

RECORDS

of the

INDIAN MUSEUM

(A JOURNAL OF INDIAN ZOOLOGY)

Vol. II, Part IV.

DECEMBER, 1908.

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Calcutta :

PUBLISHED BY ORDER OF THE TRUSTEES OF THE INDIAN MUSEUM.
PRINTED AT THE BAPTIST MISSION PRESS.

1908.

Price Two Rupees.

XXXI. REPORT ON A COLLECTION OF
AQUATIC ANIMALS MADE IN TIBET BY
CAPTAIN F. H. STEWART, I.M.S., DURING
THE YEAR 1907.

PART I.—INTRODUCTION, CœLENTERATES, NEMATOMORPHA,
ROTIFERS AND GASTROTRICHA, ENTOMOSTRACA,
ARACHNIDS, FISH (*Systematic*) AND
BATRACHIA.

INTRODUCTION.

By F. H. STEWART, M.A., D.Sc., M.B., Capt., I.M.S.

The collection which forms the subject of the following report, was made in the district between the Tang-la and the town of Gyantse in Tibet during the year 1907. The Tang-la is the pass which leads from the Chumbi Valley into Tibet proper, crossing the watershed of the main chain of the Himalayas at a height of 15,000 feet above sea-level. To the north of it the streams run into the Tsang-po, to the south into the Brahmaputra and the Ganges. Gyantse lies about one hundred miles by road north of the Tang-la at an altitude of 13,100 feet. Collections made in this region thus obviously have a double interest, firstly from the geographical position, and secondly from the altitude of their source.

No general collections of the aquatic invertebrate fauna of this part¹ of Tibet have been made previously, but fishes and amphibians were collected during the Tibet Expedition of 1904 in this district, while those from the upper reaches of the Sutlej and Indus may also be counted as Tibetan.

In crossing the Tang-la the character of the country is seen to change entirely. We are leaving the well-watered sphere of the monsoon for a region of dry arid hills which, during the greater part of the year, are entirely bare of vegetation. The rainfall changes from the steady six months' downpour of Sikkim to a scanty fall for one month only about August. Snow also falls in very small quantities except in the immediate neighbourhood of the passes. During the winter of 1906-07 it only lay in the Gyantse valley for one day, and on the hills around for short periods which, if added together, would not total more than one month. Thus during the greater part of the year the lakes and rivers are fed only from springs, which arise here and there on the hillsides.

¹ Specimens of the Phyllopods *Branchinecta orientalis* and *Estheria davidi* were collected in Gyantse by Capt. Lloyd, I.M.S., and noticed by Gurney in *Journ. Asiat. Soc. Bengal*, ii (N.S.), 1906.

The first considerable mass of water met with is the Rham-Tso (see plate xxvi), a lake situated about twenty miles from the pass at an elevation of 14,700 ft. It is about eight miles long by four broad, and appears to be shallow throughout. It occupies the whole of the north-eastern end of a broad plain which is surrounded on all sides by mountain chains. The southern portion of this boundary is the Chumolhari group of mountains covered with perpetual snow. From April to October this lake is entirely free from ice. In October ice begins to form round the margins and gradually spreads until it covers the whole surface. The winter months are, of course, intensely cold. During the summer, however, no climate could be more delightful. In the daytime the temperature rises to about that of an English summer's day and even at night remains moderate, so ringed in is the plain by bare hills which store up the sun's heat. During these months the Rham-Tso is well peopled. All round its grassy banks, bar-headed geese rear their families, while ducks of many kinds are to be seen on its waters. Fish are exceedingly plentiful, and large numbers are caught in nets set on stakes across the outlet at the northern corner of the lake, where a small river runs out to fall into Kala-Tso four miles to the north. These fish are preserved by the Tibetans by being split like findon haddocks and dried in the sun. They are not salted or smoked. When fresh they are exceedingly good eating, the flesh sweet and free of the muddy taste and the multitude of bones which render Tibetan river fish so unpleasant. The dried fish are, however, not for European taste.

Water weeds grow in abundance for many yards out from the margins of the lake, and Amphipods, Copepods, shells and a species of Hydra flourish among this vegetation.

From Kala-Tso, a lake closely resembling Rham-Tso, but on a somewhat smaller scale, the water escapes under ground in the direction of Gyantse. It reappears about twelve miles off near the village of Mang-tsa (14,500 feet) and, reinforced by several small streams issuing from springs on the hillsides, forms the commencement of the Nyang Chu, the river which flows through the Gyantse valley and ultimately falls into the Tsang-po.

These streams are only completely frozen during the coldest months of the year—February and March. The spring water is sufficiently warm to keep ice-free for some miles during the rest of the year. Here among the moss which grows in the small rivulets, shells and Amphipods, Oligochætes and Turbellarians abound. Small loaches (*Nemachilus stoliczkae*) are also common.

Twenty miles nearer Gyantse, at Kang-ma, is a group of springs, the water of which is tepid and heavily charged with carbon dioxide. The only animals found in these springs are certain Ostracods (*Eucypris minuta*, v. Dad.).

In the Gyantse valley itself the river flows with considerable rapidity. The water is grey and loaded with mud. It does not freeze over even in the depth of winter, but from December until April the surface is dotted with ice carried down from above.

The natives of the valley say that the large fish migrate down into the Tsang-po in the autumn and return in spring. The first fish of any size which I obtained in spring were all *Schizopygopsis stoliczkae* or *Ptychobarbus conirostris*. The other species appeared later.

In the Gyantse valley, as elsewhere in Tibet, there is an elaborate system of irrigation channels branching off from the rivers. During autumn these abound with young fish, and as in November most of these channels are allowed to run dry, a great loss of young life must result.

Two of the best collecting places in the valley are Te-ring Gompa and High Hill Gompa, two monasteries situated on the hill faces several thousand feet above the valley. A spring arises near each, and Turbellarians, Amphipods, Oligochaetes, Rotifers and frogs abound among the moss, algæ and stones.

Through the courtesy of the Director General of Observatories I am able to give the following table showing the maximum and minimum temperatures recorded each month during 1907 in Gyantse.

GYANTSE, 1907.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Maximum temperature in degrees Fahr.	43·3	39·5	46·3	57·2	65·6	73·0	74·8	74·5	73·4	66·4	54·6	43·4	59·3
Minimum temperature.	8·7	8·8	13·8	27·6	32·9	42·7	47·6	44·4	43·1	32·3	12·3	4·0	26·5

OBSERVATIONS ON SPECIMENS OF *HYDRA* FROM TIBET, WITH NOTES ON THE DISTRIBUTION OF THE GENUS IN ASIA.

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

Hydra fusca, Linn.

? *H. rhætica*, Asper, Zool. Anz., 1880, p. 205.

Several specimens from among weeds in the Rham-Tso (lake) at an altitude of about 15,000 feet; taken in August, 1907 (Capt. F. H. Stewart).

The specimens, which are much contracted and have suffered in transit, have a pale orange-brown colour in spirit; but Capt. Stewart tells me that they were red in life. Some of them have five and some six tentacles; no gonads are present, but one individual bears a large bud with five well-developed tentacles. The bud arises very near the base of the parent polyp. The larger nematocysts, which are not numerous on the tentacles and very scarce on the body, measure 0·0135 mm. by 0·0108 mm.; their threads appear to be short and rather stout and the cnidocils are short and inconspicuous.

In diagnosing such specimens it is impossible to come to a very definite conclusion. The species they represent resembles Asper's form, which was found in a Swiss Alpine lake, in its red colour and in the number of its tentacles. Whether *H. rhaetica* is specifically distinct from *H. fusca*, Linn., may, however, be doubted. In any case it appears to be distinct from the only other red form that has received a name, viz., *H. rubra*, Lewes, which is stated to be a free-living form only found at considerable depths (Roux, *Ann. Biol. Lacustre*, ii, p. 266, 1907).

I take this opportunity to add some remarks on the distribution of *Hydra* in Asia, a certain amount of additional information having become available since I wrote my two papers on the Bengal species (*Mem. Asiat. Soc. Bengal*, i, 239, 1906, and *Journ. Asiat. Soc. Beng.*, 1907, p. 27).

I am indebted to Major J. Stephenson, I.M.S., Professor of Biology, Government College, Lahore, for several specimens taken by him in a small pond in that city. They are well preserved and have, even in spirit, their tentacles considerably longer than their bodies. Several of them bear buds, but no gonads are present. The larger nematocysts, which are far less abundant, especially on the body, than those of *H. orientalis*, measure 0·0135 mm. by 0·0081 mm. and are therefore smaller than those of the Bengal form, which measure 0·0189 mm. by 0·190 mm.; their threads also appear to be shorter and stouter and their cnidocils to be less conspicuous. The colour in spirit is a dirty white. I think that these specimens are identical with the form called *Hydra fusca* by Linné.

Dr. A. Powell, of the Grant College, Bombay, has found a *Hydra* at Bombay, which differs in its biology from my species, while Capt. H. J. Walton, I.M.S., writes that he has recently taken specimens at Bulandshahr in the United Provinces. These, he says, do not altogether agree with my description of *H. orientalis*, from which it is very probable that both they and the Bombay form are distinct.

During a recent visit to Burma (March, 1908) I found a *Hydra*, apparently identical with specimens from Calcutta, common in a pond at Mandalay; while in a small pool near Moulmein, in Lower Burma, I took a single polyp, which was of an "oil-green" colour and had eight tentacles. None of these specimens showed any sign of sexual activity, but several of the Mandalay examples bore buds. The nematocysts of all agreed with those of *H. orientalis*, to which

I therefore assign even the Moulmein specimen, in spite of its eight tentacles. Such identifications, however, no gonads being present, can only be provisional.

One of my examples from Mandalay exhibited a very remarkable peculiarity, which can hardly have been more than an abnormality. The specimen consists of a parent polyp with four buds. The parent polyp had no trace of tentacles, although possessed of a mouth; but on one of the buds five well-developed tentacles were present, while on the others they had commenced to appear. Other parent polyps from the same pond had normal tentacles.

The following table embodies all that appears to be known as regards the distribution of *Hydra* in Asia:—

TURKESTAN AND SIBERIA	.? <i>Hydra fusca</i> , Linn., E. v. Daday, <i>Zool. Jahrb.</i> , syst. Abth. xix, p. 480, 1904.
TIBET	. <i>Hydra fusca</i> , Linn. (<i>vide supra</i>).
INDIA	. <i>Hydra orientalis</i> , Annand. (Calcutta, North and East Bengal, Chota Nagpur, Upper and Lower Burma). <i>Hydra</i> , spp. (Bombay, United Provinces). <i>Hydra fusca</i> , Linn. (Punjab).
CEYLON	? <i>Hydra orientalis</i> , Annand. (Colombo and Peredeniya), Willey, <i>Spolia Zeylanica</i> , iv, p. 185, 1907.
MALAYA	.? <i>Hydra orientalis</i> , Annand. (Penang).
TONQUIN	.? <i>Hydra fusca</i> , Linn., Richard, <i>Mém. Soc. zool. France</i> , vii, p. 237, 1894.

Although a considerable number of records of the occurrence of *Hydra* in the East now exist, the absence of gonads makes a definite specific diagnosis at present impossible in most cases; but no form answering to the descriptions of *Hydra viridis* has yet been found in Asia, while the production of eggs has only been observed in the case of *Hydra orientalis*, which seldom produces them at all and sometimes produces them in a degenerate condition¹ possibly due to their not having been fertilized. This form, as I have pointed out elsewhere (*Journ. Asiat. Soc. Bengal*, 1907, p. 28), is very closely related to the Palæarctic species *H. grisea*, Linn. (= *H. oligactis*, Pallas), of which it is possibly a tropical race.

¹ Cf. Weltner, *Archiv f. Naturgesch.*, 73 Jahr. (1), p. 475, 1908.

NOTE ON A FREE-LIVING NEMATODE FROM
RHAM-TSO LAKE, TIBET.By DR. J. G. DE MAN, *Ierseke, Zeeland*.

The single specimen of free-living Nematode which was collected by Captain F. H. Stewart in Rham-Tso Lake, Tibet, belongs to a long-tailed species of the genus *Dorylaimus*, Duj., and is apparently most closely related to the well-known *D. stagnalis*, Duj., of the fresh water of Europe. The point of the partly protruded spear is broken off, as also the extremity of the tail.

The measurements of this specimen, which is an egg-bearing female 5.45 mm. long, are the following:—

Length of œsophagus	1.04 mm.
Distance between posterior extremity of the œsophagus and the genital aperture	1.33 „
Distance between genital aperture and anus	2.83 „
Length of the tail	0.24 „
Length of the body	5.44 „
Breadth at base of head	0.023 „
Breadth at posterior extremity of œsophagus	0.126 „
Breadth at the genital aperture	0.133 „
Breadth at the anal aperture	0.063 „
Length of the anterior (<i>i.e.</i> , antevaginal) part of the genital organs	0.94 „
Length of the posterior (<i>i.e.</i> , postvaginal) part of the genital organs ..	0.94 „
Proportion between the length of body and the average breadth	$\frac{4.5}{1}$
Proportion between the length of body and that of œsophagus	$\frac{5}{1}$
Proportion between the length of body and that of tail ..	$\frac{20}{1}$

These measurements fully agree with those of *D. stagnalis*, Duj. (*vide* de Man, "Contribution à la connaissance des Nématodes libres de la Seine et des environs de Paris," *Annales de Biologie lacustre*, ii, 1907, p. 25, pls. ii and iii, fig. 5). Both species fully resemble one another as regards the general shape of the body and of the œsophagus, the structure of the head or cephalic region, the situation of the genital aperture and the shape of the tail. In one character, however, this specimen differs from *D. stagnalis*. On behalf of the quoted paper on the free-living Nematodes of the river Seine, no less than twelve female specimens of *D. stagnalis* were measured by me, for the greater part, if not all, egg-bearing; in all these specimens the posterior part of the genital apparatus proved to be *distinctly longer* than the anterior, *i.e.*, that part which is situated between the genital aperture and the œsophagus; the posterior part, indeed, appeared $1\frac{1}{5}$ to $1\frac{1}{2}$ times, in one individual

even twice, as long as the anterior. In the specimen from Rham-Tso Lake, however, the anterior portion of the genital organs appears *exactly as long* as the posterior (*vide* table of measurements). The anterior portion appears but *little shorter* than the œsophagus, while in the observed females of *D. stagnalis* it was usually considerably shorter, for, with a rare exception, the œsophagus proved to be once-and-a-half to twice as long as the anterior part of the genital organs. At either side of the vagina four or five ova are situated, more or less compressed against one another; somewhat farther distant from the genital aperture, each oviduct contains another fully developed egg, 0.1 to 0.11 mm. long.

It is to be regretted that no more specimens were collected, especially male specimens, which probably present greater differences, in which case the Tibetan species would, indeed, be different from *D. stagnalis*.

Prof. von Daday's paper on microscopical freshwater animals from Mongolia (in *Math. Term. Ért.*, Budapest, 24, 1906) is not at my disposal: according to the *Zoological Record*, however, no new species of the genus *Dorylaimus* are described in it.

SUR LES GORDIENS RECUEILLIS PAR LE CAPITAINE F. H. STEWART DANS LE TIBET.

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

Monsieur N. Annandale, Superintendant du Musée d'Histoire Naturelle Indien de Calcutta, a eu l'obligeance de me soumettre les Gordiens recueillis par le Capitaine F. H. Stewart dans le Tibet. Comme il s'agit d'une région peu explorée jusqu'à présent je le crois utile de publier les résultats relatifs aux Gordiens qui ont été recueillis, résultats qui viennent compléter aux ceux que j'ai déjà publiés à propos des Gordiens rapportés d'autres régions du Tibet et des pays voisins par l'expédition Russe de 1899 à 1901.

Parachordodes pustulosus, Baird.

Gyantse—(13,120 pieds sur la mer), 11-vi-1907.

♀—Longueur maxima, m. 0.193. Largeur maxima, m. 0.001.
L'animal est d'un brun clair.

Mang-tsa (14,500 pieds sur la mer), Juillet 1907.

♀—Longueur maxima, m. 0.295. Largeur maxima, m. 0.001.
Cet exemplaire est couvert d'un dépôt de carbonate de chaux.
Il s'est trouvé peut-être dans une eau très calcaire après sa mort.

♀—Longueur maxima, m. 0·140. Largeur maxima, m. 0·0008.

L'animal est d'un brun clair.

♂—Longueur maxima, m. 0·116. Largeur maxima, m. 0·0008.

L'animal est d'un brun noirâtre.

♀—Longueur maxima, m. 0·135. Largeur maxima, m. 0·0008.

L'animal est d'un brun clair.

♂—Longueur maxima, m. 0·114. Largeur maxima, m. 0·0005.

♂ " " m. 0·113. " " m. 0·0005.

L'animal est d'un brun noirâtre.

L'expédition Russe au Tibet (1899-1901) a trouvé le *Parachordodes pustulosus*, Baird, à Entok-gomba dans une source près du fleuve Dza-Eju (Bassin du Fleuve Bleu).

Cette espèce est très répandue en Asie—Desert des Kirgisi—Chine septentrionale, Chingan meridionale, Monts Tjân-schan—Zarkand. (Cf. L. Camerano, "Gordiens nouveaux ou peu connus du Musée Zoologique de l'Acad. Imp. Sc. St. Pétersbourg," *Annuaire du Mus. Zool. Acc. Sc. St. Pétersbourg*, vol. i (1896), p. 117—125, et vol. viii (1903), p. 22—29; "Gordiens du Musée Indien," *Rec. Ind. Mus.*, vol. ii (1908), p. 113, Calcutta.)

On trouve aussi le *Parachordodes pustulosus*, Baird, en Angleterre, en France, en Allemagne, en Italie (L. Camerano, "Monografia dei Gordii," *Mem. R. Accad. Sc. de Torino*, ser. ii, vol. xlvii (1897).

ROTIFERS AND GASTROTRICHA FROM TIBET.

By F. H. STEWART, M.A., D.Sc., M.B., Capt., I.M.S.

ROTIFERA.

BDELLOIDA.

Family PHILODINADÆ.

1. *Philodina erythrophthalma*, Ehrenberg.

Locality.—Te-ring Gompa, 14,000 ft., in a small pool among algæ. June.

2. *Philodina roseola*, Ehrenberg.

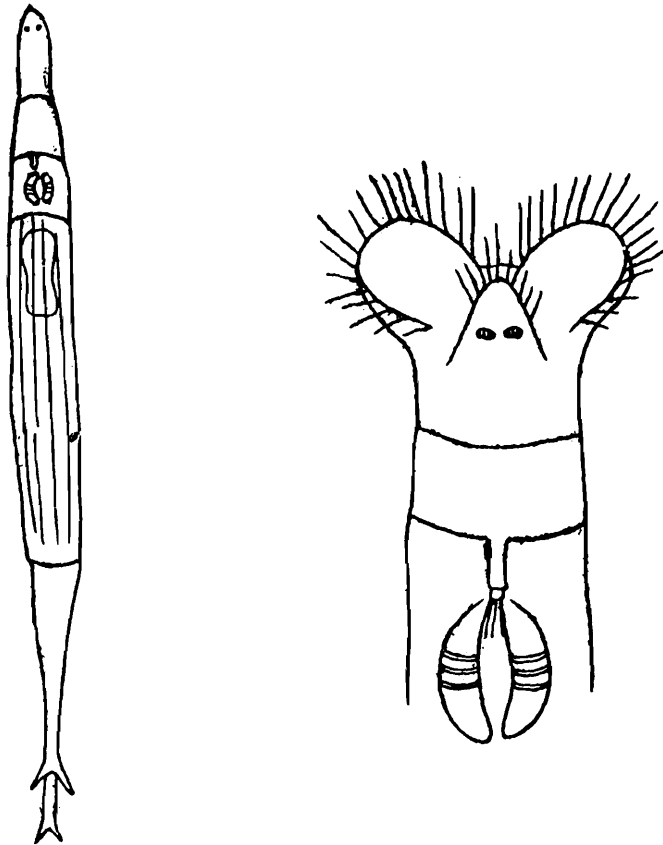
Locality.—Gyantse, 13,100 ft. May.

3. *Philodina citrina*, Ehrenberg.

Locality.—Gyantse, 13,100 ft. July.

4. *Rotifer tridentatus*, sp. nov. (figs. 1 and 2).

Specific characters.—General shape vermiform, slender. Corona divided by a deep and broad sulcus into right and left halves. Eyes circular. The tip of the dorsal column can be partially retracted. There are three circular lines around the neck, from the second of which the antenna arises. The antenna has a minute terminal invertile portion bearing setæ. The body is longitudinally fluted. The foot tapers gradually, with three or four encircling lines.



FIGS. 1 AND 2.

Spurs conical, length .02 mm. There are two long conspicuous pedal glands.

Mastax—Teeth three.

Colourless.

Length5 mm.

Locality.—Te-ring Gompa, 14,000 ft., in a small pool among algæ. June.

PLOÏMA ILLORICATA.

Fam. NOTOMMATADÆ.

5. *Notommata aurita*, Ehrenberg.

Locality.—Te-ring Gompa, 14,000 ft. April to September.

6. *Copeus labiatus*, Gosse.

Locality.—Chang-lo, 13,100 ft. August.

7. *Proales gibba*, Ehrenberg.

The measurements of this Tibetan form are slightly larger than those given by Gosse, *i.e.* $\frac{1}{150}$ " in length as compared with $\frac{1}{300}$ "— $\frac{1}{200}$ "

Locality.—Chang-lo, 13,100 ft., in slowly flowing water among algæ. June.

8. *Diglena catellina*, Ehrenberg.

Locality.—Te-ring Gompa, 14,000 ft.

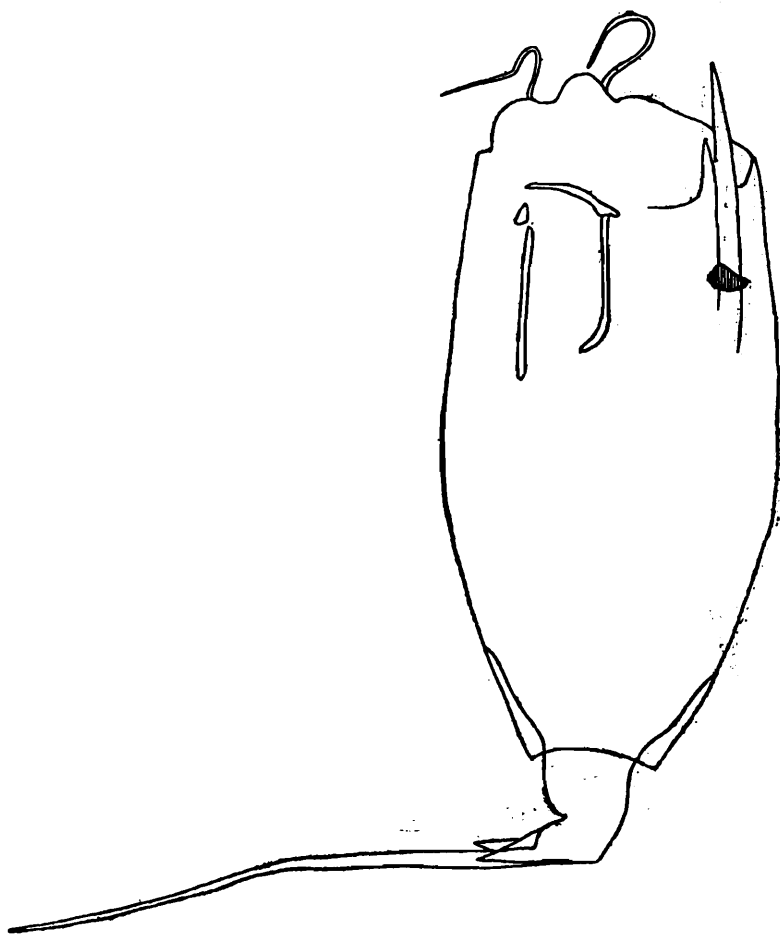


FIG. 3.

PLOÏMA LORICATA.

Fam. RATTULIDÆ.

9. *Mastigocerca auchinleckii*, sp. nov. (fig. 3).

Specific characters.—Body fusiform. Head truncate. Occipital margin of lorica armed with two unequal spines of which the longer

is median, the shorter situated to the left. The lorica is ridged in its anterior quarter in continuation of the median spine. Toe $\frac{2}{3}$ of length of body and head; two minute substyles at the base. Two large flagellæ in the ventral half of the corona. Right malleus absent.

Length—Body and head	·27 mm. ($\frac{1}{90}$ ")
Toe	·17 mm. ($\frac{1}{180}$ ")
Maximum breadth	.. ·1 mm.

Locality.—Se-chen, 13,000 ft., in small marshy pools. March and April.

This form closely resembles *M. bicornis*, Ehrenberg. It differs from it in the following three points: (1) The short spine is to the left, not to the right of the mid-line. (2) The lorica is ridged. (3) There is a pair of minute substyles.

Fam. DINOCHARIDÆ.

10. *Dinocharis pocillum*, Ehrenberg.

Locality.—Chang-lo, 13,100 ft. July.

11. *Scaridium longicaudum*, Ehrenberg.

Locality.—Gyantse, 13,100 ft.

Fam. SALPINADÆ.

12. *Diaschiza exigua*, Gosse.

The form found in Tibet is somewhat larger than that described by Gosse, as the head and body measure $\frac{1}{290}$ " in length as compared with $\frac{1}{325}$ " of the English form. It does not, however, correspond with the larger *D. taurocephalus*, Hilgendorff,¹ described from New Zealand, as the head is not so large in comparison with the body as in that form.

Locality.—Chang-lo, 13,100 ft. In a small pool off an irrigation channel among algæ. August.

13. *Diaschiza semiaperta*, Gosse.

Locality.—Te-ring Gompa, 14,000 ft.

14. *Salpina shapé*, sp. nov. (fig. 4).

This species closely resembles *S. brevispina*, Ehrenberg, differing from it apparently only in the following two points: (1) it is double the length of *S. brevispina*; (2) it is devoid of lumbar spines.

¹ Hilgendorff, *Trans. and Proc. New Zealand Institute*, vol. xxxi, p. 107.

It differs from *S. similis*, Stokes,¹ in (1) the fact that the pectoral spines do not curve toward the dorsum; (2) the absence of lumbar spines.

