ | 3. <i>Culicoides himalayae</i> , ³ |
| 2. <i>Culicoides oxystoma</i> , ² | 4. <i>Culicoides peregrinus</i> . ⁴ |

Of these the first two species were found sucking that of cattle and deer in the Calcutta Zoological Garden in March, 1908.

C. himalayae was originally described from Kurseong (June, 1910) and other specimens have recently been sent to the Museum by Mr. H. Stevens, who took them at Kaliponni on the Nepal-Sikkim frontier at an altitude of about 9000 feet. He refers to them as "blood-sucking flies of a particularly venomous nature."

The type-specimens of *C. peregrinus* were taken at Puri on the coast of Orissa in March. I recently (July, 1913) found the species very abundant in a bungalow near Balugaon in the same district. One individual was killed in the act of biting my wrist, and I had reason to think that many others were attacking my ankles. The irritation was considerable but not lasting and very little swelling followed the bite. Both sexes swarmed at night in the corners of rooms, particularly in the neighbourhood of a lighted lamp; females were much commoner than males.

Mr. F. H. Gravely, to whom I am indebted for the identification, by comparison with the types, of Mr. Stevens' examples of *C. himalayae*, has recorded a curious habit of an undetermined

¹ Kieffer, *Mem. Ind. Mus.* ii, p. 193, pl. viii, fig. 9.

² *Id.*, *ibid.*, p. 193, pl. ix, fig. 1.

³ *Id.*, *Rec. Ind. Mus.* vi, p. 326.

⁴ *Id.*, *Mem. Ind. Mus.* ii, p. 191, pl. viii, fig. 1.

species of *Culicoides*,¹ viz. that of sucking the abdomen of mosquitoes of the genus *Anopheles* (s.l.), probably in order to obtain mammalian blood ingested by the larger fly. The actual species attacked was *A. rossii* and the observation was made at Port Canning in the Ganges delta.

The same habit has been attributed to a Burmese species of "*Ceratopogon*" by Major N. P. O'G. Lalor,² I.M.S., who found it sucking blood from *Anopheles fuliginosus*, *A. karwari* and *A. ludlowi*. He reports that species of this genus are abundant at Kyaukpyu on the coast of Burma in August and bite human beings.

N. ANNANDALE.

COELENTERATA.

FURTHER NOTES ON THE HABITS AND DISTRIBUTION OF *Limnocnida indica*.—In the *Records of the Indian Museum*, vol. vii, pp. 399-403, Mr. Gravely and I published some notes on the habits and distribution of *Limnocnida indica*, Annandale, based on our observations last year. I wish to include in this note further observations on the same subject which I made this year. We then expressed the conclusion "that in the life cycle of *Limnocnida indica* there is probably an asexual hydroid stage which lives attached to rocks at the bottom of deep pools, and that this hydroid produces Medusae by budding from February till April or May, when it ceases to do so whether the pool in which it lives is flooded or not, and very possibly dies." It has been my effort during the current year to find out this supposed hydroid stage.

I began my work in October, 1912, when the rains had nearly ceased. I selected Medha as the place of observation owing to its being easily accessible from Bombay. It was thought that it would be possible to induce the hydroid to grow on stones placed at different depths below the surface of the water in the pool and left undisturbed for a sufficiently long time. I, therefore, visited Medha towards the end of October, 1912, and arranged to have four slabs of the same kind of trap as that which forms the bottom and sides of the pool immersed 5, 10, 15 and 21 feet below the surface of the water. The last was resting on the bottom of the pool. The stones were secured by means of strong coir ropes to other bigger stones which were placed on a not easily accessible part of the rock in the middle of the pool. This precaution was necessary to prevent meddlesome persons from taking out the stones and preventing the growth of the hydroid. The place was also watched continually by a peon, whom I engaged for the purpose. I visited the locality again towards the middle of January, February and April, 1913, i.e. after 3, 4 and 6 months respectively. During none of these visits was I able to see on the stones any organism which could be the hydroid stage of *Limnocnida indica*. On one occasion I found a few Rotifers

¹ Gravely, *Rec. Ind. Mus.* vi, p. 45.

² *Paludism*, Sept., 1912, p. 42.

attached to one of the stones and at all times a few water beetles and some Neuropterous larvae were to be seen crawling on them or lurking in the meshes of the coir rope.

At the time of my visit in April I found Medusae in fair numbers in the pool, though nothing was found on the stones. It was clear that the effort to induce the hydroid to grow on the stones had failed, and some other means must be employed to get at the missing stage. I, therefore, tried in April 1913, another plan suggested to me by Dr. Annandale. It was to put a number of Medusae in a wide-mouthed jar and to immerse it at the bottom of the pool after closing its mouth by means of a piece of muslin. The immersion was necessary to keep the temperature conditions as nearly natural as possible. Another reason was to make as little difference in the character of the food of the animal as possible. I used to take out the jar twice a day and observe the condition of the Medusae. The first experiment was tried on the 23rd of April, 1913, and the Medusae appeared to be perfectly healthy for two days after that. On the 26th, however, I found that some of them had died and others were not as active as they had been. An examination of the contents of the jar under a microscope failed to reveal any eggs. That the death was not natural but due to pathological changes set up by the peculiar environment, which prevented their coming to the surface of the water periodically and also circumscribed their movements to a small area, appears to be clear from the fact that the Medusae in the jar were of all sizes and ages. I tried the experiment again on the 26th, but found that the Medusae died even earlier *i.e.* on the 27th evening. There was a heavy shower of rain on that day and I thought I would do better to move to some other locality and try the experiment.

I left Medha on the 28th and reached Dhôm on the Krishna on the 29th. We had heard of the occurrence of the Medusae in this place last year but were not able to visit it. I found the Medusae here in very great abundance. The pool in which they occur is of the type found at Tambi on the Koyna. It is wide and long, about 15 ft. deep, and has a muddy and gravelly bottom. The pool is held sacred and fishing is not allowed. I was, however, permitted to catch the "flowers"—as the Medusae are called—and collected a large number. Among these are some very small specimens almost equal in size to a large pin's head. The experiment tried at Medha was also tried here but was unsuccessful. I, however, suspect that the number of Medusae put in the jar may have something to do with the success of the experiment and if it were tried with only one or two Medusae in each jar we may yet succeed. This, however, was not possible this year and I left Dhôm for Karâd at the junction of the Krishna and Koyna on the 1st of May.

At Karâd I found that I was a little too late, the Medusae having all been washed away by the rain of the 28th April. I searched the river in a boat which was available, but could not see

any Medusae. From Karâd I explored the lower Koyna but was not able to get *Limnocoñida* at any place, though I was told that they occur in a number of pools in the river which I was not able to visit. The best time for observations on *Limnocoñida* appears to be the beginning of April. Later in the month, the numerous storms which occur and the rain which they bring frequently interrupt the work.

Our knowledge of the distribution of *Limnocoñida* has been increased as the result of this year's work. I have been able to confirm its occurrence in the Krishna at Dhôm. While at Karâd, I obtained information about the occurrence of Medusae in the Vârnâ and Panchgangâ, both tributaries of the Krishna which have their sources in the Western Ghats. Want of time prevented my visiting these localities, but should an opportunity present itself I will do so next year.

Before concluding I have to express my best thanks to Dr. Ammandale who has taken very great interest in this work. His suggestions have been very valuable and but for his generous help the work would not perhaps have been done at all.

S. P. AGHARKAR.

XVII. ON A SMALL COLLECTION OF
BIRDS FROM THE MISHMI HILLS,
N.E. FRONTIER OF INDIA.

By E. C. STUART BAKER, F.Z.S., F.L.S., M.B.O.U.

The birds mentioned in this article were collected by Capt. R. S. Kennedy, I.M.S., in the Mishmi Hills during the months of March and April, 1913, and though but few in number form a most interesting collection. It contains a splendid specimen of *Ithaginis cruentus kuseri*, hitherto represented by two specimens only which were obtained in Yunnan.

1. *Garrulus bispecularis* (Vig.).

Blanford, *Fauna of British India*, Birds, i, p. 39.
British Museum Catalogue, iii, p. 100.

No. 25385. Not sexed. Mishmi Hills, 8500 ft., 22-iii-13.

This specimen is a fairly typical specimen of *bispecularis*, rather dark above and brightly coloured. It exactly resembles the type of *Garrulus owstoni* from Formosa, so named by Ingram, but which is merely a synonym of *bispecularis*.

2. *Nucifraga hemispila* (Vig.).

Blanford, *Fauna of British India*, Birds, i, p. 41.
British Museum Catalogue, iii, p. 54.

No. 25389. ♀, Mishmi Hills, 8000 ft., 5-iv-13.

Although now it is often accepted as such I do not consider *hemispila* a sub-species of *caryocatactes* as the former bird and *multi-punctata*, which is a sub-species of the latter bird, overlap in their breeding grounds without, as far as I can see from the material in the British Museum, in any way grading into one another. *Hemispila* is the common form over the North Eastern Frontier of India and breeds in Tibet and further east, but I have also received skins of *multi-punctata* killed in Tibet during the breeding season.

The three forms of nutcracker should therefore stand as follows:

Nucifraga caryocatactes caryocatactes,
Nucifraga caryocatactes multipunctata (Vig.), and
Nucifraga hemispila (Vig.).

3. *Garrulax leucolophus leucolophus* (Hardw.).Blanford, *Fauna of British India* Birds, i, p. 77.*British Museum Catalogue*, vii, p. 435.

No. 25383. Not sexed. Etalni, Mishmiland, 2200 ft., 13-ii-13.

A quite typical *leucolophus* showing no signs of an approach to *belangeri*.4. *Yuhina gularis gularis* (Hodg.).Blanford, *Fauna of British India*, Birds, i, p. 211.*British Museum Catalogue*, viii, p. 631.

No. 25388. ♀, Mishmi Hills, 8000 ft., 5-iv-13.

On the upper parts this bird is very close to *Y. gularis yangpiensis* (Sharpe), but has not the chestnut tinge on the throat, a character which appears to be always present in *yangpiensis*.5. *Oreocincla mollissima* (Blyth).Blanford, *Fauna of British India*, Birds, ii, p. 154.*British Museum Catalogue*, v, p. 157.

No. 25386. ♂, Mipi, Mishmi Hills, 8500 ft., 9-iii-13.

I have recently shown that the form *dixoni* must be suppressed (*Bull. B.O.C.* clxxxviii, p. 81), as the alleged differences between this and *mollissima* are not specific but merely individual and are found in a certain number of specimens throughout the whole area inhabited by this bird. The present specimen has boldly marked wings, considerably better marked than most of the birds hitherto called *dixoni*.6. *Glaucidium brodiei* (Burton).Blanford, *Fauna of British India*, Birds, iii, p. 307.*British Museum Catalogue*, ii, p. 212.

No. 25382. ♀, Etalni, Mishmiland, 2200 ft., 13-ii-13.

7. *Tinnunculus laudarius* (Gmel.).Blanford, *Fauna of British India*, Birds, iii, p. 428.*British Museum Catalogue*, i, p. 425.

No. 25384. ♂, Mipi, Mishmi Hills, 5000 ft., 22-iii-13.

This is a rather large specimen for a male and is in very pale abraded plumage, but otherwise is quite typical *laudarius* and agrees closely with birds killed in Great Britain.8. *Turtur orientalis* (Lath.).Blanford, *Fauna of British India*, Birds, iv, p. 40.*British Museum Catalogue*, xxi, p. 403.

No. 25387. ♂, Mipi, Mishmi Hills, 8500 ft., 9-iii-13.

9. *Ithaginis cruentus kuseri* (Beebe).

No. 25380. ♂, Upper Matun Valley, Mishmi Hills, 8000 ft., 28-iii-13.

This most beautiful blood pheasant was recently described by Beebe from two skins in the Museum d'Histoire Naturelle de

Paris. These two skins, both of males, were received from Tsékon, Yunnan, and were collected by R. G. Soulie; one is still in the Paris Museum and the second is now in the British Museum collection. Compared with the latter skin the present specimen is considerably brighter, the black is more intense, the crimson both of the breast and other parts is more vivid and perhaps more extended into the abdomen, the green is richer and the grey of the back deeper and clearer in tint. All these differences, however, are probably only due to the present skin being fresh whilst the others are somewhat faded.

There is, however, one other difference which calls for remark and that is in regard to the white striations on the upper parts. In the Mishmi skin these are very narrow, little more than shaft stripes in fact, whereas in the Yunnan skins the striations are decidedly broader, in some cases as much as $\frac{1}{2}$ of an inch. An examination of the series of *Ithaginis cruentus cruentus* in the Museum shows that individuals of this species vary very considerably in this respect, and I am therefore unable to assume that this characteristic is anything but individual in the present case also. If, however, at any future time more specimens be obtained and the striations be found to be constantly narrow as in this bird, it would, combined with the general more intense colouration, suffice to divide it subspecifically from *cruentus kuseri*.

It is a most remarkable and interesting fact that the same species—or sub-species—should be found inhabiting areas so wide apart as Yunnan and the Mishmi Hills, and it is a great feather in Captain Kennedy's cap securing so great a rarity. He writes about the specimen as follows:—

“The specimen was shot in the Upper Matun Valley, Mishmi Hills, at an altitude of 8000 ft., lat. $29^{\circ} 20'$ and long. $96^{\circ} 20'$ (roughly).

“In that part of the Mishmi Hills this bird occurred in considerable numbers, and one frequently saw their droppings or scratchings when searching for takin.

“They are not wary and quite a number were shot by the various parties: they formed a most welcome addition to the larder, being good to eat. I believe Capt. Bailey sent a couple of female skins to the Bombay Nat. Hist. Society.

“I do not remember seeing traces of these birds at a lower altitude than 6500 ft., and think they might be said to occur, in winter, from about 6000 ft. up to the snow line, which, in these hills is of course comparatively low.

“The takin, Slater's moonal and tragopan have a similar range, though perhaps the moonal and tragopan remain a little lower. The hills in which they occur are clothed with forest, largely, though not entirely, composed of fir and pine trees with an undergrowth of rhododendron. In some places the forest gives way to grassy slopes, and to these slopes the blood pheasants repair to feed, morning and evening; and it is then that one can bag them for the pot so easily. They form large flocks; I have

seen 30-40 in one flock. When startled they run away into the jungle. They can fly—I have seen them fly across a stream, when frightened, but ordinarily do not, and must be shot on the ground.

“Their call is the same as that of the common Himalayan blood pheasant which I have shot in the Chumbi Valley.”

10. *Arboricola torqueola* (Valenc.).

Blanford, *Fauna of British India*, Birds, iv, p. 125.

British Museum Catalogue, xxii, p. 107.

No. 25381. Not sexed. Mishmi Hills, 9000 ft., 5-iv-13.

Quite typical.

XVIII. NEW AND INTERESTING DIPTERA
FROM THE EASTERN HIMALAYAS.

By E. BRUNETTI.

(Plate xiv).

Since Lord Carmichael became Governor of Bengal he has employed several collectors to collect the insects and other smaller fauna of the country round Darjiling. His Excellency has generously arranged to distribute the specimens between several Museums in India, Australia and Great Britain, and to present sets of certain groups to the specialists who are describing them. I have been asked by Dr. Annandale of the Indian Museum, in which the types will be retained, to work out the Diptera, amongst which a number of new and rare species are represented.

Unfortunately most of the specimens have been preserved in spirit, and others in papers, so that their condition is by no means satisfactory and for this reason several which almost certainly belong to undescribed species cannot be utilized as types. The proportion of new and uncommon species, however, is sufficiently large to make further collections from the same districts eminently desirable.

Nearly a hundred species are included in all, but, mainly owing to the inferior condition of the specimens, it has been possible to determine with tolerable certainty only between thirty and forty already known, to which must be added the fourteen new ones described here.

Unless otherwise stated, the species noted simply from "Singla" were collected in April, 1913, and those noted as "Darjiling," in May, 1912; the latter at from 1000 to 3000 ft. altitude.

MYCETOPHILIDAE.

Sciara indica, Walk.

One from Senchal, v-13; it has the whole sides of the abdomen, except at the base, conspicuously red.

Leia nigra, Brun.

One ♀, Senchal, v-1913.

BIBIONIDAE.

Crapitula melanaspis, Wied.

Three (♂ ♀) from Singla, iii-13, and Senchal, v-13.

It is probable that the name *Pleciomyia*, Brun., must sink in favour of *Crapitula*, Gimm., as pointed out by Prof. Bergroth recently.¹ In my Fauna volume I overlooked the fact of *Crapitula* having been set up for *melanaspis*, and as a reference to the generic description was not possible, I accepted it as synonymous with *Plecia* in a general sense. In a letter to me some few years ago Mr. Austin told me *melanaspis* would have to be removed from *Plecia*, and as the Kertesz catalogue ranked *Crapitula* as a synonym it was thus the oversight occurred. It certainly was not my desire to deliberately set up a new genus for a species already sufficiently provided for.

Bibio hortulanoides, Brun.

One ♂, Darjiling District, 1000-3000 ft., vi-1912.

Bibio nigripennis, mihi, sp. nov.

♀ Darjiling.

Long. 7 mm.

Head dull black, except for a little grey hair on underside; flat, with a small but conspicuous prominence bearing the ocelli. Eyes separated by more than one-third the width of the head. Antennae and palpi black.

Thorax black (denuded), but apparently in life with some short yellowish or yellowish-grey pubescence. Scutellum and sides of thorax black, bare or nearly so.

Abdomen black, the surface wrinkled, *sides* with some yellowish-grey hair, which probably in good specimens covers the dorsum also.

Legs.—Fore coxae bright brownish-yellow except blackish at base; remainder of legs bright brownish-yellow except posterior coxae blackish, becoming dirty yellow on apical half. Fore femora greatly incrassated; fore tibiae more or less dirty yellow; apical spines strong, long and of equal length. Last two joints of all tarsi and extreme tip of previous joint black.

Wings blackish, darker on anterior border; stigma black, obvious but ill defined. Halteres black.

Described from a single specimen from Senchal, 8000 ft., May, 1913 in inferior condition.

TIPULIDAE.

Pselliophora fuscipennis, Macq.

One ♂, Darjiling, 1000-3000 ft., one ♀, Singla.

These do not altogether answer to the description, the thorax is wholly reddish-orange instead of the disc being blackish, and

the small pale spot around the stigma is absent, but in this genus a wholly reddish thorax is not rare in some species normally having it partly black.

***Pselliophora gaudens*, Walk. (Pl. xiv, fig. 8).**

A ♂ from Singla is probably this species, but the wings are wholly deep brown. The first seven abdominal segments are bright orange, the 8th black, the lower sternite rather enlarged and pronouncedly V-shaped, as though supporting the conspicuous genital organs, which latter are almost bare and wholly dull black. They consist of an elongate, bilobed dorsal plate and a narrow ventral stylate plate, which is apparently fused to the large obtuse basal joints of the claspers. The remainder of the claspers seem to comprise a conical bare 2nd joint with some attendant interior appendages, but the whole organ being rather closely closed an exact description is impossible.

***Pselliophora compedita*, W.¹**

One ♀, Darjiling, 1000-3000 ft. Except that the marks on the thorax are inconspicuous, though legible, and for its large size (many species vary considerably in size), 25 mm. from tip of nasus to tip of the rather short ovipositor, this specimen agrees with Wiedmann's description.

***Tipula majestica*, Brun.**

One ♂, Singla, one ♀ Darjiling, 1000-3000 ft., vi-12, one ♀ Tindharia, 3000 ft., viii-12. The expanse of the wings is no less than 90 mm.

***Tipula flava*, Brun. (Pl. xiv, fig. 7).**

One ♂, Singla, v-13, one ♀ Darjiling, 1000-3000 ft., vi-12. The species was described from a single ♂ in the Vienna Museum, from Sikkim. The ♀ has not before been seen; it is in every way identical with the ♂ except for the sexual organs.

***Tipula pulcherrima*, Brun.**

Two ♂♂, one ♀ Darjiling, 1000-3000 ft., v-13.

***Tipula carmichaeli*, mihi, sp. nov. (Pl. xiv, figs. 6, 9).**

♂ Darjiling District. Long. 38 mm.; expanse of wings 91 mm.
Head much flattened, upper side brownish yellow, fading nearly to whitish at the margins, and deepening in the median line to a moderately wide, distinct, dark brown band, extending from nape to between the eyes. Frons small but prominent, in the shape of a blunt cone, with a narrow median brown stripe

¹ See note under *Plecticus wulpii* concerning protective resemblance between these two species.

above, and a similar one on each side of the base of the prominence. The width of the frons just above the conical prominence about one-fourth that of the head. Proboscis brownish-yellow, dark above, below, and at the sides at the tip; labella brownish-yellow; palpi (only one joint remaining) and antennal 1st joint (remainder missing), brownish-yellow. Occiput, which is distinct in spite of the very large flattened top of the head, dark brown or brownish-yellow, a few concolorous hairs on underside.

Thorax.—The distinct neck dark brownish-yellow or dark brown, with, on each side, a narrow whitish longitudinal streak above and a broader one below it, well separated from each other. Prothorax well defined, dark chocolate-brown with the margins pale yellowish or yellowish-white, apparently variable. Dorsum of thorax brownish-yellow, two median chocolate-brown moderately narrow stripes (separated by about the width of one of them), from anterior margin almost to suture. On the outer side of each of these stripes, leaving a moderately wide brownish-yellow intervening space, is a large chocolate-brown spot irregularly triangular in shape, bounded by the lower margin of the dorsum and by the transverse suture. In this spot are two pale brownish-yellow approximately oval spots, placed longitudinally, one above the other, the lower one immediately in front of the wing base. The transverse suture is very deep, and the linear depression connecting it with the scutellum also, causing the hinder half of the dorsum to apparently consist of two rather conspicuous convex portions; brownish-yellow in colour, paler anteriorly, with silvery white shimmer on anterior corners and irregularly along the front margin, and with a chocolate-brown transverse band irregular in outline, narrowest in its middle, from the wing root to the sutural-scutellar depression, which latter is almost wholly chocolate-brown.

The scutellum, which is quite small, is dark chocolate brown, with a brilliant white spot on each side of the dorsum; the frenulum well developed, dark chocolate-brown. Mesopleurae similarly coloured, a broad stripe on upper part, shining yellowish-white, and a short smaller central brownish-yellow elongate mark placed longitudinally. Sternopleurae yellowish-white, with a median dark brown stripe from anterior margin to middle, posterior to which is a round brown spot; the lower margin of the sternopleura also brown. The pteropleura extends from the wing root to between the 2nd and 3rd pair of legs, where it takes the form of a small globular piece, conspicuous, pale yellowish-white. Metapleurae brownish-yellow on upper third, chocolate-brown on middle third and black on lower third; the hinder part of the latter brownish-yellow. An oval, brilliant, shining white spot in middle of the lower third part. Hypopleurae shining white, and a similar silver white spot on extreme hinder part of metapleurae, adjacent to the meta-notum, which latter is large and conspicuous, brownish-yellow, with the anterior part of the sides brilliantly silvery white, and a small elongate brown spot on inner side of each such white side spot.

Abdomen.—The 1st segment brownish-yellow, hinder part at sides dark chocolate-brown, with a large irregular oval white spot on each side, nearly or quite reaching the upper side; 2nd segment very narrow, barely wider at tip, pale yellowish, an irregular, lighter brown dorsal stripe, and at each *side* towards tip, a short dark brown stripe; tip of 2nd segment more or less white both on dorsum and at sides; 3rd and 4th segments dark chocolate-brown, with two slightly curved, narrow elongate spots, (convex side inwards), from towards the sides at the base of the segment, and extending to the hind margin, where they are still widely separated. These spots are yellowish on the 3rd and chalk-white on the 4th and remaining segments but the colour may be a little variable. A couple of small whitish spots towards each hind corner of the segments. The 3rd and 4th segments are both very considerably wider at tip than base, the 5th and 6th are replicas of the 3rd and 4th, but the brown colour is lighter. The 7th segment is light brown with two nearly parallel white stripes.

Belly brownish-yellow at base, lighter chocolate-brown from 3rd segment (inclusive) to tip, with two well separated white stripes extending over the segments, the surface on the outer side of these stripes black. There is a distinct 8th sternite, lighter brown, well curved. The whole abdomen is practically bare.

Genitalia comparatively very small, mainly concealed, brown, an upper bifid oblong dorsal plate, and a pair of claspers with one or two appendages.

Legs.—Coxae white dusted, with a blackish spot on front side; remainder of legs brownish-yellow; femora at tip, tibiae at base and tip, and metatarsi at base, all with broad dark brown rings, but not well delimited.

Wings clear, very shining, absolutely bare, the whole surface transversely ribbed. The wing roots blackish, the stem of the wing considerably elongated, a distance of 9 mm. before the wing definitely widens. The 1st posterior cell extremely narrow throughout its length, the petiole of the 2nd posterior cell almost as long as the cell, and about as long as the discal cell; the 6th vein remarkably close to the 5th and taking a sudden bend at its middle.