Length of head and body.	.25 mm.
„ of foot and toes	.13 mm.

Locality.—Te-ring Gompa, 14,000 ft. May.



FIG. 4.

Family EUCHLANIDÆ.

15. *Euchlanis dilatata*, Ehrenberg.

Locality.—Gobshi, 13,100 ft., in a small pool among algæ.

16. *Cathypna amban*, sp. nov. (fig. 5).

Specific characters.—Lorica of two unequal plates, both roughly elliptical but truncated at the anterior end. The ventral plate compared with the dorsal is broader at the anterior extremity, and is shorter, as it ends in front of the foot which projects ventrally, whereas the dorsal plate covers the origin of the foot. The occipital edge of the lorica is straight, the pectoral somewhat crescentic. There is no incisura for the foot in either plate. The toes are one-shouldered.

Length	.17 mm. ($\frac{1}{140}$ ")
Maximum breadth	.11 mm.

Locality.—Chang-lo, 13,100 ft. July.

¹ Stokes, *Ann. Mag. Nat. Hist.*, 1896, p. 17.

This form resembles *C. luna*, Ehrenberg, but differs from it in the following points: (1) the dorsal plate of the lorica is narrower in front than the ventral; (2) the occipital edge is not inangulated; (3) the horns of the pectoral edge are not so prominent; (4) there is no posterior inangulation of the dorsal plate.

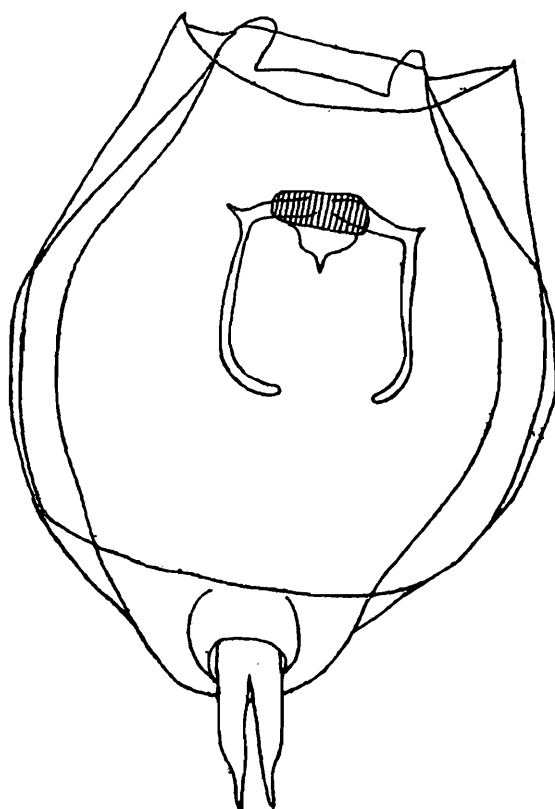


FIG. 5.

Fam. ANURÆIDÆ.

17. *Notholca scaphula*, sp. nov. (fig. 6).

Specific characters.—Shape viewed from the dorsum, broad oval truncated at the head; viewed from the side it is horn-shaped. Lorica of two dissimilar plates, the dorsal broader than the ventral, projecting in two thin wing-like lateral expansions beyond the latter. Occipital margin with six spines, the two central sharpest and highest, sublateral lowest. Pectoral margin with a deep rounded midventral incisura bounded by two flat spines. Dorsal plate 20—24 striæ; ventral plate 10 striæ.

Corona.—The outer ring of cilia passes ventrally into the incisura of the pectoral edge, while dorsally it reaches well in front of the tips of the spines. Inside the ring are three dorsal projections bearing large cilia.

Trophi—Teeth, three.

Eye single, immediately anterior to the mastax.

Length 14 mm. ($\frac{1}{170}$ ")

Maximum breadth 07 " ,

Locality.—Te-ring Gompa, 14,000 ft. April to September.

This form closely resembles *N. scapha*, Gosse. It differs from it in (1) the more marked difference in size between the central and sublateral spines of the occipital edge; (2) in the greater depth of the incisura of the pectoral edge; (3) there are 20—24 dorsal striæ instead of 11.

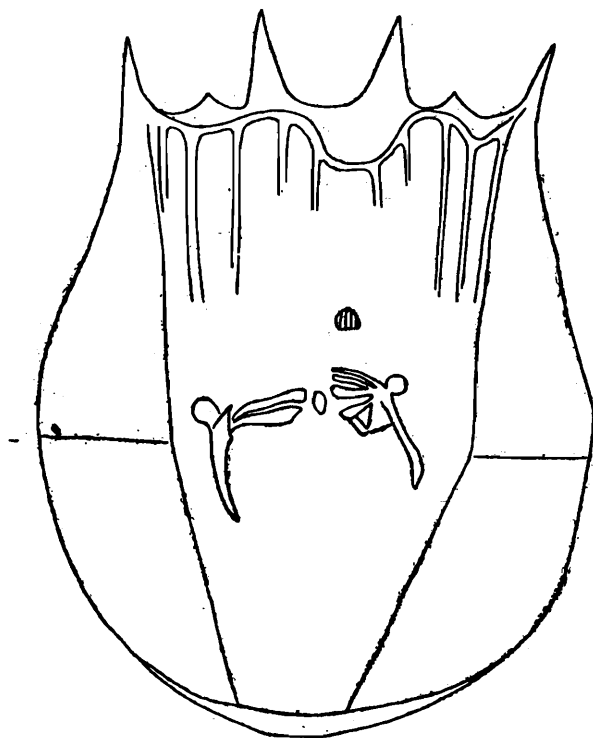


FIG. 6.

GASTROTRICHA.

18. *Lepidoderma squammatum*, F. Dujardin.

Only one specimen was preserved. It corresponds, however, so closely with the description of *P. squammatum* by Zelenka, that there appears to be no doubt about the diagnosis. The transverse rings separating the ciliary fields in the anterior portion of the body and the scales in the same position in the posterior portion can be made out, although the specimen is mounted on its side.

Measurements.

Length		17 mm.
Maximum dorso-ventral measurement of head		026 " ,
Minimum " " " neck		026 " ,
Length of œsophagus		05 " ,
" " terminal spur		016 " ,

The latter measurement is the only one which differs appreciably from the corresponding measurement given by Zelenka, *viz.*,

·022 mm. As my specimen, however, is mounted on its side, there is doubtless some foreshortening due to the lateral curve of the spur.

Habitat.—Te-ring Gompa, 14,000 feet. 17th May, 1907.

These animals were by no means of frequent occurrence. I believe that I did not find more than three or four specimens in six months' work.

Lepidoderma squammatum has been recorded from Germany, France, England, Austria and North America (Zelenka).

Technique.—For the two groups of Rotifers and Gastrotricha the only form of technique employed was that of Rousselet—cocaine, osmic acid and formalin (*Journ. Queckett Micr. Club*, vol. v, p. 1), asphalt being used as a cement. This method gave excellent results for observation within three or four months, and about thirty per cent. of the specimens were found to be in very fair condition after fifteen months, in some cases in such a good state of preservation as to repay examination with a $\frac{1}{2}$ -inch oil immersion lens. When it is considered that the slides had made a road journey of two hundred miles, and had endured extremes of climate from the cold of the Tibetan passes in mid-winter to the full heat of the hot weather in Calcutta, the method may be regarded as having been tested under somewhat adverse conditions, and to have come well out of the test.

ENTOMOSTRACA ET HYDRACHNIDAE E TIBET.

[Cum Figuris 9 in Textu.]

PROF. E. DADAY DE DEES.

Illustr. Dom. F. H. Stewart anno 1907 in Tibet ex aliquot localitatibus inter alia etiam materiam planctonicam collegii quam Illustr. Dom. N. Annandale, Superintendens Musei Indian Historiae Naturalis studiendi causa Entomostracorum Hydrachnidarumque ad me misit. Commissionem hanc honorabilem, literatura datis de Entomostracis Hydrachnidisque in Tibet occurrentibus hucusque exceptis ab Illustr. D. G. O. Sars publicatis carente, libenter accepi resultatemque studii mei in subsequentibus breviter conscribere necessarium esse putavi. Notandum est, collectionem Dom. F. H. Stewarti in 17 vitris et e 4 localitatibus species 21 infra partim enumeratas, partim descriptas continere.

Localitates materiae planctonicae examinatae sunt sequentes :—

1. *Mang-tsa*, altitudine 4419·5 mtr. a superficie maris; anno 1907, 2 Julii—2 vitra.

2. *Gyantse*, altitudine 3998·9 mtr. a superficie maris; anno 1907, 4 Augusti, 9 Septembris et 6 Novembris—8 vitra.
3. *Rham-Tso*, altitudine 4480·5 mtr., a superficie maris; anno 1907, 12 Augusti—3 vitra.
4. *Kang-ma*, altitudine 4267·1 mtr., a superficie maris; anno 1907, 18 Augusti—1 vitrum.

I.—SPECIES EXAMINATAE SECUNDUM LOCALITATES CONSCRIPTAE.

1. *Mang-tsa*.

Simocephalus elizabethae (King).

Herpetocypris stewarti, n. sp.

2. *Gyantse*.

Cyclops strenuus (Fisch).	Alona guttata, G. O. Sars.
Cyclops viridis (Jur).	Simocephalus elizabethae
Cyclops serrulatus (Fisch).	(King).
Diaptomus tibetanus, n. sp.	10. Scapholeberis mucronata
5. Diaptomus paulseni, G. O. Sars.	(O. F. M).
Chydorus sphaericus (O. F. M).	Daphnia longispina, Leyd.
Dunhevedia crassa, King.	Potamocypris stewarti, n. sp.
	13. Eulais tibetana, n. sp.

3. *Rham-Tso*.

Cyclops viridis (Jur).	Moina rectirostris (Jur).
Cyclops serrulatus, Fisch.	Ceriodaphnia pulchella, G. O. Sars.
Diaptomus paulseni, G. O. Sars.	Simocephalus elizabethae
Chydorus sphaericus (O. F. M).	(King).
5. Euryalona annandalei, n. sp.	10. Herpetocypris smaragdea,
Macrothrix hirsuticornis (Br. Nr.).	n. sp.

Eucypris tibetana, n. sp.

4. *Kang-ma*.

Eucypris minuta, n. sp.

II.—CONSPECTUS SYSTEMATICUS SPECIERUM EXAMINATARUM
DESCRIPTIONESQUE SPECIERUM NOVARUM.

Ordo COPEPODA.

(1) *Cyclops viridis* (Jur).

Cyclops viridis, O. Schmeil (9), p. 97, tab. 8, fig. 12-14.

Specimina numerosa e localitatibus *Gyantse* et *Rham-Tso* collecta examinavi.

(2) *Cyclops strenuus*, Fisch.

Cyclops strenuus, O. Schmeil (9), p. 39, tab. 2, fig. 12-15.

Cyclops strenuus, W. Lilljeborg (2), p. 28, tab. 2, fig. 20-25.

Specimina numerosa e localitate *Gyantse* collecta examinavi haecque structura pedis quinti paris formae *Cyclopis strenui* formae *lacustris*, Lillj., similia sunt.

(3) *Cyclops serrulatus*, Fisch.

Cyclops serrulatus, O. Schmeil (9), p. 141, tab. 5, fig. 6-14.

Species haec cosmopolita in Tibet frequens esse videtur. Specimina numerosa e localitatibus *Gyantse* et *Rham-Tso* collecta examinavi in societate *Cyclopis viridis* et *strenui*.

(4) *Diaptomus tibetanus*, n. sp.

(Fig. 1, a-e.)

Corpus antice parum angustatum, segmento primo longitudinem segmentorum trium segmentorum simul junctorum superante. Segmentum ultimum thoracicum feminae distinctum angulis lateralibus posticis productis, lamelliformibus, magnitudine parum diversis (fig. 1, a). Angulus laminiforme productus sinister dextro parum longior latiorque, aculeo sat magno externo armatus. Angulus dexter brevior angustiorque aculeo externo parvo. Segmentum ultimum thoracicum maris angulis lateralibus posticis parum productis, apice acute rotundatis.

Abdomen feminae triarticulatum, articulo genitali duobus ultimis simul junctis longiore. Abdomen maris 5-segmentatum, segmentis 4 ultimis fere aequilongis.

Laminae furcales longitudine segmentum ultimum abdominale superantes, margine interno setosae.

Antennae primiparis feminae 25-articulatae, retrorsum vergentes apicem laminarum furcalium attingentes vel parum superantes.

Antenna geniculans maris articulo 13 aculeo valido, longo, falciformi armato. Articulus ultimus antennae geniculantis in apice hamulo parvo, introsum vergenti (fig. 1, e).

Pedes quintiparis feminae articulo ultimo exopoditi biaculeato, aculeis sat crassis, endopodito uniarticulato, digitiformi, longitudinem dimidiam articuli primi exopoditi parum superante, apice distali biaculeato, aculeo externo longiore, interno vero brevior (fig. 1, b).

Protopoditum pedis dextri quintiparis maris articulo primo in angulo externo-distali processu lobiformi, articulo secundo cum endopodito connato, marginibus laevibus. Articulus primus exopoditi angulo externo-distali mucronato, mucrone valido, in margine interiori parum tuberculatus. Articulus secundus exopoditi

fere cuneiformis, apicem versus valde angustatus, aculeo valido, curvato, ab apice distali valde remoto, in parte tertia basali sito. Unguis apicalis exopoditi falciformiter valde arcuatus, longitudine articulos tres antecedentes parum superans (fig. 1, *d*). Endopoditum uniarticulatum, perbreve, longitudinem dimidiam articuli primi exopoditi non superans, cuneiformi, extrorsum vergens.

Articulus secundus protopoditi pedis sinistri quinti paris margine interiore laevi. Articulus secundus exopoditi in margine

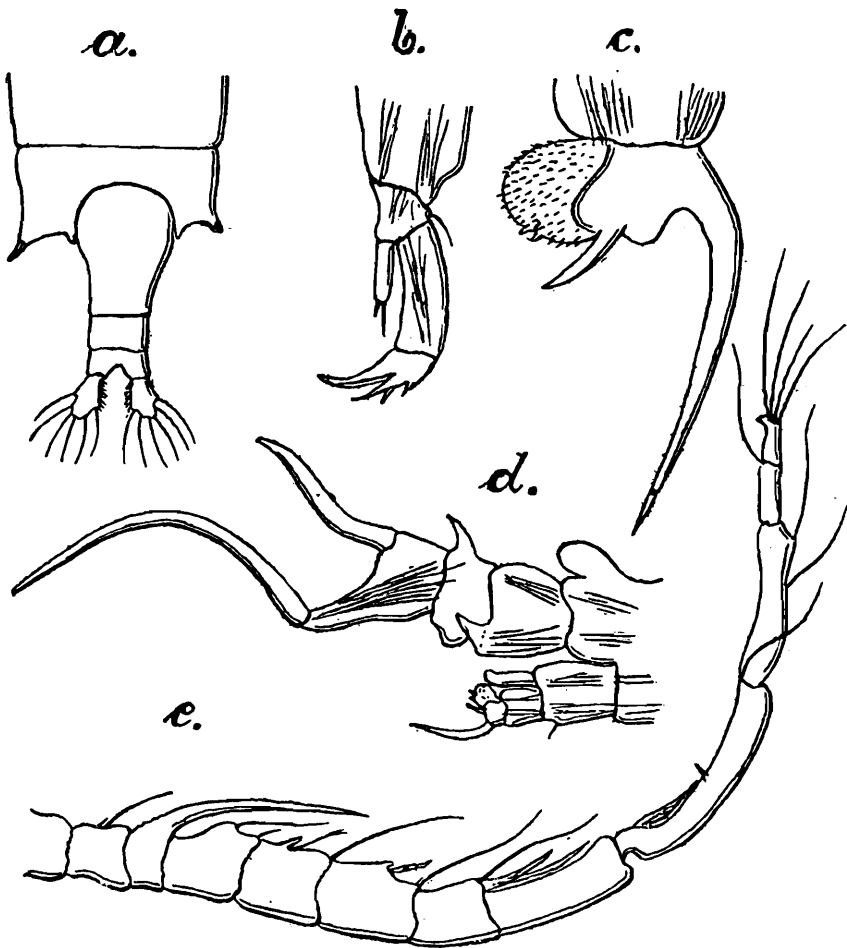


FIG. 1.—*Diaptomus tibetanus*, n. sp.

- (a) Segmenta duo posteriora trunci cum abdomine feminae.
- (b) Pes quinti paris feminae.
- (c) Apex pedis quinti paris sinistri maris.
- (d) Pedes quinti paris maris.
- (e) Pars media antennae geniculantis maris.

interno lobiformiter prominens, lobo rotundato, dense piloso aculeisque parvis 3-4 armato, in margine apicali aculeo brevior, in angulo externo apicali aculeo valido parum falciformi praeditus (fig. 1, *c*, *d*). Endopoditum huius pedis uniarticulatum, digitiforme, longitudine articulum primum exopoditi plusminusve superans.

Longitudo totalis feminae 2 mm.; maris 1.8 mm.

Specimina numerosa e localitate *Gyantse* collecta examinavi,

Species haec nova differt a speciebus ceteris: structura pedum quintiparis feminae precipueque maris.

(5) *Diaptomus paulseni*, G. O. Sars.

(Fig. 2, a, b.)

Diaptomus paulseni, G. O. Sars (7), p. 20, tab. 15, fig. 1, a-f.

Species haec adhuc solum e Pamir cognita etiam in Tibet sat frequens esse videtur. Specimina numerosa examinata e localitatibus *Gyantse* et *Rham-Tso* collecta solum structura antennae

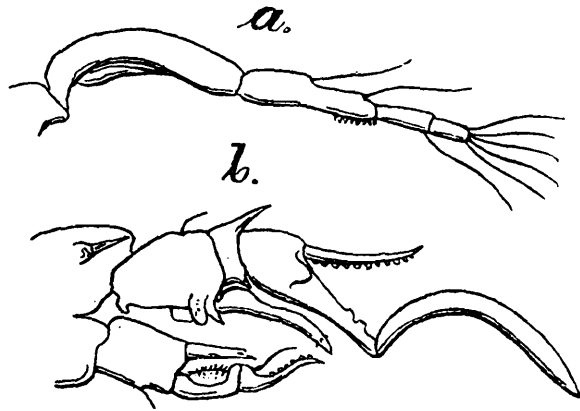


FIG. 2.—*Diaptomus paulseni*, G. O. Sars.

- (a) Pars apicalis antennae geniculantis maris.
(b) Pedes quinti paris maris.

geniculantis pedumque quinti paris maris differunt a speciminibus adhuc descriptis. Articulus antepenultimus antennae geniculantis scilicet in parte ultima marginis interioris denticulis minutis, serratim ordinatis armatus (fig. 2, a). Articulus secundus exopoditi pedis quintiparis dextri maris prope basin aculei lateralis lamina lobiformi et in margine exteriori prope basin unguis apicalis tuberculis duobus parvis armatus. Endopoditum pedis sinistri quintiparis apicem versus attenuatum, apice bifisso, aculeo minore interno, externo vero majore (fig. 2, b).

Subordo CLADOCERA.

(6) *Chydorus sphaericus* (O. F. M.).

Chydorus sphaericus, W Lilljeborg (1), p. 561, tab. 77, fig. 8-25.

Species haec cosmopolita in Tibet sat frequens esse videtur et ego exemplaria numerosa in materiam e localitatibus *Gyantse* *Rham-Tso*que inveni.

(7) *Dunhevedia crassa*, King.

Dunhevedia crassa, G. O. Sars (3), p. 42, tab. 5, fig. 1-4.

Specimina solum duo feminina examinaui e localitate *Gyantse*.

Species haec fere cosmopolita etiam e Ceylon et e Siberia (Akmolinsk) cognita.

(8) *Alona guttata*, G. O. Sars.

Lynceus guttatus, W. Lilljeborg (1), p. 468, tab. 68, fig. 16-26.

Species haec etiam e Turkestan enumerata in Tibet sat rara esse videtur, specimina non numerosa solum e localitate *Gyantse* examinavi.

(9) *Euryalona annandalei*, n. sp.

(Fig. 3, a-c.)

Testa corporis subrotundata, margine dorsali late arcuato, marginem versus posteriorem flexuoso et cum margine posteriore angulum acutum, parum prominentem formante. Margo posterior testae in parte superiore parum sinuatus, in parte inferiore rotundatus et in marginem ventralem sine limite visibili ineuns. Margo ventralis testae ante medium parum prominens, in parte posteriore subrectus et in marginem anteriorem sine limite ineuns,

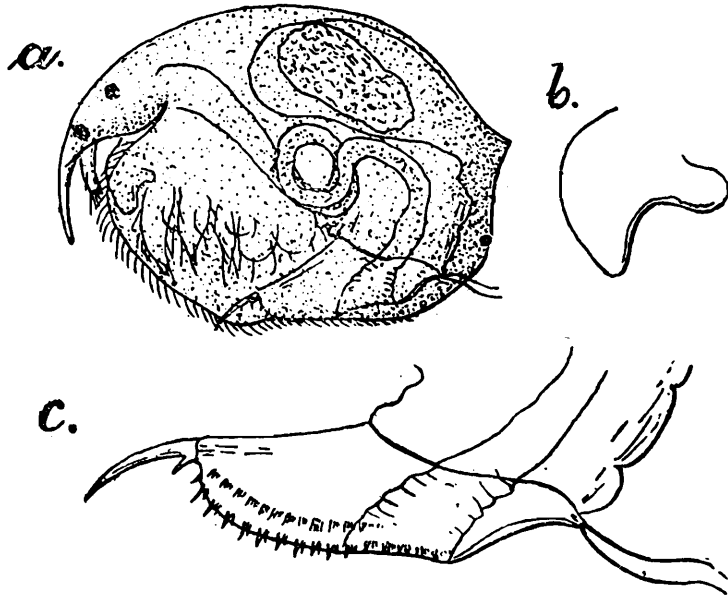


FIG. 3.—*Euryalona annandalei*, n. sp.

- (a) Femina a latere visa.
- (b) Processus labri.
- (c) Cauda a latere visa.

setis parvis armatus (fig. 3, a). Superficies testae concinne granulata.

Caput rostro sat longo, parum arcuato tenuique, sub lineam medianam testae declinato.

Oculus sat magnus; macula ocularis magnitudine oculi, oculo multo quam apice rostri proprior.

Antennae primi paris sat breves, longitudinem dimidiam rostri non superantes.

Processus labri sat parvus, antice late, infra acute rotundatus (fig. 3, b).

Cauda apicem distalem versus parum angustata, margine posteriore vel superiore ultra fissuram analem usque ad partem

tertiam apicalem subrecto, in parte tertia arcuato, serie aculeorum marginalium circa 12-14 serieque laterali aculeorum minimorum fasciculatim dispositorum. Aculei marginales in poribus ordinati, unus major, alter minor tenuiorque, unguis apicalis caudae laevis aculeo basali parvo (fig. 3, c).

Longitudo totalis 0.9—1 mm. ; altitudo maxima 0.6—0.65 mm.

Species haec nova in honorem Illustr. D. N. Annandale, denominata forma, longitudine structuraque rostri, testae precipueque caudae differt a speciebus ceteris generis. Specimina solum tres feminina examinavi e localitate *Rham-Tso*.

(10) *Macrothrix hirsuticornis*, Brady-Norm.

Macrothrix hirsuticornis, *W Lilljeborg* (1), p. 346, tab. 55, fig. 6-14.

Speciei huius etiam e Mongolia enumeratae, solum specimina tres examinavi e localitate *Rham-Tso*.

(11) *Moina rectirostris* (Jur).

Moina rectirostris, *W Lilljeborg* (1), p. 216, tab. 29, fig. 23-30, tab. 30, fig. 1-12.

Specimina 7 ♀ et 1 ♂ vidi e localitate *Rham-Tso*. Species haec in Europa et in America boreali frequens occurrit etiam in Siberia (Akmolinsk) et in Mongolia.

(12) *Ceriodaphnia pulchella*, G. O. Sars.

Ceriodaphnia pulchella, *W Lilljeborg* (1), p. 198, tab. 28, fig. 6-18.

Speciei huius in Asia sat frequentis et e Siberia Turkestanque jam cognitae solum exemplaria tria examinavi e localitate *Rham-Tso*.

(13) *Scapholeberis mucronata* (O. F. M.).

Scapholeberis mucronata, *W. Lilljeborg* (1), p. 151, tab. 22, fig. 15-19, tab. 23, fig. 1-7.

Species haec distributione geographica sat constricta etiam in Asia sat frequens esse videtur, enumerata est scilicet e Ceylon et e Siberia. Specimina non numerosa, a me examinata sunt e localitate *Gyantse* collecta.

(14) *Simocephalus elizabethae*, King.

Simocephalus elizabethae, *G. O. Sars* (3), p. 22, tab. 2, fig. 6-7.

Simocephalus gibbosus, *G. O. Sars* (4), p. 15, tab. 2, fig. 4-6.

Simocephalus vetuloides, *G. O. Sars* (5), p. 5, tab. 6, fig. 11-12.

Simocephalus mixtus, *G. O. Sars* (5), p. 18, tab. 6, fig. 4.

Species haec in Asia frequens esse videtur. Secundum opinionem meam species supra enumeratae synonymae sunt et

non dubito quin ipsam species *Simocephalus elizabethae* propter affinitatem magnam *Simocephali vetuli*, varietas sit.

Specimina numerosa vidi e localitatibus *Mang-tsa*, *Gyantse* et *Rham-Tso* itaque species haec in Tibet frequentissima esse videtur.

(15) *Daphnia longispina* (O. F. M.).

Daphnia longispina, *W Lilljeborg* (1), p. 94, tab. 12, fig. 14, tab. 13, fig. 1-8, tab. 14, fig. 1-9.

Speciem hanc iam a D. G. O. Sars, e Tibet cum varietate *caudata* enumeratam solum e localitate *Gyantse* examinavi hincque specimen unicum vidi.

Ordo OSTRACODA.

(16) *Eucypris tibetana*, n. sp.

(Fig. 4, *a-f*.)

Conchae ambae forma structuraque similes, a latere visae fere oviformes, altitudine maxima dimidiam longitudinem parum superante.

Margo anterior concharum altitudine posterioris remota, regulariter et acutiusculo rotundatus, lamina hyalina canalibusque pororum carens, tuberculis minimis, setigeris; in marginem dorsalem ventralemque sine limite visibili ineuns (fig. 4, *a*).

Margo dorsalis concharum late rotundatus, in parte anteriore parum humiliter flexuosus, in parte posteriore late arcuatus et in marginem posteriorem arcuato-flexuoso sineque limite visibili ineuns.

Margo posterior concharum altitudine anteriorem superans, sat late regulariterque rotundatus, lamina hyalina canalibus pororum tuberculisque minimis carens, in marginem ventralem sine limite visibili ineuns (fig. 4, *a*).

Margo ventralis concharum rectus, non sinuatus, structura marginibus ceteris simili.

Conchae de conspectu dorsali aut ventrali oviformes, antice acute, postice sat late rotundatae, latitudine maxima post medium sita (fig. 4, *b*).

Testa concharum concinne granulata superficie sat dense setosa. Color ignotus.

Longitudo maxima 1.5—1.8 mm.; altitudo maxima 0.8—1 mm.; latitudo maxima 0.7—1.9 mm.

Antennae secundi paris endopoditi triarticulato fasciculoque setarum natatorium usque ad apicem unguiculorum apicalium vergente. Articulus penultimus unguiculis tribus, denticulatis uno brevioribus duobus multo longioribus armatus. Articulus ultimus in apice unguiculis duobus diversis, uno brevioribus laevique, altero longioribus et denticulato (fig. 4, *c*).

Palpus maxillaris articulo apicali longioribus, quam latioribus.

Processus manducatorius primus maxillarum in apice aculeis duobus validis, denticulatis (fig. 4, *d*).

Pedes maxillares forma structuraque specierum ceterarum similes.

Pedes primi paris articulis duobus antepenultimis in superficie setosis, articulo penultimo in angulo anteriore distali setis duabus

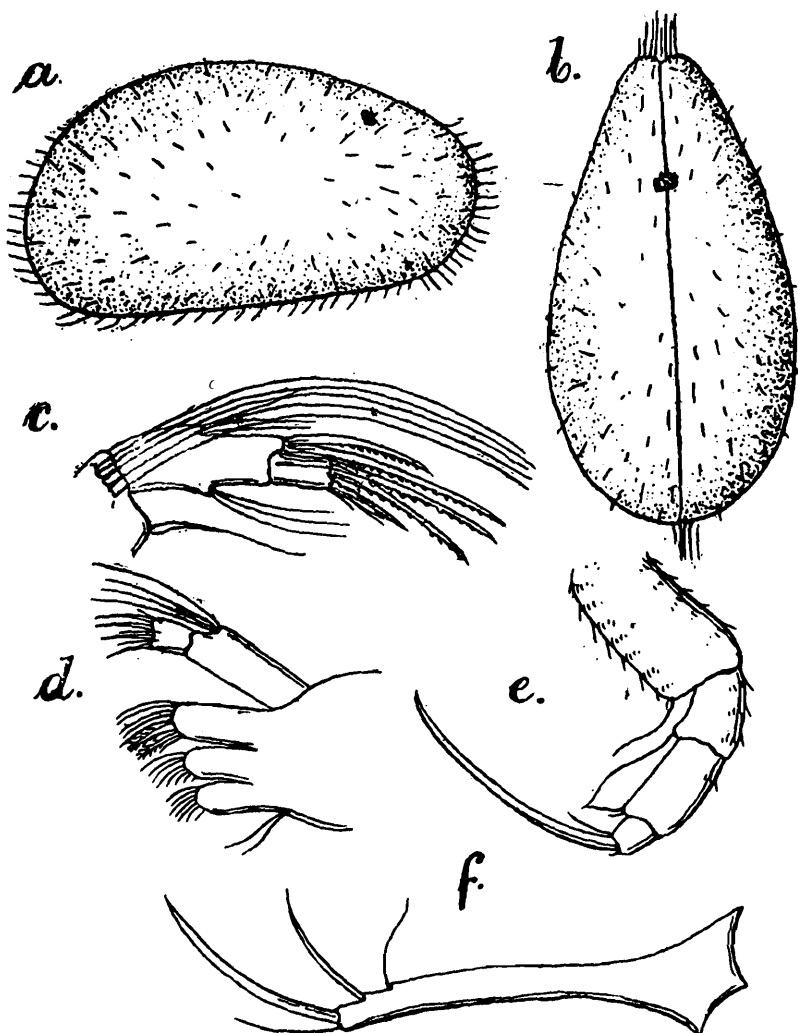


FIG. 4.—*Eucypris tibetana*, n. sp.

- (a) Concha dextra a latere visa.
- (b) Conchae supra visae.
- (c) Endopoditum antennae secundi paris.
- (d) Maxilla.
- (e) Pes primus.
- (f) Lamina furcalis.

inaequalibus. Unguiculus apicalis longitudinem articulorum 3 ultimorum pedis superans, parum falciformiter arcuatus (fig. 4, *e*).

Laminae furcales fere rectae, minime curvatae, margine posteriore vel superiore laevi, seta laterali ad unguiculum lateralem approximata; unguiculo laterali dimidiam longitudinem unguiculi apicalis superante; unguiculo apicali fere longitudine dimidia laminae furcalis; seta apicali longitudine dimidia unguiculi apicalis.

Specimina numerosa ♀ examinaui e localitate *Rham-Tso*.

Species haec nova speciei *Cyprinotus congener*, Vavr., affinis, sed differt inter alia structura marginis anterioris posteriorisque concharum.

(17) *Eucypris minuta*, n. sp.

(Fig. 5, a-c.)

Conchae ambae inter se similes, a latere visae parum reniformes, altitudine maxima longitudinem dimidiam non attingente (fig. 5, a).

Margo anterior concharum fere altitudine marginis posterioris, late rotundatus, in parte inferiore acutiusculo arcuatus, in parte superiore vero flexuoso arcuatus, in marginem dorsalem ventralemque sine limite visibili ineuns, lamina hyalina canalibusque pororum carens (fig. 5, a).

Margo dorsalis concharum late arcuatus, in parte anteriore

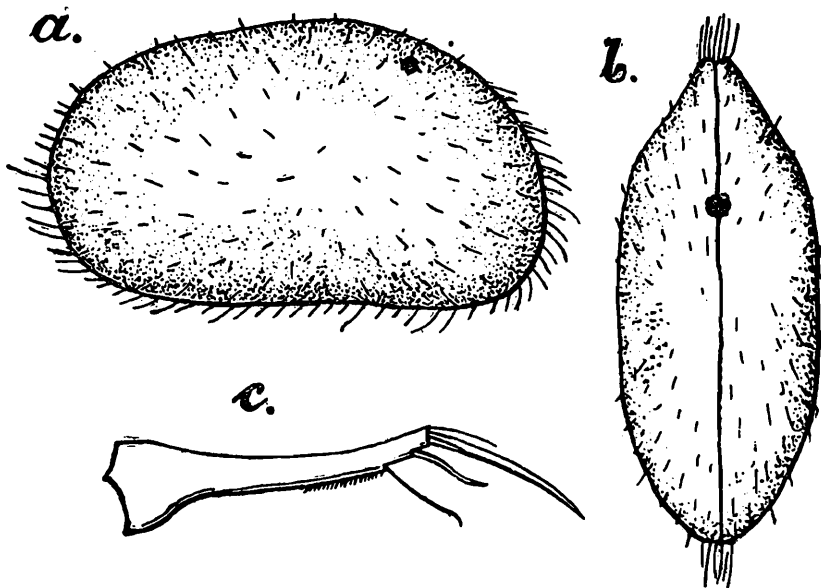


FIG. 5.—*Eucypris minuta*, n. sp.

- (a) Concha dextra a latere visa.
- (b) Conchae supra visae.
- (c) Lamina furcalis.

tamen altior, marginem versus posteriorem leniter flexuosus et in marginem posteriorem sine limite visibili ineuns.

Margo posterior latiusculo aequaliterque rotundatus, lamina hyalina canalibusque pororum carens, in marginem ventralem sine limite visibili ineuns.

Margo ventralis subrectus, fere in medio minime sinuatus, structura marginis posterioris aequali.

Margo anterior conchae sinistrae lamina hyalina valde angusta.

Conchae supra aut infra visae fere formam navicellae imitantes, apice anteriore acutiusculo, apice posteriore acute rotundato, latitudine maxima in medio (fig. 5, b).

Valvulae concharum superficie concinne granulata sparsimque setosa. Color brunneus. Longitudo 1.2—1.5 mm.

Antennae secundi paris endopodito triarticulato, fasciculo setarum natatoriarum apicem unguiculorum apicalium superante. Articulus penultimus in angulo superiore distali unguiculis duobus aequilongis, denticulatis setisque duabus longis armatus. Articulus ultimus in apice unguiculis duobus validis, denticulatis setaque parva.

Articulus penultimus palpi mandibularis processu aculeiformi, dense setoso, sensorio.

Palpus maxillaris articulo apicali longiore, quam lato.

Processus manducatorius primus maxillae in apice aculeis duobus denticulatis.

Pedes maxillares, pedes primi secundique paris structura specierum ceterarum generis similes. Articulus penultimus pedum primi paris in angulo anteriore distali setis duabus inaequalibus.

Laminae furcales apicem distalem versus parum attenuatae, leviter arcuatae, margine posteriore vel superiore concinne setoso; seta laterali unguiculo laterali approximata, longitudinem unguiculi laterali parum superante; unguiculo laterali longitudinem dimidiam unguiculi apicalis non attingente; unguiculo apicali longitudinem dimidiam laminae furcalis parum superante, leviter arcuato; seta apicali brevi, fere longitudine tertia unguiculi apicali (fig. 5, c).

Specimina non numerosa (4 ♀ et 2 juv.) examinaui e localitate *Kang-ma*.

Species haec nova a speciebus ceteris generis differt forma structuraque concharum.

(18) *Herpetocypris stewarti*, n. sp.

(Fig. 6, a-k.)

(*Femina*, fig. 6, a-b.)

Conchae a latere visae reniformes, inter se parum dissimiles, altitudine maxima longitudinem dimidiam non attingente (fig. 6, a-b).

Concha dextra (fig. 6, a) a latere visa margine anteriore altitudinem posterioris superante sat acute regulariterque arcuato lamina hyalina carente, canalibus pororum distinctibus, rectis, non ramosis; in marginem dorsalem ventralemque sine limite visibili ineunte.

Margo dorsalis conchae dextrae marginem anteriorem versus flexuosus, supra oculum parum tuberculatus, in parte media late arcuatus, marginem posteriorem versus arcuate flexuosoque declinatus et in marginem posteriorem sine limite visibili ineuns (fig. 6, a).

Margo posterior margine anteriore humilior, acute arcuatus, in marginem ventralem sine limite visibili ineuns, lamina hyalina carens, canalibus pororum distinctis, rectis, non ramosis.

Margo ventralis conchae dextrae in medio parum sinuatus, ante sinum late arcuatus, post sinum subrectus, structura marginis anterioris posteriorisque simili (fig. 6, a).

Concha sinistra margine anteriore posterioreque fere aequalto (fig. 6, *b*).

Margo anterior conchae sinistrae acutiusculo arcuatus, in mar-

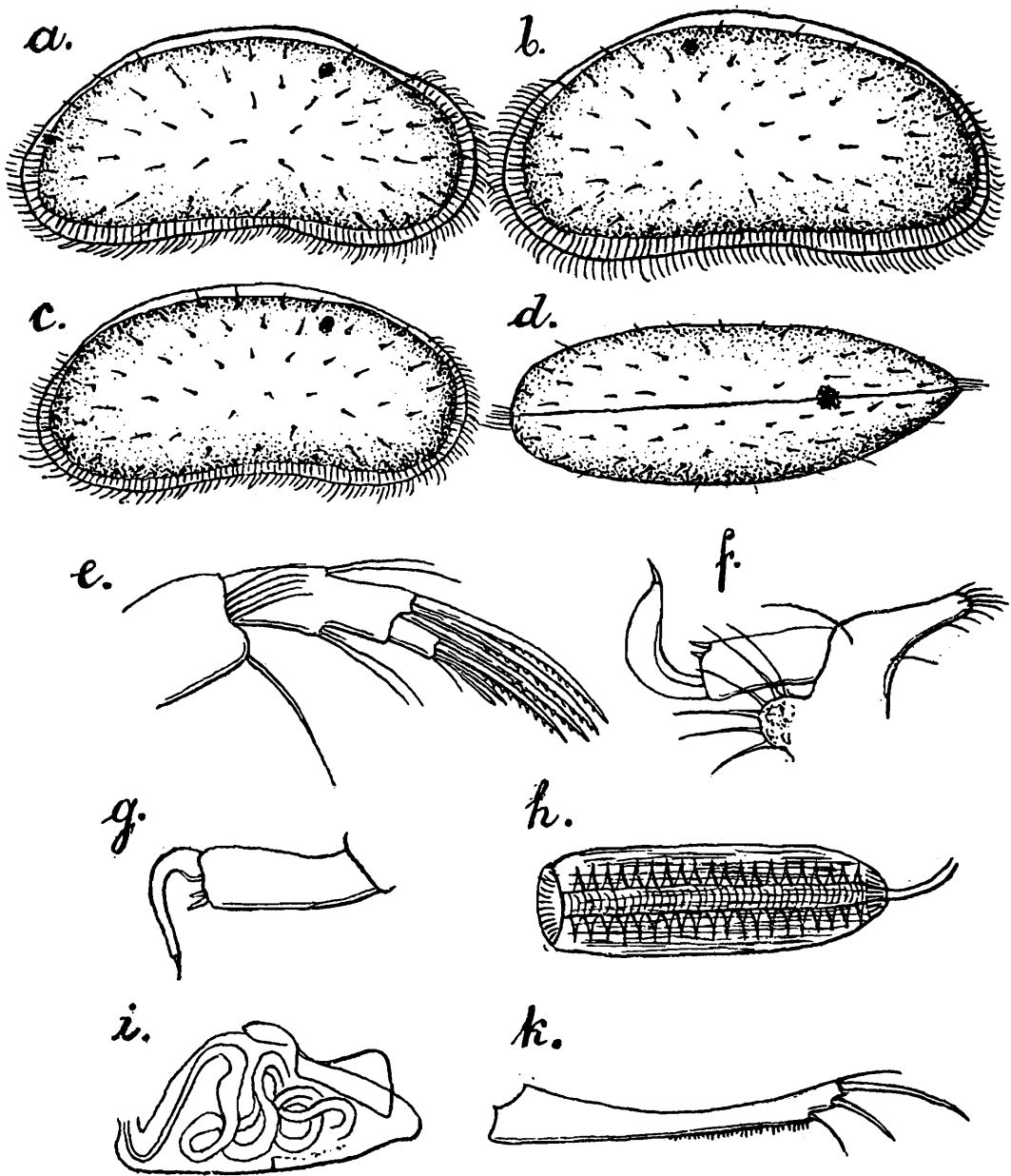


FIG. 6.—*Herpetocypris stewarti*, n. sp.

- (a) Concha dextra feminae a latere visa.
- (b) Concha sinistra feminae a latere visa.
- (c) Concha dextra maris a latere visa.
- (d) Conchae maris supra visae.
- (e) Endopoditum antennae secundi paris.
- (f) Pes maxillaris dexter maris.
- (g) Palpus pedis maxillaris sinistri maris.
- (h) Ductus ejaculatorius.
- (i) Penis.
- (k) Lamina furcalis maris.

ginem dorsalum ventralemque sine limite visibili ineuns, lamina hyalina carens, canalibus pororum rectis, non ramosis.

Margo dorsalis late arcuatus supra oculum minime protuberans,

antice posticeque arcuate flexuosus et in marginem posteriorem sine limite visibili ineuns (fig. 6, *b*).

Margo posterior conchae sinistrae obtuse rotundatus, cum margine ventrali angulum arcuatum formans, lamina hyalina carens, canalibus pororum rectis, non ramosis.

Margo ventralis in medio late sinuatus, ante sinum subarcuatus, post sinum subrectus, canalibus pororum rectis, non ramosis (fig. 6, *b*).

Conchae supra infraque visae formam navicellae imitantes apice anteriore acuto, posteriore vero rotundato, lateribus minime arcuatis, fere subrectis, latitudine maxima in medio sita.

Valvulae concharum superficie splendida, concinne granulata, setosa, setis parvis, sat rare dispersis; colore viridi.

Longitudo concharum 1.2—1.3 mm.; altitudo maxima 0.6—0.65 mm.; latitudo maxima 0.43—0.48 mm.

Antennae, mandibulae, maxillae, pedes laminaeque furcales structura iisdem maris similes.

(*Mas*, fig. 6, *c-k*.)

Conchae ambae forma structuraque fere similes, reniformes, altitudine maxima longitudinem dimidiam non attingente, in margine anteriore, posteriore ventralique lamina hyalina carentes, canalibus pororum rectis, non ramosis, ubique fere aequalis (fig. 6, *c*).

Margo interior concharum altitudinem posteriorem superante, regulariter acutiusculo arcuatus, in marginem dorsalem ventralemque sine limite visibili ineuns (fig. 6, *c*).

Margo dorsalis late arcuatus in marginem anteriorem posterioremque aequaliter flexuoso declinatus, sine limite visibili.

Margo posterior anteriore humilior acutiusculo arcuatus, in marginem dorsalem ventralemque sine limite visibilis ineuns.

Margo ventralis concharum in medio late sinuatus, ante et post sinum fere aequaliter subarcuatus.

Conchae supra vel infra visae formam navicellae imitantes, apice anteriore acuto, posteriore vero rotundato, latitudine maxima in medio sita (fig. 6, *d*); structura coloreque feminarum similes.

Longitudo concharum 1.05—1.1 mm.; altitudo maxima 0.45—0.5 mm.; latitudo maxima 0.4 mm.

Antennae primi paris articulo ultimo setis duabus aculeoque laevi, elongato armato.

Articulus proximalis endopoditi antennarum secundi paris fasciculo setarum natatoriarum perbrevium, evanescentium. Articulus penultimus in angulo superiore distali unguiculis apicalibus tribus, aequalibus, denticulatis. Articulus ultimus in apice unguiculo apicali, denticulato, aculeo laevi, unguiformi, seta bacilliformi sensoria setaque simplici parva (fig. 6, *e*).

Articulus ultimus palpi maxillaris longitudinem latitudinem superante. Processus primus maxillae manducatorius in apice

aculeis duobus validis, laevibus. Pedes maxillares appendice branchiali 6 setosa, setis plumosis. Palpus pedis maxillaris dextri biarticulatus, articulo basali columniformi ubique fere aequilato, in angulo anteriore distali aculeis duobus diversis sensoriis; articulo ultimo fere falciformi, basi et in apice angustiore (fig. 6, f).

Palpus pedis maxillaris sinistri biarticulatus, articulo basali columniformi, ubique fere aequilato, in angulo anteriore distali aculeis duobus diversis; articulo ultimo fere falciformi, basi inflato, apicem versus sensim attenuato (fig. 6, g).

Pedes primi paris articulis duobus proximalibus superficie setosis, articulo antepenultimo in angulo anteriore distali setis duabus inaequalibus armato; ungue apicali longitudinem articulorum trium antecedentium superante.

Laminae furcales fere gladiiformes, margine posteriore vel superiore recto, dense setoso, setis minimis, margine anteriore vel inferiore sinuato; seta laterali unguiculo laterali valde approxmata; unguiculo laterali longitudinem dimidiam unguiculi apicalis attingente; unguiculo apicali longitudinem dimidiam laminae furcalis multo non attingente; seta apicali longitudine dimidia unguiculis apicalis multo brevior (fig. 6, h).

Ductus ejaculatorius circum canalem centralem annulis 20 aculeorum (fig. 6, h).

Penis utcunque pyriformis appendice accessoria fere quadrangulari, apicem distalem versus dilatata. Vas deferens laqueos multos formans (fig. 6, i).

Specimina numerosa ♀ et ♂ examinavi e localitate *Mang-tsa* collecta.

Species haec nova in honorem D. F. H. *Stewarti*, denominata differt forma structuraeque concharum, ductus ejaculatorii penisque a speciebus ceteris generis.

(19) *Herpetocypris smaragdea*, n. sp.

(Fig. 7, a-d.)

Conchae ambae structura formaque similes, a latere visae fere reniformes, altitudine maxima dimidiam longitudinem attingente; margine anteriore, posteriore ventralique lamina hyalina, canalibusque pororum carentibus.

Margo anterior concharum fere altitudine posterioris, latiusculo arcuatus, in marginem dorsalem ventralemque sine limite visibili ineuns (fig. 7, a).

Margo dorsalis late arcuatus, antice posticeque flexuosus, in marginem posteriorem sine limite visibili ineuns.

Margo posterior acutiusculo rotundatus, in marginem ventralem sine limite visibili flexuose ineuns.

Margo ventralis in medio late sinuatus, ante et post sinum parum arcuatus.

Conchae supra aut infra visae elongato oviformes, antice acutius

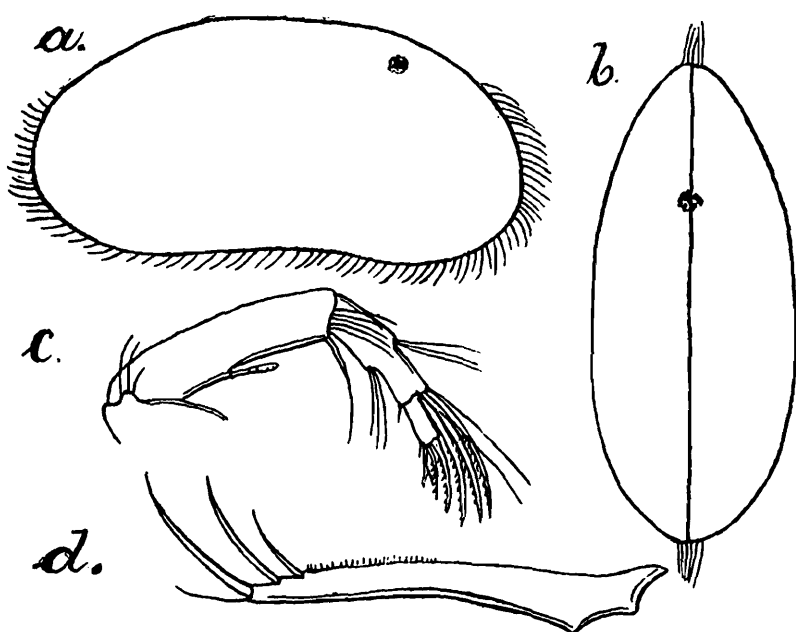
quam postice rotundatae, lateribus late arcuatis; latitudine maxima in medio sita (fig. 8, b).

Valvulae concharum politae, laeves; colore viridi.

Longitudo concharum 1.25 mm.; altitudo maxima 0.6 mm.; latitudo maxima 0.55 mm.

Articulus ultimus antennarum primi paris setis duabus longis aculeoque elongato, setiformi, laevi.

Articulus basalis endopoditi antennarum secundi paris fasciculo setarum 5 breviorum natatoriarum evanescente, dimidiam, longitudinem articuli sequentis parum attingene. Articulus penultimus in angulo superiore distali unguiculis 3 aequilongis, validis, denticulatis setisque duabus longis.



[FIG. 7.—*Herpetocypris smaragdea*, n. sp.

(a) Concha dextra a latere visa.

(b) Conchae supra visae.

(c) Endopoditum antennae secundi paris.

(d) Lamina furcalis.

Articulus ultimus in apice unguiculis duobus diversilongis, denticulatis, seta bifissa sensoria setaque parva simplici (fig. 7, c).

Palpus maxillaris articulo ultimo longiore quam latiore. Processus manducatorius primus in apice aculeis duobus laevibus, politis.

Palpus pedum maxillarium cuneiformis apice trisetoso, setis brevibus. Appendix branchialis setis 6 plumosis.

Pedes primi paris articulis duobus proximalibus in marginibus setosis. Articulus antepenultimus in angulo anteriore distali setis duabus inaequalibus. Unguis apicalis longitudinem articulorum trium antecedentium pedis superans, parum arcuatus.

Pedes secundi paris iisdem specierum ceterorum generis similes.

Laminae furcales apicem versus parum attenuatae, subrectae, margine posteriore setoso, setis minimis; seta laterali unguiculo

lateralis approximata, longitudinem dimidiam unguiculi lateralis superante; unguiculo laterali elongato, longitudinem dimidiam unguiculi apicalis multo superante; unguiculo apicali fere longitudine dimidia laminae furcalis; seta apicali longitudinem tertiam unguiculi apicalis non superante (fig. 7, d).

Specimen unicum ♀ examinavi e localitate *Rham-Tso*.

Species haec nova speciei *Herpetocypris stewarti* affinis, sed differt: forma structuraque concharum antennarumque secundi paris.

(20) *Potamocypris stewarti*, n. sp.

(Fig. 8, a-c.)

Conchae ambae structura formaque similes, a latere visae parum oviformes, altitudine maxima in medio concharum sita longitudinem dimidiam valde superante (fig. 8, a); margine anter-

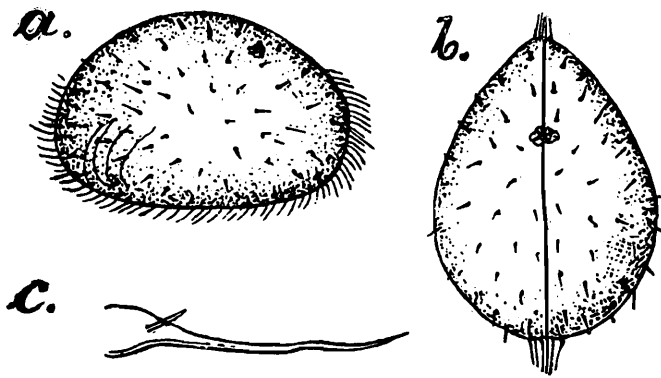


FIG. 8.—*Potamocypris stewarti*, n. sp.

- (a) Concha dextra a latere visa.
- (b) Conchae supra visae.
- (c) Lamina furcalis.

iore, posteriore ventralique lamina hyalina canalibusque pororum carentibus.

Margo anterior fere altitudine posterioris, obtuse arcuatus, in marginem dorsalem ventralemque sine limite visibili ineuns.