Costal cell pale yellowish except for the clear tip; the stigmatic portion and the region around the discal cell dark brown, the colour extending uninterruptedly to hind margin of wing, embracing tip of 5th vein. This brown colour encroaches narrowly but distinctly on the apices of both basal cells, on the basal half of the submarginal cell, extending very narrowly along its upper (costal) side. The colour also fills wholly the 1st posterior cell (though here it becomes yellowish), and it borders narrowly the upper side of the 2nd posterior cell, and the basal parts more broadly of the 3rd, 4th and 5th. There is, in the brown colour filling the discal cell, a triangular clear space of moderate size and a small pale streak at tip of 1st basal cell and also just above the praefurca. The 5th longitudinal vein is rather broadly brown,

bordered on each side, except towards the tip of the 2nd basal cell, whilst a large brown spot like a recumbent **V**, lies across the middle of both basal cells, the basal part of the **V** directed towards the wing base, and the colour continued narrowly into the costal cell where it separates the yellowish and clear areas of that cell. The very narrow anal cell dark brown throughout, except on the hinder part of its middle. The base and tip of 1st axillary cell dark brown, and a transverse dark brown band across its middle, in a line with the base of the afore-mentioned recumbent **V** and ending on the wing border at the 6th vein. The 2nd axillary cell dark brown, except the basal fourth and a large triangular space beyond the middle, adjacent to the wing border, which are clear. Halteres pale brownish-yellow.

Described from a single σ in good condition taken by Lord Carmichael in a bathroom at Sureil, Darjiling District, vi-13. This is the most magnificent *Tipula* it has yet been my lot to behold.

***Tipula imperfecta*, mihi, sp. nov.**

φ Darjiling, 1000—3000 ft. Long. 22 mm. from tip of nasus, exclusive of 3 mm. ovipositor.

Head moderately dark rich brown, with traces of brownish-yellow colour on frons and face; frons forming a rather conspicuous conical prominence. The whole occiput and frons with a little black pubescence, and some longer pubescence on under side of head. Proboscis, palpi and labella concolorous brown with lighter patches here and there, all pubescent. Antennae with 1st joint long, brown, with soft black hairs, 2nd short, brownish-yellow, bare, remainder nearly black, with a whorl of four hairs at base of each segment.

Thorax rich dark brown; traces of three darker stripes on anterior margin; the ground colour lighter on dorsum behind the suture; the hind margin from wing roots up to and including the scutellum, lighter, and of a slightly livid grey tinge. Sides of thorax concolorous with dorsum; metapleurae well defined, lighter brown; metanotum rich dark brown (with a very narrow pale median line), a little lighter on hinder side. The whole thoracic dorsum, scutellum and metanotum with short soft black hairs, but sides of thorax practically bare.

Abdomen dark brown, but duller and less rich than thorax, slightly narrowed at base, widest at about the 4th segment, the whole dorsum with microscopic pubescence, which is longer towards sides of first two segments. Belly similar to dorsum. Ovipositor moderately long, bright ferruginous.

Legs only moderately long, bright reddish-brown; coxae black, femora with subapical black ring, extreme base of tibiae pale yellow; tarsi a little darker brown.

Wings.—*Anterior cross vein absent*, owing to the basal section of the 3rd longitudinal vein being so long as to reach the corner

of the discal cell before the vein turns horizontally. Ground colour of wing pale yellowish-grey; costal and subcostal cells brownish-yellow, the colour extending a little below the 1st longitudinal vein, and about the stigmatic region. The wing distad of the two basal and the anal cells, and of the yellow stigmatic region embracing the discal cell, is grey, except for clearer spots (showing the pale yellowish-grey ground colour of the wing) placed as follows:—A long one in the 1st posterior cell, occupying the major part of its apical half, and extending in its middle, narrowly into the 2nd submarginal cell, ending at the wing border near tip of lower branch of 2nd longitudinal vein. This latter cell also has a small oval pale spot at its tip. A small elongate pale spot towards the tips of 2nd, 3rd, 4th and 5th posterior cells, and traces of a small similar one at the base of the 3rd, 4th and 5th cells. Lower part of 1st basal, and apical part of 2nd basal, mainly, and some streaks in the anal and axillary cells also, pale. A narrow elongate *hyaline* spot lies across the vein separating the 1st basal and the discal cell; and there is a black oval spot on the costa at tip of 1st vein, extending to the forking of the 2nd vein; and another spot over base of 2nd vein. Halteres blackish-brown.

Described from a unique ♀ in fair condition, Darjiling, iv-1912.

There are three other apparently undescribed species of *Tipula*, one, a ♂, with blackish wings with a few small yellowish spots, taken in Government House grounds, Darjiling; the 2nd species is a ♂ from Sikkim, with pale yellowish-grey wings, and the 3rd has grey wings slightly infuscated, and comes from Senchal, represented by a ♂ and ♀. All these are in too bad condition to be set up as types.

Dicranomyia pulchripennis, Brun.

One ♀, Darjiling, 1000—3000 ft.

Eriocera nepalensis, Westw.

One ♂, Darjiling, 1000—3000 ft.

STRATIOMYIDAE.

Ptilocera fastuosa, Gerst.

Three (♂ ♀), Darjiling, 1000—3000 ft., May and June, 1912.

STRATIOSPHECOMYIA, mihi, gen. nov.

(*Pachygastrinae*).

Head flattened, semicircular, narrower than greatest width of thorax, nearly bare; occiput not at all projecting behind eyes; ocelli on small, very distinct prominence, equidistant. Eyes in ♂ quite contiguous for a moderate distance, hinder and lower facets

distinctly smaller than anterior and upper ones. Proboscis thick, apparently moderately long but mainly concealed within the mouth opening, probably producible; palpi elongate, a little pubescent, apparently of one joint only. Antennae elongo-cylindrical, nearly filiform, two-thirds as long as head and thorax together; 1st joint about twice as long as broad, 2nd about half this length; flagellum with eight distinct annulations, subequal, except the last which is rather longer and pointed.

Thorax approximately oval, widest at level of wings, only slightly arched; microscopically pubescent here and there. Scutellum of moderate size, semicircular or sub-triangular, unspined.

Abdomen apparently 5 jointed, the emargination between the 2nd and 3rd joints extremely indefinite, possibly these forming but a single joint. The 1st joint very short, transverse, 2nd as wide as 1st at base, thence suddenly narrowing at half its length to cylindrical form, the 3rd at base as wide as tip of 2nd, rapidly widening to tip; the abdomen widening to tip of 4th segment, thence rapidly narrowing, the tip rounded, the 2nd to the 5th segments subequal in length. Abdomen with a little soft pubescence towards sides at base. Genitalia exposed, fairly complex, consisting of a dorsal plate and a pair of two-jointed hairy claspers, with, apparently, at least one other pair of appendages.

Legs quite slender, moderately long, minutely pubescent; hind legs longer and slightly stouter, hind femora barely thickened towards tips, hind metatarsi distinctly incrassated, larger and longer than the remainder of the tarsus; 4th tarsal joint of all the tarsi distinctly shorter than any others.

Wings well developed, fairly broad, a little longer than abdomen, venation as in *Pachygaster*, distinct, halteres large.

N.B.—In my table of genera (Rec. Ind. Mus. I, 89) this genus will separate from *Salduba*, Walk., on the following characters: the pedunculated abdomen, the different construction of the antennae, the longer wings (unless Walker by a *lapsus calami* has written thorax instead of abdomen, which seems probable), and lastly on the greater breadth of wing. The differences in the abdomen and antennae alone are sufficient to require a new genus.

The ♀ unknown.

Stratiosphecomyia variegata, mihi, sp. nov.

(Pl. xiv, figs. 14, 17).

♂ Darjiling, 1000—3000 ft.

Long. 11—12 mm.

Head.—Eyes contiguous for one-fourth the distance from vertex to antennae, vertex rather depressed, with conspicuous ocellar prominence, wholly black. Frontal triangle brownish-yellow, bare, shining, flush with eyes. Face lighter brownish-yellow, with almost microscopic whitish pubescence, and two large circular black spots below base of antennae. The hinder part of the lower part of the head black. Proboscis and palpi brownish-yellow, withdrawn, with a little pale pubescence. Antennae

cylindrical, nearly filiform, scape brownish-yellow, bare, 1st joint twice as long as 2nd, flagellum black with 8 annulations, subequal, except that the last one is a little longer and pointed.

Thorax black, microscopically pubescent, with bright lemon-yellow markings as follows:—On anterior margin of prothorax; the humeral calli; a large triangular mark at each end of the transverse suture, in front of root of wing; a broad band from shoulder to wing base; the posterior margin of dorsum of thorax broadly yellow, in the form of four contiguous triangles, the outer ones approximate to wing bases; a large spot placed diagonally on the sternopleura; a curved one between it and the wing base and a last one behind the wing, almost contiguous to the metanotum. Sides of thorax with extremely short and rather sparse pubescence, which is black or yellow in accordance with the colour of the surface.

Abdomen.—Basal segment reddish-brown, 2nd, except perhaps at extreme tip, black; remainder of abdomen reddish-brown, with a narrow indistinct transverse blackish streak at base of 4th, and a similarly coloured subquadrate large spot on base of 5th, filling the major part of the segment.

Legs.—Coxae black, tips sometimes a little paler; anterior legs yellowish, tibiae indistinctly a little darker, fore tarsi black, except metatarsus, middle metatarsi yellowish-white, rest of tarsus brownish-yellow. Hind legs brownish-yellow, with indistinct traces of brown here and there, base of femora narrowly pale yellow; tibiae rather flattened at base and slightly pinched beyond the middle, with two indistinct though fairly obvious moderately broad blackish rings, one just beyond base, the 2nd sub-apical; tarsi brownish-yellow, last two or three joints black; the 4th joint in all the tarsi much shorter than any of the others.

Wings pale grey, gradually darker on apical half, stigmatic region moderately dark brown, ill defined; halteres large, yellow. Venation as in *Pachygaster*.

Described from five ♂♂, Darjiling, 1000—3000 ft., May, 1912. All have been in papers (not in spirit) and are more or less compressed, especially the thorax.

Craspedometopon frontale, Kert.

A ♂ from Darjiling, 1000—3000 ft., agreeing exactly with specimens in the Indian Museum supplied by Prof. Kertész, in which collection are also two others from Tenasserim.

? *Gen. nov.* near *Acanthina*, W.

A single ♀ from Darjiling 1000—3000 ft., apparently represents an undescribed genus near *Acanthina*, but is in too bad condition to describe.

Ptecticus wulpilii, Brun.

Several specimens from Darjiling, 1000—3000 ft., v-1912, and Singla, iv-1913, of this rather common Sargid. The extraordinary

resemblance in colour, size, and amount of infuscation of the wing tip between this species and the Tipulid *Pselliophora compedita*, W. seems more than coincidental. Possibly one is distasteful to the birds and the mimicry of the other is protective.

***Eudmeta marginata*, F.**

Five ♂♂ from Darjiling, 1000—3000 ft., June, 1912.

***Ampsalis longispinus*, mihi, sp. nov.** (Pl. xiv, figs. 2, 4, 16).

♂♀ Darjiling, 1000—3000 ft. Long. 10—13 mm.

Head twice as broad as long. Eyes in ♂ contiguous for the greater part of the distance from vertex to antennae; frons shining black in ♂, in ♀ from one-fourth to one-fifth the width of the head, less shining, bare. Ocelli on a distinct prominence, yellowish. Antennae black, 1st and 2nd joints subequal, cylindrical, barely broader at the narrowly brown tips, minutely spinose; 3rd joint cylindrical, almost filiform, pointed, with 8 annulations. Occiput black, minutely pubescent.

Thorax dull black, with microscopic pubescence which in perfect examples is probably blackish or dark grey. Traces of a little brownish-yellow colour behind the wings, and the hind corners of the dorsum distinctly so coloured. Scutellum conspicuous, though of normal size, shining aeneous or blue-black, with some soft (? pale) hairs, and two apical very long and powerful reddish-brown spines, half as long as the abdomen, diverging and directed slightly upwards.

Abdomen brownish-yellow; 1st and 2nd segments mainly black, hind border of latter brownish-yellow, 3rd and 4th each with a rounded or subquadrate blackish spot of considerable size towards each side of the dorsum, but clear of the margins. In the ♀ these four spots are much larger and nearly fill the surface of these segments. The 5th and 6th segments in both sexes mainly black, but sides and hind margins brownish-yellow. Belly with 1st, 2nd, 4th and 5th segments mainly black, remainder brownish-yellow. In the ♀ the black colour is a little more extended; in both ♂ and ♀ the belly has very short yellowish pubescence over its whole surface. Genitalia in ♂ concealed, in ♀ a narrow, cylindrical tube, with a pair of rather long brownish-yellow hairy filamentous appendages.

Legs yellow; hind tibiae incrassated on apical two-thirds, black; hind tarsi longer than tibiae, the hind metatarsus black for two-thirds of its length, and being as long as the remaining joints taken together.

Wings distinctly yellowish, very shining, apical third and hind margin grey; stigma black or blackish-brown, veins blackish; halteres yellow.

Described from 3 ♂♂ and 4 ♀♀ from Darjiling, 1000—3000 ft. v, vi-1912 and Singla, iv-1913, in fair condition.

N.B.—There is nothing to materially prevent this species coming in *Ampsalis*. The head is barely as wide as the thorax at its widest part, and Walker says the scutellum is armed with two oblique ascending spines, but does not mention their great length. The only apparent discrepancy is that he says the flagellum is about twice the length of the scape, whereas in the present species it is fully three times as long, but this difference would not be generic.

Odontomyia rufoabdominalis, mihi, sp. nov.

♂ Darjiling, 1000—3000 ft.

Long. 17 mm.

Head black, a little shining. Eyes absolutely contiguous for a short space, leaving a very elongate narrow vertical triangle. Vertex considerably prominent, with a few black hairs; ocelli pale yellowish. Face but little prominent, with short black and grey hairs. Antennae black, 1st and 2nd joints normal, 1st black, 2nd dull brownish (3rd missing). Two small tufts of grey hairs immediately above antennae, and a trace of grey hairs along the sides of the face.

Thorax black, slightly shining, dorsum and sides with moderately thick, not long, black and grey hairs, set in minute black sockets which give the dorsum a granulated appearance, often two or three hairs emerging from the same socket. Small patches or bunches of grey hairs occur around the base of the wing and on the pleurae. Scutellum similarly clothed to the thorax, with a fringe of rather ragged grey hair on posterior border and a short blunt spine at each hind corner.

Abdomen.—Ground colour of 1st and 2nd segments and major portion of 3rd, 4th and 5th black, a little shining, the sides of the dorsum, nearly from the shoulders to the extreme tip, and the hind margins of the 3rd, 4th and 5th and the bulk of the 6th segment all bright reddish-orange, covered with similarly coloured pubescence. The black parts are clothed with sparse black pubescence, a small patch of greyish hairs on hind corners of 2nd segment, and some yellow hairs extend along the narrow red side edges of the abdomen, nearly or quite to the shoulders. Belly dull reddish-orange, becoming brighter towards tip, the central part of most of the segments more or less black. Pubescence of belly wholly reddish-orange, short and depressed.

Legs black, with a little short greyish hair; under and inner sides of tibiae towards tips and about the apical half of the anterior and the whole of the hind tarsi (the latter lengthened) orange yellow, with short gold pubescence.

Wings yellowish-grey stigmatic region black; the major portion of the middle of the wing from anterior margin nearly to posterior border darker brown, the colour fading away gradually. Halteres buff; thoracic squamae milk-white with similarly coloured soft hair.

Described from a single ♂ in good condition, Darjiling, 1000—3000 ft., June, 1912. A very handsome species and totally unlike anything described from the East.

TABANIDAE.

All the specimens of this family are in bad condition through immersion in spirit, three species being present, one, which though I cannot identify it, appears to fall in Miss Ricardo's "group IX," represented by a short series of examples in less inferior condition than the remainder.

BOMBYLIDAE.

Hyperalonia tantalus, F.

Several from Darjiling, 1000—3000 ft.

H. flaviventris, Dol. or *oenomaus*, Rond.

One ♂ from Darjiling, 1000—3000 ft., July, 1912, is probably one or other of these species.

Argyramoeba distigma, W.

Three from Darjiling, 1000—3000 ft., and Singla.

MYDASIDAE.

Mydas carmichaeli, mihi, sp. nov.

♂ ♀ Darjiling District. Long. ♂ 25, ♀ 27 mm.

Head black, frons slightly wider than one-third of the head, slightly wrinkled, with a moderate amount of blackish-brown pubescence; a small tuft of greyish hairs on each side of the mouth opening. Proboscis rather less than the height of the head, dark brown; palpi slender, black, reaching as far forward as a vertical line drawn through the antennal prominence, which latter is small and black. Antennae normal, black, bare, about as long as from the vertex to the tip of the proboscis. Occiput black, shortly pubescent; a little grey tomentum behind the eye border.

Thorax wholly dull velvet black with very short sparse black pubescence, which is a little longer below the wings.

Abdomen shining black with a slight indigo-blue tinge, and very short pubescence; in ♂ subcylindrical, as long as head and thorax together and barely as wide; in ♀ a little broader and longer and much more bulky. The ♂ genitalia consist of a hollow triangular piece, hairy above, with a deep keel, a pair of dark reddish-brown, nearly bare, moderately long, narrow, finger-like claspers (only one joint being visible, the organs being somewhat withdrawn), and a curved ventral plate, with black pubescence on its lower side. The ♀ genitalia appear to consist

of two telescopic cylindrical shells, the inner one ending in two small (probably) retractile lamellae.

Legs wholly black; coxae with a little short black pubescence; hind femora with two rows of spines on under side, an inner one of about a dozen and an outer one of a few only. Hind tibiae with a row of reddish spines on under side (not at all conspicuous), and 5 or 6 such spines at the tip on the under side only. Fore tibiae with some inconspicuous spines at tip, which appear to be only the terminal ones of a row on the under side nearly hidden by the thick though short black pubescence which clothes all the tibiae. A row of spines including the apical ones is apparently present on the middle tibiae also, though certainly much less conspicuous. Claws distinct, pulvilli pale brownish-yellow.

Wings dark blackish-brown, a little paler towards tip and hind margin, and with a strong violet tinge. Halteres and squamae black, the latter with a narrow fringe of dark brown hair.

Described from a single pair, the ♂ from Darjiling, v-1912, the ♀ from Singla, iv-1913. Both are perfect specimens and the ♂ has not been immersed in spirit.

ASILIDAE.

There are a good many specimens of this family, but nearly all are valueless from immersion in spirit. About 15 examples are fairly or quite good, representing about half that number of species, but I am at present unable to identify oriental species in this family.

SYRPHIDAE.

Baccha robusta, Brun.

Four specimens, ♂ ♀, Darjiling, 1000—3000 ft.

Didea ovata, Brun.

One ♂, Darjiling, 1000—3000 ft.

Syrphus spp.

Several specimens; two species, of which one is either *ribesii*, L., or allied to it.

Asarcina aegrotus, F.

One from Darjiling, 1000—3000 ft. The head being crushed, the sex is indeterminable.

Milesia gigas, Macq.

Three, ♂ ♀, Darjiling, 1000—3000 ft., and Singla, v-1913.

Milesia balteata, Kert.*(M. himalayensis*, Brun.).

A good series of both sexes in bad condition, Darjeeling, 1000—3000 ft., Singla and Sevook, 1000 ft., Darjiling District, iv-1913.

Milesia variegata, Brun.

Several of both sexes in bad condition from Darjiling 1000—3000 ft., and Singla.

Milesia ? macularis, W., var.

A single ♀ from Singla is near this species but there are several discrepancies, as for instance a second, smaller pair of yellow spots on the 2nd to 4th segments, whilst the colouration of the antennae and legs is different. The specimen is not sufficiently well preserved to describe as new, but a figure is given of it.

Milesia ferruginosa, mihi, sp. nov. (Pl. xiv, fig. 12).

♀ Darjiling, 1000—3000 ft.

Long. 10—17 mm.

Head rich shining yellowish-brown, a large, approximately oval, bright yellow-dusted spot on each side of middle of frons contiguous to eyes. Traces of yellow dust on cheeks and above mouth opening, where are also a few short yellow hairs. Vertex with some short stiff black hairs. Frons just above antennae one-third the width of the head, diminishing to half that width at vertex, with a few scattered black hairs. Proboscis, palpi and labella blackish, the latter rather large, antennae wholly shining yellowish-brown, 3rd joint deeper than long, the anterior edge straight, arista concolorous. Occiput bright yellow-dusted.

Thorax brownish-yellow; dorsum mainly filled by three nearly or quite contiguous black stripes of equal width, not attaining anterior margin, but the two outer stripes reaching posterior margin. The spaces between the stripes on anterior part occupied by two narrow gold dust lines, broadest in front, and extending posteriorly to just beyond the suture. Humeral calli distinct, a little brighter yellow. Whole dorsum with minute black or yellow pubescence, following the ground colour. Scutellum deep reddish, broadly black at base, whole surface with moderately long black softer pubescence and numerous isolated longer hairs. Posterior border with sparse fringe of very short golden yellow hairs. Sides of thorax black; mesopleura wholly, and the adjacent margins broadly of the pteropleura and sternopleura, with a space below the shoulders brownish-yellow.

Abdomen.—The 1st segment all black, 2nd black, with a very narrow but well defined lemon-yellow band a little beyond the base, tip of segment with short yellow hairs; 3rd and 4th segments with a moderately broad chrome-yellow band at base, followed by a narrow, not well defined, though distinct, black

band, more or less emarginate in the middle, the remainder of each segment rather bright reddish-yellow. The whole dorsum of abdomen with short recumbent yellow hairs, which are nearly whitish on the 1st segment and become more reddish-yellow on the 3rd and 4th segments. Genitalia withdrawn, apparently fairly large, reddish-yellow with black hairs. Belly black, yellow haired, posterior margins of segments narrowly yellow.

Legs.—Femora reddish-yellow or orange; basal half of posterior pairs black, front sides of anterior femora with black stiff pubescence, hinder sides with longer and softer hairs, especially on apical half. Hind femora with a small yellowish tooth just beyond two-thirds of its length, pubescence covering most of the limb yellowish, but some longer black hairs on underside. Tibiae yellow, posterior pairs paler, all with short and rather close pale yellow pubescence. Tarsi pale yellow with concolorous pubescence, fore pair with traces of blackish here and there.

Wings pale grey; yellowish-brown from costa to spurious vein, the colour extending just behind the apical half of the 3rd longitudinal vein. Halteres small, black.

Described from three ♀♀ from Darjiling, 1000–3000 ft., and Singla, also from three ♀♀ sent me for identification by Dr. Imms, taken by him in the Kumaon district, 13-v; 18-v; 18-vi-12. The species seems remarkably constant in its markings and colouration but varies considerably in size. It seems to come near *M. doriae*, Rond., described from Borneo.

***Eumerus rufoscutellatus*, mihi, sp. nov.** (Pl. xiv, fig. 13).

♂ Darjiling.

Long. 12 mm.

Head.—Eyes contiguous for only one-fourth the distance from vertex to antennae, rather suddenly separated above this space, forming a moderately wide frons which is black, with black hairs in the middle and bright yellow hairs on vertex and lowest part; facets of uniform size throughout except those immediately in front. Frons flat, not at all prominent, yellowish-grey with bright yellow hair. Antennae large, rather dark brown, first two joints normally bristly; 3rd joint a little lighter on upper side, with microscopic grey tomentum, rounded above to tip, straight on lower side, a long dorsal arista.

Thorax violet-aeneous, moderately shining, with moderately dense short brownish-yellow pubescence, and two widely separated grey tomentose longitudinal stripes from anterior margin to scutellum, and a stripe along the transverse suture, but interrupted between the two longitudinal stripes. Humeral calli aeneous, with a little yellow pubescence. Sides of thorax blackish-aeneous with a considerable amount of bright yellow hair on pleurae. Scutellum broad, violet-aeneous, covered with copious long bright yellow hair.

Abdomen dark aeneous black, not very shining, basal corners a little steel coloured viewed from certain angles; a pair of diverg-

ing, narrow, elongate, grey tomentose stripes on 2nd, 3rd and 4th segments, beginning approximately near base of segment and extending nearly to posterior corners. Surface of the abdomen with microscopic pale yellow pubescence, which is brighter and longer on hind margins of segments, and there is a patch of bright reddish-orange pubescence at basal corners of 2nd segment. Tip of abdomen with black hairs. Belly blackish, with a little sparse yellow pubescence.

Legs black; basal half and tips of anterior tibiae and the anterior tarsi brownish-yellow; hind legs black, except knees, tips of tibiae and apical part of each tarsal joint. All legs with yellow pubescence, rather long on femora and tibiae, especially on hinder and under sides; hind tarsi considerably incrassate, with bright reddish-brown pubescence.

Wings grey, stigma small, blackish; anterior cross vein at two-thirds of the discal cell, very sloping; halteres yellow.

Described from one ♂, in inferior condition from immersion in spirit, from Singla.

Xylota annulata, mihi, sp. nov. (Pl. xiv, figs. 11, 15).

♂ ♀ Darjiling District.

Long. 11 mm.