Margo dorsalis sat acute rotundatus, antice posticeque flexuose declinatus, in marginem posteriorem sine limite visibili ineuns.

Margo posterior acutiusculo arcuatus, marginem dorsalem versus flexuoso, marginem ventralem versus acutius rotundatus et in marginem ventralem sine limite visibili ineuns.

Margo ventralis leviter arcuatus, antice posticeque parum flexuosus (fig. 8, a).

Conchae supra aut infra visae ovo brevi, sat dilatato similes, apice anteriore acuto, posteriore vero sat obtuse rotundato, latitudine maxima post dimidium sita (fig. 8, b).

Valvulae concharum concinne granulatae, sparsim setosae, setis parvis; colore viridibrunneo.

Longitudo concharum 1 mm.; altitudo maxima 0.75 mm.; latitudo maxima 0.56 mm.

Exopoditum antennarum primi paris lobum parvum trisetosum formans seta mediana perlonga, apicem articuli ultimi fere attingente. Articulus primus endopoditi in parte distali infra setosus, fasciculo setarum natatoriarum apicem unguiculorum apicalium attingente. Articulus penultimus in angulo superiore distali unguiculis tribus apicalibus setisque duabus longis. Unguiculi apicales inter se diversi, duo aequilongi, tenue denticulati, alter brevior, parum latior, validiusque denticulatus. Articulus ultimus in apice unguiculis duobus inaequalibus denticulatis, seta sensoria bacilliformi, setaque parva simplici.

Processus manducatorius maxillarum primus aculeis duobus laevibus, politis.

Pedes maxillares solum setis duobus branchialibus.

Pedes primi secundique paris iisdem specierum ceterorum generis similes.

Laminae furcales evanidae seta laterali brevi, processu flagelliformi apicali (fig. 8, c).

Specimen unicum ♀ examinavi e localitate *Gyantse*.

Species haec nova in honorem D. F. H. *Stewarti*, denominata differt forma structuraque concharum a speciebus ceteris generis.

HYDRACHNIDAE.

(21) *Eulais tibetana*, n. sp.

(Fig. 9, a-e.)

Corpus ovale, antice acutius, postice latius rotundatum, longitudine 2-3 mm., latitudine maxima 1.5—2 mm.

Integumentum corporis dense concinneque striatum.

Circuitus oculorum oviformes, antice posticeque aequaliter rotundati ponte elongato conjuncti. Pons conjungens longitudine 0.17 mm. margine anteriore posterioreque trituberculato, tuberculo medio majore, duobus lateralibus minoribus aequalibus, lamina adhaesionis musculorum sat magna, rotundata, setis sensoriis e tuberculis exeuntibus (fig. 9, a).

Capitulum breviusculum superficie granulata, in angulo posteriore utrinque processu retrorsum et a latere vergente sensim attenuato; margine posteriore prope basin processorum lateralium tuberculo parvo (fig. 9, c).

Sacculi tracheales longitudinem pharyngis non superantes (fig. 9, b).

Pharynx postice in lateribus processu parvo dentiformi (fig. 9, c).

Palpus maxillaris longitudine 1.2 mm. Articulus secundus in margine inferiore prope angulum setis duabus, latere externo laevi, latere interno in margine apicali setis 4 brevibus, aculeiformibus, setosis (fig. 9, b, d). Articulus tertius in latere exteriori et in margine distali seta aculeiformi pilosa (fig. 9, b), in latere interiori et in margine apicali setis 4 aculeiformibus pilosis (fig. 9, d). Articulus quartus in margine superiore inferioreque

setis duabus simplicibus, in latere exteriori laevi (fig. 9, *b*), in latere interiore vero setis 11 simplicibus in seriebus duabus longitudinalibus ordinatis (fig. 9, *d*). Articulus ultimus apice denticulatus, denticulis parvis, numerosis, in latere exteriori laevi (fig. 9, *b*), in latere interiore vero setis duabus aculeiformibus, simplicibus (fig. 9, *d*).

Pedes unguiculo apicali bifisso (fig. 9, *e*), longitudine diversi. Pedes primi paris 1.6 mm.; secundi paris 1.9 mm.; tertii paris 2.1 mm.; quarti paris 2.5 mm.

Specimina 4 examinavi e localitate *Gyantse*.

Species haec nova speciei *Eulais megalostoma* a D. F. Koenike

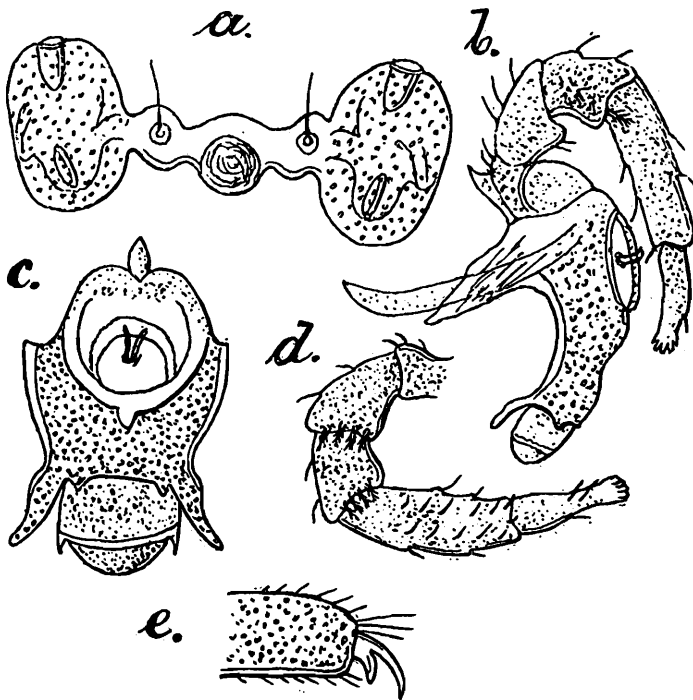


FIG. 9.—*Eulais tibetana*, n. sp.

- (a) Oculi.
- (b) Capitulum et palpus maxillaris a latere exteriori.
- (c) Capitulum a latere ventrali visum.
- (d) Palpus maxillaris a latere interiore.
- (e) Unguis pedum 1-4 paris.

ex Afrika orientali descriptae affinis, sed differt: structura circuitus oculorum, capituli palpique maxillaris.

LITERATURA IN TEXTU CITATA.

1. Lilljeborg, W. *Cladocera Sueciae*, Upsala, 1900, tab. 1-87.
2. „ „ „Synopsis specierum huc usque in Suecia observatarum generis Cyclopis,” *Kongl. Svenska vetensk. Akad. Handlingar*, bd. 35, No. 4, Stockholm, 1901, tab. 1-6.
3. Sars, G. O. „Additional Notes on Australian Cladocera,” *Viedensk. Selsk. Forhandl.*, 1888, No. 7, tab. 1-6.

Schizothorax macropogon, Regan. (Pl. xxv, fig. 4.)

Three specimens measuring 26, 29 and 37 cms. They differ slightly from the described type of the species, which was from Lhasa.

The length of the head is only $\frac{1}{3}$ of the total length, and the barbels are as long as the head excluding the snout.

Schizopygopsis stoliczkæ, Steindachner.

A very common fish in these waters (identified by Captain Stewart).

Schizopygopsis stoliczkæ (colour variety). Specimens were taken in which the pigment of the back was concentrated in stellate spots: this peculiarity had no dependence on illumination, age, or sex.

Parexostoma stoliczkæ (Day).

Two specimens, measuring 250 and 190 mm. respectively, have been referred to this species. They agree very closely in their proportions with certain of Day's specimens from Leh in Western Tibet. They differ, however, somewhat in that their heads are relatively larger and flatter. In colour they are olivaceous above, the pigment being arranged in a speckled manner on a yellow ground; below they are dull yellow.

P. maculatum, Regan, from Lhasa seems to resemble *P. stoliczkæ* very closely, except in colour. In this respect, however, our specimens from Gyantse appear to agree, judging from the descriptions, with the specimens from Leh more closely than with those from Lhasa.

In the specimens from Gyantse, the head length is more than $\frac{1}{3}$ of the total length, the length of the snout is $1\frac{1}{2}$ times the interocular distance as in *P. maculatum* and as in many of Day's type specimens (of *P. stoliczkæ*) from Leh.

In Day's description of this latter species, however, the length of the snout is said to be twice the distance between the eyes.

Schizopygopsis stewartii, n. sp. (Pl. xxv, fig. 1.)

The length of the head bears to the length of the body (without the caudal) the proportion of 1 : 4. The head is flattened above, the snout being conical and pointed, the point of the lower jaw and the snout reach to the same level. The diameter of the eye is to the length of the head as 1 : 7; to the length of the snout as 1 : 2. The length of the snout is slightly greater than the interocular distance.

The dorsal fin contains three spines and seven rays, the third ray is deeply serrated and is about as long as the postocular part of the head. The first spine is situated nearer to the root of the tail than to the end of the snout, the distances which separate these

points being in the proportion of 5: 6. By "root of the tail" is meant the point where the lateral line ends against the caudal fin.

The anal fin contains three spines and six rays, and nearly touches the caudal when laid flat.

The pectoral, pelvic, and anal fins very nearly of the same length, which is slightly less than the postocular part of the head.

There are 110—120 scales in the lateral line. Behind the operculum the scales are arranged in eight to ten rows, placed one above the other; in each row there are two to four scales, they are irregularly imbricated. The "tiled" row contains thirty to thirty-five scales, on either side of the vent the diameter of these scales is $\frac{2}{3}$ that of the eye in front, and behind the vent their diameter becomes considerably less.

There are no barbels.

Pharyngeal teeth 4.3 | 3.4; the teeth of the outer row are longer than those of the inner and are curved.

Colour.—Silvery with dark uniformly distributed small blotches apparently under light control. Top of head dirty olive extending on to the cheek, dorsal and caudal fins dirty olive. Pelvic, ventral and anal fins orange-red near the free margin.

An active predatory fish; a small fish of another species was taken from the stomach of one of the specimens.

Schizothorax o'connori, n. sp. (Pl. xxv, fig. 3.)

. Length of the head to the length of the body (without caudal) bears the proportion 1: 5.

The greatest depth of the body is a little more than the length of the head. The diameter of the eye is $\frac{1}{6}$ of the length of the head. The eye is nearer to the snout than to the posterior border of the operculum, being separated by two diameters from the former and three diameters from the latter.

The diameter of the eye is to the length of the interocular distance as 2: 5.

The shape of the head is that of a bluntly pointed cone: between the eyes the head is nearly flat, but in the middle line a raised crest of the frontal bone projects slightly. (This may only be visible in the spirit specimen.)

The mouth is transverse and is only slightly curved. The snout projects well beyond the level of the lower jaw. The posterior barbel is in length about $\frac{2}{3}$ of the diameter of the eye, the anterior barbel being somewhat less than this.

The dorsal fin is situated behind the level of the ventrals, its first spine is somewhat nearer to the root of the tail than to the snout, the proportion of the distances which separate these points being as 6: 7.

There are three spines and eight soft rays in the dorsal fin, the third spine being equal to the length of the head without the snout. In the character of this spine the two specimens differ considerably; in the larger specimen the serrations are distinct but small, and the

distal half of the spine is flexible, in the other the spine is much stouter, the serrations are longer and only the distal third is flexible.

The anal fin contains three feeble spines and seven soft rays; when laid flat it does not quite reach to the caudal.

L.L. 105—110,—L.tr. 25—1—25. The “tiled row” contains fifteen scales, each about $\frac{3}{4}$ of the diameter of the eye. Pharyngeal teeth ten on either side, rows not regularly arranged.

Colour.—“Bluish above with steel-blue scales; sides yellow orange; belly white; upper surface of head dirty olive; cheeks golden.”

Oreinus baileyi, n. sp. (Pl. xxv, figs. 2, 2a.)

Length of head is to the length of the body (without caudal) as 1: 4. The head is scaleless, and conical in shape, the upper profile slopes downwards, but the lower profile is almost in a line with the ventral surface of the body. The diameter of the eye is to the length of the head as 1: 7.

The eye is to the snout in length as 2: 5.

The dorsal fin contains three spines and seven rays; the third spine is stout and deeply serrated posteriorly; it is jointed and flexible near the tip, and is as long as the postocular part of the head. The first dorsal spine is much nearer the root of the tail than to the snout. The distances which separate these points being in the proportion of 3: 4. The anal fin contains three feeble spines and six rays; when laid flat it does not quite touch the caudal.

The pectoral, pelvic, and anal fins are all very nearly of the same length and are equal to the length of the head excluding the snout.

The length of the caudal fin is equal to the greatest depth of the body.

Both upper and lower lips are very thick and fleshy, so that they appear as though covered by a mask.

The lower lip has a deep median notch which converts it into a horse-shoe-shaped sucker.

The maxillary barbel is as long as the lower lip, the rostral barbel is somewhat shorter.

Pharyngeal teeth 5.3.2 | 5.3.2.

Lateral line contains about 100 scales. The “tiled” row of scales contains about 23. The diameter of the largest of them is about $\frac{3}{4}$ of the diameter of the eye.

Colour.—“Steel-blue, silvery, with a tinge of gold on the sides; back of the head is dirty olive, a tinge of gold on operculum; dorsal and caudal fin spotted with black; also irregular black spots over the body.”

DESCRIPTION OF THE TADPOLE OF *RANA PLESKII*, WITH NOTES ON ALLIED FORMS.

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

The only species of Batrachian represented in Captain Stewart's collection is *Rana pleskii*, Günther, which has already been recorded from the neighbourhood of Gyantse by Boulenger (*Ann. Mag. Nat. Hist.* (7), xv, p. 378, 1905).

Rana pleskii, Günther.

R. Pleskii, Günther, *Ann. Mus. St. Petersb.*, 1896, p. 199.

Several adult specimens of various sizes, and tadpoles in various stages from the neighbourhood of Gyantse.

Boulenger (*op. cit.*) records this species from an altitude of 15,000 feet, and Captain Stewart tells me that it is abundant all about Gyantse, occurring even in small puddles of water and in mountain streams. Like its allies *R. vicina* and *R. liebigii* it appears to be mainly aquatic in its habits.

The fact that *R. pleskii* breeds at an altitude of 13,000 feet or over is interesting. There is a full-grown tadpole in Captain Stewart's collection which was taken in April at the height mentioned, and a very small frog taken in November at the same height. There are also several smaller tadpoles, all of which are unusually well preserved. The following description is drawn up from the largest tadpole, which has the hind legs about 10 mm. long but no signs of the fore limbs:—

Tadpole of *R. pleskii*, Günther—

Total length 72 mm.; length of tail 45 mm.; greatest breadth of body 13 mm.; depth of body 9 mm.; greatest depth of tail 12 mm.; of caudal muscles 8 mm. Head and body flat; eyes far apart, dorsal; nostril dorsal, a little nearer the tip of the snout than the eye; spiracle sinistral, pointing backwards and upwards; anus opening on the right side; caudal fin commencing well behind the level of the base of the hind limbs, continued round the tail to the anus, bluntly pointed at the tip. Lips moderately well developed, both with a fringe, which is only interrupted for a short distance in the middle of the upper lip; both jaws serrated at the edge and roughened on the external surface; the upper jaw bearing a couple of long, narrow teeth at either end; lower jaw crescentic,

undivided; dental formula $\frac{1}{3+3}$. Colour slate-grey, indistinctly

marbled on the tail and fading to white on the belly.

For the sake of comparison I give a description of a somewhat similar tadpole which appears to be that of *R. vicina*, a frog found

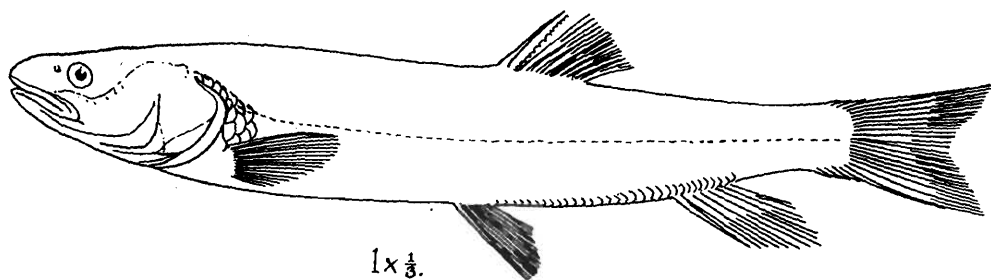
above 6,000 feet in the Himalayas and common in the Simla district and in Kumaon. I have found this tadpole with the adult of the species to which I assign it both in Kumaon and in the Simla hills:—

Tadpole of *Rana vicina*, Stoliczka—

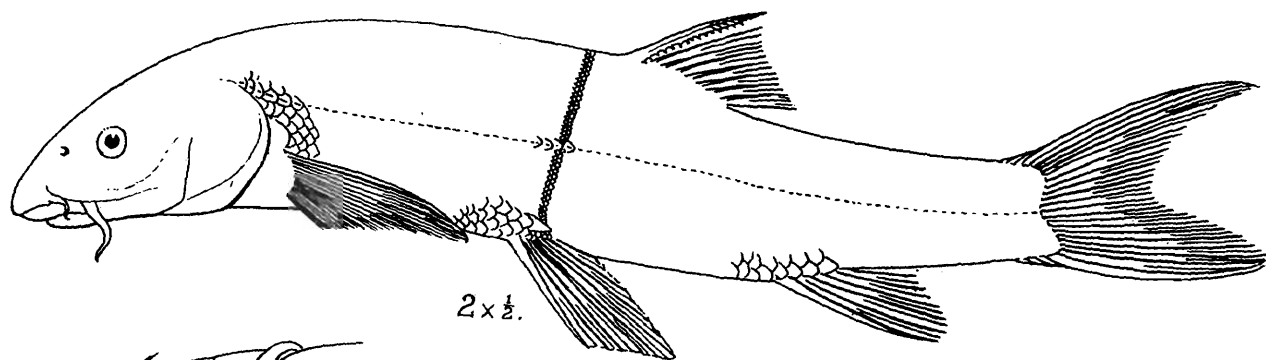
Total length (specimen without legs) 43 mm.; length of tail 30 mm.; greatest breadth of body 8 mm.; greatest depth of tail 8 mm.; of caudal muscles 5 mm. Head and body moderately flat; eyes far apart; nostrils nearer the eyes than the tip of the snout; eyes and nostrils dorsal; spiracle sinistral, pointing upwards and backwards; vent opening on the right side; caudal fin commencing in front of the base of the hind limbs, continued round the tail to the anus, sharply pointed at the tip. Lips very large, considerably larger than those of the tadpole of *R. pleskii*, resembling those of *R. liebigii* in extent; the lower lip fringed completely, the upper lip only at the corners; both jaws serrated; upper jaw in two parts, without enlarged teeth at the sides; dental formula $\frac{1}{\frac{1+4}{1+1}}$; a minute, round papilla, bearing horny teeth, exists on either side between the uppermost row and the first of the double rows on the upper lip. Colour brownish, more or less distinctly mottled and spotted, paler below.

The dental formula of the tadpole of *R. liebigii* (Annandale, *Journ. Asiat. Soc. Bengal*, 1906, p. 290) is $\frac{3}{\frac{5+5}{1+1}}$; otherwise the larva of this species is much like that of *R. vicina*.

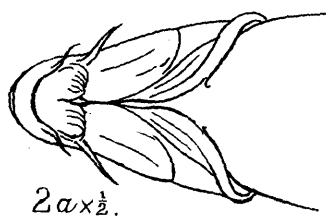




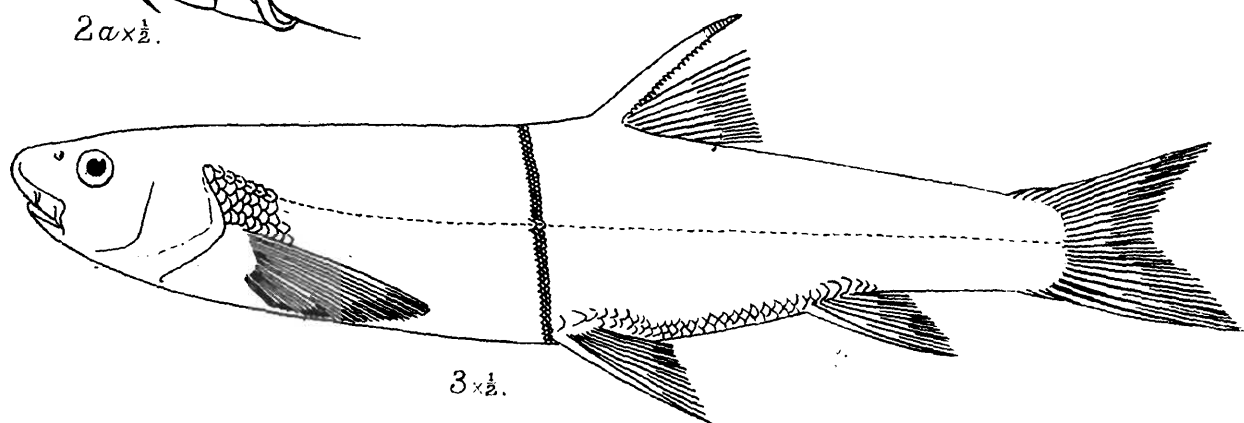
1 x $\frac{1}{2}$.



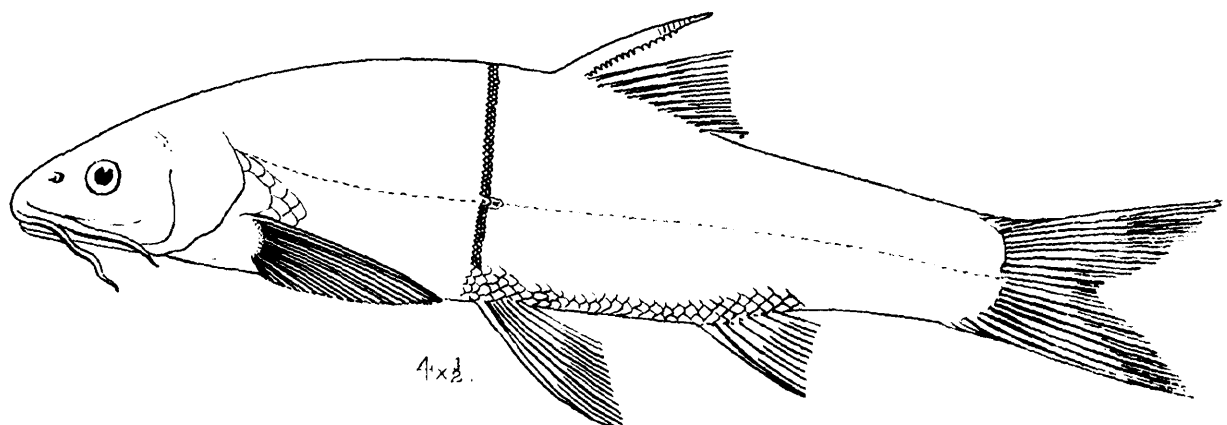
2 x $\frac{1}{2}$.



2 a x $\frac{1}{2}$.



3 x $\frac{1}{2}$.



4 x $\frac{1}{2}$.

1. *Schizopygopsis stewartii*, Lloyd.
2. *Oreinus baileyi*, Lloyd

- A.C. Chow Hany Lichuan
 3. *Schizothorax o'connori*, Lloyd
 4. *Schizothorax macropogon*, Day



F. H. Stewart, Photo.

Survey of India Office, Calcutta, 1908.

TWO VIEWS OF THE RAM-TSO FROM THE NORTH.

XXXII NOTES ON ACULEATE HYMENOPTERA IN THE INDIAN MUSEUM

PART I.

By COLONEL C. T. BINGHAM.

From time to time during the last two years Dr. Nelson Annandale, Superintendent of the Indian Museum, Calcutta, has been good enough to send me for determination small collections of Aculeate Hymenoptera contained in the Indian Museum. A list of these, with descriptions of the new forms, is given in the following paper.

TUBULIFERA.

Family CHRYSIDIDÆ.

Holopyga indica, Mocsáry.

Holopyga indica, Mocs., Mon. Chrys., 1889, p. 118, ♀ ; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 422.

Hab.—Burma : Rangoon.

Apparently widely spread. I took it at Delhi, Nurse in Rajputana.

Ellampus timidus, Nurse.

Ellampus timidus, Nurse, Entom., xxxv, 1902, p. 305, ♀ ♂ ; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 42, pl. 1, fig. 11, ♀

Hab.—Assam : Margherita.

As widespread as the last. The single ♀ in the collection agrees entirely with a specimen sent me by Col. Nurse, taken in Baluchistan.

Hedychridium wroughtoni, du Buysson.

Hedychridium wroughtoni, du Buyss., Jour. Bomb. N. H. Soc., x, 1896, p. 466, pl. 2, fig. 6, and pl. 5, fig. 4 ; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 425.

Hab.—Nepal : Soondrijal ; Oudh : Lucknow.

Originally described from Central India.

Chrysis mendicalis, Cameron.

Chrysis mendicalis, Cam., Mem. Manch. Lit. and Phil. Soc., xli, 1897, p. 4 ; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 451.

Hab.—Purneah.

Originally described from Barrackpore.

Chrysis triacantha, Mocsáry.

Chrysis triacantha, Mocs., Mon. Chrys., 1889, p. 325; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 453.

Hab.—Bengal: Purneah, Calcutta.

Extends to Ceylon and the Malayan subregion.

Chrysis nitidula, Fabricius.

Chrysis nitidula, Fabr., Syst. Ent., 1775, p. 359; Mocs., Mon. Chrys., 1889, p. 347.

Hab.—Assam: Margherita.

Of very wide distribution in both hemispheres. Not, however, recorded from India before.

Chrysis fuscipennis, Brullé.

Chrysis fuscipennis, Brullé, Hist. Nat. Ins. Hym., iv, 1846, p. 38; Mocs., Mon. Chrys., 1889, p. 370; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 467.

Hab.—Purneah, Siliguri, Calcutta, Perso-Baluch Frontier.

A common form throughout India.

Chrysis angustata, Mocsáry.

Chrysis angustata, Mocs., Termész. Füzetek, xv, 1892, p. 225; Bingham, Faun. Brit. Ind. Hym., ii, p. 469.

Hab.—Purneah.

Occurs also in Upper Burma: Mandalay and Maymyo.