Head.—♂ Eyes contiguous for half the distance from the black vertex to the face; frons a small triangle, with very short grey pubescence below the space occupied by the reddish ocelli. Face black on upper part, yellow on lower part, wholly covered with yellow tomentum except the shining black upper side of the antennal prominence. Antennae rather dark brown, shining, bare of pubescence, but with a few short bristles on two basal segments; mouth parts blackish-brown. Occiput blackish, with a little sparse yellowish-grey hair behind the eye borders. In the ♀ the frons less than one-fifth of the head at the vertex, widening distinctly down to the antennae, all black, with a little very short bright yellow pubescence which may (apparently) extend over the whole frons except perhaps towards the vertex.

Thorax aeneous, a little bronze reflection viewed from certain angles; two median well separated stripes of bright minute golden yellow hairs from anterior margin nearly to scutellum; a little similar hair on shoulders, hind corners of dorsum and at each end of the transverse suture; shoulders a little yellowish. Sides of thorax black, with a yellowish tinge to the mesopleurae, which bear a little bright yellow hair. Scutellum dull aeneous black with a little very short yellow pubescence around the margin.

Abdomen.—The 1st segment mainly yellowish, rest of dorsum black with, on each side of the 2nd and 3rd segments, a subtriangular or semicircular yellow spot, extending nearly the length of the side margins and spreading inwards until only a rather narrow median black intervening space is left. The 4th segment in ♂ and ♀ shining aeneous, brighter in ♀ (this may be mere individual variation), 5th segment in ♂ yellow; both 4th and 5th segments

in both sexes with a little short bright yellow pubescence, of which there is also a little at the basal angles of the abdomen. The whole yellow part of the dorsum with minute yellow pubescence, of which a little occurs on the belly.

Legs bright yellow, hind femora exceedingly incrassated (as in *Syritta*), with a broad black median band, widest on upper side, and a narrow black apical band. Hind tibiae and tarsi and anterior tarsi tips black.

Wings pale grey, anterior cross vein just beyond middle of discal cell and distinctly sloping; stigma pale yellow, halteres yellow, squamae yellow with yellow fringe.

Described from a ♂ from Singla, iv-13, and a ♀ from Darjiling, 1000-3000 ft., v-12.

N.B.—The hind femora are much more incrassated than is normal in *Xylota*, but the species fits into this genus better than elsewhere. It might be placed in *Syritta*, to which its general resemblance is striking, but for the position of the anterior cross vein.

Mallota rufipes, mihi, sp. nov.

♂ Darjiling District.

Long. 12 mm.

Head.—Frons at vertex one-fifth total width of head, considerably wider at level of antennae; black, a little shining, with some black hairs, which apparently do not continue as far as the antennae; ocelli at vertex on the barely perceptibly raised surface. Face moderately produced, wholly black, bare, but for a little whitish-yellow pubescence. Antennae bright yellowish-brown, on a distinct, shining black prominence, the tip of which is bright yellowish-brown; 3rd joint grey-dusted, arista bright yellowish-brown, bare.

Thorax wholly dull black, with thick long black pubescence; scutellum dull reddish-brown with thick black pubescence.

Abdomen rather curved, dull black, with thick black pubescence; apical part of 4th segment and whole of 5th with a little grey tomentum. A bunch of very bright orange-yellow hairs towards sides of 2nd segment. Belly dull black, pubescent.

Legs.—Coxae and about basal half of femora black, with black pubescence; remainder bright reddish-orange, with thick dense concolorous pubescence. Hind femora almost straight, considerably deepened, with numerous small spines below towards tip; hind tibiae distinctly but not greatly curved, considerably flattened and moderately deepened. Pulvilli orange, claws orange on basal half, remainder black.

Wings pale yellowish-grey, apical half a little infuscated, embracing loop of 3rd longitudinal vein; marginal cell obviously but not widely open; anterior cross vein exactly at middle of discal cell, slightly sloping; anal vein continued straight, almost to the wing border. Halteres dull brownish-yellow.

Described from a single ♂, Singla.

N.B.—The pubescence is considerably matted in this specimen through it having been immersed in spirit, and though the colours may not have altered, they are probably brighter in fresh specimens and the black parts of the surface more shining.

***Eristalis tenax*, L.**

A ♀ from Senchal, 8000 ft., v-1913.

***Eristalis orientalis*, W.**

Three ♂♂ from Singla.

N.B.—Two other species, a ♂ of each, are present, which cannot be identified with certainty.

***Megaspis crassus*, F.**

One ♀, Darjiling, 1000-3000 ft

***Megaspis zonalis*, F.**

Two ♀♀, Darjiling, 1000-3000 ft.

***Axona cyanea*, mihi, sp. nov.¹ (Pl. xiv, fig. 3).**

♂ Darjiling District.

Long. 11 mm.

Head set closely on the thorax. Eyes touching for a considerable space, chocolate-brown, upper facets distinctly larger than lower ones. Vertical triangle small, black, with a little black pubescence; ocelli red. Frons rather prominent, brilliantly shining violet, with soft black hairs. Face brilliantly shining violet, distinctly prominent, cut away below antennae and produced over mouth opening, provided on each side of the latter with a small blunt point. Mouth parts concealed, blackish. Antennae blackish-brown, 1st and 2nd joints short, normal, with a few short bristles, 3rd rounded, dull, with basal brownish-yellow bare arista (the latter under high microscopic power being seen to bear a few pale hairs towards the base). Occiput black, hind border of eyes narrowly margined with grey tomentum.

Thorax, scutellum and abdomen shining violet-blue, all covered with short stiff black hairs. Belly dark with black pubescence.

Legs black with violet-blue tinge; hind femora rather flattened and considerably deepened until just before the tip; no bristles or spines are obvious. Hind tibiae barely curved and with a slight peculiar thickening in the middle. All the legs with short soft black pubescence, tarsi with a little golden brown pubescence on underside; claws and pulvilli well developed.

Wings clear, rather pointed, marginal cell almost closed on the border; anterior cross vein immediately beyond the exact middle of the discal cell, slightly sloping; 6th longitudinal (anal) vein

¹ See addendum, p. 277.

continued almost to the wing margin, nearly straight. Alulae large, thoracic squamae rather large, dirty white with rather thick dark fringe; halteres very small, bright yellow.

Described from a single perfect ♂, Singla, April, 1913

N.B.—This species has every appearance of a large *Calliphora*. There can be little doubt of it belonging here. The head, thorax and abdomen are closely applied to one another, answering to Walker's expression "body subfusiform"; his "wings acute" is another point of resemblance, and the purplish-blue colour of the only species previously known, *chalcopyga*, W., is a final similarity.

Ceria javana, W.

Four ♀♀, Darjiling, 1000-3000 ft.

Ceria trinotata, Meij

A good series of both sexes in inferior condition from Darjiling, 1000-3000 ft., and Singla.

Ceria triangulifera, mihi, sp. nov. (Pl. xiv, fig. 10).

♂ ♀ Darjiling, 1000-3000 ft.

Long. 12-13 mm.

Head.—Eyes in ♂ contiguous for a very short space only, ocellar prominence occupying the whole of the vertical surface; a little gold hair immediately above the point of junction of the eyes. Frons wholly black, remainder of front part of head down to the mouth opening rather bright lemon-yellow. A large semicircular black spot (convex side uppermost) embracing the antennal prominence, joined to the upper black part of the frons by a somewhat narrow black stripe, and also joined by a black stripe below the antennae to an irregular elongate-triangular spot on the face (apex downwards), with rounded angles and incurved on the two sides. The lowest part of this triangle does not quite reach the mouth opening. Cheeks lemon-yellow with a broad black stripe from lower corner of eye to lower corner of cheek. Mouth parts blackish. Antennal prominence ferruginous brown; basal half of 1st joint, apical half of 2nd and the 3rd joint black, the three joints forming an elongated club. A broad, bright yellow band behind the vertex and upper part of hind margin of eyes. Occiput black, yellowish towards sides.

Thorax dull black with just perceptible black pubescence and lemon-yellow more or less oval spots placed as follows: on humeral calli, at each end of transverse suture, on mesopleurae and one placed transversely on the sternopleurae. There is also a faint yellow line extending indistinctly along the suture. Scutellum yellow, with a basal, rather small, black, semicircular spot; metanotum black.

Abdomen black; 2nd segment often with a narrow dull reddish-brown tinge at base and tip. A large yellow spot at sides of 1st

segment, and the hind margins of 2nd, 3rd and 4th segments yellow; a little yellow tomentum on hind part of 4th segment.

Legs.—Coxae black; femora lemon-yellow, anterior pairs a little brown on apical half, and with a black irregular streak on underside; hind pair lemon-yellow on basal half, brownish-yellow on apical half, with an intermediate black band, which is considerably wider on the underside. Tibiae brownish-yellow, a little darker towards tips, hind pair moderately curved. Tarsi light brown.

Wings grey, anterior part as far as spurious vein on basal half, and as far as 3rd vein on apical half, rather dark brown. Halteres yellow.

Described from one ♂ and several ♀♀, Darjiling District, 1000–3000 ft., May, 1912.

N.B.—Three other species of *Ceria* are present, all apparently undescribed. The first is near *fruhstorferi*, represented by a good series of both sexes from Darjiling District and Singla; of the second three specimens (♂♀) from Singla are present; of the third, which is near *apicata*, four specimens (♂♀) are present from Singla.

CONOPIDAE.

Physocephala quadrata, mihi, sp. nov. (Pl. xiv, fig. 5).

♂♀ Darjiling.

Long. $7\frac{1}{2}$ –9 mm.

Head yellow or brownish-yellow. Frons just over one-third the width of the head, barely wider on its upper part, dull yellow, more or less irregularly infuscated with black, sometimes nearly wholly black. Mouth opening more or less blackish, proboscis black, twice as long as the head. Antennal 1st joint reddish-brown, 2nd black above, reddish-brown below, brighter on apical fourth, the colour at the tip often encroaching on upper side also; 3rd joint black above, reddish-brown at least on basal part of underside. In some examples the whole tip of the 2nd and base of the 3rd are reddish-brown above as well as below. Occiput blackish, more or less black infuscated here and there.

Thorax wholly brownish-yellow; a quadrate dull black spot nearly filling the dorsum, but not attaining the margin, although connected with the anterior margin by a short broad black stripe. Scutellum and metanotum probably reddish-brown normally, the latter with a little gold tomentum at the actual sides. Sternopleurae and mesopleurae with a little silvery-white shimmer.

Abdomen brownish-yellow or reddish-yellow; 1st joint black, 2nd with a black streak on dorsum at base, 3rd with about the middle third or more black, 4th, 5th and 6th with more than basal half black, a broad band of bright gold tomentum on hind margin of 3rd and 4th segments; apical half of 5th and about the same of the 6th in ♂ (and nearly whole of 6th in ♀) similarly dusted with gold tomentum, which is, however, less bright. The 5th segment is very short in the ♂ and the 6th considerably lengthened, although in the ♀ both are normally shaped.

Genitalia in ♂ large, ellipsoid in shape, reddish-brown, smooth, shining, with a small shining bare, black 2nd joint at tip, and the usual triangular hollow appendage below 5th segment. Genitalia in ♀ small, black. The degree of slenderness of the basal part of the abdomen is slightly though distinctly variable.

Legs brownish-yellow. Coxae black, hind pair with silvery-white dust; hind femora with a broad black ring situated so that the limb is broadly brownish-yellow at base and rather narrowly so at tip. All tibiae with a silvery-white shimmer, with a tinge of pale lemon-yellow on basal part; hind pair black towards tips on inner sides. Tarsi more or less blackish above; pubescence brownish-yellow.

Wings pale grey. Anterior part moderately dark blackish-brown from costa to 3rd longitudinal vein, the colour sharply demarcated, and extending distally to level with about the middle of the 1st posterior cell, but without any sharp demarcation. Costal cell often a little paler. Halteres yellow.

Described from several of both sexes from Singla

N.B.—These specimens have all been immersed in spirit and the finer points are therefore indefinite. The characters depicted, however, appear constant, except of course those stated to be variable. The species is probably bare on the head and thorax, though this is not certain; a limited amount of very short black pubescence on the abdomen. It must bear some resemblance to *P. testacea*, Macq., *calopa*, *tenella* and *nubeculosa*, Bigot.

Conops sp.

One ♀ from Darjiling, 1000–3000 ft., in too indifferent condition to identify.

MUSCIDAE.

Of the *Muscidae* most of the calyptrates are valueless from immersion in spirit, but they include several specimens of a large Tachinid, which has a general resemblance to the common European Muscinid *Mesembrina meridiana*, except that it has a dull reddish-brown abdomen; one or two *Sarcophagae*, a *Calliphora*, a *Rutilia* and some others.

Amongst the acalyptrata there is a *Calobata*, a Trypetid, an Ortalid and one or two others, all represented with one exception by single specimens, and in addition the two following species.

Xenaspis vespoides, Meij.

Five of this very large handsome species, agreeing very well with Meijere's description and figure, from Darjiling, 1000–3000 ft.

Loxoneura ornata, mihi, sp. nov. (Pl. xiv, fig. 1).

Darjiling, 1000–3000 ft.; Dehra Dun. Long. 10–11 mm.

Head.—Frons and face to lowermost point of head almost of uniform width, one-third of the head, but slightly narrowed just

below antennae. Frons rich brownish-orange, vertex with a little more yellowish tinge, both with minute black hairs; ocellar triangle exceedingly small, barely raised above the surface. Facial triangle quite prominent and flat, pale yellowish, blackish towards tip. A narrow tomentose stripe on inner side of eyes from vertex to lower corner of eye, gradually widening from top to bottom, but when viewed from behind the whole of the sides of the face appear uniformly yellowish; the space between this stripe and the facial triangle brownish-orange as the frons. Mouth border narrowly black. Proboscis large, completely filling mouth opening, much swollen at tip, side view triangular, yellowish, labella and palpi concolorous; former with a little yellow pubescence, latter two-jointed, about as long as the 3rd antennal joint, elongo cylindrical, with a few hairs. Antennal 1st joint very short, 2nd distinctly longer than wide, both reddish-brown, with some small black bristles on upper side; 3rd joint ovate-conical with narrower rounded tip, bare, blackish, reddish-brown at base, arista rather long, basal, black, apical half plumose above and below.

Eyes oblong, twice as high as wide; occiput flush with vertex on upper half, much swollen posteriorly on lower half, almost equal in width to the eye; wholly brownish-yellow.

A single pair of post-vertical strong bristles towards corners of eyes, and a pair of oral vibrissae.

Thorax deep metallic indigo-blue, the surface studded with almost microscopic tubercles, from each of which two or three short stiff brownish-yellow hairs emerge. Sides of thorax and scutellum of a similar nature, latter with a row of several bristles on posterior margin. Humeral calli yellowish-brown, bare, a small similar dark brown callus bearing a single spine, at each end of the transverse suture.

Abdomen much curved downwards; shining metallic deep blue, studded with hair-bearing tubercles as the thorax. Belly mainly yellowish in centre. Genitalia deep blue, small, cylindrical, with a telescopic yellow interior piece.

Legs.—Fore coxae long, slender, smooth, shining, twice as long as posterior ones, the latter a little pubescent; fore femora with a row of 8 or 10 small spines on underside, extending nearly its entire length. Legs all blue-black, microscopically pubescent; pulvilli yellow.

Wings.—Ground colour pale grey; dark brown from anterior border to 5th longitudinal vein, and distally from base to the upturned section of the 5th vein, the colour thence rather sharply delimited in an oblique line to the anterior margin; the costa broadly brown to the tip, but sometimes this apical section of the brown colour is cut off from the remainder by a very narrow clear space. Beyond the middle of the wing a large semicircular spot on costa, extending nearly as far backwards as the 4th longitudinal vein, and more yellowish in front. Halteres blackish.

Described from a single specimen in good condition amongst Lord Carmichael's Diptera from Ghumti, 4000 ft., August, 1912,

and also from four other specimens of the species in the Indian Museum from Sikkim and Dehra Dun. One of these bears a label with the present name in Bigot's handwriting, and as it is in all probability a *nomen nudum* it is allowed to stand.

HIPPOBOSCIDAE.

Hippobosca capensis, Olfers.

Five specimens from Singla.

ADDENDUM.

Axona cyanea, ♀.

Since describing the ♂, a ♀ has been found amongst the same Diptera, from Darjiling District, June, 1913. It is similar to the ♂, the frons being one-fourth the width of the head, barely wider at level of antennae; face moderately projecting with two equal-sized bumps, not extending beyond the antennal protuberance; both frons and face being shining violet-blue.



1.



2.



5.



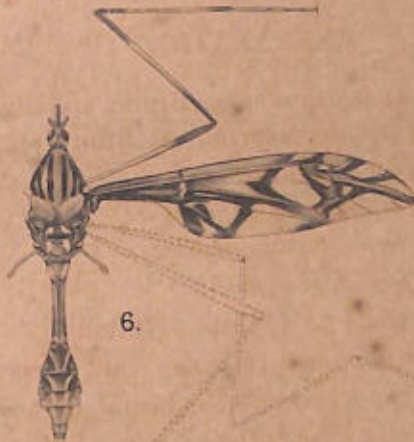
3.



8.



4.



6.



9.



10.



11.



17.



14.



7.



12.



13.



15.



16.

D. Bagchi, del.

Bombay Colln, Genl. by

XIX. ON SOME INDIAN CESTODA.

PART I.

By T. SOUTHWELL, A.R.C.S. (Lond.), F.L.S., F.Z.S.,
Deputy Director of Fisheries, Bengal, Honorary
Assistant in the Indian Museum.

The present paper on the Cestoda of British India is the first of a series which the writer proposes preparing, as opportunity permits.

Up to a very short time ago the number of species of Cestoda in the collection of the Indian Museum did not exceed twenty. These are all included in the present paper, together with much fresh material.

It is proposed in the second paper of this series to deal with Cestoda from birds, of which about 50 species have been collected up to date, and in the third with Cestoda from fish, of which we have at present about 70 species.

For the characters of the order Pseudophyllidea and the sub-family Dibothriocephalinae I am indebted to Stiles (1906).

The characters of the families Mesocestoides, Anoplocephalidae, Davaineidae, Hymenolepididae and Taenidae, with their sub-families and genera, are those given by Ransom (1909), whilst the characters of the genera *Rhynchobothrium*, *Tetrarhynchus*, *Otobothrium*, and *Syndesmobothrium* are after Linton (1887).

Order PSEUDOPHYLLIDEA, Carus, 1863.

= BOTHRIOCEPHALOIDEA, Braun, 1903.

General diagnosis:—Cestoda. Scolex armed or unarmed, with two groove-like suckers, situated dorsally and ventrally; they are usually not highly developed, but in some cases are considerably modified by development of their walls, or by more or less coalescence of their margins; or they may unite to form a single apical sucker, or may become rudimentary, their function being performed by an unpaired apical sucker. In some cases a pseudo-scolex may form. External segmentation present or absent. Neck present or absent. Three genital pores present; uterine pore is always on one of the surfaces; the vaginal and cirrus pores may be on the same surface as the uterine, or on the opposite surface, or marginal. Genital organs usually single, rarely double. Their development progresses from anterior end, posteriorly, but does not

pass from the mature stage into an atrophying stage. Testicles numerous, situated in two more or less separated lateral fields in the medullary layer; vas deferens always highly developed, usually forming a coil. Ovary distinctly or indistinctly bipartite, situated in distal portion of segment, usually median in forms with single series of genitalia; in forms with double series, sub-median; in forms with lateral pores, on side of median line toward the pore.

"Schluckorgan" always present. Vitelline glands with numerous follicles, situated in two more or less separated lateral fields nearly always dorsal and ventral, and usually in cortical layers. Eggs quite similar to those of *Fasciola*, but not always with operculum.

Family BOTHRIOCEPHALIDAE, Cobbold, 1864.

= DIBOTHRIOCEPHALINAE, Lühe, 1899.

With the characters of the order.

Sub-family (I) *LIGULINAE*, Mont. & Crety, 1891.

General characters:—Scolex armed, short and three-cornered. Suckers small and feeble. Neck absent. External segmentation present or absent. Genitalia simple. Genital pores situated ventrally, posteriorly, or close together, approximately median. Testes dorsal. Ovary median and ventral. Shell gland median and dorsal. Vitelline glands lateral. Vas deferens dorsal, strongly coiled, and lying in front of the opening of the cirrus pouch, which latter is continuous with the vesicula seminalis which is always present. Eggs covered. Adults in water-birds. Larvae in coelom of Teleosts.

Genus *Ligula*, Bloch, 1782.

General characters:—Adult form only, segmented anteriorly. These segments, however, do not coincide with the inner segmentation of the genitalia. Suckers feebly developed. Larvae without suckers and unsegmented. Larvae in coelom of Cyprinoids. Adults in water-birds.

Ligula simplicissima, Rudolphi, 1802.

Several specimens:—

Z E V ³³⁸⁶⁻⁷. No history.

Z E V ³³⁴¹. *Labeo rohita*. Berhampur, Bengal. T. Southwell.

Z E V ²³⁵². *Labeo rohita*. Calcutta.

Z E V ²⁰⁹³. *Nemachilus rupicola*. Kurseong, E. Himalayas. F. H. Gravely.

Another specimen has lately been obtained by the writer from *Rashora daniconius* from Sambalpur, Behar, June, 1913.

Synonymy:—

- Ligula intestinalis*, Gmel., 1790.
 „ *abdominalis* (Goeze, 1782), Gmel., 1790.
 „ *avium*, Bloch, 1782.
 „ *piscium*, Bloch, 1782.
 „ *monogramma*, Creplin, 1839.
 „ *diagramma*, Creplin, 1839.
 „ *uniserialis*, Rudolphi, 1810.

Literature:—

- Donnadieu, 1877. Zschokke, 1884.

Sub-family (II) *DIBOTHRIOCEPHALINAE*, Lühe, 1899.

Sub-family diagnosis:—Scolex unarmed: suckers either two small grooves (one dorsal and one ventral), or two funnel-shaped organs with highly developed borders, or, by coalescence of their borders changed to sucker-tubes, or rudimentary, and then replaced by an apical sucker. Neck present or absent. External segmentation complete. Genital organs single or double. Genital pores ventral, median or sub-median; cirrus, vagina and uterine pores in a longitudinal row, in order named; genital atrium, into which cirrus and vagina open, is provided with numerous papillae. Ovary ventral and shell gland dorsal, always median in forms with single sets of pores. Vitelline follicles always in cortical layer. Vas deferens very sinuous, running dorsally, and changing to a globular, or pyriform vesicula seminalis before opening into the cirrus pouch. Testicles in the medullary layer, for the greater part outside of the longitudinal bands. The vagina, extending ventrally, crosses the uterus near its pore, and widens to a receptaculum seminalis (the limits of which are not distinctly defined distally, but distinctly defined proximally) opposite the narrow and short seminal canal which unites with the oviduct to form the fertilization canal. Uterus often forms a "rosette." Eggs with operculum. Larval stages, for most species, unknown; adults in intestine of mammals, birds and reptiles.

(I) Genus *Duthiersia*, Perrier, 1873.

General characters:—The characteristic form of the head (three-cornered with the base anterior) is occasioned by the strongly curved funnel-shaped sucking organs. These are not perforated posteriorly as figures generally show, but are blind.¹ Neck absent. Yolk glands situated superficially. A sphincter vagina is present. Loops of the uterus not numerous, and on this account the rosette is seldom obvious. In *Varanus* spp.

Type-species *Duthiersia fimbriata* (Diesing, 1850) Mont. and Crety, 1891.

¹ See, however, Shipley, 1903. The perforations are quite distinct in our specimens.

Duthiersia fimbriata (Diesing, 1850), Mont. and Crety, 1891.

Four specimens:—

Z E V ³⁶⁶⁴. *Varanus exacanthematicus*. Katagum, N. Nigeria. Dr. J. H. Ashworth.

(Two specimens, presented by Dr. Ashworth.)

Z E V ³³⁰⁸. *Varanus* sp. Berhampur, Bengal. Major Clayton Lane, I.M.S.

Synonymy:—

Solenophorus fimbriatus, Diesing, 1854?*Duthiersia expansa*, Perrier, 1873.*Duthiersia elegans*, Perrier, 1873.

Literature:—

Lühe, 1899. Perrier, 1873. Montecelli and Crety, 1891.

The head-folds in our specimens had become so contorted during preservation that the identification was somewhat difficult. A similar contortion is figured by Shipley (1903).

(2) Genus **Bothridium**, Blainville, 1824.

General characters:—Scolex with two muscular sucking tubes, bearing openings at their anterior and posterior ends, which have been developed from bothridia by the growth of their free edges. In their walls there is a sphincter for each opening. Neck short. The yolk glands lie chiefly between the inner and outer longitudinal muscles. Uterus does not form a "rosette," but consists of two large cavities, connected with a delicate passage.

Bothridium pithonis, Blainville, 1824.

Several hundred specimens.

Z E V ¹⁶⁵⁷⁻⁸. *Python reticularis*. Goalundo, E. Bengal. Purchased.Z E V ²¹⁷⁹. *Felis tigris*. Onchagaon, Naini Tal, U. P. R. Hodgart, Museum Collector.

(It appears certain that this tiger had been feeding on a python.)

Z E V ¹⁶⁵¹. *Python molurus*. Nepal Terai. B. Warren.

Synonymy:—

Botrynocephalus pithonis (Retzius, 1830), Nordm, 1840.*Prodicoclia ditrema*, Lebland, 1836.*Solenophorus megaloccephalus*, Creplin, 1839.

Literature:—

Blainville, 1828.

Sub-family (III) **PTYCHOBOTHRIINAE**, Lühe, 1899.

General characters:—Scolex unarmed with two flattish suckers, which may, however, possess accessory suckers, or may be modified by a proliferation of their edges. Neck absent. All the genital openings lie on the surfaces of the segments. The cirrus

and the vagina open dorsally, uterus ventrally. The latter is coiled and runs dorsally. A vesicula seminalis, situated outside the cirrus-sac, is absent. The vagina crosses the uterus, and in this way reaches the ventral surface. A separate receptaculum seminalis is usually absent. Ovary ventral, and, in the case of single genital organs, always median. Shell gland median and dorsal. Yolk glands lateral, or even on the edges. Testes lateral, a large part of them lie external to the longitudinal nerves, which latter are situated much further inwards. The uterus never forms a "rosette." Genitalia often double. Eggs thin-shelled and without cover. In fish.

(1) Genus **Bothriocephalus**, Rudolphi, 1808.

General characters:—Scolex long. Suckers weakly developed. Neck wanting. Segments incomplete. Yolk glands in skin layer. Ovary median, ventral. No receptaculum seminalis. Mouth of uterus ventral and median, both other openings dorsal and median.

Bothriocephalus (Anchistrocephalus) polyptera (Leyd),
1853.

Two slide specimens only.

ZEV ⁵¹³⁸⁸. *Labeo rohita* and *Ophiocephalus striatus*. Berhampur, Bengal. T. Southwell.

Literature:—

Lühe, 1899. Southwell, 1913.

Family MESOCESTOIDIDAE, Fuhrmann, 1907.

= MESOCESTOIDINAE, Lühe, 1894.

= MESOCESTOIDAE, Ariola, 1899.

Family diagnosis:—Taenioidea. Scolex without rostellum or hooks. Suckers unarmed. A single set of reproductive organs in each segment. Genital pores located in the ventral surface of the segment. Vagina opens in front of, or besides, the cirrus pouch. Eggs in gravid segments enclosed in a single thick-walled egg capsule. Adults in mammals and birds.

Type-genus *Mesocestoides*, Vaillant, 1863.

(1) Genus **Mesocestoides**, Vaillant, 1863.

= *Monodoridium*, Walter, 1866 (type *Taenia utriculifera*, Walter, 1866).

= *Ptychophysa*, Hamann, 1885 (type *Taenia canis-lagopodis*, Rudolphi, 1810).

Generic diagnosis:—Mesocestoididae, with the characters of the family. Adults in mammals and birds.

Type-species *Mesocestoides ambiguus*, Vaillant, 1863.

Mesocestoides lineatus (Goeze, 1782), Railliet, 1893.

One specimen, without head, probably from the Zoological Gardens, Calcutta.

ZEV ¹⁸⁹³. *Felis tigris*. ? ?.

Synonymy:—

- Taenia canis-lagopodis*, Rudolphi, 1810.
 " *pseudo-cucumerina*, Baillet, 1863.
 " *pseudo-elliptica*, Baillet, 1863.
Ptychophysa lineata (Goeze, 1782), Hamann, 1885.

Literature:—

- Ransom, 1909. Lühe, 1894. Ariola, 1899. Fuhrmann, 1907. Walter, 1866. Hamann, 1885.

Family ANOPOCEPHALIDAE, Fuhrmann, 1907.

Family diagnosis:—Taenioidea. Scolex unarmed, without rostellum. Suckers relatively large, unarmed. Neck absent. Segments usually broader than long. A single or double set of reproductive organs in each segment. Genital pores marginal and bilateral, unilateral, or irregularly alternate or (?) absent. Testicles numerous or rarely (*Triplotaenia*) one in each lateral half of the segment. Median axis of female glands lateral of the median axis of segment. Uterus persistent, and transversely elongated, either tubular, sac-like, branched or reticular; or not persistent replaced by egg capsules whose formation may, or may not, be preceded by the appearance of para-uterine organs. Eggs with thin transparent shells, with or without a pyriform apparatus. Adults in mammals and birds.

Sub-family (I) ANOPOCEPHALINAE, Blanchard, 1891.

Sub-family diagnosis:—Anoplocephalidae. Uterus persistent and tubular, sac-like, branched or reticular. Adults in mammals and birds.

Type-genus *Anoplocephala*, E. Blanchard, 1848.

Genus **Anoplocephala**, E. Blanchard, 1848.

= *Plagiotaenia*, Peters, 1871 (type *Taenia gigantea*, Peters, 1857).

Generic diagnosis:—Anoplocephalinae. Segments usually much broader than long, occasionally longer than broad. A single set of reproductive organs in each segment. Genital pores unilateral, or irregularly alternate. Genital canals pass on the dorsal side of the longitudinal excretory vessels and nerve. Testicles and female glands in the median field; female glands toward the pore side of the segment, testicles toward the opposite side. Uterus a transversely elongated sac with pocket-like appendages, anteriorly and posteriorly. Eggs with well-developed pyriform apparatus. Adults in mammals.

Type-species *Anoplocephala perfoliata* (Goeze, 1782), E. Blanchard, 1848.

(1) *Anoplocephala plicata* (Zed., 1800), R. Blanchard, 1891.

One specimen:—

Z E V ⁴⁰⁷⁰. Horse (*Equus caballus*). Lahore. Punjab Civil Veterinary Department.

Synonymy:—

Taenia plicata (Zed., 1800), Rudolphi, 1805.
 " *equina*, Pallas, 1781.
 " *magna*, Abeldg. in Mueller, 1789.
Alyselminthus plicatus, Zeder, 1800.

Literature:—

Rudolphi, 1810. Neumann, 1892.

(2) *Anoplocephala gigantea* (Peters, 1856), R. Blanchard, 1891.

Five specimens:—

Z E V ⁴²⁷⁰. *Rhinoceros unicornis*. Janakpur, Nepal Terai. Museum Collector, R. Hodgart.

Synonymy:—

Taenia gigantea, Peters, 1857.
Plagiotaenia gigantea, Peters, 1871.

Literature:—

Peters, 1857 and 1871.

Sub-family (II) *THYSANOSOMINAE*, Fuhrmann, 1907.

Sub-family diagnosis:—Anoplocephalidae. Uterus transversely elongated, consisting of several or numerous communicating sacs, with parenchymatous para-uterine organs, into which the eggs probably pass in the oldest segments. Adults in mammals.

Type-genus *Thysanosoma*, Diesing, 1835.

(1) Genus *Thysanosoma*, Diesing, 1835.

Generic diagnosis:—Thysanosominae. Segments much broader than long, end segments only showing a tendency to become longer and narrower. A double set of reproductive organs, but only a single uterus in each segment, with opposite, or with irregularly alternating pores, those of one side, with the corresponding cirrus pouch, ovary, and vagina having been suppressed. Genital canals pass between the longitudinal excretory vessels, and dorsal of the nerve. Uterus transverse, undulating, composed of numerous ascon-like pouches, each supplied with a para-uterine organ. Horns of pyriform apparatus absent. Adults in mammals (ruminants).

Type-species *Thysanosoma actinioides*, Diesing, 1835.

Thysanosoma actinioides, Diesing, 1835.

Two specimens :—

Z E V ¹⁰³⁰. *Rhinoceros sondiacus*. ? ?

Synonymy :—

Taenia fimbriata, Diesing, 1850.

Literature :—

Curtice, 1890.

(2) Genus **Cittotaenia**, Riehm, 1881.= *Ctenotaenia*, Railliet, 1893 (type *Taenia marmotae*, Frolich, 1802).= *Coelodela*, Shipley, 1900 (type *Coelodela kuvaria*, Shipley, 1900). (See also Fuhrmann, 1902).

Generic diagnosis :—Anoplocephalinae. Segments broader than long. Two sets of reproductive organs in each segment. Genital pores bilateral. Genital canals pass dorsal of longitudinal excretory vessels and nerves. Interproglottidal glands absent. Vagina ventral of cirrus pouch on both sides of segment. Uterus single or double (one on each side of median line), transversely elongated, tubular generally, with simple anterior and posterior outpocketings. Eggs with well-developed pyriform apparatus, the horns of which are long, crossing each other, or in some cases without this apparatus (see Fuhrmann, 1902, p. 142). Adults in mammals and birds.

Type-species *Cittotaenia latissima*, Riehm, 1881 = *Cittotaenia denticulata* (Rudolphi, 1804), Stiles and Hassall, 1896.

(i) **Cittotaenia bursaria**, Linstow, 1906.

Several specimens :—

Z E V ²¹⁷¹. *Lepus ruficaudatus*. Songara, Gondar Dist., U.P.
Museum Collector, R. Hodgart.

Literature :—

Linstow, 1906.

(ii) **Cittotaenia pectinata** (Goeze, 1782, *partim*, Riehm, 1881),
Stiles and Hassall, 1896.

Several specimens :—

Z E V ⁵³¹⁰. Hare (*Lepus ? hispidus*). Berhampur, Bengal. Major
Clayton Lane, I.M.S.

Literature :—

Goeze, 1782. Riehm, 1881. Stiles and Hassall, 1896.

Family HYMENOLEPIDIDAE, Railliet and Henry, 1909.

= HYMENOLEPIDAE, Ariola, 1899 (type-genus *Hymenolepsis*).= ECHINOCOTYLIDAE, Ariola, 1899 (type-genus *Echinocotyle*).= DILEPINIDAE, Fuhrmann, 1907 (type-genus *Dilepis*).

Family diagnosis:—Taenioidea. Scolex with an armed rostellum, or without rostellum. Hooks on rostellum not hammer-shaped. Suckers usually unarmed. A single, or rarely a double set of reproductive organs in each segment. Genital pores marginal and bilateral, unilateral, or regularly or irregularly alternate. Egg with thin transparent shell. Adults in birds, mammals, reptiles and amphibia.

Type-genus *Hymenolepis*, Weinland, 1858.

Sub-family (I) *DIPYLIDIINAE*, Stiles, 1896.

- =Rhynchoetaenia, Diesing, 1850.
- =Malacolepidota, Weinland, 1858.
- =Cystoideae, Leuckart, 1863.
- =Cystoidotaeniae, Railliet, 1886.
- =Microtaenia, Claus, 1891.
- =Dipylidinae, Railliet, 1896.
- =Dilepininae, Fuhrmann, 1907.
- =Dilepidinae, Railliet and Henry, 1909.

Sub-family diagnosis:—Hymenolepididae. Rostellum armed or rarely absent. Suckers unarmed. A single set, or rarely a double set of reproductive organs in each segment. Uterus sac-like, simple or lobulated, or not persistent, breaking down into numerous egg capsules, each containing one or several eggs. Para-uterine organs not developed. Adults in birds, mammals and reptiles.

Type-genus *Dipylidium*, Leuckart, 1863.

Genus *Dipylidium*, Leuckart, 1863.

Generic diagnosis:—Dipylidiinae. Rostellum armed with several rings of rose-thorn hooklets, which usually have a discoidal base. Suckers unarmed. Gravid segments generally longer than broad. A double set of reproductive organs in each segment. Genital pores double and opposite. Testicles very numerous and scattered throughout entire medullary parenchyma. Vas deferens coiled, seminal vesicle absent. Uterus at first reticular, later breaking up into egg capsules, each containing one or more eggs. Eggs with two shells. Adults in mammals and birds.

Type-species *Dipylidium caninum* (Linn.), 1758.

Dipylidium caninum (Linn., 1758).

Numerous specimens:—

- Z E V 8595. Dog (*Canis familiaris*) ? ?
- Z E V 8597. Dog (*Canis familiaris*). Colombo, Ceylon. T. Southwell.
- Z E V 2279. Cat (*Felis domestica*). Egypt. London School of Tropical Medicine.
- Z E V 4675. Dog (*Canis familiaris*). Lahore, Punjab. Punjab Civil Veterinary Department.

Synonymy :—

- Alyselminthus ellypticus* (Batsch, 1786), Zeder, 1800.
Cryptocystis trichodectis, Villot, 1882.
Halysis ellyptica (Batsch, 1786), Zed., 1803.
Taenia canina, Linn., 1758.
 " *cateniformis*, Goeze, 1782.
 " *cateniformis-canina* (Linn., 1758), Gmel., 1790.
 " *cateniformis-felis*, Gmel., 1790.
 " *cucumerina*, Bloch, 1782.
 " *elliptica*, Goeze, 1782.
 " *moniliformis*, Pallas, ? 1781.

Literature :—

Linnaeus, 1758. Neumann, 1892.

Sub-family (II) *PARUTERININAE*, Ransom, 1909.

= Paruterinae, Fuhrmann, 1907.

Sub-family diagnosis :—Hymenolepididae. Scolex usually armed, rarely without rostellum. A single (double in *Stilesia*, provisionally placed by Ransom in this sub-family) set of reproductive organs in each segment. Uterus simple or double, with a single para-uterine organ, or multiple with several para-uterine organs, into which the eggs pass in the final stage of development of the segment. Adults in birds and amphibia (*Stilesia* in mammals).

Type-genus *Paruterina*, Fuhrmann, 1906.

Genus *Stilesia*, Railliet, 1893

Generic diagnosis :—(?) Paruterininae. Head unarmed, without rostellum. Neck present. Segments broader than long. A double set of reproductive organs in each segment, with opposite pore, or with irregularly alternating pore, those on one side with the corresponding cirrus pouch, vagina and ovary having been suppressed, both of which conditions may occur in the same stobila. Genital canals pass between the longitudinal excretory vessels and dorsal of the nerve. Dorsal excretory vessel a considerable distance mediad from the ventral vessel. Testicles relatively few (six to twelve in each set), in the lateral portions of the segment in the neighbourhood of the longitudinal excretory vessel. Ovary small, globose, between the dorsal and ventral excretory vessel on pore side of segment. Yolk glands not apparent. Uterus small, spherical, sac-like, one in each lateral half of the segment between the dorsal and ventral excretory vessels. When the ovary is absent from one side eggs from the opposite side of the segment appear to pass across through the median field, in a manner not understood, and enter the uterus of the side in which the ovary is lacking. Immediately anterior and mediad of each uterus, a para-uterine organ develops, into which the eggs probably pass. Eggs with two envelopes. Adults in mammals (ruminants).

Type-species *Stilesia globipunctata* (Rivolta, 1874), Railliet, 1893.

Stilesia globipunctata (Rivolta, 1874), Railliet, 1893.

A few specimens:—

Z E V ⁵⁵⁷³. Goat (*Capra hircus*). Kasauli. Major Clayton Lane, I.M.S.

Z E V ⁵⁵⁷⁵. Sheep (*Ovis aries*). Lahore, Punjab. Punjab Civil Veterinary Department.

Synonymy:—

Taenia globipunctata, Rivolta, 1874.

Literature:—

Curtice, 1890.

Family DAVAINIÆ, Fuhrmann, 1907.

Family diagnosis:—Taenioidea. Scolex with simple rostellum, armed with double row (rarely a simple row) of very numerous (and generally very small) hammer-shaped hooks. Suckers armed, or, rarely unarmed. A single or double set of reproductive organs in each segment. Genital pores marginal, and bilateral, unilateral, or alternating. Uterus sac-like, persisting, or sac-like or branched not persistent, replaced either by numerous egg capsules, or by a single egg capsule, whose formation is preceded by the appearance of a para-uterine organ. Egg with thin transparent shell. Adults in mammals and birds.

Type-genus *Davainea*, Blanchard and Railliet, 1891.

Sub-family OPHRYOCOTYLINÆ, Fuhrmann, 1907.

Sub-family diagnosis:—Davaineidae. Rostellum very broad, armed with a double row of hooks on the border. Surface of suckers armed only near the anterior border. A single set of reproductive organs in each segment. Genital pores irregularly alternate. Uterus sac-like, slightly bilobed, persistent. Adults in birds.

Type-genus *Ophryocotyle*, Friis, 1870.

Genus ***Ophryocotyle***, Friis, 1870.

Generic diagnosis:—Ophryocotylinæ, with the characters of the sub-family.

Type-species *Ophryocotyle proteus*, Friis, 1870.

Ophryocotyle bengalensis, Southwell, 1913.

About 60 specimens:—

Z E V ⁵¹⁵². *Labeo rohita* and *Ophiocephalus striatus*. Berhampur, Bengal ... T. Southwell. (TYPES).

Z E V ⁵¹⁵³. *Wallago attu*. Berhampur, Bengal ... T. Southwell.

Literature:—

Southwell, 1913. See also Friis, 1870. Fuhrmann, 1908. Fuhrmann, 1909.

The occurrence of a species of *Ophryocotyle* in a fish is remarkable, as this genus has, up to the present, only been recorded from birds. The species is placed provisionally in this genus pending a more careful anatomical examination than has been found possible up to the present.

Family TAENIIDAE, Ludwig, 1886.

Family diagnosis:—Taenioidea. Scolex usually with well-developed rostellum, armed with a double crown of hooks, rarely with rudimentary unarmed rostellum. Suckers unarmed. Gravid segments longer than broad. A single set of reproductive organs in each segment. Genital pores irregularly alternate. Vas deferens coiled. Seminal vesicle absent. Testicles numerous, usually very numerous, and scattered throughout the medullary parenchyma, except in the posterior median portion, occupied by the double ovary, posterior of which is the double yolk gland. Uterus with median stem, and, when fully developed, with lateral branches. Eggs with a thin outer membrane, and a thick brown radially-striated inner shell. Adults in mammals and birds.

Type-genus *Taenia*, Linnaeus, 1758.

Genus *Taenia*, Linnaeus, 1758.

Generic diagnosis:—Taeniidae, with the characters of the family. Adult in mammals and birds.

Type-species *Taenia solium*, Linnaeus, 1758.

(i) *Taenia saginata* (Goeze, 1782), Leuck., 1867.

Two specimens:—

Z E V	1169.	Man.	Calcutta.	Major L. Rogers, I.M.S.
Z E V	2090.	Man.	Calcutta.	?

Synonymy:—

Taenia solium var. *mediocanellata*, Kuech., 1854.
 " *dentata*, Batsch, 1786.
 " *tropica* (Schmidtmueller, 1847), Moq.-Tandon, 1860.
 " *mediocanellata*, Kuechenmeister, 1852.
 " *cucurbitina*, Pallas, 1766.
 " *inermis*, Laboulbène, 1876.
 " *lata*, Moq.-Tandon, 1860.

Literature:—

Goeze, 1782. Leuckart (Hoyle's translation), 1886.

(ii) *Taenia solium*, Linnaeus, 1758.

One specimen, fragmented.

Z E V	1638.	Man.	Calcutta.	?
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Synonymy:—

- Taenia cucurbitina*, Pallas, 1766.
 " " *plana pellucida*, Goeze, 1782.
 " *dentata*, Batsch, 1786.
 " *vulgavis*, Linnaeus, 1758.
 " *humana armata*, Rudolphi, 1810 ?
Halysis solium (Linn., 1758), Zeder, 1803.

Literature:—

Leuckart (Hoyle's translation), 1886.

(iii) *Taenia echinococcus*, Von Siebold, 1853.

One specimen:—

Z E V $\frac{5599}{7}$. *Canis familiaris*. Berhampur, Bengal. Major Clayton Lane, I.M.S.

For synonymy see Stiles and Hassall, 1898.

Literature:—

Von Siebold, 1853.

(iv) *Taenia serialis* (Gerv., 1847), Baillet, 1863.

Numerous specimens:—

Z E V $\frac{4971}{1}$. *Canis familiaris*. Lahore, Punjab. Civil Vety. Department.
 Z E V $\frac{5599}{8}$. *Canis familiaris*. Angul, Orissa. Vety. Asstt., Angul.

For synonymy see Stiles and Stevenson, 1905.

Literature:—

Baillet, 1863. Neumann (Fleming's translation), 1892.

(v) *Taenia serrata*, Goeze, 1782.

Several specimens:—

Z E V $\frac{4669}{9}$. *Canis familiaris*. Lahore, Punjab. Civil Vety. Depart.
 Z E V $\frac{4682}{2}$. *Felis tigris*. Burduar, Nepal Terai. B. Warren.
 Z E V $\frac{4688}{8}$. *Canis aureus*. Museum compound, Calcutta.

For synonymy see Stiles and Stevenson, 1905.

Literature:—

Goeze, 1782. Neumann (Fleming's translation), 1892.

LARVAL FORMS OF THE GENUS *Taenia*, Linn.(I) *Coenurus serialis*, Gervais, 1847.

(Larval form of *Taenia serialis*, Baillet.)

One large specimen:—

Z E V $\frac{4526}{4}$. Goat (*Capra hircus*). Lahore, Punjab. Punjab Civil Veterinary Department.

Synonymy:—

- (a) Adult. *Taenia coenuri-canicula*, Diesing, 1864.
 (b) Larva. *Coenurus-cerebralis leporis-canicula*, Diesing, 1863.

Literature:—

Gervais, 1847.

(2) *Cysticercus tenuicollis*, Rudolphi, 1810.

(Larval form of *Taenia marginata*, Batsch.)

One very large specimen:—

Z E V ⁵⁶⁷³. Sheep (*Ovis aries*). Lahore, Punjab. Punjab Civil Veterinary Department.

For synonymy see:—

Stiles and Stevenson, 1905.

Stiles and Hassall, 1912, except in the case of *Cysticercus cellulosa*.

Literature:—

Rudolphi, 1810. Neumann, 1892.

(3) *Cysticercus fasciolaris*, Rudolphi, 1808.

(Larval form of *Taenia crassicollis*, Rudolphi.)

About 10 specimens:—

Z E V ⁵³⁰⁷. *Mus decumanus*. Calcutta? Col. A. Alcock, I.M.S.

Z E V ⁵⁰⁷³. *Mus rattus*. Lahore, Punjab. Punjab Civil Veterinary Department.

Z E V ⁵⁰⁸⁰. No history.

For synonymy see:—

Stiles and Stevenson, 1905. Stiles and Hassall, 1912.

(4) *Cysticercus pisiformis*, Zeder, 1803.

(Larval form of *Taenia serrata* (Goeze)).

Very numerous specimens:—

Z E V ⁵¹⁴⁰. *Mus rattus*? Berhampur, Bengal. Major Clayton Lane, I.M.S.

Z E V ⁵²⁷. *Mus rattus*? Calcutta. Major R. Milne, I.M.S.

Z E V ⁵⁰⁷²⁻⁵. *Mus rattus* (liver). Amritsar, Punjab. Capt. G. I. Davys, I.M.S.

For synonymy see:—

Stiles and Stevenson, 1905. Stiles and Hassall, 1912.

Literature:—

Zeder, 1803. Neumann, 1892.

(5) *Cysticercus cellulosa* (Gmel., 1790), Rudolphi, 1808.

(Larval form of *Taenia solium*, Linn., 1758.)

Several specimens:—

Z E V ⁵⁰²⁷. Human brain. Ceylon. Medical College, Colombo.

Z E V ⁵⁰⁰⁰. *Bos taurus* (muscles). Ceylon. T. Southwell.

Synonymy:—

- Cysticercus albopunctatus* (Treutler, 1793), Zed., 1803.
 " *pyriformis*, (Treutler, 1793), Zed., 1803.
 " *finna* (Gmel., 1790), Zed., 1803.
Finna humana, Fisher in Werner, 1786.
Hydalis finna (Gmel., 1790), Bosc, 1802.
Taenia albopunctata, Treutler, 1793.
 " *cellulosae*, Gmel., 1790.
 " *finna*, Gmel., 1790.
 " *hydatigena-anomala*, Steinbuch, 1801.
 " *hydatigena-suilla*, Fischer of Chiaje, 1825.
 " *muscularis*, Joerdens, 1802.
 " *pyriformis*, Rudolphi, 1810.
 ? *Vermes vesicularis*, Bloch, 1780.
Vesicaria finna (suilla), Schrank, 1793.
 " *hygroma (humana)*, Schrank, 1793.
 " *lobata*, Fabr., 1783.

Literature:—

Stiles, 1906.

The occurrence of *Cysticercus cellulosae* in the muscles of the cow is somewhat remarkable, and, as far as I have been able to ascertain, this is the first record for this host. My first impression was that these cysts were those of *C. bovis*, but subsequent examination showed that the head was armed.

(6) *Echinococcus granulosus* (Batsch, 1786), Rudolphi, 1805.

(Larval form of *Taenia echinococcus* (Zed., 1803), Siebold, 1853.)

One specimen:—

ZEV 2925. Lungs of *Bos taurus*. Colombo, Ceylon. T. Southwell.

For the synonymy, which is very extensive, see:—

Stiles and Hassall, 1905. Stiles, 1906.

Literature:—

Stiles, 1906.

Order **TRYPANORHYNCHA**, Dies., 1863.

General characters:—Head with two or four bothridia and with four retractile and armed proboscides. Segmentation complete. Segments detach themselves usually before fully ripe. Genital pores marginal or sub-marginal. Uterus opening? Genitalia as in the Tetraphyllidea. Larvae in various marine animals. Adults mostly in gut of Plagiostomes.

(I) Genus *Rhynchobothrium*, Rudolphi, 1819.