Chrysis obliterated, Mocsáry.

Chrysis obliterated, Mocs., Termész. Füzetek, xi, 1887, p. 15; *id.*, Mon. Chrys., 1889, p. 377; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 460.

Hab.—Baluchistan.

Taken also in various parts of northern, central, and western India.

Chrysis cupreiventris, Bingham.

Chrysis cupreiventris, Bingham, Jour. Bomb. N. H. Soc., xii, 1898, p. 117, ♀; *id.*, Faun. Brit. Ind. Hym., ii, 1903, p. 465.

Hab.—Himalayas: Phagu near Simla.

Chrysis sarakhsensis, Radoszkowski.

Chrysis sarakhsensis, Radoszk., Rev. d'Ent., x, 1891, p. 195; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 475.

Hab.—Bengal: Saraghat.

Has a wide range from Central Asia to Western India and Burma.

Chrysis bengalensis, Mocsáry.

Chrysis bengalensis, Mocs., Mon. Chrys., 1889, p. 527, ♀ ; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 482.

Hab.—Bengal : Purneah.

Recorded before from Bombay and Madras.

Chrysis lusca, Fabricius.

Chrysis lusca, Fabr., Syst. Piez., 1804, p. 171 ; Mocs., Mon. Chrys., 1889, p. 527, ♂ ♀ ; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 484, pl. i, fig. 2.

Hab.—United Provinces ; Bengal : Murshidabad.

Occurs throughout India, Ceylon and Burma.

Chrysis orientalis, Guérin.

Pyria orientalis, Guér., Rev. Zool., 1842, p. 146, ♂

Chrysis orientalis, Mocs., Mon. Chrys., 1889, p. 592 ; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 485.

Hab.—Bengal : Calcutta.

Spread generally throughout India, but not as yet recorded from Assam or Burma.

Chrysis indica, Mocsáry.

Chrysis indica, Mocs., Mon. Chrys., 1889, p. 591 ; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 486.

Hab.—Bengal : Purneah.

Fea obtained it in Upper Burma.

Chrysis oculata, Fabricius.

Chrysis oculata, Fabr., Syst. Ent., 1775, p. 357 ; Mocs., Mon. Chrys., 1889, p. 543 ; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 488, pl. i, fig. 15.

Hab.—Bengal : Purneah.

Extended throughout India, Ceylon, Assam and Burma.

Stilbum cyanurum, Förster.

Chrysis cyanurum, Först., Nov. Spec. Ins., 1771, p. 89 ; Mocs., Mon. Chrys., 1889, p. 190, pl. 2, figs. 3, 4 and 16 ; Bingham, Faun. Brit. Ind. Hym., ii, 1903, p. 433, pl. i, fig. 6.

Hab.—Bengal : Purneah.

Of world-wide distribution.

FOSSORES.

Family MUTILLIDÆ.

Mutilla sex-maculata, Sevederer.

Mutilla sex-maculata, Seved. (*nec* Smith), Nouv. Act. Holm., viii, 1787, 286 ; Rad. and Sich., Hor. Soc. Ent. Ross., vi, 1869, p. 246.

Hab.—Rampur, Bijnor, Meerut, Burdwan, Purneah.

A very variable form generally distributed throughout India.

Mutilla indefrusa, Cameron.

Mutilla indefrusa, Cam., Mem. Manch. Lit. and Phil. Soc., xli, 1897, p. 62.

Hab.—Lucknow.

Mutilla interrupta, Olivier.

Mutilla interrupta, Oliv., Encycl. Méth., viii, 1823, p. 62 ; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 14.

Hab.—Purneah.

Spread throughout India, Assam and Burma, extending to China.

Mutilla pilosella, Magretti.

Mutilla pilosella, Magr., Ann. Mus. Civ. Genova, xxii, 1892, p. 220, ♂ ; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 45.

Hab.—Burma : Rangoon.

Described originally from Upper Burma. ♀ unknown.

Mutilla ruficrus, Magretti.

Mutilla ruficrus, Magr. (Radoszkowski MS.), Ann. Mus. Civ. Genova, xxii, 1892, p. 205 ; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 14.

Hab.—Bengal : Port Canning.

Not recorded before from Continental India.

Mutilla lathonia, Cameron.

Mutilla lathonia, Cam., Mem. Manch. Lit. and Phil. Soc., xliv, 1900, p. 18.

Hab.—Calcutta, Bareilly.

Mutilla vicinissima, Gribodo.

Mutilla vicinissima, Grib., Ann. Mus. Civ. Genova, xiv, 1884, p. 13 ; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 13.

Hab.—Calcutta.

Described originally from Upper Burma.

Mutilla spectra, form nov.

♀ . Apical half of the mandibles, the clypeus, antennæ, legs and abdomen, black ; the base of the mandibles, the head and thorax, dark red. The head in front and above, the thorax above, and the abdomen, clothed with stiff, erect, black hairs ; the mouth parts below the base of the antennæ, the occiput, the thorax on the sides, the legs, and the spots and bands on the abdomen, covered with golden yellow pubescence, inclining to ferruginous on the legs, the spines on which are distinctly dark ferruginous. The pubescent

markings on the abdomen are as follows: Above: a spot in the middle of the basal segment, three round spots in a transverse row close to but not actually on the base of the second, a medially interrupted broad band on the third, and a lateral spot on the fourth segment; beneath: the second, third and fourth segments fringed with stiff yellow hairs, anal segment similarly fringed on the sides and below. Head rounded, narrower than the thorax, coarsely and deeply punctured; clypeus very short, anteriorly crenulate; antennæ robust, the second joint of the flagellum slightly longer than the third or fourth; eyes oval, prominent; occiput slightly arched. Thorax subrectangular, convex, strongly tuberculate at the sides, above very coarsely and deeply punctured, the intervals between the punctures running into longitudinal coarse striæ; seen from above slightly narrower posteriorly than anteriorly, its posterior face vertical, distinctly concave. Abdomen massive, oval, longer than the head and thorax united; pygidial area convex, very delicately transversely striate; ventral carina on the basal segment short, deep, wedge-shaped, entire.

Length.—♀, 13 mm.

Hab.—Oncha near Naini Tal, United Provinces.

A very distinct form not closely resembling any Indian form known to me. In size and general shape not unlike *M. pulchrina*, Smith, but abundantly different in sculpture and markings. Like Smith's species, the pygidial area is convex and finely transversely striate, and the ventral carina wedge-shaped, short and deep.

Mutilla indiga, form nov.

♂ Head, postscutellum, median segment, legs and abdomen black; pro- and mesonotum and scutellum red; sides of the thorax and pectus black; antennæ dull golden brown, tips of the mandibles and the antennal tubercles red; pubescence silvery white, dense, and long on the face and front of the head and on the legs, shorter on the thorax and at base of and beneath the abdomen; on the last it forms distinct fringes along the apical margins of segments 1 to 3. Head orbicular, very slightly narrower than the thorax; pronotum long, posterior margin deeply arched; mesonotum convex, parapsidal furrows deep and well marked; scutellum and postscutellum short and laterally compressed; median segment long, strongly convex and gradually sloped posteriorly; abdomen subpetiolate, broad at base of second segment, gradually but quickly narrowed to the apex. Head, thorax and abdomen shining; head and thorax anteriorly finely and somewhat sparsely punctured; median segment more closely punctured with wide shallow reticulations; abdomen finely, somewhat closely and regularly, punctured. Wings fusco-hyaline; tegulæ large, black and shining; veins brown.

Length.—♂, 8; *exp.* 16 mm.

Hab.—Jhansi, N.-W. India.

Superficially resembles *Mutilla* (*Odontomutilla*) *herpa*, Cameron, from Sarawak, but structure, shape of median segment, and sculpture, all differ widely.

Family SCOLIIDÆ.

Iswara luteus, Westwood.

Iswara luteus, Westwood, Trans. Ent. Soc. Lond., 1850, p. 233, pl. 7, figs. 5, 5a—5f; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 55.

Tiphia himalayensis, Cameron.

Tiphia himalayensis, Cam.

Hab.—Nepal: Chandragiri.

Scolia quadripustulata, Fabr., var. *binotata*, Fabricius.

Scolia binotata, Fabr., Syst. Piez., i, 1804, p. 244; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 84.

Hab.—Ceylon.

Throughout India, Assam, Burma and Ceylon.

Elis prismatica, Smith.

Scolia prismatica, Smith, Cat. Hym. Brit. Mus., iii, 1855, p. 102, ♀; *Elis prismatica*, Sauss. and Sich., Cat. Scol., 1864, p. 190; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 98.

Hab.—Himalayas: Simla, Phagu, Matiana, 8,000 ft.; Mussoorie 7,000 ft.; Darjiling 7,000 ft.

Found also in Burma, Tenasserim, China.

Elis ceylonica, Kirby.

Campsomeris ceylonica, Kirby, Trans. Ent. Soc. Lond., 1889, p. 452; *Elis ceylonica*, Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 94.

Hab.—Nepal.

Described originally from Ceylon.

Family POMPILIDÆ.

Pseudagenia alaris, Saussure.

Agenia alaris, Sauss., Novara Reise Hym., 1867, p. 52.

Pseudagenia alaris, Cam., Mem. Manch. Lit. and Phil. Soc. (4), iv, 1891, p. 436; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 117.

Hab.—Calcutta.

Found also in Sikhim, Ceylon, Burma and Tenasserim.

Pseudagenia lævicula, Bingham.

Pseudagenia lævicula, Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 118.

Hab.—Burma: Rangoon.

Described originally from Tenasserim.

Pseudagenia culiciformis, form. nov.

♂. Uniform black. Head and thorax anteriorly covered with short, erect, soft whitish hairs, those on the cheeks posteriorly form a fringe. Head, pronotum, mesonotum, the sides of the thorax and the abdomen above very minutely and closely punctured; scutellum and postscutellum obliquely finely striate; median segment more coarsely punctured than the thorax, with a granular appearance. Wings hyaline, nervures brown, stigma jet black. Head lenticular, from in front orbicular; clypeus convex, as broad as long; antennæ long, thick and densely pubescent; second, third and fourth joints of the flagellum subequal; face in front slightly convex, vertex strongly arched, ocelli much closer to each other than are the posterior ones to the eyes. Thorax and median segment slightly compressed, narrow, together half as long again as the abdomen; pronotum comparatively long, the sides anteriorly convergent, its posterior margin angularly arched; mesonotum convex; scutellum laterally compressed; median segment very long, gently sloped to apex, rounded and convex; legs long, slender, tibiæ entirely without spines. Abdomen short, fusiform, subpetiolate, with a trace of a transverse furrow on the second ventral segment.

Length.—♂, 6; *exp.* 13 mm.

Hab.—Kumaon: Naini Tal, 6,400 feet.

Pseudagenia invidiosa, form nov.

♀ Black, covered all over with fine, short, white down, head and thorax very minutely and delicately aciculate; median segment finely transversely striate; abdomen very minutely and somewhat sparsely punctured, shining, the apical margins of all the segments very narrowly brownish testaceous. Head somewhat wider than the thorax; mandibles almost hidden under the clypeus, their apices castaneous red; clypeus comparatively large, convex, anteriorly triangularly produced, carinate down the middle; antennæ comparatively stout, the second joint of the flagellum one-third longer than the third, the latter slightly longer than the fourth; front convex, sloping upwards to the vertex; vertex transverse, the ocelli in an equilateral triangle closer to each other than are either of the posterior ocelli to the eyes; pronotum almost transverse anteriorly, broadly arched posteriorly; mesonotum slightly convex; scutellum, postscutellum and median segment declivous, the last rounded posteriorly and furrowed down the middle; legs stout, smooth or with only a few minute spines on the intermediate tibiæ; wings hyaline at base, fuscous towards their apices; abdomen subpetiolate, fusiform; sting well exerted.

Length.—♀, 8; *exp.* 17 mm.

Hab.—Soondrijal, Nepal.

Closest to *P. clypeata*, Bingh., from which it differs in the shape of the clypeus; that in *clypeata* is transversely suboval and has a conspicuous white macula on each side; the legs also are different in colour, being entirely black in the present form.

Pseudagenia mimica, form nov.

♀ Black, smooth and shining, sparsely clothed with somewhat long, soft, white hairs, which are most dense on the sides of the head behind the eyes and on the sides of the thorax and median segment; pronotum anteriorly with a rich purple prismatic sheen. Head and pronotum very sparsely and minutely punctured; mesonotum, scutellum and postscutellum very delicately aciculate; median segment furrowed medially from base, very obsoletely, transversely striate; abdomen smooth. Head broad, about twice as broad as long and much broader than the thorax; mandibles broad and stout; clypeus transversely oval, strongly convex, anterior margin narrowly reflexed; antennæ short but slender, the second joint of the flagellum half as long again as the third or fourth; front convex, bearing a very narrow medial furrow from the anterior ocellus to between the base of the antennæ; the ocelli very close together, the space between them barely half that between the lateral ocelli and the eyes; vertex broad, transverse. Thorax comparatively short, the pronotum transverse anteriorly, angularly arched posteriorly; mesonotum, scutellum, and postscutellum convex; median segment rounded, with an oblique slope posteriorly; legs slender, smooth; wings hyaline; nervures dark brown. Abdomen fusiform, about as long as the thorax and median segment, the second to the fifth segments in certain lights obsoletely banded along their posterior margins with silvery pile.

♂ Similar, smaller and more slender, the purple tint on the pronotum and the obsolete transverse silvery bands on the abdomen absent.

Length.—♀, 9; ♂, 6: *exp.* ♀, 16; ♂, 13 mm.

Hab.—Himalayas: Mussoorie, 7,000 ft.

Its nearest ally is *P. stulta*, Bingham. It differs from that form in the much shorter prothorax and median segment, the finely aciculate mesonotum, the colour of the legs, etc.

Salix (Priocnemis) rothneyi, Cameron.

Salix rothneyi, Cam., Mem. Manch. Lit. and Phil. Soc. (4), iv, 1891, pp. 452 and 453; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 146.

Hab.—Sikkim: Darjiling.

Descends also to the plains, as it was originally taken at Barrackpore.

Pompilus hecate, Cameron.

Pompilus hecate, Cam., Mem. Manch. Lit. and Phil. Soc. (4), iv, 1891, pp. 458 and 462, pl. 3, fig. 8; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 171.

Hab.—Nepal.

This form also descends to the plains; described originally from Barrackpore.

Pompilus iliacus, Cameron.

Pompilus iliacus, Cam., Jour. Straits Asiatic Soc., xxxviii, p. 90.

Hab.—Nepal: Nagarkote.

The specimen is not typical, and it is possibly a closely allied new form.

Family SPHEGIDÆ.

Tachytes modesta, Smith.

Tachytes modesta, Smith, Cat. Hym. Brit. Mus., iv, 1856, p. 299; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 190.

Hab.—Calcutta.

Probably spread throughout India, Burma, Siam and China.

Lyroda formosa, Smith.

Morphota formosa, Smith, Jour. Linn. Soc. Lond., 1859, p. 17, ♀

Lyroda formosa, Kohl., Verh. Zool.-bot. Ges. Wien, 1884, p. 267; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 209.

Hab.—Lucknow; Calcutta.

Widely spread. Originally described from the Celebes.

Pison punctifrons, Shuckard.

Pison punctifrons, Shuck., Trans. Ent. Soc. Lond., 1837, p. 77, ♀; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 219.

Hab.—Purneah.

Spread sparingly throughout Continental India, Assam and Burma.

Trypoxylon intrudens, Smith.

Trypoxylon intrudens, Smith, Trans. Zool. Soc. Lond., vii, 1872, p. 188; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 224.

Hab.—Purneah.

Occurs apparently throughout Continental India, Assam, Ceylon, Burma and Tenasserim.

Ammophila (Psammophila) tydei, Le Guillon.

Ammophila tydei, Le Guillon, Ann. Soc. Ent. Fr., x, 1841, p. 319, ♀

Hab.—Himalayas: Simla hills, Theog, 8,000 ft.

A remarkably wide ranging form found in Southern Europe, Northern Africa, through Western Central Asia, Baluchistan, the Himalayas, parts of Southern India, and the Malayan region to Australia.

Sceliphron bilineatum, Smith.

Pelopæus bilineatus, Smith, Ann. Mag. Nat. Hist. (2), ix, 1852, p. 47; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 238.

Hab.—Meerut.

Originally described from Western India.

Gorytes icariiformis, form. nov.

♀ Black: the anterior and lateral margins of the clypeus, a line gradually broadened anteriorly along the lower half of the inner orbits, and the scape anteriorly, bright sulphur-yellow. A line on the posterior margin of the pronotum, the apex of the femora, the tibiæ and tarsi of the anterior and intermediate legs, the knees and basal portions of the tibiæ of the posterior legs, the swollen globular portion of the first abdominal segment above, a broad band along the apical margin of the second abdominal segment and narrower similar bands on the third and fourth segments orange-red; the bands on the second and third segments continued narrowly on the ventral side. Head and thorax anteriorly closely, very finely punctured; opaque; a deep transverse groove with a number of short, longitudinal carinations between mesonotum and scutellum; median segment with a large basal triangular area coarsely longitudinally ridged and with a conspicuous medial short longitudinal sulca, which is divided into little quadrate areas by short transverse carinæ; rest of median segment coarsely sculptured, somewhat irregularly reticulate. Abdomen smooth and shining, a deep crenulated constriction between the first and second segments. Head transverse, nearly as broad as the thorax; mandibles narrow, acute at apex; clypeus transverse, convex in the middle, about twice as broad as high, the sides oblique, the anterior margin transverse, reflexed; antennæ short and slender, opaque, second flagellar joint twice the length of third; face slightly concave, inner orbits of the eyes parallel; vertex transverse. Thorax short and massive, the mesonotum slightly convex, broader than long; legs stout, posterior tibiæ with a few blunt, short spines; claws simple; wings hyaline, ample, fore and hind wings anteriorly shaded with fuscous nervures, brown. Abdomen longer than the thorax, first segment petiolate at base, apex suddenly enlarged and globose above as in most of the forms of the social wasps belonging to the genus *Icaria*.

Length.—♀, 11; *exp.* 23 mm.

Hab.—India.

The single specimen of this beautiful and very distinct form sent to me unfortunately has no particular locality on its label.

Philanthus pulcherrimus, Smith.

Philanthus pulcherrimus, Smith, Cat. Hym. Brit. Mus., iv, 1856, p. 469; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 299.

Hab.—Jullundur, Ferozepore, Agra.

Widely distributed in Continental India.

Philanthus (Trachypus) nepalensis, form nov.

♂ Black with yellow markings. Head: a triangular mark on the clypeus, a crescentic spot above it between the base of the antennæ, an oval spot above that, a spot on the front of the scape,

a broad stripe on the sides of the face along the lower half of the inner orbits, and a large spot behind the eyes, yellow. Thorax: a line on the pronotum, a spot on the tegulæ anteriorly, the tubercles, a spot on the mesopleuræ in front, a transverse oval mark on the scutellum, a similar smaller mark on the postscutellum, and a spot on either side of the median segment at apex, yellow. Legs: the apex of the femora and the tibiæ in front and the basal joints of the tarsi of the anterior and intermediate legs, and the knees and basal joints of the tarsi of the posterior legs yellow. Abdomen: a large oval spot edged anteriorly with dark red on either side of the second segment at apical margin, and a waved line on the apical margins of the third, fourth and fifth segments, with a transverse medial spot on the apical margin of the sixth segment, yellow; ventrally there are short, yellow, lateral lines on the apical margins of the second and third segments. Head, thorax, and base of first abdominal segment densely punctured, granular; rest of the abdomen with a few very fine scattered punctures. Head broader than the thorax; mandibles stout, longitudinally grooved; clypeus and face in front slightly convex; antennæ short, opaque; second joint of flagellum four times as long as the third. Thorax oval; mesonotum large, convex; median segment rounded posteriorly, medially furrowed from base, the furrow not reaching the apex; legs slender, the tibiæ with a few minute spines; wings clear hyaline; nervures brown. Abdomen: the basal segment petiolate, long, about half the length of the rest of the abdomen, convexly swollen at apex.

Length.—♂, 11; *exp.* 20 mm.

Hab.—Nepal: Katmandu.

This form is nearest to *P. punjabensis*, Nurse, but can be distinguished as follows:—

- (a) Head sparsely punctured; clypeus bisinuate; first and second abdominal segment with broad, oval, lateral, yellow spots *P. punjabensis.*
- (b) Head closely punctured, granular; clypeus arched, not bisinuate anteriorly; only second segment with broad, oval, lateral, yellow spots *P. nepalensis.*

Cerceris pictiventris, Dahlbom.

Cerceris pictiventris, Dahlb., Hym. Eur., i, 1845, p. 498; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 305.

Var. *Cerceris ferorus*, Smith, Ann. Mag. Nat. Hist. (4), xii, 1873, p. 411.

Hab.—Central India: Mhow.

Found throughout India, Assam, Ceylon, Burma and Tenasserim, extending as far as Java in the Malayan region. The specimen is var. *ferorus*, Smith.

Cerceris tetradonta, Cameron.

Cerceris tetradonta, Cam., Mem. Manch. Lit. and Phil. Soc. (4), iii, 1890, pp. 250, 261, pl. 10, fig. 12; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 304.

Hab.—Purneah.

Originally described from Poona.

Cerceris hilaris, Smith.

Cerceris hilaris, Smith, Cat. Hym. Brit. Mus., iv, 1856, p. 452. ♀; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 311.

Hab.—Himalayas: Mussoorie.

Probably found throughout Continental India.

Cerceris vigilans, Smith.

Cerceris vigilans, Smith, Cat. Hym. Brit. Mus., iv, 1856, p. 454; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 308.

Hab.—Calcutta.

Common.

Crabro annandali, form nov.

♀ Black, a short streak anteriorly near apex of scape of antennæ, a transverse band on the pronotum, the tegulæ of the wings anteriorly, the apices of all the femora, broad transverse bands along the bases of abdominal segments 2 and 5, and small lateral spots at the bases of segments 3 and 4, red. The band on the second abdominal segment posteriorly emarginate in the middle, the lateral spots on the fourth segment very small. Pubescence, erect, black on the head and thorax anteriorly, soft and whitish on the median segment and base of the abdomen; clypeus covered with dense silvery short pile. Head large, quadrate, broader than the thorax, very densely and minutely punctured, opaque; clypeus convex, transverse, shining, with a few scattered punctures; eyes very broad anteriorly, suddenly and strongly narrowed towards the vertex; seen from the front the inner orbits are widely divergent towards the vertex; antennæ comparatively short and robust; a deep fovea between the eyes above the base of the antennæ, which is continued as a shallow impressed line almost to the anterior ocellus; ocelli in an equilateral triangle; vertex and the cheeks behind the eyes very broad, the former almost flat. Thorax: pronotum transversely impressed in the middle; deep transverse sulci between the mesonotum and scutellum, between the scutellum and postscutellum, and between the last and the median segment, which last sulcus is margined anteriorly by a slender shining carina, the ends of which are turned downwards; median segment convex, steeply sloped, marked by a deep and comparatively broad medial furrow from base to near apex, crossed about midway by a transverse narrower furrow. The thorax anteriorly densely punctured like the head,

the median dull and opaque but with only scattered fine punctures. Legs: stout, the posterior femora studded with two rows of short thick spines. Wings: light brownish hyaline; nervures brown. Abdomen minutely aciculate, dull and opaque except the basal segment which is smooth and shining above.

Length.—♀, 15; *exp.* 31 mm.

Hab.—Himalayas, 9,000 ft., north of Taunghi.

This very distinct form superficially resembles *C. melanotarsis*, Cam., from the Khasi Hills, but in the latter the legs are more or less red; there is only one transverse red stripe on the abdomen, and that is on the third, not the second abdominal segment; and the sculpture of the median segment is entirely different.

DIPLOPTERA.

Family EUMENIDÆ.

Odynerus ovalis, Saussure.

Odynerus ovalis, Sauss., Mon. Guêp. Sol., 1852, p. 215; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 369.

Hab.—Ferozepore.

Throughout the plains of India.

Family VESPIDÆ.

Polybia stigma, Smith.

Polybia stigma, Smith, Jour. Linn. Soc. Lond., 1858, p. 114; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 384.

Hab.—Burma: Rangoon.

A common form in Burma, extending to Borneo.

Polistes marginalis, Fabricius.

Vespa marginalis, Fabr., Syst. Ent., 1775, p. 367; Sauss., Mon. Guêp. Soc., 1853-1858, p. 62, pl. 6, fig. 2.

Hab.—Himalayas: Simla; Nepal: Katmandu.

A very widespread form. The Himalayan form or variety is very dark.

Vespa flaviceps, Smith.

Vespa flaviceps, Smith, Trans. Zool. Soc. Lond., vii, 3, 1870, p. 191, pl. 21, figs. 10 and 11; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 406.

Hab.—Himalayas: Simla hills.

At low elevations in Sikhim, also found in the hills of Tenasserim.

Vespa auraria, Smith.

Vespa auraria, Smith, Trans. Ent. Soc. Lond., 1852, p. 46, pl. 8, fig. 8, ♀; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 407.

Hab.—Himalayas: Simla.

Found also in the hills of Tenasserim.

Vespa structor, Smith.

Vespa structor, Smith, Trans. Zool. Soc. Lond., vii, 3, 1870, p. 191, pl. 21, fig. 12; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 404.

Hab.—Himalayas: Simla.

Extends also to the Sikhim Himalayas.

Family APIDÆ.

Halictus albescens, Smith.

Halictus albescens, Smith, Cat. Hym. Brit. Mus., i, 1853, p. 61; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 423.

Hab.—Calcutta; Rajmahal; Himalayas: Simla, Matiana; Agra; Katmandu.

Widely distributed and variable.

Halictus subopacus, Smith.

Halictus subopacus, Smith, Cat. Hym. Brit. Mus., i, 1853, p. 63, ♀; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 428.

Hab.—Darjiling, Kurseong.

I took it in Upper Burma.

Halictus polycctor, form nov.