Tetrarhynchus of authors.

General characters:—Body taeniaeform. Neck tubular. Head continuous with neck, with two opposite bothridia, parallel or converging at the apices, lateral or marginal, entire or undivided, or, either bilocular with a longitudinal partition, or

bilobed or divided. Proboscides four, terminal, armed, retractile in the neck, for the most part longer than the head. Genital apertures, male marginal, female lateral, or male and female marginal, approximate.

I. *Rhynchobothrium* sp.

Numerous specimens:—

Z E V 5914. *Cybius guttatus*. Puri, Orissa. T. Southwell.

Literature:—

Southwell, 1912 and 1913.

II. *Rhynchobothrium* sp.

Numerous specimens:—

Z E V 5917. *Serranus undulosus*. Pearl Banks, Ceylon. T. Southwell.

Literature:—

Southwell, 1912.

III. *Rhynchobothrium* sp. I.

Numerous specimens:—

Z E V 5922. *Cybius guttatus* and *Chorinemus lysan*.
Pearl Banks, Ceylon T. Southwell.

Literature:—

Southwell, 1912 and 1913.

IV. *Rhynchobothrium* sp. II.

Numerous specimens:—

Z E V 5929. *Lutianus argentimaculatus*,
Drepane punctata,
Diagramma sp.
Serranus undulosus. } Pearl
Banks, Ceylon. T. Southwell.

Literature:—

Southwell, 1912.

V. *Rhynchobothrium* sp. III.

Numerous specimens:—

Z E V 5935. *Balistes* sp. Pearl Banks, Ceylon. T. Southwell.

Literature:—

Southwell, 1912.

VI. *Rhynchobothrium* spp. A, B, & C.

Few specimens:—

Z E V 5938. *Serranus undulosus*,
Lutianus gibbus,
Psettodes erumei. } Pearl Banks, Ceylon. T. Southwell.

Literature:—

Southwell, 1912.

The above species appear to differ from those described by Shipley and Hornell (1906) from the same region, and from the same species of fish.

(II) Genus *Tetrarhynchus*, Rudolphi, 1809.= *Tetrarhynchobothrium*, Diesing, 1850.

General characters:—Body articulate, taeniaeform. Neck tubular. Head with four bothridia in two lateral pairs, parallel with the head. Proboscides four, terminal, filiform, armed, retractile in the neck, free, *i.e.* not running through the bothria. Genital apertures marginal or lateral.

(1) *Tetrarhynchus gangeticus*, Shipley and Hornell, 1906.

Larvae. About 100 specimens.

Z E V 2920. *Sphyraena jello*. Pearl Banks, Ceylon. T. Southwell.

Literature:—

Shipley and Hornell, 1906. Southwell, 1912.

(2) Larva of *Tetrarhynchus platycephalus*, Shipley and Hornell, 1906.

Few specimens:—

Z E V 2921. *Trygon walga*. Pearl Banks, Ceylon. T. Southwell.

Literature:—

Shipley and Hornell, 1906.

(3) *Tetrarhynchus* sp.

Larvae. Numerous specimens:—

Z E V 2922. *Balistes* sp. Pearl Banks, Ceylon. T. Southwell.(4) *Tetrarhynchus* sp.

Larvae. Many specimens:—

Z E V 2923. *Lutianus* sp. Pearl Banks, Ceylon. T. Southwell.(5) *Tetrarhynchus* sp.

Larvae. Many specimens:—

Z E V 2924. *Serranus undulosus*. Pearl Banks, Ceylon. T. Southwell.(III) Genus *Otobothrium*, Linton, 1891.

General characters:—Body articulate, taeniaeform, head separated from body by a neck. Bothridia two, opposite, lateral,

each with two supplemental ciliated pits at the posterior free angles. Proboscides four, terminal, filiform, armed, retractile in neck. Reproductive apertures marginal.

Larva of *Otobothrium insigne*, Linton, 1905.

Many specimens:—

Z. E. V. 3023.	<i>Diagramma crassispinum,</i>	} Pearl Banks, Ceylon ... T. Southwell.
	<i>Serranus undulosus,</i>	
	<i>Balistes</i> sp.	

Literature:—

Linton, 1887. Southwell, 1912.

(IV) Genus *Syndesmobothrium*, Diesing, 1854.

= *Synbothrium*, Diesing, 1850.

General characters:—Body articulate, taeniaeform, neck tubular, rounded at base. Head tetragonal, with four terminal prominent bothridia, attached to head by posterior margin, cruciformly disposed, oval, slightly curved, joined with each other at the base by a membrane. Proboscides four, filiform, armed, each one running through a bothridium (pedicel) excurrent at apex, long, retractile in the neck. Genital apertures marginal (?).

Syndesmobothrium filicolle, Linton, 1889.

Larvae. Few specimens.

Z. E. V. 2920. *Clupea ilisha*. Calcutta. T. Southwell.

This species was also obtained from the mesenteries of *Cybbium guttatum* and *Chorinemus lysan* in Ceylon waters.

Literature:—

Linton, 1887. Southwell, 1912.

LIST OF LITERATURE CITED.

- Ariola, V., Il gen. *Scyphocephalus*, Rigg. e proposta di una nuova classificazione dei cestodi. In *Atti Soc. Lig. Sci. Nat. e Geogr.* Genoa, June 1899, Vol. 10, No. 2, pp. 160-167.
- Baillet, C., Rech. sur un Cystique polycéphale du lapin. In *Mém. de l'Acad. des. Sc. de Toulouse*, 1863 (6), Vol. I, pp. 452-482.
- Blainville, H. M. de., Article Vers. In *Dictionnaire des sciences natur.* Paris, 1828, T. LVII, pp. 365-625, avec pl.
- Blanchard, E., Recherches sur l'organisation des vers. In *Ann. Sci. Nat. Paris, Zool.*, Dec. 1848, 3rd ser., Vol. 10, pp. 321-364, pls. II, 12.
- Blanchard, R., *Histoire zoologique et médicale des téniaïdes du genre Hymenolepis*, Weinland. Paris, 1891. 112 pp., 22 figs.

- Blanchard, R., Notices helminthologiques (deuxième série). In *Mém. Soc. Zool. France*, Paris, 1891, Vol. 4, Nos. 3-4, pp. 420-488, figs. 1-38.
- Bloch, M. E., Beitrag zur Naturgeschichte der Würmer welche in anderen Thieren leben. In *Beschäft. Berl. Ges. Nat. Freund.*, 1779, Vol. 4, pp. 534-561, pl. 12, figs. 3-5, pls. 14, 15.
- Abhandlung von der Erzeugung der Eingeweidewürmer und den Mitteln wider dieselben. *Eine von der Königlich Dänischen Societät der Wissenschaften zu Copenhagen gekrönte Preisschrift*, Berlin, 1782; 2 p. 1, 54 pp., 10 pls.
- Carus, J. V., Prodomus faunae mediterraneae, sive descriptio animalium maris mediterranei incolarum . . . P. 1. Stuttgart, 1884, Pg. 113.
- Curtice, C., The animal parasites of sheep. *U.S. Dept. Agric. Bureau of Animal Industry*. Washington, 1890, 222 pp., 36 plates.
- Diesing, K. M., *Tropisurus* und *Thysanosoma*, zwei neue Gattungen von Binnenwürmern (Entozoen) aus Brasilien. In *Med. Jahrb. K. K. Österr. Staat*, Vienna, 1835, Vol. 16, neue folge, Vol. 7, no. 1, pp. 83-116, pls. 1-3.
- *Systema helminthum*. Vienna, 1850, Vol. I, xiii, pp. 11, 679 pp.
- Donnadieu, A. L., Contribution à l'histoire de la *Ligule*. *Journ. de l'anat. et de la phys.*, 1877, pp. 321-370; 451-497, avec 7 pl.—*Journ. de Micrographie*, II, 1878, pp. 34-39.—*Arch. de Zool. exp. et gén.*, Tom. V, 1876, pp. 63-64.—*Journ. de Zool.* T. VI, 1877, pp. 144-149.
- Führmann, O., Sur deux nouveaux genres de cestodes d'oiseaux. (Note préliminaire). In *Zool. Anz.*, Leipzig, May 5th, 1902, No. 676, Vol. 25, pp. 357-360, figs. 1, 2.
- Die Anoplocephaliden der vögel. In *Centralbl. Bakter., etc.*, Jena, 1902, Abt. I, Vol. 32, no. 2, Original, pp. 122-147, fig. 1-25.
- Die Systematik der Ordnung der *Cyclophyllidea*. In *Zool. Anz.*, Leipzig, 1907, Vol. 32, nos. 9-10, pp. 289-297.
- Ueber ost-asiatische Vogel-Cestoden. In *Zool. Jahrb.*, Jena, 1905, Vol. 22, no. 3, pp. 303-320, pls. 10, 11, figs. 1-22.
- Bekannte und neue Arten und Genera von Vogeltänien. *Ibidem*, Dec. 20th, 1907, Vol. 45, no. 6, Original, pp. 516-536, figs. 1-43.
- Die Cestoden der vögel. In *Zool. Jahrb.*, Jena, 1908, Supplement 10, no. 1, pp. 1-232.
- Neue *Davainceiden*. In *Centralbl., etc.*, Jena, Feb. 4th, 1909, Abt. 1, Vol. 49, no. 1, Original, pp. 94-124, figs. 1-44.
- Gervais, P., Sur quelques entozoaires taenioides et hydatides. In *Mém. de l'Acad. d. sc. et des lettr. de Montpellier. Sect. de sc. Ann.*, 1847, pp. 85-104, av. 2 pl.
- Goeze, J. A. E., *Versuch einer Naturgeschichte der Eingeweidewürmer thierischer Körper*. Blankenburg, 1782, xi+471 pp. 44 (35) pls.

- Hamann, O., *Taenia lineata*, Goeze, eine Tãnie mit flãchenstãndigen Geschlechtsöffnungen. Ein Beitrag zur Kenntniss der Bandwürmer. In *Zeitsch. Wiss. Zool.*, Leipzig, Nov. 24th, 1885, Vol. 42, no. 4, pp. 718-744, pls. 29, 30.
- Leuckart, K. G. F. R., The parasites of man, and the diseases which proceed from them. A text-book for students and practitioners. Natural history of parasites in general. Systematic account of the parasites infesting man. Protozoa-Cestoda. Translated from the German, with the co-operation of the author, by William E. Hoyle, Edinburgh, 1886, xxvi, pp. 11, 771 pp., 404 figs.
- *Die menschlichen Parasiten und die von ihnen herrührenden Krankheiten Ein Hand- und Lehrbuch für naturforscher und aerzte.* Leipzig and Heidelberg. 1863, Vol. I, viii+766 pp., 268 figs.
- Linnaeus, C., *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.* Editio decima, reformata. Stockholm, January 1758, Vol. 1, I, p. i, 823 pp.
- Linstow, V., Helminthes from the Colombo Museum. In *Spolia Zeylanica.* Colombo, Jan. 1906, Part II, Vol. 3, pp. 163-188, pls. 1-3, figs. 1-55.
- Linton, E., Notes on Entozoa of marine fishes of New England, with descriptions of several new species. *U. S. Commn. of Fish and Fisheries*, Part XV. Report of Commissioner for 1887, Washington, 1891, pp. 719, with 15 plates.
- Ludwig, H., Dr. Johannes Leunis, Synopsis der Thierkunde. *Ein Handbuch für höhere Lehranstalten und für Alle, welche sich wissenschaftlich mit der Naturgeschichte der Thiere beschäftigen wollen.* 3 gãnzlich umgearbeitete, vermehrte Auflage. Hanover, 1886, vol. 2, xv+1231 pp., 1160 figs.
- Lũhe, M. F. L., *Zur morphologie des Taenienscolex*, Diss. Königsberg i Pr. 1894, 133 pp., 21, 12 figs.
- *Verh. d. D. Zool. Ges.* 1899, p. 30.
- Monticelli and Crety, Recherche intorno alla sottofamiglia, *Solenophorinae*, Montic. and Crety. In *Mem. R. Accad. d. sc. di Torino*, 1891, Ser. II, T. XLI, pp. 381-402, c. II tav.
- Neumann, L. G., A Treatise on the Parasites and Parasitic diseases of the Domesticated Animals. Translated and edited by George Fleming from 2nd French edition. London, 1892, 800 pp., 364 figs.
- Perrier, E., *Traité de zoologie.* Paris, 1897 (Pt. 2), fasc. 4, pp. 1345-2136, figs. 980-1547.
- Description d'un genre nouveau de Cestoides. In *Arch. de Zool. exper et génér.* 1873, Tom. II, pp. 349-362, avec i pl.
- Peters, W., Ueber eine neue durch ihre riesige Grösse ausgezeichnete *Taenia*. (Secretary's abstract of remarks, November 3). In *Monatsb. k. preuss. Akad. Wiss.*, Berlin, Nov. 1856, p. 469 (1857).

- Peters, W., Note on the *Taenia* from the Rhinoceros, lately described by Dr. J. Murie. (Read Feb. 21) In *Proc. Zool. Soc.* London, 1871, no. 10, pp. 146-147, figs. 1, 2.
- Railliet, A., *Traité de zoologie médicale et agricole.* Paris, December 1893, 2^e éd. (fasc. I), 736 pp., 494 figs.
- Railliet A., and Henry, A., Les cestodes des oiseaux. (Review of Führmann, O., 1908); In *Rec. Méd. Vét.* Paris, 1909, Vol. 86, no. 9, pp. 337-338.
- Ransom, B. H., The Taenioid cestodes of North American birds. In *Bull. U. S. Nat. Mus.* Washington, 1909, 69, pp. 1-141, figs. 1-42.
- Riehm, G., Untersuchungen an den Bandwürmern der Hasen und Kaninchen. (Secretary's abstract of paper read before Naturw. Ver. Sachs. u. Thür. Halle. January 27.) In *Zeitsch. ges. Naturw.* Berlin, 1881, Vol. 54, 3 Folge, Vol. 6, p. 200.
- Studien an Cestoden. *Ibidem*, 1881, pp. 545-610, pls. 5, 6.
- Rivolta, S., Sopra alcune specie di tenie della pecora. Pisa, 1874.
- Rudolphi, C. A., Entozoorum sive vermium intestinalium historia naturalis. Amsterdam, 1810, Vol. 2, no. 2, xii+386 pp.
- St. Friis. En hidtil ubeskreven Baendelorm hos Fugle (*Ophryocotyle proteus*). In *Vid. Medd. naturh. For.*, Kjobenhavn, 1869, 3d ser., Vol. I, nos. 6-8, pp. 221-124, pl. i (1870).
- Shiple, A. E., A description of the Entozoa collected by Doctor Willey during his sojourn in the Western Pacific. In Willey's, *Zool. Results.* Cambridge, Dec. 1900, Part 5, pp. 531-568, figs. A-G, pls. 54-56, figs. 1-36.
- Some parasites from Ceylon. In *Spolia Zeylanica.* Colombo, November 1903, Vol. 1, Part 3, pp. 45-55.
- Shiple and Hornell, *Ceylon Pearl Oyster Reports.* London, 1906. Part V.
- Siebold, Von, Ueber die Verwandlung der *Echinococcus*-brut in Taenien. In *Zietsch. f. Wiss. Zool.* Leipzig, 1853. Bd. IV. pp. 409-425, mit. 1 Taf.
- Southwell, T., *Ceylon Marine Biological Reports.* Colombo, 1912. Part VI, with 3 pls.
- Some Parasites of Indian Fishes. In *Rec. Ind. Mus. Calcutta*, 1913, Vol. IX, Part II, with 4 pls.
- Stiles, C. W., Report upon the present knowledge of the tapeworms of poultry. In *Bull. 12, Bur. Anim. Ind., U. S., Dept. Agric.*, Washington, 1896., pp. 1-79, pls. 1-21, figs. 1-276, bibliography by A. Hassall, pp. 81-88.
- Illustrated key to the cestodes parasites of man. In *Bull. 25, Hyg. Lab. U. S. Pub. Health and Mar.-Hosp. Serv.*, Washington.
- Stiles and Hassall, Inspection of Meats for Animal Parasites. In *Bull. 19, U. S. Dept. Agriculture, Bureau of Animal Industry*, Washington, 1898.
- Index Catalogue of Medical and Veterinary Zoology. Cestoda and Cestodoria. Washington, 1912.

- Stiles and Hassall, Notes on parasites. 47. On the priority of *Cittotænia*, Riehm, over *Ctenotænia*, Railliet, 1891. In *Vet. Mag.* Philadelphia, July 1896, Vol. 3, no. 7, p. 407.
- Stiles and Stevenson, The Synonymy of *Tænia*, *T. crassicollis*, *T. marginata*, *T. serrata*, *T. cænurus*, *T. serialis*, and *Echinococcus*. In *Bull.* 80, U. S. Dep. of Agric. Bureau of Animal Industry. Washington, 1905.
- Walter, H., Helminthologische Studien. In *Ber. Offenb. Ver. Naturk.*, 1865-66, Vol. 7, pp. 51-79, pl., I, figs. 1-6 (1866). Nachträgliche Mittheilung zu "Helminthologische Studien." *Ibidem*, 1866, pp. 133-4.
- Zeder, J. G. H., Anleitung zur Naturgeschichte der Eingeweidewürmer. Bamberg, 1833, mit 4 Taf.
- Zschokke, F., Recherches sur l'organisation et la distribution zoologique des vers parasites des poissons d'eau douce. In *Archivis de Biol.*, 1884, T. V., pp. 1-89. Avec 2 pl.
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XX. SOME NEW AND INTERESTING
BATRACHIA AND LIZARDS FROM
INDIA, CEYLON AND BORNEO.

(Plate xv.)

By N. ANNANDALE, D.Sc., F.A.S.B., Superintendent, Indian
Museum.

The species described or commented on in this paper are represented by specimens recently presented to the Indian Museum or collected by members of its staff.

BATRACHIA.

Fam. CAECILIIDAE.

Since Mr. Boulenger published his volume on the Reptiles and Batrachia in the *Fauna of British India* (1890) the discovery by Col. Alcock¹ of a species of *Herpele* from Assam has not only added a very interesting form to the fauna but has also greatly extended the known range of the genus, which had previously been recorded only from Africa and America. The only other addition as yet made to the Indian list in the group is a new variety of the widely distributed Oriental species *Ichthyophis glutinosus* (I.g. var. *tricolor*) described from Travancore by myself.² I have here to add, from the southern part of the Malabar Zone, a new species of the South Indian and African genus *Uraeotyphlus*.

Uraeotyphlus menoni, sp. nov.

Teeth moderate, both rows on the mandible well developed.

Head triangular, short, with the snout rounded; snout about as long as the distance between the eyes, by no means prominent.

Tentacle below and slightly in advance of the nostril.

Eyes distinct.

Body cylindrical, slender, with about 170 rings; circular folds narrowly interrupted in the midventral line on the fore part of the body, alternating with longer and shorter interruptions on the hind part.

¹ *Ann. Mag. Nat. Hist.* (7) XIV, p. 271, pl. vii (1904).

² *Rec. Ind. Mus.* III, p. 186 (1909).

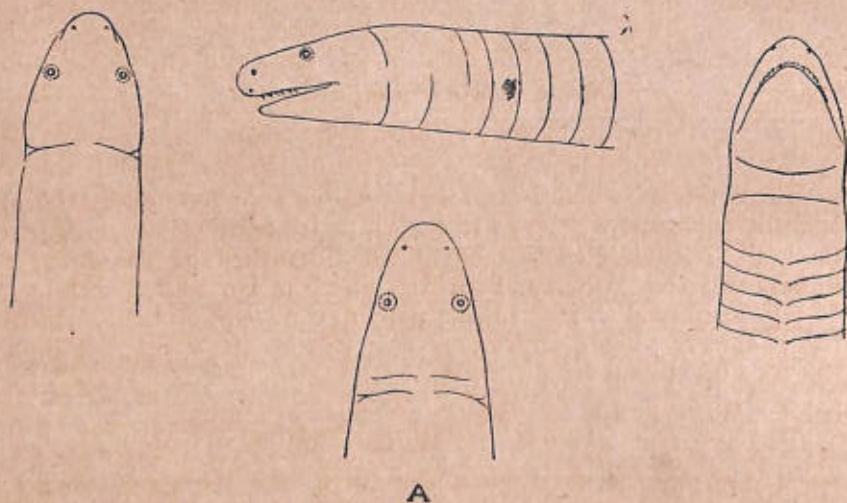
Tail short, pointed, bearing about 10 complete rings; its length 5-6 of its breadth at the base.

Colouration. Dorsal surface slate-grey; throat a little paler; lips narrowly pale; ventral surface of the body white blotched with slate grey, becoming darker posteriorly; the white extending for some distance up each fold on the side; tail uniform slate-grey; a pale spot round the vent.

Type No. 16707; *Co-type* No. 16695, *Rept. Ind. Mus.*

Distribution. Coastal districts of the southern part of the Malabar Zone.

I have examined two specimens, one (the type) from Trichur in Cochin, and the other from Kondatti in the S. Malabar district.



Head of *Uraeotyphlus menoni*, sp. nov., with that of *U. oxyurus* (A) for comparison.

Both were collected and presented to the Indian Museum by Prof. K. Rammuni Menon of Madras.

Uraeotyphlus menoni is closely related to *U. oxyurus*, from which it differs in its shorter head, in the less numerous rings on its body, in the more forward position of its nostril and in colouration.

Uraeotyphlus oxyurus, D. & B.

Numerous specimens from Cochin have recently been presented to the Indian Museum by Prof. K. Rammuni Menon.

Herpele fulleri, Alcock.

The type is numbered 14759 in our register of Reptiles and Batrachia. No further specimens have been obtained.

Fam. BUFONIDAE.

Bufo stomaticus, Lütken.

Annandale, *Rec. Ind. Mus.* III, p. 283 (1909).

This toad has not hitherto been recorded from Peninsular India south of the Indus and the Ganges. A fine specimen was, however, recently obtained by Mr. F. H. Gravely and myself at Purulia in Chota Nagpur. It was found under a stone in the middle of a ploughed field.

The Arabian toad assigned by Mr. Boulenger to his *B. andersoni* (which is undoubtedly synonymous, so far as Indian specimens are concerned, with *B. stomaticus*) apparently differs from the Indian species in having a true as distinct from an artificial tarsal fold.

Fam. RANIDAE.

Ixalus leucorhinus, Martens.

I. leucorhinus, Boulenger, *Faun. Ind., Rept.*, p. 483 (1890).

I. nasutus, Annandale (*nec* Günther), *Rec. Ind. Mus.* III, p. 286 (1909).

This species, which is recorded from both Ceylon and S. India, is easily confused with *I. nasutus*, which is apparently confined to Ceylon. The latter species may be distinguished by possessing a middorsal row of prominent whitish glands of very small size.

I. leucorhinus is not uncommon at the base of the Western Ghats in Travancore on the western side of the range. I have not seen specimens from Ceylon.

Ixalus variabilis, Günther.

Colouration seems to have literally no specific significance in this frog. Six specimens were taken on one occasion by Mr. F. H. Gravely at Pattipola in the Central Province of Ceylon at an altitude of about 6000 ft. In one the whole of the dorsal surface is pale bluish grey with a bold irregular reticulation of black lines; in another it is of an almost uniform deep brown, except that the limbs are obscurely barred and that there is a very conspicuous white lozenge-shaped mark on the snout; a third has a distinct M-shaped dark mark on the back and a dark cross-bar between the eyes; while the colouration of the others is of a less striking character, but different in each case.

Besides Mr. Gravely's specimens we have others from Golconda, the Anamalai Hills and Tinneveli, all from Beddome's collection, as well as a large series from "S. India," "Malabar" and "Ceylon."

Ixalus signatus, Boulenger.

A fine specimen of this species was recently taken at Coonoor in the Nilghiris (alt. ca. 6500 ft.) by Capt. R. B. Seymour Sewell, I.M.S. It is, therefore, not confined to the Malabar Zone.

***Ixalus cinerascens*, Stoliczka.**

(Plate xv, fig. 4.)

Ixalus cinerascens, Stoliczka, *Proc. As. Soc. Bengal* 1870, p. 273, and 1872, p. 109.
Leptobrachium monticola, Boulenger (*part.*), *Faun. Brit. Ind.*, p. 510 (1890).
Ixalus cinerascens, Slater, *Proc. Zool. Soc. London* 1892, p. 347.

This species, of which the type is in the Indian Museum, is, as Slater has pointed out, a true *Ixalus*. It was probably obtained in the first instance in the Dawna Hills inland from Moulmein. I took a specimen at an altitude of about 3000 ft. on the western side of that range in 1908.

There is no conical papilla on the tongue. A noteworthy feature is the prominence of the warts on the upper eyelid. The colouration is probably variable, my own specimen being much browner than Stoliczka's.

***Ixalus chalazodes*, Günther.**

Mr. T. Bainbrigg Fletcher recently presented to the Indian Museum a specimen he had taken in the Anamalai Hills at an altitude of 4000 ft. It agrees well with examples from Beddome's collection labelled simply "S. India."

***Ixalus glandulosus*, Jerdon.**

This is much the commonest species of the genus at moderate heights in the hills of Southern and South-western India. I have recently examined specimens from the following localities in the Western Ghats:—Satara, Kachal, Taloshi and Tambi (2000-2100 ft.) and Mahableshwar (4200 ft.) in the Satara district of the Bombay Presidency; also from Macara in Coorg and the Anamalai Hills (4000 ft.). These specimens were taken by Messrs. F. H. Gravely, S. P. Agharkar and T. Bainbrigg Fletcher.

***Ixalus annandalei*, Boulenger.**

Boulenger, *Journ. As. Soc. Bengal* 1906, (2), p. 385; Annandale, *Rec. Ind. Mus.* VIII, p. 16, pl. iii, fig. 2 (1912).

The tadpole of this species closely resembles that of *Rhacophorus maculatus himalayensis*,¹ together with which it is often abundant in pools of rain-water in the neighbourhood of Kurseong during the "rains." It may be distinguished by the following characters:—

1. The pigment is paler and more evenly disposed.
2. The tail is relatively shorter and much deeper at the base and tapers more abruptly at the tip. It has a broadly lanceolate form as a whole.
3. The upper profile of the head and body forms a more even curve.

¹ *Rec. Ind. Mus.* VIII, p. 24, pl. iv, fig. 5.

The young frog, immediately after its metamorphosis is complete, is already almost as large as the adult.

Ixalus semiruber, sp. nov.

(Plate xv, fig. 3.)

Size very small, the length from snout to vent being not more than 12 mm.

Habit stout; limbs moderate, tibio-tarsal articulation reaching a point midway between the eye and the tip of the snout.

Head. Snout bluntly rounded, about as long as diameter of orbit, with the nostril slightly nearer to its tip than to the eye; loreal region slightly concave; tympanum concealed; eyes large and prominent; dorsal surface of head slightly concave; inter-orbital space broader than upper eyelid. Tongue with a small free papilla; lower jaw with a tooth at the tip.

Skin of dorsal surface smooth, highly glandular but without prominent single glands; of throat and chest smooth, of belly and (to a less extent) of lower surface of thighs granular; a fold from the eye to the shoulder.

Digits with very small but distinct terminal disks; fingers with a vestigial web; toes about $\frac{1}{3}$ webbed; 1st finger shorter than 2nd; subarticular tubercles large, rounded; metacarpal tubercles distinctly indicated; a large oval inner metatarsal tubercle present; no tarsal fold.

Colouration. Dorsal surface of head, fore limbs and anterior part of body dark brown; posterior part of body and hind limbs pale brown (in life red); throat and chest suffused with dark pigment; belly pale brown with whitish granules; fore limbs obscurely banded; all the digits more distinctly so; no reticulate markings.

Type No. 17401, *Rept. Ind. Mus.*

Habitat. Pattipola near Nuwara Eliya, Central Province, Ceylon; alt. ca. 6000 ft.

This little frog is related to the common S. Indian species *I. glandulosus*, from which it differs in its smaller size, stouter habit, less blunt snout, smooth chest and totally different colouration. It is common under fallen tree-trunks in the jungle round Pattipola and has probably escaped notice hitherto on account of its small size. I collected only a single specimen, although I saw more, in October, 1911.

LACERTILIA.

Fam. GECKONIDAE.

Alsophylax himalayensis, sp. nov.

(Plate xv, fig. 1.)

Habit stout, not at all depressed.

Head strongly convex in lateral view; snout bluntly pointed, about as long as the distance from the eye to the ear; forehead

slightly concave; eyes large; ear-opening elliptical, vertical, about a third as large as the eye.

Limbs short, the hind limb barely reaching the axilla and the fore limb the eye; digits rather stout; their inferior lamellae without projecting tubercles.

Tail stout, tapering, slightly flattened above at the base.

Lepidosis. Snout covered with small, convex, polygonal scales, between two of which, with the rostral and first labial, the nostril is pierced; forehead and vertex with smaller, rounded, feebly keeled granules; 11 upper and 9 lower labials; mental broad, pointed but not produced behind; a single pair of large chin-shields, which form a long suture behind the mental and are followed on each side by a row of smaller enlarged scales that decrease in size from before backwards. Dorsal surface of body covered with granules similar to those on vertex but larger, among which are scattered irregularly still larger but by no means prominent keeled tubercles; tail verticillate, clothed above in imbricating, convex, leaf-shaped scales, some of which project from the surface and are larger than others, below with smaller imbricating scales of similar form; throat covered with small rounded granules, chest and belly with smooth imbricating scales rather larger than the granules on the back; about 27 scales across mid-belly.

Colouration. Dorsal surface pale grey with numerous scriptiform transverse black marks, which are regularly interrupted in the mid-line of the back and take on the tail and digits the form of more or less distinct cross-bars; ventral surface pale, each scale on the belly bearing several microscopic black dots.

Type No. 17195, *Rept. Ind. Mus.*

Habitat. Dharampur, Simla dist., Western Himalayas; alt. ca. 4500 ft. The only specimen (a female) of this very distinct species as yet obtained was found under a stone by one of the Museum collectors.

Gehyra beebei, sp. nov.

(Plate xv, fig. 2.)

Habit stout, depressed; a distinct but not at all web-like fold of skin along each side of the body.

Head ovate, flattened; snout rounded, a little longer than the distance between the eye and the ear; ear-opening nearly circular, about half as large as eye; forehead flat.

Limbs short and flattened, with a distinct fold of skin extending along their posterior margins and in the case of the hind limbs forming a regular web; digits cylindrical at the base and widely expanded distally; digital web absent from fore feet, vestigial on hind feet; subdigital lamellae, with the exception of the terminal lamella, entirely divided by a longitudinal groove and separated at the proximal end of the digital expansion in each case by one or more minute scales; lamellae curved; 8 under

inner and 8 under middle toe; 6 under inner and 7 under middle finger.

Tail flat, tapering, pointed at the tip, expanded and swollen at the base.

Lepidosis. Snout covered with small convex granules; nostril surrounded by two larger and flatter scales, with the rostral and the first labial; granules on forehead and vertex smaller than but similar to those on snout; 10 upper, 8 lower labials; two pairs of enlarged chin-shields followed on each side by several smaller scales; first pair of shields forming a very long suture behind the mental, which is pointed but not produced. Dorsal surface of body and limbs covered with small, almost uniform convex granules, which are replaced on the tail by imbricating scales of about the same size. The whole of the ventral surface of the body covered with small, imbricating, flat scales, which are larger on the belly than elsewhere; ventral surface of tail with a single series of transverse plates occupying about one third of the breadth.

Colouration of dorsal surface dull pinkish grey with numerous small paler dark-edged ocelli scattered on the back; ventral surface suffused with black pigment, which becomes intense on the digital lamellae and on some of the scales and transverse plates below the tail.

Type No. 17402, *Rept. Ind. Mus.*

Habitat. Kapit, Sarawak, Borneo.

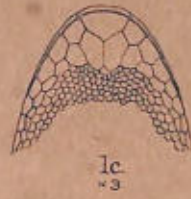
A single female specimen was taken by Mr. R. Hodgart, zoological collector in the Indian Museum, who accompanied Mr. C. W. Beebe on his ornithological expedition to Borneo in 1910. The species is related to *G. butleri*, Blgr., from the Malay Peninsula. It is distinguished by having all but the terminal subdigital lamellae completely divided, as well as by other characters.

EXPLANATION OF PLATE XV.

- FIG. 1.—*Alsophylax himalayensis*, sp. nov. (Type).
1a. Hind leg from below; 1b. Profile of head; 1c. Chin-shields.
- „ 2.—*Gehyra beebei*, sp. nov. (Type).
2a. Hind leg from below; 2b. Chin-shields.
- „ 3.—*Ixalus semiruber*, sp. nov. (Type).
3a. Profile of head; 3b. Lower surface of hind foot.
- „ 4.—*Ixalus cinerascens*, Stoliczka. (Specimen from the Dawna Hills).
4a. Profile of head; 4b. Lower surface of hind foot.



1.



1c
x3



1b
x24



2.



1a
x24



2b
x3



2a
x3



3.
x2



4a
x3



4.
x2



3a.
x3



3b
x6



4b
x6

XXI. THE INDIAN GECKOS OF THE GENUS *GYMNODACTYLUS*.

By N. ANNANDALE, D.Sc., F.A.S.B., Superintendent,
Indian Museum.

(Plates xvi-xvii.)

In his account of the reptiles of the Indian Empire and Ceylon in the *Fauna of British India* (1890) Mr. Boulenger recognized 18 species of *Gymnodactylus* as occurring within the geographical boundaries prescribed for that series. Three years later¹ he added two new species of the genus to the fauna of Burma; in 1905² I added another from the same country and in the following year³ one from the Darjiling district. I have now to describe another from that district, while the form assigned provisionally by Mr. Boulenger in 1890 to *G. fedtschenkoi*, Strauch, proves to be distinct and must be given a new name. Including all these species, the number now known to inhabit our area is 23, if we include *G. brevipes*, which has actually been found only in Persian territory but probably also occurs in British Baluchistan.

In the following list the specific names of those species of which specimens have been examined in connection with this revision are printed in italics, the fact that the type or types are preserved in the Indian Museum being indicated by an asterisk. The numbers in brackets after the names are those assigned to the species in the "Fauna."

SPECIES OF *GYMNODACTYLUS* FOUND IN INDIA, BURMA AND CEYLON.

- | | |
|---|---|
| <i>G. montium salsorum</i> ,* nov. (51). | <i>G. jeyporensis</i> , Beddome (58). |
| <i>G. scaber</i> (Rüppel) (52). | <i>G. nebulosus</i> , Beddome (57). |
| [<i>G. brevipes</i> ,* Blanford (53).] | <i>G. deccanensis</i> , Günther (59). |
| <i>G. kachhensis</i> ,* Stoliczka (54). | <i>G. albofasciatus</i> , Boulenger (60). |
| <i>G. stoliczkai</i> , Steindachner (55). | <i>G. peguensis</i> , Boulenger. |
| <i>G. lawderanus</i> ,* Stoliczka (56). | <i>G. consobrinoides</i> ,* Annandale. |
| <i>G. gubernatoris</i> ,* nov. | <i>G. fasciolatus</i> * (Blyth) (68). |
| <i>G. rubidus</i> * (Blyth) (65). | <i>G. frenatus</i> , Günther (63). |
| <i>G. himalayicus</i> ,* Annandale. | <i>G. pulchellus</i> (Gray) (66). |
| <i>G. khasiensis</i> * (Jerdon) (64). | <i>G. variegatus</i> * (Blyth) (67). |
| <i>G. oldhamii</i> ,* Theobald (61). | <i>G. feae</i> , Boulenger. |
| <i>G. triedrus</i> , Günther (62). | |

¹ *Ann. Mus. Civ. Genova* (2) XIII (XXXIII), pp. 313, 314, pl. vii, figs. 1, 2 (1893).

² *Fourn. As. Soc. Bengal (n. s.)* I, p. 82 (1905).

³ *Ibid.* II, p. 287 (1906), and *Rec. Ind. Mus.*, I, pl. vi, fig. 1 (1907).

Convenient in some respects as is the order of species adopted in the "Fauna", it seems possible to find one that exhibits their affinities more clearly. The species now assigned to *Gymnodactylus* have at one time or another been distributed in several generic groups, but these, by the consent of herpetologists, have either been abandoned altogether or else restricted to lizards no longer included with the forms to be considered here. In the case of the abandoned genera there can be no doubt that the characters on which separation was based were not of a sufficiently definite nature to bear the interpretation put upon them. Nevertheless, the genus as now restricted falls naturally into several groups, distinguished by biological and geographical and to some extent anatomical features. Among the Indian, Burmese and Ceylonese forms it is possible to recognize 5 such groups, as follows:—

Group I. Type: *Stenodactylus scaber*, Rüppel.

The lizards of this group are small ground-geckos mainly diurnal in habits and of moderately stout form, although usually somewhat depressed. Their colouration is always indefinite and their most striking structural feature lies in the regular longitudinal series of large and prominent keeled tubercles that ornament their backs. Their tails, which are cylindrical or subcylindrical, are not prehensile. The distribution of the group is essentially Palaearctic and its representatives are found only in the north-western districts of our area. Indian species are *G. montium-salsorum*, *G. scaber*, [*G. brevipes*] and *G. kachhensis*. Among the extra-Indian forms is *G. elongatus*, Blanford, of which the types are in the Indian Museum (Nos. 5848-9, 15851 and 4208). It is found in Eastern Turkestan.

Group II. Type: *Gymnodactylus stoliczkai*, Steindachner.

This species is an isolated one, distinguished from those of the previous group by its comparatively smooth back, flattened form and expanded tail. It inhabits Eastern Turkestan and the neighbouring parts of Kashmir

Group III. Type: *Puellula rubida*, Blyth.

The species of this group are slender lizards of moderate size and mainly nocturnal and arboreal in habits, although they often hide on the ground by day. Their colouration is never conspicuous,¹ but they bear narrow, irregular cross-bars on the dorsal surface. The dorsal lepidosis consists of minute rounded granules with larger and more prominent tubercles scattered amongst them; transverse subcaudal plates are never present. The group is an Oriental one, ranging as far east as the Philippines and no further

¹ As a rule it is less so in fresh specimens than in those which have been for a long time in spirit.

north or west than the Eastern Himalayas. Its species are found in dense "equatorial" forests. Those that occur in our area are *G. gubernatoris*, *G. rubidus*, *G. himalayicus* and *G. khasiensis*.

Group IV. Type: *Gymnodactylus nebulosus*, Beddome.

The species of this group are stoutly-built arboreal lizards with comparatively short tapering tails, which are probably prehensile and never have subcaudal plates. The colouration is always very conspicuous. The dorsal lepidosis varies considerably. All the species known are found in Peninsular India, Burma and Ceylon, none occurring in Assam and the Himalayas or in Malaysia, and only one in Burma. They are *G. oldhamii*, *G. triedrus*, *G. jeyporensis*, *G. nebulosus*, *G. deccanensis* and *G. albofasciatus*.

Group V. Type: *Cyrtodactylus pulchellus*, Gray.

The lizards associated with this species resemble those of group III in general structure and in habits, but are distinguished from them by their conspicuous colouration and by the fact that transverse plates are always developed under the tail. Some species attain a fairly large size. The headquarters of the group appears to be in Burma, whence no less than five species are known; several occur in Malaysia, one in Ceylon and one in the Western Himalayas. The species from India, Burma and Ceylon are *G. peguensis*, *G. consobrinoides*, *G. fasciolatus*, *G. frenatus*, *G. pulchellus*, *G. variegatus* and *G. feae*.

G. lawderanus cannot be definitely assigned to any of these groups but may be associated provisionally with *G. stoliczkai*. It is only known from a single deformed specimen.

The genus as a whole has a remarkable distribution, ranging from the shores of the Mediterranean through the mainland of Asia to the Malay Archipelago, Australia, Oceania, S. America and the West Indies. Most of the northern forms belong to my group I; the Malaysian species are distributed in groups III and V; all others probably belong to groups not represented in the Indian fauna. Apparently there are no true Ethiopian species. In the following paper, for the sake of reference, I either quote already published descriptions or give new ones of the species described since the issue of the *Fauna of British India, Reptiles and Batrachia* (1890).

In the notes on the different species I have included, under the heading of each, a list of the specimens in the collection of the Indian Museum. A large proportion of these were obtained by zoologists now no longer living, notably by Blyth, Stoliczka, W. T. Blanford, Theobald and Wood-Mason. Of recent years we have, in addition to specimens collected by the staff of the Museum, received examples of rare species from Mr. C. G. Rogers, I.F.S..

Major F. Wall, I.M.S., Lieut.-Col. A. R. S. Anderson, I.M.S., and
H. E. Lord Carmichael, Governor of Bengal.

KEY TO THE SPECIES.

- I. Dorsal keeled tubercles regularly arranged in about 12 longitudinal rows.
 - A. Dorsal tubercles half as large as eye; both femoral and praeanal pores in the male; (subcaudal plates transverse) ... *G. montium-salsorum*.
 - B. Dorsal tubercles much less than half as large as eye; only praeanal pores in the male.
 1. About 20 ventral scales across mid-belly; subcaudal plates enlarged.
 - a. Subcaudal plates much longer than wide, entire ... *G. scaber*.
 - b. Subcaudal plates as wide as long, often divided ... [*G. brevipes*.]
 2. About 30 ventral scales across mid-belly; no enlarged subcaudal plates ... *G. kachhensis*.
- II. Dorsal tubercles, if present, scattered or arranged in over 12 irregular rows.
 - A. Tail flattened and expanded at base ... *G. stoliczkai*.
 - B. Tail cylindrical or subcylindrical.
 1. No enlarged transverse subcaudal plates.
 - a. Dorsal surface covered with minute rounded tubercles among which are scattered a comparatively small number of larger ones; colouration inconspicuous; male pores present.
 - i. Back almost smooth; larger tubercles feebly developed ... *G. lawderanus* (W. Himalayas).
 - ii. Larger tubercles prominent and conspicuous under a hand lens.
 - a. Male with both femoral and praeanal pores ... *G. gubernatoris* (Darjiling district, below 4000 ft.)
 - b. Male without femoral pores.
 - a. Praeanal pores of male in a deep longitudinal groove ... *G. rubidus* (Andaman Is.)
 - b. No pubic groove.
 - i. No lateral fold ... *G. himalayicus* (Darjiling district, 5000ft.)
 - ii. A slight fold separating ventral from lateral region on each side ... *G. khasiensis* (N. Burma; Assam).
 - b. Dorsal surface covered with small rounded tubercles with much larger and more prominent ones arranged in numerous rows, dark with small pale spots; (no femoral pores in male).
 - i. A double white line forming a nuchal collar ... *G. oldhamii* (Tenasserim).
 - ii. No white lines on the neck ... *G. triedrus* (Ceylon).
 - c. Dorsal scales never prominent; dark, pale-edged spots or stripes always conspicuous on dorsal surface; no male pores.

- i. Subcaudal scales imbricate.
 - a. Dorsal scales uniform, angular, arranged with great regularity ... *G. jeyporensis.*
 - β. Dorsal scales rounded, by no means uniform, arranged irregularly ... *G. nebulosus.*
- ii. Subcaudal scales juxtaposed, verticillate.
 - a. Dorsal scales homogeneous ... *G. deccanensis.*
 - β. Larger dorsal scales separated by much smaller and less regular ones ... *G. albofasciatus.*
- 2. Enlarged transverse subcaudal plates present; (dark, pale-edged cross-bars or spots conspicuous on dorsal surface; male pores present).
 - a. Enlarged transverse plates absent from proximal part of tail ... *G. peguensis* (Hills of Pegu; Malay States).
 - . Plates extending forwards to posterior end of postanal swelling at base of tail.
 - . Dark cross-bars on back much narrower than pale interspaces; (no femoral pores in male) ... *G. consobrinoides* (Tavoy).
- i. Dark cross-bars or transverse spots on back at least nearly as wide as paler interspaces.
 - a. No femoral pores in male.
 - a. Male with 10 to 12 praeanal pores ... *G. fasciolatus* (W. Himalayas).
 - β. Male with only 4 praeanal pores ... *G. frenatus* (Ceylon).
 - β. Both femoral and praeanal pores in male.
 - a. Some of male praeanal pores in a longitudinal groove ... *G. pulchellus* (L. Burma; Malaysia).
 - β. No pubic groove in male.
 - i. 22 to 26 ventral scales across mid-belly ... *G. variegatus* (Dawna Hills, Tenasserim).
 - ii. About 35 ventral scales across mid-belly ... *G. feae* (U. Burma).

GROUP I.

Gymnodactylus montium-salsorum, sp. nov.

(Plate xvii, fig. 1).

- G. geckoides*, Blyth (*nec* Spix), *Journ. As. Soc. Bengal*, XXII, p. 410 (1853).
G. caspius, Stoliczka (*nec* Eichwald), *Proc. As. Soc. Bengal*, 1872, p. 80; Theobald, *Cat. Rept. Brit. Ind.*, p. 91 (1876).
G. fedtschenkoi, Boulenger (*nec* Strauch), *Faun. Brit. Ind., Rept.*, p. 61 (1892); Annandale, *Ann. Mag. Nat. Hist.* (7) XV, p. 26 (1905).

Habit slender, moderately depressed. Limbs moderate; hind limb reaching axilla; fore limb reaching tip of snout. Tail slender, cylindrical, tapering.

Head ovoid but narrowly rounded at tip of snout, not depressed posteriorly; snout somewhat depressed but not spatulate, a little longer than distance between eye and ear; forehead somewhat concave; ear-opening of medium size, vertical.

Digits slender; subdigital lamellae narrow.

Lipidosis.—Back bearing about twelve longitudinal rows of very large and prominent trihedral keeled tubercles, which are in contact or almost in contact longitudinally on the hinder parts and are only separated transversely by minute irregular scales; keeled tubercles less close to one another on shoulders. Snout covered with prominent rounded tubercles as a rule feebly keeled and almost homogeneous; tubercles on occiput similar but more heterogeneous; those on sides of head prominent and strongly keeled. Upper arms and femora, except near the joints, covered above with large imbricate keeled scales; scales on limb-joints small; forearm and shin (especially latter) with large non-imbricate scales above; lower surface of limbs clad in fairly uniform smooth imbricate scales. Tail bearing numerous large keeled trihedral tubercles arranged on the dorsal surface and sides in transverse bands; lower surface with somewhat irregular enlarged median transverse plates. Ventral surface of body with smooth imbricate scales in from 15 to 18 rows and limited at either side by a row of small rounded tubercles. Throat with scales like those on belly; two pairs of chin-shields, the anterior pair of which meet so as to form a suture behind the mental. About 11 upper and 11 lower labials.

Pores.—A straight uninterrupted series of 32—34 femoral and praeanal pores in the male.

Colouration.—Five or six indistinct rows of spots arranged transversely on dorsal surface; general colour dull sandy or earthy.

Length of head ..	..	18 mm.
Length of body ..	..	31 "
Length of tail (partly reproduced)		55 "
Length of fore limb	..	20 "
Length of hind limb	..	24 "

Type.—No. 6185 Rept. Ind. Mus.

Habitat.—Salt Range, Punjab.

This lizard, although closely related to *G. fedtschenkoi*, Strauch, is, to judge from Nikolski's¹ figures, distinguished from that species by its much larger abdominal scales, less spatulate snout, differently arranged mental shields and other minor characters. From *G. scaber*, Strauch, it is at once distinguished by its longer snout and by the possession of femoral pores in the male. My description is not altogether in accord with those on which Boulenger based that in the "Fauna", but the actual discrepancies are small and the only specimens I have had before me are those which were examined many years ago by Blyth, Theobald and Stoliczka. In counting the ventral scales I have omitted the little rounded tubercles that separate them from the lateral tubercles, although the former are not very clearly differentiated.

¹ *Herpet. Turanica*, pl. iv, fig. 1 (1899) in Fedtschenko's *Reise in Turkestan*.

The specimens on which the new species is founded were sent to Calcutta sixty years ago and are not in good condition. They have totally lost their natural colours and, like some other very old specimens of lizards in our collection, are stained of a peculiar greenish shade. One, which I have labelled as the type, is, however, sufficiently complete to be figured. One was sent some years ago to the British Museum under the name *Gymnodactylus fedtschenkoi*.

6181, 6184 } 6185 (Type) }	Salt Range, Punjab.	Dr. W. Theobald.
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Gymnodactylus scaber (Rüppel).

Boulenger, *Fauna*, p. 62.

The distribution of this well-known species extends from Egypt and Abyssinia through south-western Asia to Afghanistan and Sind, thus resembling that of the fish *Cyprinodon dispar*.

Specimens:—

13455-9, 13450.	Bushire, Persian Gulf.	W. D. Cumming, Esq.
14328-9.	Afghanistan.	Dr. C. R. Green.
14589.	Malakhand.	Capt. McMahon.
14979, 14980-1.	Sind, Bombay Pres.	?

[*Gymnodactylus brevipes*, Blanford.]

Blanford, *Ann. Mag. Nat. Hist.* (4) XIII, p. 453 (1874) and *Eastern Persia* II, p. 344, pl. xxii, fig. 2; Boulenger, *Fauna*, p. 63.

I have nothing to add to Blanford's excellent description. The type, which is in good condition and has apparently retained its natural colouration, still remains unique. As it was found in Persian territory, the species should not, strictly speaking, be included in the Indian fauna.

3465 (Type). Aptan near Bampur, Persian Baluchistan (3000 ft.). Dr. W. T. Blanford.

Gymnodactylus kachhensis, Stoliczka.

Boulenger, *Fauna*, p. 63.

The range of this species and that of *G. scaber* overlap, but the latter is probably not found south of the Indus. The type of *G. kachhensis* is in fair condition, but the tail is loose. Other specimens in the collection are apparently cotypes or paratypes.

Specimens:—

13462.	Bushire, Persian Gulf.	W. D. Cumming, Esq.
14726-7	Quetta, Baluchistan.	Major C. G. Nurse.
13946.	N. Baluchistan, nr. Afghanistan frontier.	Dr. Maynard and Capt. McMahon.
11963, 11965- 9, 11971-3	Sind.	J. A. W. Murray, Esq.
6192-6	Kachh.	Dr. F. Stoliczka.
5162 (Type)	"	"

GROUP II.