♀ Black; the head, pronotum and median segment opaque; the mesonotum, scutellum, postscutellum and the bases of the abdominal segments highly polished and shining. Head, thorax and abdomen with long, soft, white pubescence shorter and recumbent on the face in front and forming transverse narrow bands that are more or less posteriorly emarginate at the bases of abdominal segments 2 to 5. Head flat in front, closely punctured; clypeus slightly produced, truncate anteriorly; eyes with the inner orbits concavely arched and slightly convergent anteriorly. Thorax short, sparsely punctured above; median segment slightly compressed, truncate posteriorly, the enclosed space at base somewhat coarsely punctured, rugose. Wings hyaline, iridescent. Legs, slender, pubescent, on the posterior four legs the pubescence long, the calcaria yellow. Abdomen as long as the head and thorax united; segments 2 to 5 distinctly, finely, but sparsely punctured, each strongly constricted at base. Anal rima ferruginous.

Length.—♀, 6; *exp.* 13 mm.

Hab.—Himalayas: Theog near Simla, 8,000 ft.

A more slender and smaller insect than *H. constrictus*, Smith, its nearest ally.

Halictus deiphobus, form nov.

♀ Black. Head, thorax, legs, and abdomen, laterally and beneath with abundant, soft, erect, greyish or fuscous white pubescence; abdomen with comparatively broad whitish pubescent bands at the bases of segments 2 to 4; anal rima black. Head, thorax, and abdomen very minutely and densely punctured but not opaque, slightly shining; on the apex of the clypeus the punctures are larger and more scattered. Head about as wide as the thorax; clypeus broader than long, abruptly truncate anteriorly; antennæ short, opaque, bare; third, fourth, and fifth joints of the flagellum subequal, second joint twice the length of either of them; face flat; vertex arched; eyes wide apart, their inner orbits parallel; ocelli large and prominent, placed in a curve. Thorax short; mesonotum strongly convex, with a short impressed line above each tegula; median segment very short, evenly rounded posteriorly and vertical, the enclosed space at base very large, reticulate, punctate; legs very stout, the femora and tibiæ more thickly pubescent than the thorax, the intermediate and posterior calcaria ferruginous; wings hyaline, the nervures and stigma light brown. Abdomen as long as or a little longer than the head and thorax united, segments 1 to 4 with a medial transverse impression more or less obsolete in the middle but well marked on the sides.

Length.—♀, 8-9; *exp.* 14-16 mm.

Hab.—Himalayas: Simla hills, Matiana, 8,000 ft.

Differs from *H. vishnu*, Cam., in the abdominal segments being closely punctured right up to the margin, which is glabrous in *vishnu*, and from *H. buddha*, Cam., in the margins of the abdominal segments not being constricted, and in the head and thorax, though closely punctured, not being opaque. It differs also in the colour of the legs. *H. vishnu* and *H. buddha* were described from males, and it is quite possible that one of them may be the ♂ of the present form.

Halictus lucidipennis, Smith.

Halictus lucidipennis, Smith, Cat. Hym. Brit. Mus., i, 1853, p. 62, ♀; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 435.

Hab.—Kumaon: Bhim Tal; Simla hills: Theog.

Halictus senescens, Smith.

Halictus senescens, Smith, New Sp. Hym. Brit. Mus., 1879, p. 30; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 438.

Hab.—Mussoorie hills: Landour.

Generally distributed in India and Burma.

Halictus paris, form nov.

♀ Black, more or less shining. Head, thorax, legs, and the abdomen laterally and beneath clothed with short, erect, pale yellow pubescence, the abdomen probably in fresh specimens

with transverse bands of similar but shorter and recumbent pubescence on the apical margins of segments 1 to 4 (in the type and only specimen available, these bands are more or less abraded); anal rima black, apex of abdomen with ferruginous pubescence. Head, thorax and abdomen minutely punctured, the punctures dense on the front of the head and the vertex, and on the thorax, above and on the sides, more scattered on the clypeus anteriorly and on the abdomen above. Head broader than the thorax, lenticular, posteriorly widely emarginate; clypeus convex, broader than long, its anterior margin transverse; antennæ short, stout, opaque, second joint of flagellum shorter than the third; ocelli in a curve just below the vertex; vertex arched. Thorax short; mesonotum convex; scutellum broad, wedge-shaped, truncate posteriorly; postscutellum sunk, densely pubescent; median segment compressed, vertical posteriorly, the enclosed space at base finely and very densely punctured, separated from the postscutellum by a sharp, curved, shining carina; legs stout, black beneath, rufous above on the femora, tibiæ and tarsi; wings hyaline; nervures and stigma pale brown. Abdomen shining, the margins of the segments where the pubescence is abraded, rufo-testaceous.

Length.—♀, 8; *exp.* 17 mm.

Hab.—Himalayas: Simla hills, Theog, 8,000 ft.

A race or representative form of the European *H. calceatus*, Scopoli, from which it differs in being much narrower in shape and somewhat smaller. The enclosed space at the base of the median segment in the European form is much more coarsely punctured, and has the sides of that segment rugulose and not smooth and shining.

Anthrena floridula, Smith.

Andrena floridula, Smith, Second Yarkand Mission, Hym., p. 2, fig. 4 of plate; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 444.

Hab.—Himalayas: Simla hills, Phagu, Theog, 8,000 ft.

Anthrena moris, Brullé.

Andrena moris, Brullé, Exped. Sc. Morea, Zool., ii, 1832, p. 353, pl. 49, figs. 8, 9.

Var. *Andrena lugubris*, Erichs., M. Wagner, Reise in Algeria, iii, 1840, p. 191, ♀ ♂.

Hab.—Himalayas: Simla hills, Matiana, 8,000 ft.

A solitary specimen quite indistinguishable from specimens from Northern Africa.

Anthrena brunneipennis, form nov.

♀ Black, densely pubescent. The pubescence pale yellow on the head, the front and sides of the thorax, and on the abdomen, very long, tufted and hoary on the thorax posteriorly and on the

median segment, and short, very dense and rich ferruginous on the tibiæ and tarsi, and on the apical two abdominal segments. Wings hyaline, basally stained or clouded with brown, this colour reaching up to the apices of the radial cubital and discoidal cells; the last joint of the tarsi of the anterior and intermediate and the whole of the tarsi of the posterior legs rufo-ferruginous. Head about as broad as the thorax, the mandibles large, acute; clypeus large, convex, punctured, and with a medial, ill-defined, vertical carina, anteriorly transversely truncate. Thorax massive, finely punctured underneath the pubescence; median segment rounded posteriorly, with a not very steep slope to the apex. Abdomen somewhat depressed, long, not so densely pubescent as the thorax, the pubescence hoary and arranged more or less in transverse bands as fringes at the apical margins of the segments; the surface beneath the pubescence, where it is sparse, lightly and sparsely punctured and more or less shining.

Length.—♀, 15-16; *exp.* 28-31 mm.

Hab.—Himalayas: Simla hills, Matiana, 8,000 ft.

Nearest to probably a race of the European *A. nigroænea*, Kirby, but larger; the colour of the pubescence and of the wings different.

Anthrena burkelli, form nov.

♀ Black, the second and succeeding joints of the flagellum of the antennæ, and the apical four joints of all the tarsi, red. Head and thorax more or less densely, abdomen very sparsely, pubescent. The pubescence round the base of the antennæ and on the front rich dark brown, in striking contrast to that on the sides of the face and clypeus and on the back of the head, which is hoary, as is that on the thorax, the median segment and abdomen; pubescence on the legs shorter, denser, and ferruginous. Head, thorax, and median segment very finely and sparsely punctured, enclosed space at the base of the median segment more densely and coarsely punctured. Abdomen very minutely, densely punctured, opaque; apical margins of segments 1 to 4 smooth, pale yellowish, testaceous, that colour preceded by an obscure, transverse, narrow red band. Head as wide as the thorax; mandibles stout, polished, smooth, and shining; clypeus nearly circular, very convex, medially vertically carinate, and strongly, though not very closely, punctured; antennæ stout, rugulose, second joint of the flagellum as long as the succeeding three joints united. Thorax rather long; mesonotum convex; median segment rounded, somewhat oblique at the sides, its posterior face steeply sloped, truncate, and slightly concave; legs robust; wings hyaline; nervures and tegulæ testaceous. Abdomen oval, about as long as the thorax and head united.

Length.—♀, 12; *exp.* 23 mm.

Hab.—Himalayas: Simla hills, Matiana, 8,000 ft.

A very distinct form not closely allied to or resembling any form known to me.

Anthrena mollis, Smith.

Anthrena mollis, Smith, Desc. New Spec. Hym. Brit. Mus., 1879, p. 50; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 446.

Hab.—Jhansi.

A very variable and generally distributed form.

Anthrena sodalis, Cameron.

Anthrena sodalis, Cam., Mem. Manch. Lit. and Phil. Soc., xli, 1897, p. 121.

Hab.—Calcutta (?), Darjiling.

Described originally from Mussoorie.

Anthrena gracillima, Cameron.

Andrena gracillima, Cam., Mem. Manch. Lit. and Phil. Soc., xli, 1897, p. 118, pl. 4, fig. 19; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 444.

Hab.—Darjiling, Calcutta (?).

Described originally from Mussoorie.

Anthrena mephistophelica, Cameron.

Andrena mephistophelica, Cam., Mem. Manch. Lit. and Phil. Soc., xli, p. 117; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 443.

Hab.—Mussoorie.

Probably spread throughout the Himalayas above 6,000 feet.

Nomia elliotii, Smith.

Nomia elliotii, Smith, Trans. Ent. Soc. Lond., 1875, p. 44; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 449.

Hab.—Calcutta.

The plains of India generally; Burma; Tenasserim.

Nomia westwoodi, Gribodo.

Nomia westwoodi, Grib., Bull. Soc. Ent. Ital., 1894, p. 128; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 449.

Hab.—Calcutta.

Nomia punctulata, Dalla Torre.

Nomia punctata, Westwood (*nec* Smith), Trans. Ent. Soc. Lond., 1875, p. 213, ♀ ♂

Nomia punctulata, Dal. Torre, Cat. Hym. (Apidæ), x, 1896, p. 169.

Hab.—Calcutta.

Not recorded before from India. Originally described from China.

Nomia clypeata, Smith.

Nomia clypeata, Smith, Trans. Ent. Soc. Lond., 1875, p. 54, pl. 2, fig. 18; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 456.

Hab.—Lucknow.

Nomia floralis, Smith.

Nomia floralis, Smith, Trans. Ent. Soc. Lond., 1875, p. 58; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 453.

Hab.—Calcutta.

Found also in Burma. A very variable form as to the amount of red on the abdomen.

Osmia adæ, Bingham.

Osmia adæ, Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 468.

Hab.—Himalayas: Simla, Phagu.

Megachile lanata, Fabricius.

Apis lanata, Fabr., Syst. Ent., 1775, p. 385.

Megachile lanata, Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 483.

Hab.—Cawnpore.

Spread throughout India.

Megachile umbripennis, Smith.

Megachile umbripennis, Smith, Cat. Hym. Brit. Mus., i, 1853, p. 175; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 483.

Hab.—Calcutta.

Found also in Tenasserim.

Megachile albifrons, Smith.

Megachile albifrons, Smith, Cat. Hym. Brit. Mus., i, 1853, p. 180; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 487.

Hab.—Agra.

Probably spread throughout the plains of India.

Megachile nana, Bingham.

Megachile nana, Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 487.

Hab.—Agra, Ferozepore.

I procured it in Tenasserim in the dry Dipterocarpus scrub on more or less bare rocky hills.

Ceratina hieroglyphica, Smith.

Ceratina hieroglyphica, Smith, Cat. Hym. Brit. Mus., ii, 1854, p. 226; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 503, pl. 4, fig. 3.

Hab.—Mussoorie.

Very widely spread.

Ceratina bhawani, form nov.

♀. Black and shining, the bases of the mandibles, a large quadrate spot on the labrum, an irregular, very broad, **⌞** shaped mark on the clypeus, an oblong mark on either side of the face along the middle of the inner orbits, a transverse line on the pronotum, the tubercles, and the calcaria of all the tibiae of the legs yellowish white; very narrow transverse bands along the junctions of the first and second, second and third, and third and fourth abdominal segments dull castaneous. Head, smooth and polished; thorax, with the exception of the postscutellum, very sparsely and finely punctured; postscutellum and abdomen quite as finely but much more closely punctate; the enclosed space at base of the median segment very minutely but very densely punctured and rugulose. Head broader than the thorax, with the hollows round the bases of the antennae and on the face above characteristic of *Ceratina*; antennae short, stout; second, third, and fourth joints of the flagellum subequal. Thorax short, with medial and sublateral, short, longitudinally impressed lines; median segment compressed, rounded, and vertical posteriorly. Legs stout. Wings ample, hyaline; nervures and stigma very dark brown; tegulae testaceous. Abdomen long, massive, longer than head and thorax united.

Length.—♀, 8; *exp.* 17 mm.

Hab.—Himalayas: Simla hills, Theog 8,000 feet.

Allodape parvula, Smith.

Allodape parvula, Smith, New Spec. Hym. Brit. Mus., 1879, p. 98; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 507.

Hab.—Jubbulpore.

Heriades parvula, Bingham.

Heriades parvula, Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 508.

Hab.—Mhow.

I procured it in Burma.

Habropoda magretti, Bingham.

Habropoda magretti, Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 523.

Hab.—Ferozepore.

Habropoda krishna, form nov.

♂. Black. Head, thorax, and abdomen densely covered with long, pale brownish yellow pubescence turning to ferruginous golden on the posterior segments of the abdomen, and mixed throughout with a sprinkling of black hairs, the surface beneath more or less closely and finely punctured. Head: mandibles white; apical

third rich castaneous; base black; clypeus white; apical margin narrowly castaneous; sutures at the sides and above narrowly black. Thorax: the wings hyaline; nervures and tegulæ testaceous. Legs: apical joints of the tarsi rufo-testaceous; claws black. Head as wide as the thorax; the vertex broad, depressed; antennæ comparatively long, second joint of the flagellum attenuate at base, clavate at apex, as long as the succeeding three joints; ocelli in equilateral triangle, the distance between the anterior and either of the posterior ocelli greater than either of the posterior ocelli and the eye next to it; eyes large, prominent, their inner orbits parallel. Thorax globose; mesonotum convex, scutellum and postscutellum slightly raised, median segment short, vertical at the sides and to the apex. Abdomen subcordate, short, very convex above.

In some specimens not so densely pubescent as others, the pubescence forms distinct transverse bands on the apical margins of the segments beneath which the surface is rufo-testaceous. Female unknown.

Length.—♂, 12-13; *exp.* 24-27 mm.

Hab.—Sikim: Darjiling, 7,000 ft.

Nearest to *H. radoszkowskii*, but differs in sculpture and in colour of pubescence.

Podalirius quadrifasciatus, Villers.

Apis quadrifasciata, Villers, Linn. Ent., iii, 1789, p. 319.

Anthophora quadrifasciata, Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 529.

Hab.—No locality on label.

Podalirius pulcherrimus, Bingham.

Anthophora pulcherrima, Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 532.

Hab.—Simla, Matiana, above 7,000 ft.

Bombus hæmorrhoidalis, Smith.

Bombus hæmorrhoidalis, Smith, Trans. Ent. Soc. Lond., 1852, p. 43; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 554.

Hab.—Himalayas: Simla; Subathu; Dhurrampur, 5,000 ft. Originally described from China.

Bombus tunicatus, Smith.

Bombus tunicatus, Smith, Trans. Ent. Soc. Lond., 1852, p. 43, pl. 8, fig. 7; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 549.

Hab.—Himalayas: Simla hills, Theog, Matiana, Phagu, 8,000 ft.

Originally described from China.

Bombus flavescens, Smith:

Bombus flavescens, Smith, Trans. Ent. Soc. Lond., 1852,
p. 45; Bingham, Faun. Brit. Ind. Hym., i, 1897, p. 550.

Hab.—Himalayas: Taunghi, 9,000 ft.

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### XXXIII. INDIAN PSYCHODIDÆ

By E. BRUNETTI.

Until *Phlebotomus argentipes* was described by Dr. Annandale and myself in an earlier number of this Journal (vol. ii, p. 101), no species of this family had been described from the East. I therefore now offer descriptions of fourteen Indian species, the types of which are in the Indian Museum collection.

For the common Calcutta species, *Psychoda bengalensis*, I was about to erect a new genus, the flagellum of the antenna apparently consisting of only ten instead of thirteen or fourteen joints, but on a microscopic examination of fresh specimens, thirteen joints are plainly visible, the last three being exceedingly small. This fact I had overlooked, but the oversight was pointed out to me by Dr. Annandale; to which gentleman I desire to express my thanks for a considerable amount of assistance in the microscopic examinations in this group, and especially in the study of the genital apparatus; for it is mainly due to help thus received that I have had the courage to attack this family at all.

Many of the species herein characterised will be fairly easily recognised by some character found in none of the others. Many of them are described from the females only, but the sexes do not appear to differ, in those species of which both are known, except in the generative organs.

These organs in the male are apparently more or less uniformly shaped in all the species, consisting (in those species before me, in which this sex is present) of two pairs of appendages, the lower pair much the larger, and clothed with dense, long hairs. In the female this apparatus also appears very uniformly shaped in all the species, and consists of a moderately large, scythe-like, chitinous appendage, evidently capable of erection or depression, also of protrusion or withdrawal, for in some specimens it is erect, in others horizontal, and in others not visible at all. Dr. Annandale found that upon pressure from above, it is seen to be formed of two symmetrical valves, and below it are two very small, single-jointed, palpus-like organs, apparently springing from a common base. These I have not observed in all the species, but they are probably present.

In *Phlebotomus* no ovipositor is visible. I do not touch upon *Phlebotomus*, however, in this paper, as Dr. Annandale is occupied with a study of the Indian species of this genus.



## TABLE OF SPECIES.

*Psychoda*, Latr.

(Third longitudinal vein running straight to wing-tip.)

- A Wings with numerous, distinct scales, in addition to ordinary pubescence.
- B No white spots on wing-border . *squamipennis.*
- BB White spots on wing-border.
- C Brown species; legs mainly brown *argenteopunctata.*
- CC Coal-black species; legs black . *atrisquamis.*
- AA Wings without scales but clothed with hairs.
- D Wing-border with black or white spots, or both.
- E Spots at end of veins black only.
- F Greyish yellow species. Wings with seven black spots at tips of veins, and no scale-spots along the costa *bengalensis.*
- FF Black and white species. White scale-spots along the black costa *albonigra.*
- EE Spots at end of veins formed of white scales.
- G Tips of veins with silvery white hair-spots *albonotata.*
- GG Tips of veins with black hair-spots and with white intermediate spots . *distincta.*
- DD Wing-border unspotted.
- H Wing covered uniformly with blackish grey hairs . *nigripennis.*
- HH Wing crossed by a band of light brown hairs with one or more areas of white hairs .. *vittata.*

*Pericoma*, Wlk.

(Wing-tip occurs between lowest branch of second vein, and the third vein.)

- A Lower fork of fourth vein with an appendix at base.
- B First joint of flagellum long, with several long spines *spinicornis.*
- BB First joint of flagellum normal, unspined *appendiculata.*
- AA Lower fork of fourth vein without appendix.
- C Wing wholly jet-black, with white tip, and five white spots on wing-border .. *annandalei.*
- CC Wing blackish grey, with black and grey spots.
- D A black hair-spot at end of each vein *margininotata.*
- DD The black hair patches irregularly placed on disc and border of wing *bella.*

*N.B.*—I retain all the species in the above two genera, which appear ample for the species in this sub-family, the genera proposed by the Rev. A. E. Eaton (*Entomologist's Monthly Magazine*, 1904, p. 55), appearing to me to be based upon insufficiently strong characters.

***Psychoda bengalensis*, mihi, sp. nov.**

♂ ♀ Bengal. Long. 1–1 $\frac{3}{4}$  mm.

*Body* entirely clothed with hair, varying from yellowish grey to whitish, and of a nature varying from soft long hairs to bristly ones, which latter on some parts, and around the tip of the abdomen, are distinctly scale-like. In certain lights some of the scale-like bristles appear blackish or even wholly black.

*Head*: Eyes black, with very large facets; frontal groove very narrow with long, greyish hair. Lower part of head covered with long hair. Antennæ fifteen-jointed; scape of two larger joints egg-shaped; the flagellum of ten joints of nearly uniform size, each shaped like a long-necked flask, and three further very minute joints, invisible except under a microscope. Each joint of the whole antenna bears a rather thick verticil of hairs. Palpi of four joints of equal length, with some hairs, last joint very thin, pointed.

The genital process in the male consists of a pair of small, bare, upper chitinous appendages, and a much larger and longer lower pair, densely covered with long hair. In the female it consists of a pair of very small, pointed, chitinous appendages forming a small ovipositor, which it is somewhat difficult to distinguish amidst the hair.

*Legs* of the same colour as the body, clothed rather thickly with concolorous scales, and with numerous black bristles, the former being thickest on the tibiæ and tarsi.

*Wings* with all the veins bearing a double row of hairs, pointing respectively anteriorly and posteriorly. The fork of the upper prong of the second longitudinal vein originates a little before the middle line of the wing; and the fork of the fourth longitudinal vein originates a little behind this middle line, but the linear space between the two forks varies in different specimens. A few black bristly hairs forming a small black spot occurs at the tip of each of the four veins *above* the third longitudinal (which is unmarked); also at the tip of the upper prong of the fourth, and at the tips of the fifth and seventh. These black hairs gradually become more scale-like towards the last spot, which is usually the deepest of all.<sup>1</sup> The whole border of the wing is thickly fringed with long blackish grey hair, which extends over the tegulæ also.

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<sup>1</sup> In some specimens there is a collection of black hairs showing a tendency to form an irregularly shaped spot at the base of the wing, and, more often, two similar vague spots, one below the costa, the other above the hind border, both near the base of the wing.

*Genitalia*: Superior appendages consisting of two sub-equal joints, the proximal joint cylindrical, often concealed in a vertical position in the body, distal joint sickle-shaped, its ventral edge being somewhat sinuous. Inferior appendages very long, arising from an elongated, broad ventral plate; themselves sickle-shaped, clothed with long, fine hairs at their base, and bearing very minute, straight bristles on their ventral surface, each appendage terminating in a single, short, flattened, almost triangular spinule.

*Described* from about fifty examples in good condition in the Indian Museum collection, taken chiefly on windows, both in Calcutta during January, 1908, and in Simla and neighbouring places in May of the same year. Specimens are also present from: *Bengal*; Calcutta (Jan., Feb., May, July, Aug., Oct., Dec.), Port Canning, Ganges delta (Dec.), Katihar, Purneah district (Oct.): *Oudh*; Lucknow (Jan., Feb., April): *Western Himalayas*; Simla (May), Kasauli (May), Dharampur (May), Naini Tal (May or June): *Eastern Himalayas*; Kurseong, Darjiling district (July), both sexes common on windows and in grass at Darjiling (21-ix to 2-x-1908): *Burma*; Rangoon (March), Moulmein, Tenasserim (March).

### *Psychoda distincta*, mihi, sp. nov.

♀ Sylhet. Long.  $1\frac{1}{2}$  mm.

*Body* pale brownish yellow, entirely clothed with long, pale brownish yellow, bristly hair, with some concolorous elongated scales, and with a few black bristles here and there. The bristles are long, and become scale-like on the dorsum of the thorax and towards the tip of the abdomen, where, in the latter case, the black bristles are also more numerous.

*Head*: Eyes black, with dense, soft, pale yellowish grey hair between them. Antennæ sixteen-jointed; first joint of scape cylindrical, second spherical; flagellum of fourteen elongated, pear-shaped joints, each surrounded by numerous long hairs in the form of a rather thick irregular verticel.

*Legs* with numerous bristles, which are very long on the tibiæ, which, in addition, have short scales of the same colour lying rather close, and a circlet of rather long, scale-like bristles at the tips. The metatarsus, which is nearly as long as the four remaining sub-equal joints together, has a few irregular bristles, and the tarsi are covered by close-lying, pale yellowish white scales, giving a whitish appearance in certain lights.

*Wings*: The upper prong of the second longitudinal vein forks near the base, before one-third of the wing, and the fourth longitudinal vein forks at exactly one-third. All the veins seem to bear the usual double row of hairs, and the intervening spaces are also covered with brown hairs rather thickly. The basal half only of the wing is covered moderately closely with pale brownish yellow, semi-transparent elongated scales of rather small size. There is

a patch of black hairs at the tip of all the veins from the first to the lower fork of the fourth (inclusive), with a trace of a patch at the tip of the fifth; and a patch of white hairs appears between all these black patches; so that the border of the wing appears spotted alternately black and white, and is fringed along its entire length with close, long, light brown hair. The hair of the wing appears lighter or darker in different specimens, and according to the direction in which the light falls on it, a brilliant iridescence being at times visible.

*Described* from two specimens in the Indian Museum from Sylhet (Major Hall), 1-i-05 and 30-i-05, also from a third specimen mounted on a slide, in the same collection.

***Psychoda albonotata*, mihi, sp. nov.**

♀ Calcutta. Long. 1 mm.

*Body*: Ground colour black. Thorax and abdomen with whitish grey hairs which in certain lights appear silvery.

*Head*: Eyes black, facets large; interocular space light brown, filled with strong, rather long black bristles. Antennæ sixteen-jointed, light brown; two basal joints cup-shaped, rather short, with circlets of stiff black bristles; the flagellum of fourteen cup-shaped joints placed rather close together, and bearing the usual long hairs which are both thick and long. Palpi dark brown, hairy.

The *genital* apparatus appears to be a moderate-sized, bare, pointed, pale yellowish brown appendage, similar to that of this sex in other species.

*Legs* with livid yellow femora and tibiæ, the latter black towards the tips; tarsi brownish black, covered with close, brownish scales. The extreme tip of the tibiæ, of the metatarsus, and of the last tarsal joint, with a few brilliant, snow-white hairs.

*Wings* with the upper prong of the second longitudinal vein originating much before the fourth part of the total length of the wing; the fourth longitudinal vein bifurcates at about one-fourth of the wing. Ground colour dark grey, the veins with the usual double row of hairs, which are black, giving, with the long fringe of black hairs around the whole wing-border, a wholly black appearance to the wing. A silvery white spot formed by a few minute, very elongate, hair-like white scales, at the tip of all the veins, from the first to the sixth inclusive, nine spots altogether.

*Described* from a female in excellent condition in the Indian Museum collection, taken in Calcutta, 5—6-i-08.