Gymnodactylus stoliczkai, Steindachner.

Steindachner, *Novara Reise, Rept.* p. 5, pl. ii, fig. 2; Anderson (*Cyrtodactylus yarkandensis*), *Proc. Zool. Soc. London* 1872 p. 381, fig.; Boulenger (*G. stoliczkae*), *Fauna*, p. 63.

The representatives of this species in our collection apparently include the types of Anderson's *Cyrtodactylus yarkandensis*, but there is no evidence that either of his specimens was originally designated as such. The whole series was obtained on the Second (Forsyth's) Yarkand Expedition by F. Stoliczka. Some of the specimens are in excellent condition. The species is evidently common in Ladak.

Specimens:—

3792-3.	Yarkand (E. Turkes-	Forsyth's Expedition.
	tan).	
3796-9.	Kargil, Ladak.	" "
3801-3.		" "
5845.	Sneema, Ladak.	" "
3771, 3774-6,	} Ladak.	" "
3778-82.		
3789, 3793.		
3795, 3777.		
3799, 3792.		
3794, 3783.	} Chiliscoombe, Ladak.	" "
3762, 3764,		
3766, 3768-70.		

Gymnodactylus lawderanus, Stoliczka.

Stoliczka, *Journ. As. Soc. Beng.* XLI, p. 105, pl. ii, fig. 4 (1872); Boulenger, *Fauna*, p. 64.

It is evident from Stoliczka's figure that the type-specimen was deformed, probably owing to the tail having been reproduced. This specimen still remains unique and has, perhaps fortunately, lost its tail, the lepidosis of which was evidently abnormal. Otherwise it is in good condition. It does not, however, offer sufficient evidence, although the species is undoubtedly distinct, for a dogmatic statement as to the correct position of *G. lawderanus* in the genus. It may be allied to *G. mauritanicus* (Gray).

5890 (Type). Almora, Kumaon, W. Himalayas. Dr. F. Stoliczka.

GROUP III.

Gymnodactylus gubernatoris, sp. nov.

(Plate xvii, fig. 3.)

Very closely allied to *G. marmoratus*,¹ D. & B., but distinguished from that species by its darker colouration, smaller and

¹ As to the authors of this species see Barbour, *Mem. Mus. Harvard* XLIV (1), p. 79 (1912).

relatively shorter head, slighter habit, smaller ear-opening, larger ventral scales, smaller dorsal granules and more divergent series of praeanal pores.

Habit slender, moderately depressed. Limbs rather stout; hind limb reaching shoulder, fore limb a point midway between eye and tip of snout; tail slender, tapering, cylindrical, $1\frac{1}{2}$ times as long as the head and body.

Head somewhat broadly ovoid, moderately depressed, flat on dorsal surface; forehead not concave; snout bluntly pointed, a little longer than distance between eye and ear, flat above; ear-opening small, its diameter not more than twice that of a dorsal tubercle.

Digits rather stout, transverse plates on ventral surface of proximal phalanges well developed; tubercles below joints large and prominent; transverse plates on distal phalanges reaching almost across digit.

Lepidosis.—Snout covered with small, regular, rounded granules considerably larger than those on occiput, the latter a little smaller than those on back, having mixed with them small rounded tubercles not much larger than granules on snout; back and dorsal surface of femora and shins covered with granules among which are mixed numerous fairly prominent round tubercles considerably larger than those on occiput; dorsal surface of fore limbs bearing small granules and tubercles; II upper, 9 lower labials; nostril between rostral, first labial and several small scales; rostral quadrilateral, deeply grooved in the upper half of its middle line, three small plates running transversely across its upper end, the two outer plates being much larger than the inner one; mental large, produced backwards and sharply pointed; two large chin-shields, forming a long suture behind mental and followed by several irregular plates; throat covered with small, smooth granules; ventral surface of body and limbs bearing small leaf-shaped imbricate scales; about 30 scales across mid-belly; a well-defined row of enlarged tubercles separating ventral from lateral region on either side; tail covered above with small, flat, juxtaposed plates; those on its ventral surface larger, more irregular and with a tendency to become imbricate.

Male pores.—A widely divergent series of 9 praeanal pores and, widely separated from them, 6 femoral pores on either side; the latter not joined to praeanal pores by a row of enlarged scales; several large scales in fork of praeanal series.

Colouration.—Dorsal surface dark brown, marbled with a paler shade and with numerous narrow irregular, zig-zag black cross-bars on back; many of the dorsal tubercles white; a black band extending from eye to ear on either side and connected with its fellow across back of occiput; ventral surface pale brownish; tail banded with alternate bars of grey and dark brown, those of the latter shade being the broader.

Type.—No. 17275 Rept. Ind. Mus.

Habitat.—Sikhim Himalayas (Darjiling) at low altitudes.

Measurements :—

Total length ..	..	..	115 mm.
Head and body ..	..	..	52 "
Tail ..	..	..	62 "
Head ..	..	..	15 "
Breadth of head ..	..	..	10 "
Hind limb ..	..	..	25 "
Fore limb ..	..	..	19 "

Closely allied as this species is to the Malayan *G. marmoratus*, it can be distinguished by the characters given in the first paragraph of the foregoing description. From *G. himalayicus*, the only related species known from the Sikhim Himalayas, the femoral pores of the male and the line of tubercles along each side are sound diagnostic features. I have seen only the following examples, the second of which is very young.

Specimens :—

17275 (Type).	Darjiling dist. (1000-3000 ft.).	H. E. Lord Carmichael of Skirling.
17276 (juv.)	"	"

Gymnodactylus rubidus (Blyth).

Boulenger, *Fauna*, p. 69; Annandale, *Journ. As. Soc. Bengal LXXIII* (2) Suppl., pp. 13, 14 (1904).

This species is confined to the Andaman group, on all the wooded islands of which, including the isolated Narcondam, it is abundant. Although usually seen on tree-trunks, it is also found on the ground under flowerpots in the gardens of the settlement of Port Blair. Its nearest ally is apparently *G. philippinicus* (Gray) from the Philippines but the subdigital lamellae of the latter are much more feebly developed. All the members of this group, to which *G. marmoratus* and *G. philippinicus* belong as well as the Indian forms, are very closely related, the strongest distinguishing features lying in the secondary sexual characters of the males.

The type is in good condition, except that the natural colouration has completely disappeared, as is the case with most of Blyth's types of lizards.

Specimens :—

6208 (Type).	Andamans.	Capt. Hodge.
5622-5, 5628-30, 5632-3.	"	Capt. Hodge, Dr. Dobson,
5636, 6302-7, 6209-10,	"	J. Wood-Mason, Esq.,
6212-8, 14675.	"	Major A. R. S. Anderson.
13888.	Little Andaman I.	F. Finn, Esq.
17149.	Ross I., Andamans.	C. A. Paiva, Esq.
15013-15.	Narcondam I.	Major A. R. S. Anderson.

***Gymnodactylus himalayicus*, Annandale.**

Fourn. As. Soc. Bengal (n. s.) II, p. 287 (1906); *Rec. Ind. Mus.* I, pl. iv, fig. 1 (1907).

Closely related as this species is to *G. khasiensis*, it totally lacks either a row of enlarged tubercles or a fold of skin separating the ventral from the lateral regions on the side. The type, which still remains unique, is in excellent condition. It was caught on the floor of a room of one of the hotels in a well-known Himalayan hill-station. I reprint the original description.

Description.—Head large, rather narrow, depressed, ovoid; snout slightly longer than orbit, obtusely pointed; forehead concave. Habit slender; digits compressed throughout; tail slightly longer than head and body, rounded, tapering. Dorsal surface of head and body granular, with numerous small conical tubercles on the body, base of head and hind limbs; on the back these tubercles tend to be arranged in 16 irregular lines; they are very much smaller than the ear-opening. Ventral scales small, leaf-shaped, imbricate; about 35 across middle of belly. No lateral fold or enlarged scales in its place. Rostal grooved; nostril between rostral, first labial and several small scales; ten upper and ten lower labials. Ear-opening ovoid, slanting, one-third as large as eye. Subdigital lamellae moderate, larger on proximal than on distal joints. Eleven praeanal pores arranged in a continuous, wide, V-shaped series; the scales posterior to them, between the arms of the V, enlarged; three postanal papillae (in the male) on either side; base of tail swollen below; no public groove; no femoral pores. Colouration as in *G. marmoratus*.

Measurements :—

Total length	..	..	III mm.
Head and body	..	..	53 "
Tail	..	..	58 "
Hind limb	..	..	25 "
Fore limb	..	..	20 "
Breadth of head	..	..	9 "

15716 (Type). Kurseong, Darjiling dist. Dr. N. Annandale.
(5,000 ft.).

***Gymnodactylus khasiensis* (Jerdon).**

Boulenger, *Fauna*, p. 68; Annandale, *Rec. Ind. Mus.* VIII, p. 39 (1912).

This species is found in the hills of north-eastern Burma and in those of Assam both north and south of the Brahmaputra. It thus occurs in the extreme east of the Himalayan foot-hills.

Specimens :—

6197, 6199 (Type)	Khasi Hills, Assam. Cherrapunji, Khasi Hills.	Dr. Jerdon. Lieut. Bourne.
5818-9, 5835-3 }		
5831, 5837-8 }		

16896-7.	Kobo, Abor Hills (400 ft.).	} S. W. Kemp, Esq. (Abor Exp. 1911-1912).
16879.	Upper Rotung, Abor Hills (2000 ft.).	
16918.	Upper Renging, Abor Hills (2150 ft.).	

GROUP IV.

Gymnodactylus oldhamii, Theobald.

(Plate xvii, fig. 2.)

Theobald, *Cat. Ind. Rept.* p. 81 (1876); Boulenger, *Fauna*, p. 67; Annandale, *Fourn. As. Soc. Bengal* (n. s.) I, p. 83 (1905).

This species is closely allied to *G. triedrus* of Ceylon, differing therefrom chiefly in its longer and narrower head and less strongly keeled dorsal tubercles. The double white line extending backwards from the eye to meet its fellow of the opposite side is also a distinctive feature. There are about 30 ventral scales across the mid-belly.

In spite of Theobald's statement that the enlarged scales in the praeanal region are not pierced "probably owing to the sex of the specimen", the type is a male and one scale of this series bears a distinct pore. In two other males examined there are 4 praeanal pores arranged in two pairs, which are separated by an unpierced scale in the middle line. In the type, moreover, the scales corresponding to those which bear pores in these specimens, if not actually pierced, bear distinct impressions resembling pores in size and position. It is evident, therefore, that the normal number of praeanal pores is 4. As I have already pointed out (1905) elsewhere, there is no real evidence that this lizard occurs in South India. Beddome merely suggested that it might do so (see page 322 *post.*) and the history of the type, which is from Stoliczka's collection, is unknown. The other specimens since discovered are from Tenasserim.

Specimens:—

5858 (Type).	?	Dr. F. Stoliczka.
12660.	Mintao, Tavoy dist., Tenasserim.	Tenasserim Exp.
12675.	Tavoy.	Mus. colltr. (Moti Ram).

Gymnodactylus triedrus, Günther.Boulenger, *Fauna*, p. 67.

This species is found in the hill-country of Ceylon at low altitudes.

Specimens:—

15082.	Ceylon.	Brit. Mus. (Ex.)
16710.	Peradeniya, Ceylon (ca. 1500 ft.).	F. H. Gravely, Esq.

Gymnodactylus jeyporensis, Beddome.

Beddome, *Proc. Zool. Soc. London* 1877, p. 685; Boulenger, *Cat. Liz. Brit. Mus.* I, p. 36, pl. iv, fig. 1 (1885), and *Fauna*, p. 65.

This species, which I have not seen, is only known from Patinghe Hill in the Madras Jeypur, situated in the north-eastern part of that Presidency.

Gymnodactylus nebulosus, Beddome.

Gymnodactylus nebulosus, Beddome, *Madras Journ. Med. Sci.* 1870; Boulenger, *Cat. Liz. Brit. Mus.* I, p. 34, pl. iv, figs. 1, 1a and *Fauna*, p. 64; Annandale, *Spol. Zeyl.* III, p. 189 (1906).
Gymnodactylus speciosus, Beddome, *loc. cit.*
Gymnodactylus collegalensis, Beddome, *loc. cit.*

Three distinct colour-forms exist of this species, which as a whole appears to be the most widely distributed of its group. The typical form (C of Boulenger's "Catalogue") bears on its back transverse spots, which are of a somewhat clouded nature and tend to be joined in pairs on the middle line. This form is perhaps endemic in the central parts of southern Peninsular India, but the two others do not appear to be localized apart from one another. Seemingly they occur together in the extreme southern and south-eastern part of the Peninsular and in Ceylon. One of them, which was described by Beddome as a distinct species under the name *G. collegalensis*, is distinguished from the typical form by its broader and more clearly defined spots, which are always separated in the middle line. This is form B of the "Catalogue." In the third form (*G. speciosus*, Beddome=form A, Boulenger) there are three broad cross-bars and no oval spots on the back. The specimen from Nelamba in the Indian Museum and two of the other three belong to the typical form, the fourth representing the var. *collegalensis*.

Specimens:—

12479 (typical).	Nelamba.	Purchased.
5881-1 (")	S. India.	Col. Beddome.
4311 (var. <i>collegalensis</i>).	"	Col. Beddome.

Gymnodactylus deccanensis, Günther.

Günther, *Rept. Brit. Ind.*, p. 115, pl. xii, fig. E (1864); Boulenger, *Fauna*, p. 66.

This species apparently inhabits the northern part of the Western Ghats, being replaced in the southern part of the same range by the closely allied *G. albofasciatus*.

Specimens:—

7531.	Matheran, W. Ghats, Bombay Presidency.	Brit. Mus. (Ex.).
17219.	Helvak, Koyna Valley, Satara dist., Bombay (2000 ft.).	F. H. Gravely, Esq.

Gymnodactylus albofasciatus, Boulenger.

Cat. Liz. Brit. Mus. 1, p. 37, pl. iv, fig. 2 and *Fauna*, p. 66.

This species differs greatly both in lepidosis and in colouration from *G. oldhamii*, with which Beddome confused it (see Boulenger, *Cat. Liz.* 1, p. 35). It is probably to this confusion that the belief of the occurrence in South India of the latter species is due (p. 320).

The only specimen in the Indian Museum is apparently a co-type.

15232. S. Canara, Western Madras. Brit. Mus. (Ex.)
(ex coll. Beddome).

GROUP V.

Gymnodactylus feae, Boulenger.

Ann. Mus. Civ. Stor. Nat. Genova (1) XIII (XXXIII), p. 313, pl. vii, fig. 1 (1893).

I have not seen this species, for the specimens I referred to it in 1905 (*Ann. Mag. Nat. Hist.* (7) XV, p. 27) were actually young examples of *G. consobrinus*, Peters. That this was so was first suggested to me by Dr. F. de Rooy after an examination of one of these specimens. As the original description of *G. feae* is not always available to Indian herpetologists I quote the essential parts of it.

“Head large, oviform; snout longer than the orbit, which equals its distance from the ear-opening; forehead and loreal region concave; ear-opening small, oval, oblique. Limbs elongate; digits strong, scarcely depressed at the base, strongly compressed distally; the basal phalanx with well-developed plates beneath. Head granular, the granules intermixed with small round tubercles from between the eyes to the nape, where they increase in size; rostral twice as broad as deep, with median cleft above; rostral and first labial entering the nostrils; seven or eight upper and eight or nine lower labials; mental triangular; two pairs of chin-shields, anterior largest and forming a suture behind the mental; throat minutely granulate. Body and limbs granular above, with numerous small, round, keeled tubercles; a series of small tubercles, on a slight fold, limiting the abdominal region; ventral scales small, cycloid, imbricate, 35 across the middle of the belly. Male with a cutaneous series of 32 pores along the thighs and across the praeanal region. Tail cylindrical, tapering, covered with minute granules intermixed with a few large flat, smooth tubercles, which do not form regular rings, except quite at the base; a series of large transverse plates below. Dark brown above, with four black bars, bordered with white tubercles, on the back, and a crescentic black, white-edged band from eye to eye across the nape; upper surface of head with large black spots,

separated by a whitish network; lower parts dark brown; tail black, with nine white cross-bands above." (Boulenger).

Gymnodactylus peguensis, Boulenger.

Boulenger, *Ann. Mus. Civ. Stor. Nat. Genova* (1) XIII (XXXIII), p. 315, pl. vii, fig. 2 (1893); and *Fauna Malay Pen., Rept.*, p. 136 (1912); Laidlaw, *Proc. Zool. Soc. London* 1911 (1), p. 304; Annandale, *Rec. Ind. Mus.* VII, p. 91 (1912).

I have nothing to add to Mr. Boulenger's excellent descriptions (one of which I quote in full from the *Fauna of the Malay Peninsula*), except to say that the U-shaped band on the back of the head may be broken up into a series of large spots.

"Ear-opening subtriangular, half the diameter of the eye. Limbs moderate; toes short, scarcely depressed at the base, the plates under the basal phalanx small, much narrower than the digit, roundish, convex. Head granular, with minute tubercles on the occiput; rostral with median cleft above, entering the nostril; 9 upper and 7 or 8 lower labials; symphyseal triangular; four pairs of chin-shields, the median largest and forming a suture behind the symphyseal. Body and limbs granulate above, with numerous small, round, keeled tubercles; a feeble fold along the side; ventral scales small; imbricate about 45 in a transverse series. Males with a angular series of 7 or 8 preanal pores; no femoral pores. Tail covered with small scales. Pale grey above, with blackish-brown markings edged with whitish, viz. several spots on the tip of the head, a U-shaped band from eye to eye across the nape, two series of large spots on the back, and a series of smaller spots along each side, lower parts whitish. From snout to vent 64 millim; tail 64." (Boulenger).

G. peguensis seems to me to be most nearly related to *G. variegatus* (Blyth) from the Amherst district of Tenasserim. Males of the two species are easily recognized by the number and arrangement of the pores; females can be distinguished only by slight differences in colouration and in the conformation of the head and by the smaller and more numerous ventral scales of *G. peguensis*. From *G. rubidus* (Blyth), with which Boulenger compares his species, it is distinguished by its conspicuous colouration, its much stouter habit, the form and lepidosis of its tail and other important characters. Laidlaw has recorded *G. peguensis* from the central region of the Siamese Malay States and his record is confirmed by Boulenger. In Burma it has only been found in the hilly districts of Pegu and Arrakan. In the Dawna range, in the interior of the Amherst district of Tenasserim, it is apparently replaced by *G. variegatus*.

Specimens:—

16719.	E. Yoma forest reserve, Thayetmyo dist., Pegu Yomas ca. 1000 ft.	C. G. Rogers, Esq.
17220.	Henzada dist., Arrakan Yomas.	"

Gymnodactylus consobrinoides, Annandale.

(Plate xvi, fig. 1).

Journ. As. Soc. Bengal (n. s.) I, p. 82 (1905).

I have to thank the authorities of the Amsterdam Museum for giving me an opportunity of comparing the type of *G. consobrinoides* with an adult specimen of *G. consobrinus*, Peters. They are not so closely related as I thought; I take this opportunity to redescribe my own species.

Habit slender, cylindrical; limbs moderate, hind limbs reaching axilla, forelimb anterior border of eye; tail slender, cylindrical, tapering.

Head narrow and elongate, moderately flat, forehead not concave; snout slightly convex above, rounded at tip, slightly longer than distance between eye and ear; ear-openings minute.

Lepidosis.—Snout covered with rounded granules of somewhat unequal size, larger than those on the back of the head; latter mixed with small round keeled tubercles; dorsal lepidosis consisting of granules like those on the snout mixed with numerous round keeled tubercles of moderate size; no row of enlarged tubercles or fold of skin separating side from belly; tail covered with smooth imbricate scales above, with well-developed transverse plates below; scales on the throat granular, smooth; those on the belly smooth, imbricate; about 20 across mid-belly; rostral quadrangular, cleft, with several somewhat irregular enlarged scales behind it; nostril between rostral and several small scales; 10 upper, 9 lower labials; mental moderate, not produced backwards; a single pair of very large chin-shields forming a long suture behind mental and followed by several smaller enlarged scales in two rows on each side.

Male pores.—No femoral pores; an uninterrupted divergent series of 5 preanal pores followed on the thighs by a row of enlarged scales which may bear impressions but are not pierced; no public groove.

Digits short and rather stout; subdigital lamellae by no means strongly developed.

Colouration.—Dorsal surface dull brown with several dark insulariform spots on the head, a U-shaped dark bar extending from eye to eye and 7 dark bars, much narrower than the interspaces and only reaching a short distance down the sides, on the back; the first of these bars consisting of two convergent wedge-shaped marks; tail barred; dorsal surface pale brown.

Measurements:—

Total length	..	..	110 mm.
Head and body	..	..	50 "
Tail	..	..	64 "
Head	..	..	16 "
Breadth of head	..	..	8 "
Hind limb	..	..	21 "
Fore limb	..	..	19 "

Only one specimen is now in the collection of the Indian Museum, the co-type having been sent to the British Museum some years ago.

12741 (Type). Tavoy dist., Tenasserim. Mus. colltr. (Moti Ram).

Gymnodactylus fasciolatus (Blyth).

(Plate xvi, fig. 3).

Naultinus fasciolatus, Blyth, *Fourn. As. Soc. Bengal* XXIX, p. 114 (1860); Boulenger (*Gymnodactylus*), *Fauna*, p. 71.

The type and co-type are in good condition, except that the markings have almost completely disappeared. A female recently taken by Major Wall at Almora differs from them in having only six perfect dark cross-bars on the body, the seventh being represented by a few irregular marks. The complete cross-bars are broader than the interspaces and have sinuous margins. There are 30 (not 36) ventral scales across the mid-belly in the type; the other specimens agree in this respect.

The species is apparently endemic in the Western Himalayas at low and moderate elevations.

Specimens:—

6589 (Type).	Subathu, Simla dist. (foot hills).	W. Atkinson, Esq.
6595 (Co-type).	" "	" "
56514.	Almora, Kumaon (5300 ft.).	Major F. Wall.

Gymnodactylus frenatus, Günther.

Günther, *Rept. Brit. Ind.*, p. 113, pl. xii, fig. D. (1864); Boulenger, *Fauna*, p. 68; Annandale, *Spol. Zeyl.* III, p. 189 (1906).

Specimens:—

12470.	Ceylon.	Purchased.
15337.	" "	Ceylon Museum.

Gymnodactylus pulchellus (Gray).

Boulenger, *Cat. Lis. Brit. Mus.* I, p. 46, *Faun. Brit. Ind. Rept.*, p. 69; and *Fauna Malay Pen., Rept.*, p. 36.

A specimen in the British Museum labelled "Bengal" seems to be the only evidence for the occurrence of this not uncommon Malayan species north of Tenasserim. None of those in the Indian Museum are from Indian territory. In the Malay Peninsula *G. pulchellus* is found both in limestone caves and on tree-trunks.

Specimens:—

1760.	Johore, Malay Peninsula.	J. Wood-Mason, Esq.
15010.	Bukit Kutu, Selangor.	Selangor Mus. (Ex.)
15011.	Gunong Anging, Negri Sembilan.	" " "

Gymnodactylus variegatus (Blyth).

(Plate xvi, fig. 2).

Naultinus variegatus, Blyth, *Journ. As. Soc. Bengal* XXVIII, p. 279 (1829); Boulenger (*Gymnodactylus*), *Faun. Brit. Ind., Rept.*, p. 70.

A reference to the original description shows that the type came not from Moulmein but from the interior of what is now the Amherst district: probably from the Dawna Hills, in which our second specimen was recently captured.

The type is in excellent condition, except that its colours have faded considerably, preserving only the outlines of the original markings.

Specimens:—

6188 (Type).	Country inland from Moulmein.	W. Atkinson, Esq.
16732.	Between Thingannyinaung and Sukli, Dawna Hills, Amherst dist., Tenasserim.	F. H. Gravely, Esq.

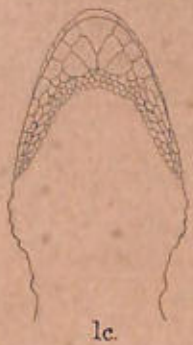
EXPLANATION OF PLATE XVI.

- FIG. 1.—*Gymnodactylus consobrinoides*, Annand. Type, ♂.
FIG. 1a, hind leg, × 2. Fig. 1b, chin-shields, × 2.
- „ 2.—*Gymnodactylus variegatus* (Blyth). Young female from
Dawna Hills.
FIG. 2a, hind leg, × 2½. Fig. 2b, chin-shields, × 2.
- „ 3.—*Gymnodactylus fasciolatus* (Blyth). Male from Kumaon.
FIG. 3a, hind leg, × 2. Fig. 3b, chin-shields, × 2.



EXPLANATION OF PLATE XVII.