*N.B.*—The general appearance of this species is that of a black *Psychoda* with nine snow-white spots on the wing-border, and with white spots on the legs. In certain lights nearly all parts of the body in turn appear more or less silvery white, including the black wing-fringe, the femora and tibiæ, and nearly the whole

of the pubescence on the body; the wings also, in certain lights, present a beautiful iridescence.

A second example in the same collection, from Sylhet (Major Hall), 8-i-05, is apparently the same species. The hairs on the wing are golden brown, and those on the body more brownish than in the Calcutta specimen, whilst the white scales cover the whole of the metatarsus.

The antennæ are missing, and there are a few white, elongated, hair-like scales in the centre of the wing towards the base. The wing-fringe is golden brown on the distal half and black on the basal part of the costa and on most of the posterior margin.

On the dorsum of the abdomen are a few remaining short white scales, lying rather close to the surface, but there are no such scales in *albonotata*, yet as the general resemblance between the specimens is so great, I regard this latter as a possible variety, in preference to describing it as new.

***Psychoda albonigra*, mihi, sp. nov.**

♀ (?). Calcutta. Long. nearly 1 mm.

*Head*: Form and face with white bristly hair on upper part and black scaly bristles below. Antennæ with second joint of scape short, cup-shaped, both joints encircled by white scales; flagellum of fourteen distinct, pale yellow, flask shaped joints, and an additional very minute spherical one; each joint bearing a thick verticel of stiff greyish white hair. Palp black, with black bristly hair.

*Thorax* covered with thick, bristly greyish white hair, with some darker hairs intermixed.

*Abdomen* (damaged): Dirty yellow, with some black hairs.

*Legs*: Femora pale dirty yellow. Tibiæ with closely-placed black scales, with black bristles intermixed, and bearing, placed irregularly, isolated white scales and white bristles; the posterior pairs with rather long black hair behind: tips of tibiæ with a few white scales. Tarsi covered with black scales and a few bristles; the tips of the metatarsi and of the last joint, with a few white scales.

*Wings*: Very pale grey, nearly clear round the posterior border. The veins with the usual double row of blackish grey hairs, with some white, nearly erect hairs placed in irregular rows and patches about the middle of and (more abundantly) across the base of the wing. A small bunch of black, bristly hairs at the tip of each vein, and the costal border clothed nearly to the tip of the wing with stiff, black, bristly hairs; along which are placed, at shortly regular intervals, one or two small white scales. Towards the tip of the costa the wing-fringe becomes greyish, and from thence, round the border, nearly to the base, it is greyish white, rather long and thick. Near the base of the posterior margin the fringe becomes blackish grey.

The bifurcations of the upper branch of the second vein, and of the fourth vein, occur just before the middle of the wing.

*Described* from a perfect unique ♀ (?) in the Indian Museum collection, captured by Dr. Annandale in the Museum, 30-vii-08.

***Psychoda squamipennis*, mihi, sp. nov.**

♀ Calcutta. Long.  $1\frac{1}{4}$  mm.

*Body* blackish brown, with brownish grey hair, which appears much lighter when the light falls on it in a certain direction. Eyes black, large facets. Antennæ: first joint elongate, one-and-a-half times as long as the second, which is short and subspherical; both with some bristly hairs; flagellum of apparently only thirteen joints, which are cup-shaped, with a central cylindrical prolongation, each joint bearing a thick verticil of long, close, scale-like, light brownish grey hairs, in addition to some ordinary hairs on each joint; the last joint tapers to a point and may really be separable into two.

*Legs* with close, greyish pubescence, and some apparently irregularly placed bristles of various lengths; some stiff black ones on the metatarsus.

*Wings* with the surface between the veins closely covered with distinct, moderately large, brown scales, and both veins and the intermediate spaces covered with brown and black hairs. Border of wing with a fringe of long brown hairs, which appear grey in certain lights; and along the extreme edge of the wing is placed, here and there, a single, small, snow-white scale-like hair.

The example is apparently a ♀ as no trace of a genital appendage is visible, but from the manner the specimen is mounted, it is very difficult to see the body and legs.

*Described* from a unique ♀ in the Indian Museum collection, taken by Dr. Annandale in Calcutta, 5-viii-07.

***Psychoda argenteopunctata*, mihi, sp. nov.**

♀ Calcutta. Long. nearly 1 mm.

Considerably resembling *squamipennis*.

The antennæ have a flagellum of thirteen spindle-shaped joints, each bearing a thick verticil of hairs.

Mouth with rather long bristles; the four-jointed palpi are thin, moderately hairy, gradually tapering towards the tip; the second joint being twice as long as the first, the rest sub-equal. The genital appendage appears bare, conical, horny, upright. The legs are covered with brownish scales which, in certain lights, show a greyish white shimmer. The tibiæ have rather long hairs of irregular length, and a circlet of strong bristles of different lengths at the tip; the apical half of the metatarsus has some white scales.

*Wings*: The second longitudinal vein divides almost directly after its divergence from the third, and the prong forks at a quarter

the length of the wing. The first longitudinal vein ends at the centre of the costa; the third ends at the extreme, slightly blunted, tip of the wing; the fourth divides from apparently a common stem just below the divergence of the second and third; the fourth forking a little beyond the fork of the upper prong of the second; the seventh is curved downward at the tip. The wings have a small spot of snow-white scale-like bristles at the tip of all the veins (not always very distinct), and two rather larger, similar spots on the costa, one before the tip of the first longitudinal vein, and the other before the uppermost branch of the second longitudinal vein. The under side of the wing in certain lights shows a brilliant iridescence, due to numerous, scattered, small scales of variegated colours.

In all remaining points, as in *squamipennis*, but a very distinct species.

*Described* from one ♀ in the Indian Museum collection taken in Calcutta, 27-viii-07.

***Psychoda atrisquamis*, mihi, sp. nov.**

♀ Calcutta. Long.  $1\frac{1}{4}$  mm.

Very near *squamipennis* and *argenteopunctata*. The wings are almost entirely clothed with soft black hairs, and the basal and central portions with thick black scales which, in certain lights, and from the under side view, appear partly iridescent. At the tip of each vein is a small bunch of snow-white, moderately long, scale-like hairs. The legs are almost wholly black, with a few small white scales at the tip of the tibiæ, and (at least, on the hind pair) a few at the tips of the metatarsus and succeeding joint.

Type (a perfect unique ♀) in the Indian Museum, taken on a window of the Museum building by Dr. Annandale, 22-vii-08.

*N.B.*—It is possible that this may be identical with *argenteopunctata*, as, though they appear quite distinct when viewed side by side, it is difficult to specify any strong point of difference, except that this species is coal-black, whilst *argenteopunctata* is brownish.

***Psychoda nigripennis*, mihi, sp. nov.**

♂ ♀ Himalayas (Simla and Darjiling districts); Bengal. Long.  $\frac{2}{3}$  to  $1\frac{1}{2}$  mm.

*Body* yellow, wholly covered with greyish brown hair, which in certain lights appears whitish.

*Head*: Eyes jet-black, facets very large. Antennæ: basal joints short and not broader than the flagellum, yellow, with some black bristles; second joint spherical; flagellum of fourteen joints, of which the first ten are flask-shaped (as in *bengalensis*); the eleventh has no "neck," and is roughly ovate; the twelfth, thirteenth and fourteenth are very minute, the two former cup-shaped, the terminal joint spherical. The verticels of greyish white hair on each

joint are very thick, lying closely, directed forwards and clustering together, thus giving the antenna the usual appearance of an organ of solidity, with parallel sides, of a grey colour, marked with small, black, round spots. Palpi of four elongated cylindrical joints, hairy, of equal length, except that the fourth is slightly longer and pointed at the tip.

*Legs* pale blackish brown; the femora with some white hairs below, the tibiæ rather closely covered with snow-white hairs, the tarsi blacker, with white hairs which, towards the tip, are replaced by small, elongated white scales.

*Wings*: These have the appearance of being pale blackish, but are really pale grey, wholly unmarked; the veins distinct, each with the usual double row of hairs, which appear black when viewed from above, but which appear white when viewed horizontally from the tip of the wing. Fringe of wing, longest on posterior border, grey, appearing dark in some lights and nearly white in others. Wing with a purplish iridescence.

*Genitalia*: In the male very similar to those of *bengalensis*, but the inferior appendages decidedly shorter. In the female it consists of a very concave (on the upper side), leaf-shaped appendage, bending backwards, but the appendage probably consists of two symmetrical blade-like halves, as in the other species.

*Described* from four ♂♂ and twelve ♀♀ in the Indian Museum collection from the following localities: Kasauli (Simla district), 6,300 feet, 15-v-08; Simla, 7,000 feet, 10-v-08; Kurseong (Darjiling district), 5,000 feet, 4-vii-08. Types in the Indian Museum. At Kasauli Dr. Annandale found the species common in bungalows on the date given. He has also taken it on mossy walls and at light in Calcutta.

*N.B.*—In a specimen from Calcutta (3-vi-08) there is a slight but distinct spot of black hairs at the tip of each of the veins, and the tarsi are more densely covered with white scales. It may possibly be distinct, but I can detect no other differences of value.

***Psychoda vittata*, mihi, sp. nov.**

♀ Calcutta. Long. 1 mm.

*Body* pale yellow with grey and white hair.

White bristly hair between the eyes, with black bristly hair below. Scape of antennæ with the joints barely broader at the tip; second rather short, both with black bristles. Flagellum of ten dirty yellow, distinct, long-necked, flask-shaped joints, each surrounded by a thick verticel of stiff blackish grey hairs, also a terminal conical joint which is composed of three small coalescing subspherical ones. The antennæ have the thickened appearance noticeable in *nigripennis*.

*Legs* pale yellow, with a few irregular black bristles; hind femora with a row of long bristles and hind tibiæ with two rows of long bristly hair. Tibiæ with a few black spines at the tip.



*Wings* pale grey: the veins bearing the usual blackish grey hairs, with a wide transverse band (composed of erect light brown hairs) across the centre of the wing, and the apical portion of the wing is also broadly covered with similar brown hairs. At the base of the wing is a space covered with erect, soft, white hairs, and some traces of a similar patch towards the costa between the two areas of brown hairs. Fringe of wing on costa brownish grey, on posterior margin, more grey or whitish.

*Described* from five ♀♀, dated Calcutta, 11-vii to 2-viii-08, taken by Dr. Annandale; common on mossy walls.

*N.B.*—Further specimens in the Indian Museum collection may represent a small variety of this species with less conspicuously banded wings, and one or two of them show a darkening of the tips of some of the tarsal joints. The hair on the thorax is sometimes snow-white, sometimes yellowish grey, which inclines me to the opinion that they all represent the present species.

***Pericoma spinicornis*, mihl, sp. nov.**

♂. Himalayas (Simla and Darjiling districts). Long.  $1\frac{1}{4}$  to  $1\frac{3}{4}$  mm.

Very near *appendiculata* (v. post.) in general appearance, but very distinctly differing in the *first joint of the flagellum*, which is  $3\frac{1}{2}$  times as long as the second, sub-cylindrical, slightly narrowed and rounded at base, and slightly contracted just before the tip. This joint bears on its upper surface a row of *five or six long, strong, black, vertical straight spines*, set in raised sockets, followed by, placed almost at the apex of the joint, two (perhaps three) other still longer spines springing from a common socket. The under side of this joint is beset with narrow, curved, greyish scales. The remainder of the flagellum consists of thirteen sub-equal, elongated joints, gradually shortening to the last one, which is styliform. The two basal joints are thickly beset with very elongate, whitish grey scales, with which are intermixed some long, stiff, black bristles. On the face and anterior part of the thorax the bristles become almost scale-like, and are nearly white.

*Legs*: Femora slightly curved, sometimes considerably so, sometimes nearly straight. The femora and tibiæ are covered with long, pale yellowish grey, bristly hair; the tibiæ tips having a circlet of rather elongate, whitish, scaly bristles, with some short black bristles intermixed; the tarsi are covered with black scales and bristly black hair. The base of the metatarsus, and of the following joint, and the tip of the last joint are covered with small, cream-white scales.

*Wings*: Venation and general appearance as in *appendiculata*; the veins with the double row of hairs each, as are present in most species. The wing-border has a fringe of grey hairs, which appear lighter or darker according to the direction in which the light falls on them; whitish towards the tip of the wing, and both blackest and longest on the basal portions of both anterior and

posterior borders. On the surface of the wing are short rows of quite white, short, bristly hairs, placed at apparently irregular intervals along the veins, these hairs being intermixed with black ones towards the base of the wing. The hairs on the surface of the wing on its apical half, and towards the centre portions of both anterior and posterior margins are much darker than on the remaining surface, thus leaving the base, and the proximal part of the centre of the wing apparently much clearer, as in *appendiculata*.

*Genitalia*: Superior appendages consisting of a short, elliptical, basal joint, and a thin, curled, cylindrical, pointed distal one, the whole appendage being small and easily overlooked; the basal joint bearing stout bristles with sockets, the distal joint bare. Inferior appendages arising from a triangular basal plate, sickle-shaped, bearing a number (about twenty) of flattened spatulate spinules on the distal two-thirds of the dorsal surface.

*Described* from eight ♂♂ in good condition in the Indian Museum taken by Dr. Annandale at Kurseong (5,000 feet), 5-vii-08, and some others in less good condition from the same source; also two ♂♂ from Simla (7,000 feet), 11-v-08. I took three males at Darjiling on windows, 2-x-08.

***Pericoma appendiculata*, mihi, sp. nov.**

♀ North Bengal. Long. 1½ to 2 mm.

*Body* blackish, rather sparsely covered above and below with whitish grey hair, which is thickest towards the posterior borders of the abdominal segments, and is darker in some specimens. The posterior part of the thoracic dorsum bears long, black, bristly hair.

*Head*: Eyes black, facets very large, bronze; palpi long, brownish grey, with a few hairs. Antennæ sixteen-jointed, scape thick, first joint cylindrical, second globular; a narrower flagellum of fourteen ovate joints, each with a rather thin verticil of hairs, *first joint only barely longer than second: without spines*.

*Legs* pale yellowish white, *fore and hind femora distinctly curved*, tarsi mainly black. The legs with numerous bristles of unequal length, some long bristly hairs on the tibiæ, which have a circlet of scale-bristles at the tip; some close-lying small scales on the femora.

*Wings* dark grey. The lower prong of the fourth longitudinal vein springs at right angles from the upper, and then forms a second right angle, *bearing a distinct appendiculation* at that spot, directed backwards. The fourth longitudinal vein forks a little behind the fork of the second, which itself is placed just before the centre line of the wing. The veins, which are very distinct, all bear the usual double row of partly erected hairs, directed forwards and backwards, and at the tip of each vein is a small bunch of stronger bristly hair; the intervening space (especially on the hind borders) being nearly clear, thus giving the border of the wing the appearance of bearing alternate black and white spots. The hairs

are in the main black, but those on the proximal half of the disc (except those in the immediate vicinity of the third vein) are distinctly more erect than the others, and are distinctly *grey*. A thick row of bushy, long, black bristly hair on nearly the whole length of the seventh vein. Wing-border with fringe of black hair which is rather short on the apical half, longer on the basal half of the costa, and longest and thickest on the basal half of posterior border. Towards the ends of some of the veins are a few silvery white, irregularly placed, elongated scales.

The *genital apparatus* consists of a single, horny, pointed, bare appendage of moderate size, projecting rather prominently.

*Described* from ten ♀ ♀ in the Indian Museum collection from Kurseong, taken by Dr. Annandale, 5-vii-08. A ♀ from Siliguri, North Bengal, 18—20-vii-07, is in the same collection.

*N.B.*—I suspect that this species is the ♀ of *spinicornis* on account of all the specimens of that species being ♂ ♂, and all those of *appendiculata* ♀ ♀; taken into consideration with the fact that they were nearly all captured at the same time, and in the same locality. I also found both sexes at Darjiling from September 20th this year up to October 2nd, the females being rather common on windows and attached to the under side of large leaves on the hillside, in both situations in company with an abundance of *Psychoda bengalensis*. As I know of no other species in the family varying sexually to such a striking extent as occurs between the present two forms in the first joint of the flagellum, I refrain from uniting both forms under one name: should they represent one species only, the name *spinicornis* must stand.

***Pericoma annandalei*, mihi, sp. nov.**

♀ Darjiling district. Long. 2 mm.

*Head*: Frons with long greyish white bristly hairs, and a few black bristles about the mouth. Eyes black, facets large, those on upper border of eyes bronze. Antennal scape thickly clothed with long white scales, and on upper side with some blackish brown ones; flagellum of thirteen elongated, cigar-shaped, light brown joints, clothed rather thickly with long greyish white, bristly hairs. Palpi well developed, long, black, thickly clothed with black scaly bristles and hairs. Back of head black, bare.

*Thorax* moderately shining black, with long black hair which in certain lights has a blackish grey tint. Humeral calli bare, distinct, shining black.

*Abdomen* black, with black bristly hairs. Ovipositor brown, of moderate size and normal shape.

*Legs* brown, with black and grey hairs, and both black and white bristles, the latter less numerous than the black ones. The tips of the tibiæ have a few white scales, the metatarsi are nearly wholly clothed thickly with white scales, and there are also a few at the extreme tips of the tarsi.

*Wings* brownish grey, rather thickly covered with black hairs, and with a fringe of long black hairs around the whole border except at the tip of the wing, where, for the distance between the lower branch of the second longitudinal vein and the upper branch of the fourth, the black hairs are replaced by long, snow-white bristly hairs. Five spots on the wing-border (each consisting of a few silvery white scales, which have a faint bluish tint) are placed as follows: a larger one in the centre of the fore border, the second (a small one) just beyond the first; the third at the end of the lower branch of the fourth longitudinal vein; and the fourth and fifth at the tips of the sixth and seventh longitudinal veins, the fourth spot being the largest.

*Described* from a perfect unique ♀ in the Indian Museum collection captured by Dr. Annandale at Kurseong, 5-vii-08.

***Pericoma margininotata*, mihi, sp. nov.**

♂ ♀ Western Himalayas (Simla district). Long.  $1\frac{1}{4}$ – $1\frac{3}{4}$  mm.

*Body*: Ground colour of thorax blackish brown, of abdomen, blackish, both covered with thick, long, pale yellowish grey bristly hair, plentifully intermixed on the thorax with black hairs, and likewise, to a less degree, on the base of the abdomen. The hairs on the thoracic dorsum show a tendency to be arranged in fan-shaped sets. On the abdomen they are arranged in a thick row of long ones on the posterior border of every segment, with a shorter, erect row in front of them. Pleuræ light to dark mahogany brown, bare, or nearly so. Eyes bronze, with large facets. The antennæ have the two large basal joints (second one cylindrical, wider than the first, which is cup-shaped) covered with short white scales, and are surrounded by a cluster of longer ones; flagellum of thirteen small globular joints of equal size, last one conical, each with a circlet of a few long black hairs, and more numerous, short white ones.

*Legs*: Femora and tibiæ grey, with minute greyish white pubescence, a number of longer, white bristly hairs (with black reflections in certain lights). These are apparently irregularly placed on the fore legs and the femora, but show a tendency to form longitudinal rows. Those, at least on the hind tibiæ are arranged in three such longitudinal rows, one pointing outwards, the other two rows, posteriorly. The apical part of the tibiæ is narrowly but thickly clothed with jet-black scaly bristles, and the extreme tip with a circlet of white scaly bristles. The tarsi are thickly covered with jet-black scaly bristles, the tips of the metatarsus and following joint bearing a circlet of white scaly bristles. The metatarsus bears several very strong long black bristles, and the extreme tarsi tips have minute cream-coloured scales.

*Wings*: Dark grey, with all the veins bearing a double row of spreading hairs, and without scales. Upper fork of second longitudinal vein bifurcates at two-fifths of the wing, and the

fourth longitudinal bifurcates between one-fourth and one-third of the wing. A small spot, consisting of numerous rather strong black hairs, at the tip of each vein, and a similar spot at the bifurcations of the upper prong of the second longitudinal vein, and of the fourth vein, these two spots being in a straight line with the last spot on the posterior margin. The first spot on the anterior border, the last one on the posterior border, and the upper discal spot, are all larger and darker than the others, but this may be accidental.

The hairs in some parts of the disc of the wing are distinctly darker and show a tendency to form black patches, and along most of the veins are short rows and bunches, here and there, of quite white, erect, short, bristly hairs, becoming almost scale-like in the small tuft-like spots of them on the margin of the wing, placed alternately with the black marginal hair-spots. These give the border of the wing a strikingly distinct, tessellated appearance composed of black and white spots alternately. Wing-border with a fringe of blackish grey hair, which is shortest on the distal portion, especially on the apical part of the costa. Halteres rather large, cup-shaped, with hairy upper edge, the stem being very narrow and short.

*Genitalia* in ♂: Superior appendages consisting of a short, stout, cylindrical basal joint, and a distal one which is shaped like a scorpion's sting, consisting of a basal bulb, and a slightly coiled, tube-like prolongation of about the same length. Inferior appendages arising from a broad, rather short basal plate, than which they are considerably larger; themselves sickle-shaped, each bearing at the distal end, on the dorsal surface, a pair of flattened, spatulate spinules, the whole joint covered with fine hairs.

*Described* from a male and two females in the Indian Museum collection, taken by Dr. Annandale during May 1907 and 1908 at Simla (7,000 feet).

#### Var. *lacteitarsis*, mihi.

Three ♀ specimens in the Indian Museum taken by Dr. Annandale at Kurseong, 4-vii-08, agree perfectly with the above description, but differ by the pubescence of the thorax and abdomen being much darker (nearly black), and by all the tarsi being wholly milk-white. This variety approaches *gilvipes*, but the black hair-spots at the tips of the veins in the wings are as distinct as in the typical *margininotata*, whereas in *gilvipes* they are much less distinct, and in this latter form the metatarsi are black, whilst in *lacteitarsis* they are white.

#### Var. *gilvipes*, mihi.

♀ Considerably resembling typical *margininotata*, but is smaller, and the general colour of the long hair of the thorax and abdomen is more brownish grey. The basal joints of the antennæ are invisible, owing to the position of the head in the

type specimen; the thirteen joints of the flagellum resemble those of *Psychoda bengalensis*. The legs have the tarsi (except the metatarsus, which is black nearly to the tip) entirely covered with cream-coloured microscopic, scaly pubescence. The wings resemble *margininotata*, and there appears to be a tendency to dark spots of a similar nature, placed irregularly on the disc of the wing, but especially on the bifurcations of the veins.

The genital appendages as in *margininotata*, but rather longer.

*Described* from three ♀ ♀ in the Indian Museum, from Calcutta, dated 28-vii-08 (type), 2-viii-08, and 17—18-viii-07.

*N.B.*—I place *lacteitarsis* and *gilvipes* as varieties of my *marginipunctata*, as the markings of the wing seem to keep them all within the range of one species and the variation in colour is not more than is known to occur in other species. The technical differences, therefore, rest with those of the tarsi, which may be regarded as black with white tips in the typical form; wholly white in *lacteitarsis*; and white with black metatarsi in *gilvipes*. It is possible that my two varieties represent one species, distinct from *marginipunctata*, in which case the name *lacteitarsis* had better stand.

***Pericoma bella*, mihi, sp. nov.**

♀. Darjiling.

*Body* covered with dense, greyish white bristly hair; very dense between the eyes and on lower part of face; arranged on the abdomen in transverse rows at the base of each segment. They are long and semi-erect, thus covering most of the abdominal surface. Antennæ with both joints of the scape covered with dense white scales, both joints appearing dark at their bases; flagellum of fourteen subconical joints, the apical one produced to a blunt conical point, each joint bearing a verticel of hairs, the whole flagellum having a grey appearance. Palpi apparently black, with white bristly hair. Genital appendage inconspicuous.

*Legs*: Femora with long bristly grey hair; hind pair thickly covered with whitish scales. Tibiæ blackish brown with long, irregularly placed bristles; a ring of close, short black bristles towards the tip, and a circlet of closely packed, elongated white scales at the tip. Metatarsus and tarsal joints black, with a circlet of short white scales at the tip of most of them.

*Wings*: Fork of the upper branch of second longitudinal vein and the fork of the fourth vein both occur a little before the middle of the wing. The upper branch of the second vein, immediately after its origin, takes a rather sudden curve upwards, descending slightly to where it forks, and the lower branch ends only slightly above the extreme tip of the wing. The third vein originates in a right angle from the fourth, just beyond where the second vein divides into its upper and lower branches. The veins bear the usual double row of greyish, semi-erect hairs, and patches of black, erect, bristly hairs are distributed as follows: at the fork of

the upper branch of the second vein, and at (or just beyond) the similar fork of the fourth vein. Also about the middle of the sixth and along the seventh, except in its centre. The fringe round the border of the wing is generally greyish white, with an arc of black bristly hairs near the middle of the costa, and just beyond the middle; on the posterior border between the lower fork of fourth vein, and the fifth; also from the end of the sixth, nearly to the base of the wing.

*Described* from six females taken by me on windows at Darjiling during the last few days of September, and on October 1st, 1908. It was not uncommon.

*N.B.*—The patches of black hairs on the wing are by no means of regular size or shape, but the markings of the six examples examined agree fairly well with the distribution of black hairs as herein described. Small irregular patches occur in nearly all the specimens. Sometimes the general appearance of the wing is wholly blackish or black, with a slightly curved band of lighter hairs across it near the tip; a patch of white hairs in the middle of the costa, and beyond the middle on the hind border, and also at the tip of the wing.