- FIG. 1.—*Gymnodactylus montium salsorum*, Annand. Type, ♂.
FIG. 1a, hind leg, × 2. FIG. 1b, head in profile, × 2.
FIG. 1c, chin-shields, × 2.
- „ 2.—*Gymnodactylus oldhamii*, Theobald. Type, ♂.
FIG. 2a, praeanal pores of normal male, × 3.
- „ 3.—*Gymnodactylus gubernatoris*, Annand. Type, ♂.
FIG. 3a, hind leg, × 2. FIG. 3b, praeanal pores, × 3.



1c.



1.



1a.



2a.



2.



3b.



3a.



3.



1b.

XXII. BUTTERFLIES OF THE GENUS
PARNASSIUS
IN THE COLLECTION OF THE INDIAN
MUSEUM.

By ANDRÉ AVINOFF, F.E.S.

In the summer of 1912 I made a journey by way of Kashmir, Ladak, the Karakorum and Chinese Turkestan from India to Russia for the purpose of lepidopterological investigations. On my way through Calcutta I received the kind permission of Dr. Annandale to look through the collection of butterflies in the Indian Museum. I was very sorry not to be able to spend more time in studying these precious documents; for I had just time to gain an idea of the great scientific value of the material present in the collection, which contains the types of Lionel de Nicéville and other entomologists.

In the following paper I give a list of the forms of the genus *Parnassius* preserved in the collection of the Museum. The order adopted seems to show the natural gradation of the development of the *Parnassius* type, connecting it systematically with *Doritis*, a genus which links *Parnassius* with the other Papilionidae.

1. *Parnassius charltonius*, Gray.

Tehri Garhwal; Kulu Kharbu, 13,000 feet; Kokser, Lahaul, 22-vii; Nila Valley, Kutie Pass, Ladak, ix.

The specimens from these localities seem to belong to the typical form, though strictly the real *charltonius* was described from Chinese Tartary (from some place in Tibet near the frontier of Ladak). They are of rather small size and have the red ocelli reduced.

I found this form at Rupshu, Sumkil, at 16,000 feet (18-vii) and the Shera-la Pass in Ladak.

var. *deckerti*, Verity.

Northern side of Darkot Pass, ca. 12,000 feet; 15-vii-95 (A. W. Alcock): quite typical. Shundar, Chitral; 1-viii. Shera-la specimens are transitional.

var. *princeps*, Gr. Gr.

Turkestan. Probably from Trans-Alai or Alai, as this is the locality in which the form was found by Grum in 1884 and caught by me in 1908.

2. *Parnassius imperator*, Oberth.

Ta-Tsien-lou. From Ch. Oberthür's collection.

var. *angustus*, Frust.

Kamba-jong, Tibet; vii-1903.

The specimens in my own collection also came from Kamba-jong.

3. *Parnassius delphius*, Ev., var. *fuldussica*, Verity.

Tian-Chian, Fuldus, 9000 feet; vii-1879, caught by S. Alpheraky.

var. *staudingeri*, Bang-Hass.

Hissar Mountains.

var. *chitralica*, Verity.

Shundar, Chitral, 10-viii. Very few examples of this form are known. There are two in the British Museum and four in my own collection. Localities:—Kila-drosh, Shundar, Baroghil.

var. *stoiczkanus*, Moore.

W. Tibet, Rupshu, Lachu Ling Pass, 16,000 feet; vii.

Bara Lacha Pass, N. of Lahoul, 16,000 feet; 18-iv-79.

The specimens in my collection come from Rupshu, Sumkil and Tagalang-la, ca. 17,000 feet; vii.

4. *Parnassius hardwickii*, Gray.

This very variable species has different geographical and seasonal forms. Some of the specimens in the Indian Museum are as dark as ab. *charino*, Kirby, and some as pale as ab. *otos*, Frust.

Punjab: Sutlej Valley, 10,000 feet; viii. Kulu. Lahoul. Pangi, 10,000 to 13,000 feet; vii (light form = *otos*, Frust.). Kangra, Jalauri (pale form).

Tibet: Nila (an aberration with the red ocelli of the upper and lower wings absent). Phari-jong; viii-ix (pale form). Chumbi (pale and dark forms).

Sikkim: Gnatong (dark form).

The last form represents the typical *charino*, Kirby.

5. *Parnassius acco*, Gray.

Tibet near Sulphur Springs; 10-vii-96.

This butterfly is represented in very few collections. I have it from Kangma (Tibet), S. W. Tibet, Shera-la in Ladak, Rupshu, Tagalang-la and Sumkil. The specimens in the British Museum come from S. W. Tibet; Tibet lat. 34° 47' 10" N., long. 81° 40'

20" E.; Lupsang; Karakorum and Chumbi. M. Ch. Oberthür and the Hon. W. Rothschild have it from S. Tibet near the Sikkim Boundary.

6. *Parnassius szechenyi*, Friv.

Kuku-nor.

var. *germanae*, Aust.

Ta-Tsien-lou.

7. *Parnassius tenedius*, Ev.

Siberia (probably Altai Mts.).

8. *Parnassius honrathi*, Stgr.

Bokhara.

Known in other collections from Hissar Mts., Gharm in Bokhara, Chorog in the Pamirs, etc.

9. *Parnassius apollonius*, Ev.

Kuldja.

10. *Parnassius apollo*, L., var. *pyrenaicus*, Harc.

Pyrenees.

var. *geminus*, Stich.

Alps.

var. *alpherakyi*, Krulik.

Altai.

var. *sibirica*, Nordm.

Tian-Chian.

Not *hesobolus*, as on the label.

var. *chryseis*, Oberth.

Syr-Darja.

This locality indicates not the river Syr-Darja but the province. The specimen comes very probably from some place near Issyk-kul (lake) in the Alexander mountains.

11. *Parnassius nomion*, Fisch.-Wald.

Siberia (some locality in the Altai).

var. *nomius*, Gr. Gr.

Kuku-nor.

12. *Parnassius delius*, Esp.

Alps.

var. *intermedius*, Men.

(=*altaica*, Men., =*phoebus*, Fab.)

Altai.

var. *smintheus*, Doubl.

Colorado.

13. *Parnassius discobolus*, Alph. (Stgr.).

Tian-Chian.

var. *insignis*, Stgr.

Shundar. The only two other known specimens of *discobolus* from British limits are in my collection (also from Shundar, Chitral).

Another *insignis* in the Museum has the label Kuku-nor, which is sure to be wrong.

var. *romanovi*, Gr. Gr.

Pamir (most probably from Trans-Alai).

14. *Parnassius thibetanus*, Ober.

Ta-Tsien-lou.

15. *Parnassius mercurius*, Gr. Gr.

Kuku-nor (not Pamir, as written on the label).

16. *Parnassius actius*, Ev.

Kisil Art, 14,000 feet.

17. *Parnassius himalayensis*, Elwes.

(=*jacquemontii*, Boisd.)

Garhwal: Phulaldaru, viii. Tehri Garhwal, vii. Nilung Pass, 15,000 feet, vii. Kulu.

Punjab: Kailang, Lahoul; 20-vii-79.

Ladak: Chang-la, 4000 feet.

Chitral, 12,000 feet.

Badakshan.

The last locality is especially interesting, as so little is known of the fauna of Afghanistan.

18. *Parnassius rhodius*, Honr., var. *variabilis*, Stich.

Djirg-thal (Alai Mts.).

var. *chitralensis*, Verity.

Shundar, 1—10-viii; Darkot, 15-vii-95.

19. *Parnassius epaphus*, Boisd.

Tibet near Sulphur Springs, 17,600 feet; vii-96 (rather small, like my specimen from Rupshu).

N. of Chang-la (not *P. jacquemonti* as marked on the label).

var. *cachemiriensis*, Ober.

Kashmir: Deosai Plains; 13,000 feet, 12-viii.

Baltistan: Scoro-la; 15,000 ft., 3-viii.

var. *sikkimensis*, Elwes.

Sikkim: Lachen to Lachung 12,000-18,000 feet.

Tibet: Phari Jong.

var. *poeta*, Ober.

Ta-Tsien-lou.

20. *Parnassius orleans*, Ober.

Ta-Tsien-lou.

var. *groumi*, Ober.

Kuku-nor.

Not the typical *orleans* as on the label.

21. *Parnassius eversmanni*, Men.

N. Siberia: Lena; 20-vi.

22. *Parnassius clarius*, Ev.

Altai.

ab. *dentata*, Aust.

Altai.

23. *Parnassius nordmanni*, Men., var. *minima*, Honr.

Caucasus: Dagestan.

24. *Parnassius mnemosyne*, L.

Scandinavia; S.W. Russia.

25. *Parnassius stubbendorffii*, Men.

Probably Altai.

var. *tartarus*, Aust.

Kuku-nor.

var. *koreana*, Verity.

Korea.

var. *citrinarius*, Motsch.

Japan.

XXIII. NEMESTRINIDEN (DIPT.) AUS DEM
INDIAN MUSEUM IN CALCUTTA.

Von B. LICHTWARDT, Charlottenburg.

1. *Hirmoneura cingulata*, Lichtw.

Ist von mir nach einem ♀ aus dem Brit. Mus. "India, ex coll. Saunders" beschrieben worden (Deutsch. Ent. Zeitschr. 644, 50; 1909). Es liegen 2 ♂ vor, welche von Herrn Superintendent Annandale in Phagu, Simla Hills, 9000 ft., 12-v-09, gefangen sind. Augen dicht und stark pubescent. Stirn kaum schmaler, als wie bei dem ♀, so dass die Augen des ♂ deutlich getrennt sind. Die Behaarung ist reichlicher und etwas länger und mehr gelblich. Dadurch hebt sich die ring-förmige schwarze Behaarung der Hinterleibs-segmente besser hervor; sie bildet an den Seitenrändern fast kleine Büschel von abwechselnd gelben und schwarzen Härchen. Die grau tingierten Flügel sind im costalen Teil leicht gebräunt. Fühler, Taster und Beine gelbrot, Tarsen kaum dunkler. Schinger schwarzbraun. 11-12 mm.

2. *Hirmoneura annandalei*, sp. nov.

Diese neue Art, welche ich dem Entdecker zur Ehre und zugleich als Zeichen meines Dankes für Unterstützung meiner Arbeit benenne, gleicht der *H. cingulata* ganz ungemein in Grösse und Färbung. Doch trennen die vollkommen kahlen Augen der neuen Art auf den ersten Blick diese beiden Verwandten. Bei *H. cingulata* sind durch die längere Behaarung die Ringe deutlich; bei *H. annandalei* ist die sonst gleich gefärbte Behaarung sehr kurz, wodurch die braune Farbe des Körpers mehr sichtbar wird und das Tier mehr uniform wirkt, was besonders bei den ♀ auffällt. Fühler, Taster, Beine gelbrot, Schwinger schwärzlich, Bauch und Thorax-unterseite weissgrau, Flügel deutlich grau tingiert mit dunklerem Vorderrand. 11-13 mm.

5 ♂ 3 ♀, Simla, W. Himalayas, 7000 ft., 9-v-10 und Kufri, Simla Hills, 8000 ft., 11-v-09 (*Annandale*), "common near Simla, hovering in the air in sunny spots on the road (often a considerable number of individuals together) and sometimes settling on the mud at the edge of pools of water."

3. *Hirmoneura basalis*, Lichtw.

Ich hatte diese ansehnliche Art von einem Händler gekauft mit der Vaterlands-angabe: "Ecuador, iii-1899" und "Deutsch.

Ent. Zeitschr. 595, 92-93, fig. 3 (1910)" veröffentlicht. Diese Angabe ist sicher falsch gewesen, wie der genaue Vergleich mit einem ♂ des Ind. Mus. ergibt. Das vorliegende Stück ein ♂ trägt den Zettel: Dawna Hills, 2000-3000 ft., L. Burma, 3 iii-08 (N.A). Beide Tiere sind ♂ und vorzüglich erhalten. Die schöne, dunkel zimtbraune Fliege mit der elfenbeinweiss gefärbten Basis des Hinterleibes ist leicht kenntlich. Die vorderen Beinpaare sind hellbrann, dünn weisslich pubescent, sowie die Hinterschenkel; die Hinterschienen und Tarsen aber dunkelbraun durch dichte schwärzliche Pubescenz dick erscheinend. Das Datum des Fanges scheint für mein Exemplar richtig zu sein "iii-1899." Es war auf einem besonderen kleinen Zettel vermerkt; so ist die Patria-Angabe wohl verloren gegangen oder durch Unachtsamkeit das vorliegende Stück in einen falschen Kasten gesteckt worden. "Bei der überaus genauen Angabe im Indian Museum über Ort, Zeit und besondere Fanggelegenheit, welche den Tieren (Nemestriniden wie zahlreichen Dolichopodiden) beigegeben ist, kann mein Exemplar nur aus Nord-Indien stammen."

4. *Hirmoneura opaca*, Lichtw.

D.E.Z. 643, 49 (1909).

Von dieser Art liegen 5 ♂ 8 ♀ vor, welche sich durch die stark behaarten Augen sogleich von *H. austeni* oder *ochracea* unterscheiden. Bei Gelegenheit der Beschreibung von *H. obscura*, Meig. und *villosula*, Lw. (l. c. 514; 1909) bemerkte ich bereits, dass die Augen nicht "nackt" sind, wie Schiner (F.A.i. 46) angibt. Bei diesen Arten ist die Pubescenz der Augen so zart, dass sie nur mit einer guten Lupe erkannt werden kann; bei *austeni*, *ochracea*, *cingulata* stark pubescent; bei *opaca* sind die Augen deutlich behaart, so dass man die Härchen ohne Lupe erkennen kann. Diese Eigentümlichkeit bietet ein gutes Merkmal für die Art; als Gattungsmerkmal ist es nicht zu verwenden. Düstere, schwärzliche, grau bestäubte Art mit dünner, zarter, grauer Behaarung; ca. 15 mm; Taster und Fühler schwarz, Stirn mit langen, schwarzen Haaren. Gesicht, Kinn, Brust und Thorax seiten mit gelblichgrauen längeren Härchen. Die ganze Oberseite zeigt einen dünnen schiefergrauen Reif. Auf den Hinterleibssegmenten liegt eine schwer erkennbare Zeichnung von einem Mittelfleck und zwei queren Seitenfleckchen. Diese ist nur an frischen Stücken bei auffallendem Licht sichtbar; die vorliegenden Stücke sind alle etwas "ölig." Die Flügel sind dunkel schwarzgrau. Ein Stück ist von derselben Herkunft wie die Type im Brit. Mus. 1 ♀ Kangra valley, N.-W. Himalayas, India, 4500 ft., Nov., 1899 (G. C. Dudgeon). Die übrigen ♀ aus Mussooree, W. Himalayas, ein ♀ aus Pharping, Nepal.—Die Männchen machen zunächst den Eindruck, als wenn sie einer anderen Art angehören könnten. Zwei der Exemplare sind einigermaßen erhalten, die drei anderen stark durch Schimmel incrustiert. Bei dem einen dieser Stücke war nach gründlicher Reinigung die characteri-

stische Zeichnung der Tergite erkennbar: auf schiefergrauem Grunde ein Mittel und zwei quere Seitenflecke. Die Sternite sind mehr oder weniger rötlichbraun mit hellgrauer (♀) oder gelblicher (♂) Behaarung. Augen deutlich getrennt, lang und dicht dunkelbraun behaart. Stirn über den Fühlern mit langen schwarzen Haaren. Thorax und Hinterleib möchte ich als "stichelhaarig" bezeichnen. Ueber die allgemeine starke, dunkelbraune Pubescenz ragen bleiche gelbe, bei auffallendem Licht seidenglänzende, und auch einzelne ganz schwarze Haare hervor, welche besonders an den Seiten der Tergite dichter stehen; 3♂ aus Mussooree, 2♂ von den Simla Hills.

5. *Nemestrinus niveus*, Lichtw.

♂ und ♀ aus Kogyar, Eastern-Turkestan (*Stoliczka*). (Zeitschr. f. Hym. und Dipt. 440. 1. 1907 und D.E.Z. 113. 1. 1909). Die beiden Stücke sind wohl einst in Spiritus gesammelt worden, so dass man von der rötlichen Farbe des Leibes und der Beine mehr sieht als von der schneeweissen, seidenglänzenden Behaarung, welche sonst die schönen Tiere schmückt.—Ein letztes Exemplar, ein *Nemestrinus* mit halbkugeligem Kopf und zusammen stossenden Augen und bandiertem Hinterleib—"no history"—bildet den Schlusspatium der kleinen interessanten Sammlung. Schlechte Conservierung und das Fehlen der Vaterlands-angabe machen eine Beschreibung unmöglich.

MISCELLANEA.

MAMMALS.

A SUBFOSSIL BAT'S SKULL FROM RODRIGUEZ I.—[In the late Dr. J. Anderson's Catalogue of the Mammals in the Indian Museum (pt. I, p. 100; 1881) a subfossil bat's skull from the Rodriguez Island is referred to *Pteropus rodricensis*. As some doubts were felt as to the correctness of this identification, the specimen was recently sent to Dr. Knud Andersen, who reports on it as follows.]

"The subfossil *Pteropus* skull from the island of Rodriguez is that of a *Pteropus niger* (not, as believed by the late Dr. John Anderson, the widely different *Pt. rodricensis*).

"For two reasons this specimen is of more than ordinary interest:—First, because the species is said now to be very rare, if not actually extinct; second, because (so far as I am aware) it was hitherto known from Réunion and Mauritius only, so that this would mean to be the first record from the more outlying island of Rodriguez.

"The skull is that of an aged individual, whereas that figured in Cat. Chir. B. M., 2nd edition, I, p. 217 is subadult only."

KNUD ANDERSEN.

REPTILES.

A LIST OF THE REPTILES OBTAINED BY MR. H. STEVENS IN UPPER ASSAM AND THE EASTERN HIMALAYAS.—Apart from a lizard, *Gymnodactylus khasiensis*, Jerdon, obtained at Dejoo, North Lakhimpur, Upper Assam, and a frog, *Rana liebigii*, Gthr., from 11,500 ft. altitude at Sandakpho (Nepal-Sikkim frontier), the species represented in the small collection submitted to me for identification belong to the Ophidia.

1. *Typhlops diardi*, Schleg.

Dejoo; Silonibari; base of Daffla hills, Upper Assam.

2. *Tropidonotus parallelus*, Blgr.

Maikola valley, East Nepal, 7000—10000 ft.

Two specimens, ♂ (V. 196; C. 102) and ♀ (V. 172; C. 86).

The former is remarkable for the high number of ventral and subcaudal shields. Back olive-green, sides brown, the light dorso-lateral band scarcely indicated; sides of ventral and subcaudals red.

3. *Tropidonotus piscator*, Schneid.
Dejoo, North Lakhimpur, Upper Assam.
4. *Tropidonotus himalayanus*, Gthr.
Dejoo, North Lakhimpur, Upper Assam.
5. *Tropidonotus stolatus*, L.
Dejoo, North Lakhimpur, Upper Assam.
6. *Tropidonotus chrysargus*, Schleg.
Silonibari, North Lakhimpur, Upper Assam.
7. *Pseudoxenodon macrops*, Blyth.
Maikola valley, East Nepal.
8. *Blythia reticulata*, Blyth.
Dejoo, North Lakhimpur, Upper Assam, and base of
Dafla hills.
9. *Lycodon jara*, Shaw.
Dejoo, North Lakhimpur, Upper Assam.
10. *Coluber radiatus*, Schleg.
Dejoo, North Lakhimpur, Upper Assam.
11. *Simotes albocinctus*, Cantor.
Dejoo and base of Dafla hills.
The specimens belong to the typical form.
12. *Dipsadomorphus hexagonotus*, Blyth.
North Lakhimpur; base of Dafla hills.
13. *Psammodynastes pulverulentus*, Boie.
North Lakhimpur; base of Dafla hills.
14. *Dryophis prasinus*, Boie.
Dejoo, North Lakhimpur, Upper Assam.
15. *Naia tripudians*, Merr.
North Lakhimpur; base of Dafla hills.
A young specimen referable to the var. *fasciata*, Gray,
with 25 scales across hood, 21 across body; V. 196;
C. 62.
16. *Lachesis gramineus* (Shaw).
North Lakhimpur; base of Dafla hills.

G. A. BOULENGER.

CRUSTACEA.

NOTES ON PLANKTON FROM THE CHILKA LAKE.—The tow-nettings on which the following notes are based were taken by Dr. Annandale and Mr. Kemp on the surface of the Chilka Lake off Barkul in the Puri district of Orissa in July, 1913.

Of three samples that I have examined, the first contained only a number of immature Mysids, and a small quantity of detritus. The remaining two samples, however, contained a certain number of planktonic organisms.

The main bulk of the plankton in sample II consists of vegetable debris and Copepoda, while the third sample contained numerous Algae.

By far the commonest Diatom present was a species of *Nitzschia*: in addition there were present several different species of *Chaetoceras*, among which I was able to recognize *C. diversum*, *C. peruvianum* and *C. lorenzianum*. A single species of *Rhizosolenia*, closely allied to if not identical with *R. setigera*, was present, but was extremely rare, only a very few individuals being found, while a few examples of species of *Ditonula* and *Melosira* were also seen, and a few filaments of a species of both *Nostoe* and *Oscillaria*.

Dinoflagellates were present in considerable numbers, and of these by far the commonest was *Ceratium fusus*, Ehr. Dr. Annandale tells me that at the time the collections were made numerous minute phosphorescent points were seen, and these were no doubt due to these individuals. Among other forms were at least two species of Peridininian's that I have been unable to identify.

The Copepoda obtained belong to three species.

1. *Paracalanus crassirostris*, Dahl.

Paracalanus crassirostris, Dahl. "Die Copepoden Fauna des unteren Amazonas". Berichte der Naturforschenden Gesellschaft zu Freiburg. Zool. Abhand. n. ser. Vol. 8, p. 21, pl. i, figs. 27-28. Freiburg and Leipzig, 1894.

? *Paracalanus pygmaeus*, T. Scott. "Entomostraca from the Gulf of Guinea". Trans. Linn. Soc. Zoology, series 2, Vol. VI, p. 27, pl. i, figs. 1-8. London, 1893.

Paracalanus crassirostris, Thompson and A. Scott. "The Copepoda". Ceylon Pearl Oyster Fisheries and Marine Biology, pt. I, p. 243. Royal Society, London, 1903.

Numerous examples of this species (both ♂ and ♀) were present in the collections. The form of the rostrum, the general proportions of the body and abdomen and the structure of the 5th pair of legs in the female exactly correspond with the figures given by Dahl, and I have no doubt that the present specimens belong to his species.

Dahl only obtained examples of the female and as the male differs in several details, I have given below a few notes on the main points of its structure.

♂. Total length 0.39 mm.

Proportions of cephalothorax and abdomen 3 : 1.

The head and 1st thoracic segment are fused completely and the 4th and 5th thoracic segments are partially so, but the line of separation can in most cases be detected towards the ventral side.

The abdomen consists of the usual five segments having with the furcal rami the following proportions:—6 : 7 : 5 : 4 : 7 : 7.

The furcal rami are not quite twice as long as broad and have convex inner borders.

The 1st antennae, as in other members of the genus, have a large basal portion consisting of several fused segments, and reach as far as the posterior thoracic margin.

The 2nd antennae also show the nipple-like termination of the exopodite as in all adult males of both *Paracalanus* and *Acrocalanus*.

As regards the swimming legs, these closely resemble those of *Paracalanus parvus*: in the 2nd-4th pairs of legs, both exopod 2 and 3 have serrated margins, and the distal as well as the proximal part of the border of the 3rd exopod bears teeth.

The 5th pair of legs is asymmetrical, but the most striking feature in this species is the remarkable length of the right leg; this consists of the usual number of segments, but when folded back it reaches beyond the tip of the furca by the last two segments, whereas in the other males of the genera, it only reaches to the last abdominal segment.

T. Scott has described a form *P. pygmaeus* from the Gulf of Guinea; according to Giesbrecht this is the same as *P. crassirostris*, Dahl; but his description of the female, which was the only sex he obtained, while closely resembling the present specimens as regards the general shape of the body, yet differs very materially in the arrangement of the spines on the swimming feet: according to him, his examples possessed spines on both the last joints of the 2nd-4th swimming feet: in the present specimens, spinulation was completely absent in exopod 2 in all the swimming feet of the ♀, nor in this sex was there any trace of spines on the distal part of the margin in exopod 3. I am inclined, therefore, to believe, that these two forms are not the same.

Thompson and Scott have recorded *P. crassirostris* from the coastal waters of Ceylon. I have recently examined a large collection from the Ceylon Pearl Banks, but have seen no examples of this species.

It is interesting to note that Dahl's specimens were obtained in brackish water having a salinity ranging from 11.8 to 12.8.

2. *Acartia centrura*, Giesbrecht.

This species seems to be a common inhabitant of Indian waters. The examples in the present collection are interesting in that they are slightly smaller than the normal, measuring ♂ 1.028: ♀ 1.113.

In both sexes the general structure of the body and appendages is as in normal examples, but the spines on the posterior thoracic margin, and the distal border of the abdominal segments are much smaller than is the case in specimens obtained in the open sea. It would seem probable that these are a "depauperized" form.

3. *Oithona* sp.

Not only were numerous adults of all species present, but also a large number of immature forms and nauplii larvae, thus showing that the three species were all actively breeding in the lake.

R. B. SEYMOUR SEWELL.