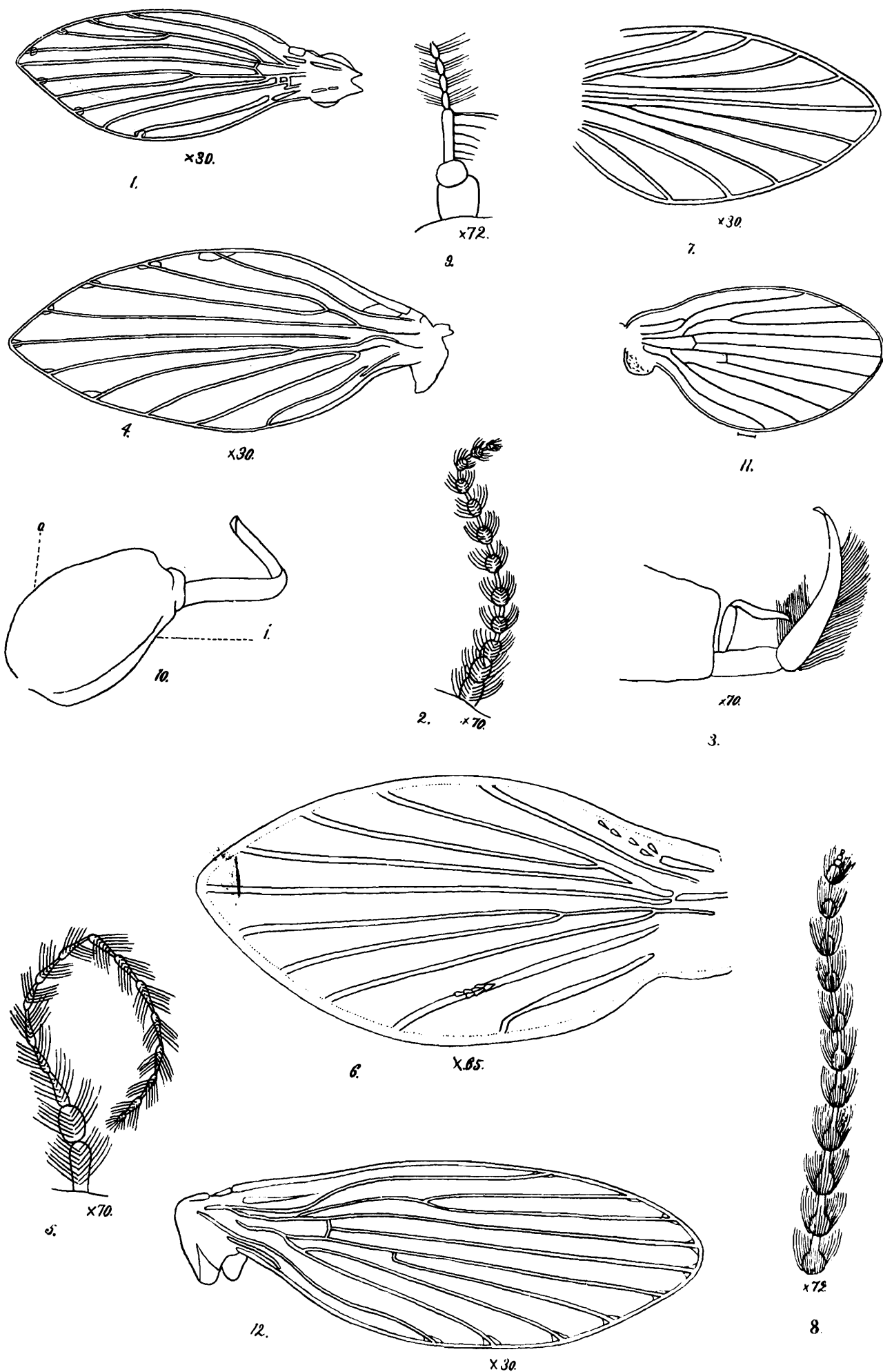
The species is closely allied to (but, I have no doubt, distinct from) *margininotata*.



EXPLANATION OF PLATE XXIV.

- FIG. 1. *Psychoda bengalensis*, Brun., wing.  
,, 2. *Id.*, antenna.  
,, 3. *Id.*, ♂ genitalia.  
,, 4. *Psychoda distincta*, Brun., wing.  
,, 5. *Id.*, antenna.  
,, 6. *Psychoda argenteopunctata*, Brun., wing.  
,, 7. *Psychoda albonotata*, Brun., wing.  
,, 8. *Psychoda nigripennis*, Brun., antenna.  
,, 9. *Pericoma spinicornis*, Brun., antenna.  
,, 10. *Id.*, ♂, superior appendage,  
right side, from above.  
,, 11. *Pericoma appendiculata*, Brun., wing.  
,, 12. *Pericoma margininotata*, Brun., wing.





# XXXIV. DESCRIPTION OF A NEW SPECIES OF MOUSE FROM THE MADURA DISTRICT, MADRAS

By T. BENTHAM, *Indian Museum.*

This mouse is common round Rámanád town and digs shallow burrows there, in which it brings forth its young.

Seven specimens in alcohol and two skins are in the Museum. They were collected in August, 1905, by Dr. Annandale, and were found in company with *Mus (Leggada) buduga*.

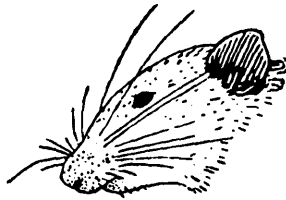


FIG. 1.—Head of *Mus (Leggada) ramnadensis*.

*Description.*—Altogether a larger mouse than *M. buduga*. Fur longer than in this species, and inclined, in older animals, to be slightly spiny in the dorsal region. Tail shorter than head and body. Ear of medium length, rounded and, when turned forward, reaching the posterior extremity of the eye. Feet as in *M. buduga*, but longer and narrower. Skull very long for the size of the body. The nasal bones especially are very long, and give the animal in the flesh rather a shrew-like appearance. Molars as in *M. buduga* (see C, text-fig. 2).

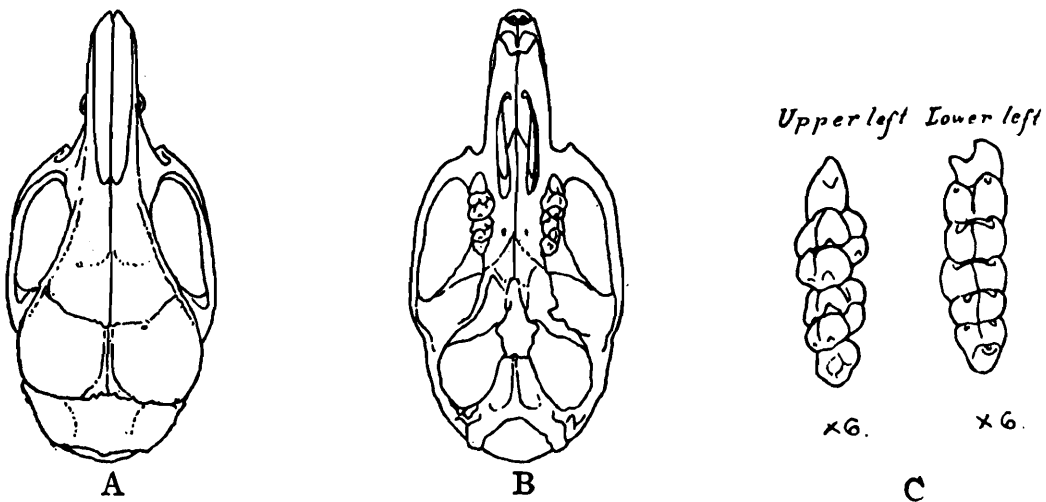


FIG. 2.—*Mus (Leggada) ramnadensis*: A = skull from above; B = skull from below;  $\times 2$ ; C = Molars.

*Colour.*—In all eight specimens this is constant, being a light, almost golden fawn on the upper parts, lighter towards the side of the head. Hair on upper parts ash-grey for basal two-thirds, a sub-terminal ring of light golden fawn, the extreme tips dark brown. Ears dark silver grey both inside and out. Under parts and upper lip dead white, each hair being of the same white throughout.

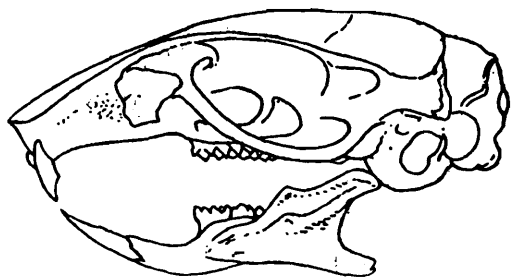


FIG. 3.—Side view of skull of *M. ramnadensis*.

Tail clay-colour above, lighter below, and faintly ringed throughout its length.

*Dimensions.*—The following are measurements of two small females in the flesh taken by Dr. Annandale:—

|                  |        |        |
|------------------|--------|--------|
| Head and body .. | 66 mm. | 55 mm. |
| Tail .           | 61 ,,  | 50 ,,  |
| Ear .            | 10 ,,  | 8 ,,   |
| Hind foot .      | 13 ,,  | 10 ,,  |

Measurements of dry skin of full-grown male:—

|                 |     |        |
|-----------------|-----|--------|
| Head and body . | . . | 77 mm. |
| Tail .          | . . | 55 ,,  |
| Ear .           | . . | 10 ,,  |
| Hind foot .     | . . | 16 ,,  |

Measurements of two male skulls:—

|                           |        |        |
|---------------------------|--------|--------|
| Total length .            | 25 mm. | 25 mm. |
| Breadth, zygoma to zygoma | 12 ,,  | 11 ,,  |
| Length nasals .           | 11 ,,  | 11 ,,  |

Some of the specimens were sent to the British Museum, where Mr. Wroughton stated that they might prove to be identical with Blyth's *Mus albidiventris* (cf. *Mem. Asiat. Soc. Bengal*, vol. i, p. 22). Blyth, however, afterwards admitted that this mouse was identical with *Mus cervicolor*.

In any case there seems to be no specimen of “*albidiventris*” in existence, and, as Blyth's description of this animal appears to be too short to be definitive, it would be better to drop the species altogether. The mouse under discussion is certainly not *Mus cervicolor*, as can be judged from the above description. I propose, therefore, to make a new species and call it *Mus (Leggada) ramnadensis*, sp. nov., in virtue of the locality whence it was obtained.



## XXXV. SOME CLERIDÆ OF THE INDIAN MUSEUM.

By S. SCHENKLING, *Berlin*.

A lot of *Cleridæ* kindly sent to me for identification by Dr. N. Annandale contains the following species; among them are two new species of the Oriental genus *Callimerus* of which I give here a short description.

1. *Cladiscus sanguinicollis*, Spin.—Andamans.
2. „ „ sp. (immature).—Andamans.
3. *Tillus notatus*, Kl., var. *tristis*, Schklg.—(?) Calcutta.
4. *Callimerus cribratus*, sp. nov.

Niger, capite densissime, pronoto minus dense punctato, palpis apice, antennis basi flavis, elytris irregulariter crebre punctatis, apicibus rotundatim emarginatis, pone medium fascia albo-squamosa. Long. 6 mm. Bengal: Berhampur, Murshidabad District (R. E. Lloyd).

Head very finely rugose. Thorax bluish black, coarsely but not very thickly punctured, at the sides confusedly rugose, largest width before the middle. Scutellum densely clothed with long white hairs. Elytra black, bronzy shining, sparsely not densely punctured, behind the middle a fascia nearly straight of white hairs, abbreviated towards the suture, the extreme apex deeply emarginated between a short interior and a longer exterior tooth. Hind tibiæ not denticulate, lamellæ of the tarsi yellowish.

5. *Callimerus pulcher*, sp. nov.

Niger, violaceo micans, prothoracis punctis duobus, scutello, elytrorum fascia postmediana maculisque duobus (prima rotunda pone basim altera longa ante apicem) albo-squamosis, femoribus rufis. Capite densissime rugosulo, prothorace globoso, parce fortiter punctato, elytris lateribus dense, partim fere seriatim punctatis, juxta suturam fere glabris, apice non emarginatis. Long. 7 mm. Upper Burma: N. Shan Hills (F. Coggin Brown).

Head and thorax black, bluish shining, the antennæ at the base yellow. Thorax highly globular, sparsely strongly punctured, with a white spot at the anterior margin on both sides. Elytra bluish and greenish shining, at the base and at the sides thickly and coarsely punctured (punctures partly arranged in rows, near the suture and before the apex much finer and smaller), behind a little divergent, single apex tapering, the elytra with the following white pattern: a narrow arcuate fascia abbreviated towards margins and suture, a round punctiform patch at the anterior fifth and a sutural line before the apex. All the sides of pectus and

abdomen clothed with white scales. Femora of light red, hind tibiæ not denticulate.

6. *Callimerus*, sp.—Kurseong, E. Himalayas, 5,000 feet.
7. *Opilo sordidus*, Westw., var.—Murree, W. Himalayas; Darjiling; Tukvar.
8. „ sp. nov.—Daffla Hills, N. Assam.
9. [*Natalis spinicornis*, Blackb.—Adelaide, Australia.]
10. *Tillicera javana*, Spin.—Kurseong, Sikhim; Shillong, Khasi Hills.
11. „ *bibalteata*, Gorh.—Sikhim.
12. *Orthrius subsimilis*, Wk.—Calcutta; Maldah.
13. „ *andamanensis*, Schklg.—Andamans.
14. „ *rufotestaceus*, Schklg.—Shillong, Khasi Hills; and Jhelum Valley, N.-W. Himalayas.
15. „ *tarsalis*, Gorh.—At light on board steamer, Damukdia Ghat, E. Bengal.
16. „ sp. nov.—Kurseong; a single specimen.
17. „ sp. nov.—Sukna, E. Himalayas, 500 feet; a single specimen.
18. [*Phlogistus imperialis*, Gorh.—Adelaide, Australia.]
19. [*Trogodendron fasciculatum*, Schreib.—Adelaide, Australia.]
20. [*Fenithicola funestus*, Chevr.—Adelaide, Australia.]
21. *Trichodes spectabilis*, Kr., var. *kuwerti*, Rtrr.—Kogyar, E. Turkestan.
22. *Dasyceroclerus* sp.—Calcutta; Lower Bengal: Port Canning.
23. *Phæocyclotomus* sp.—Andamans.
24. *Omadius seticornis*, Westw.—Malay Archipelago.
25. „ *mediofasciatus*, Westw.—Sikhim; Sibsaugor, Assam.
26. „ *roepstorfi*, Kuw.—Andamans.
27. *Neohydnius despectus*, Gorh.?—Lower Burma: Base of Dawna Hills, interior of Amherst District.
28. „ sp. nov.—Calcutta; a single specimen.
29. *Tenerus signaticollis*, Cast.—Nicobars.
30. „ „ var. *marginipennis*, Gestro.—Sibsaugor, Assam.
31. „ *flavicollis*, Gorh.—Sibsaugor Assam.
32. „ *cyanopterus*, Spin., var.—Andamans.
33. „ *andamanensis*, Gorh.—Andamans.
34. [*Phymatophæa pustulifera*, Westw.—N. Zealand.]
35. *Necrobia ruficollis*, F.—Poona, W. India.
36. „ *rufipes*, De Geer.—On board ship, Madras coast; on skeleton of an elephant, Calcutta.
37. *Opetiopalpus obesus*, Westw.—Nilgiri Hills, S. India.

XXXVI THE FAUNA OF BRACKISH  
PONDS AT PORT CANNING,  
LOWER BENGAL

PART XII.—DESCRIPTION OF A NEW SPECIES OF POLYCHÆTE  
WORM OF THE GENUS *Spio*.

By A. WILLEY, D.Sc., F.R.S., Director, Colombo Museum.

*Spio bengalensis*, sp. nov.

Amongst the invertebrate animals collected in 1907 by Dr. Nelson Annandale from brackish ponds at Port Canning in Lower Bengal, there were some small tubicolous Polychæte worms which he sent to me for description. Although clearly belonging to the family Spionidæ, there appeared, under ordinary inspection, to be no trace of the long occipital (peristomial) tentacles which are characteristic of this family, nor were they seen in the living worms. But after repeated examination under strong reflected sunlight I have found what I take to be the bases or scars of the lost tentacles. In its general characters the species otherwise resembles the *Spio filicornis* described and figured by Malmgren (*Annulata Polychæta*, 1867, p. 92, pl. i, fig. 1) except that the branchiæ or branchial cirri, instead of occurring on all setigerous segments, are confined to the anterior region of the body; this being the distinctive character of the species.

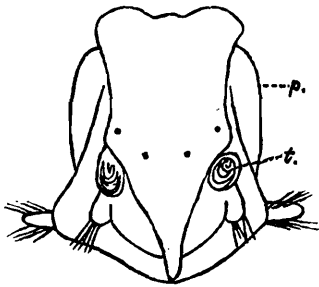


FIG. 1.

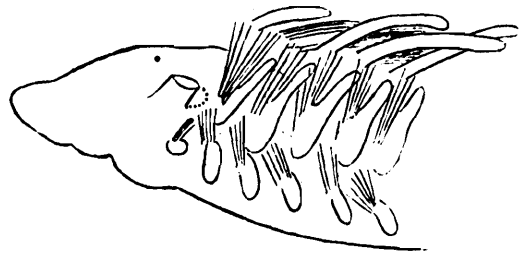


FIG. 2.

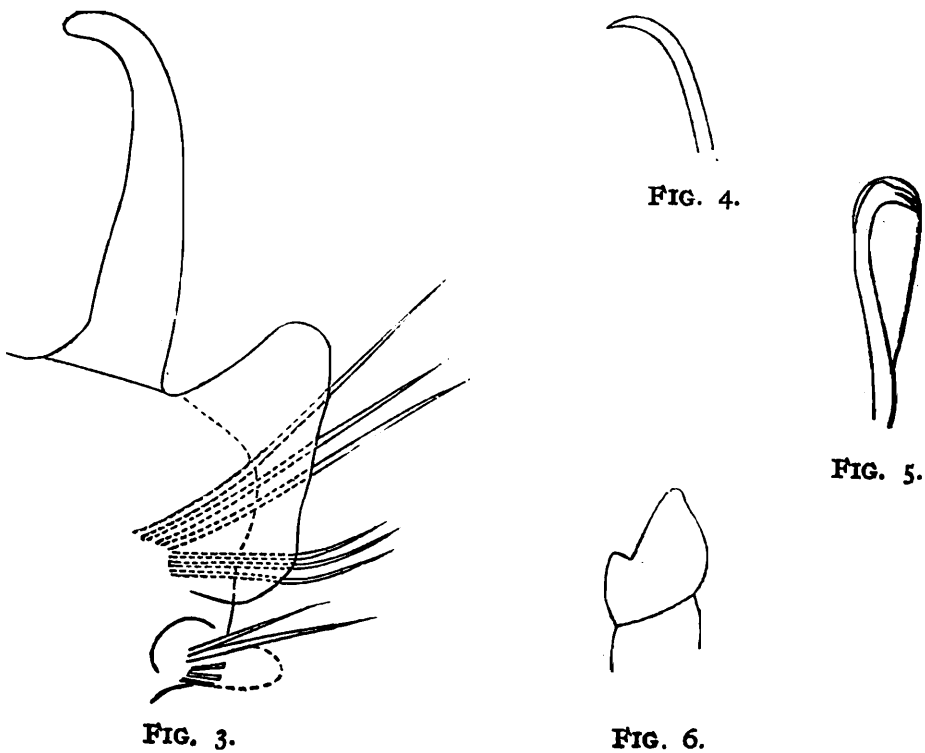
FIG. 1.—Head of *Spio bengalensis*: *p.* = proboscis; *t.* = tentacular basis.  
,, 2.—Anterior end of *Spio bengalensis* in side view.

The material includes at least two mature females; the ovaries commence in the posterior branchial region and may be followed segmentally on each side of the gut to the hinder region of the body. The size is small, 12 to 13 millimetres in length, with about 70 segments.

The four small eyes are placed as shown in fig. 1 when the proboscis is protruded, but the ocular area becomes narrower when the proboscis is withdrawn. The prostomium is slightly emarginate in front; behind the eyes it narrows down to a pointed

extremity ending on the first setigerous segment. At the sides of the head close behind the ocular area occurs a pair of structures which I identify as the scars of the occipital tentacles; these are followed by the small setigerous notopodia of the first setigerous segment (figs. 1 and 2). The branchiæ commence on the second setigerous segment and occur on twelve to fourteen segments only, the last two or three smaller than the preceding; they are distinct to their bases, not joined to the notopodial lamellæ (fig. 3). Behind the branchial region the parapodial prominences become very inconspicuous.

In the anterior segments capillary setæ occur in both fascicles, and the dorsal setæ remain capillary throughout, becoming very slender towards the posterior region of the body. Simple hooked setæ (setæ infimæ ventrales) appear singly in each neuropodium from about the 12th somite (fig. 4); they appear to be rather



- FIG. 3.—Fourth gill-bearing parapodium from hinder aspect. The neuropodial ligule was concealed in the preparation; compare fig. 2.  
 „ 4.—Ventral hooked seta from 12th foot.  
 „ 5.—Guarded uncinata seta or crochet from the 28th foot; sketched from a preparation *in toto*.  
 „ 6.—Pygidium in side view.

less curved in the hinder region. Guarded crochets (fig. 5) were observed from about the 28th segment; apart from the single inferior ventral seta mentioned above, they are the only setæ present in the neuropodia of the posterior segments, 6 or 7 appearing in each appendage.

The pygidium (fig. 6), as observed in one specimen, is simple with a ventral cone and a pair of low dorsal elevations.

The first small notopodium is hard to see in side view and is indicated by a dotted line in fig. 2.

XXXVII. DESCRIPTION OF A NEW SPECIES OF SAW-FISH CAPTURED OFF THE BURMA COAST BY THE GOVERNMENT OF BENGAL'S STEAM TRAWLER "GOLDEN CROWN"

By B. L. CHAUDHURI, B.A., D.Sc.

*Pristis annandalei*, sp. nov.

Length of the rostrum in the total length 4·8, height of body 10·84, greatest breadth 6 in the total length. Breadth of rostrum at tip in the breadth of rostrum at base 1·75. The rostrum is armed with about 25 pairs of teeth, the left side having one more tooth than the right. The two anterior pairs and the two posterior ones are opposite to one another, the rest of the pairs do not lie opposite. Interspaces between teeth vary greatly, the diameter of the sockets of the teeth being contained in the interspaces differently, from 4 to 1 : teeth are mostly unequal and uneven. Mouth transverse, with a membranous valve or fold hanging from the upper edge of the upper jaw behind the teeth,



*Pristis annandalei*, sp. nov.

with two round lobes at two ends. Spiracles large and oblique, posterior to the eyes, the diameter of the eye being contained 4·6 times in the distance between the eye and the spiracle which is 2·1 diameters of the eye in length. Fins: first dorsal is neither entirely behind the ventral nor opposite to it, but commences slightly posterior to the anterior side of the ventral fin; second dorsal smaller than the first, not reaching the caudal; the distance between the second dorsal and the caudal contained 2·75 times in the distance between the two dorsals. The caudal has a distinct lower lobe, which is decidedly round. The keel is very imperfectly developed on the posterior part of the tail. Pectorals triangular, the distal angle almost a right angle.



*Colour*.—Head and upper part of the body ash-grey, gradually passing into light blue and then to light yellow on the sides, edged with a reddish line from snout to pectoral fins; eyes gold; body of the dorsal and caudal fins yellowish to light red; the claspers red.

One ♂ caught near Elephant Point, Burma Coast, in July 1908, measuring 8 feet 7 inches without the rostrum.

It differs from *Pristis zysron*, which it resembles in some respects, in the following points :—

- (1) It possesses an unequal number of teeth on the two sides of the saw, whereas *P. zysron* has the same number on each side;
- (2) the first dorsal in *P. zysron* is almost entirely behind the ventral, whereas in the new species it is almost above the ventral;
- (3) in *P. zysron* the second dorsal is larger than the first, in the new species it is smaller;
- (4) in *P. zysron* the second dorsal is situated near the root of the caudal, to which its posterior lobe almost reaches, but in the new species there is a considerable space between;
- (5) in *P. zysron* the caudal is without a lower lobe, but in the new species it has a distinct lower lobe, which is rounded;
- (6) the pectorals in *P. zysron* are rounded distally, whereas in the new species they are triangular.

I have compared the type of the new species with specimens of all the known Oriental species.



XXXVIII A NEW STING RAY OF THE  
GENUS TRYGON FROM THE BAY OF  
BENGAL

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

Among the Selachians recently captured by the Bengal Government's trawler "Golden Crown" is a large specimen of a species of Sting Ray which does not appear to have been as yet described. It may be defined as follows :—

*Trygon microps*, sp. nov.

*Size* large. *Colour* white ; the dorsal surface of the disk suffused with rose-pink, without definite markings ; tail grey above, becoming darker distally. *Disk* rhombic, wider than long by more than one quarter of the width ; the pectoral angles rather greater than right angles. *Snout* rounded as a whole, but with a small terminal projection. *Eyes* very small, dark in colour, little prominent ; spiracles large, without dorsal flaps, their area more than eight times that of the eyes ; distance from eyes to tip of snout more than twice as great as that from eye to eye. *Tail* without cutaneous fins, longer than disk, consisting of a broad, flat proximal part about half as long as the disk, and a slender, cylindrical distal part probably longer in unmutilated specimens, a single massive spine borne at the junction of the two parts ; a very low ridge on the ventral surface of the distal part. *Skin* soft and delicate, without enlarged tubercles on the disk, bearing numerous minute, spiny denticles, which become rather larger on the tip of the snout and the region surrounding the eyes and spiracles ; proximal part of the tail armed with much larger spiny denticles, which are largest on the sides and only bear very short spines on the ventral surface ; distal part densely clothed with denticles similar to but smaller than those on the sides of the proximal part. *Mouth* large ; upper jaw undulating slightly, lower jaw practically without undulation ; a serrated cutaneous flap hanging down from the roof of the mouth ; five short finger-like processes on the floor of the mouth, three in the centre and one at either side.

*Measurements of the type specimen (♀).*

|                              |                          |
|------------------------------|--------------------------|
| Length of disk               | 4 ft. 7 inches (137 cm.) |
| Breadth of disk              | 6 „ 6 „ (195 „ )         |
| Length of tail (? mutilated) | 6 „ 5 „ (192 „ )         |

*Habitat*.—Coast of Chittagong, head of the Bay of Bengal ; shallow water (17 fathoms). Captured at the end of August, 1908.

Only one specimen has as yet been taken. It represents a form very distinct from any hitherto fully described, but may be identical with Blyth's *Trygon atrocissimus*, a species described from pieces of a tail and therefore impossible to recognize, especially as the "type" appears to have perished. Although the specimen of *T. microps* was taken in shallow water, its pale colour, small eyes and delicate skin would suggest that it is really a deep-sea form.





Survey of India Offices, Calcutta, 1908.

TRYGON MICROPS, sp. nov. ( Photograph of type specimen, ♀ ).

Scale  $\frac{1}{10}$

XXXIX NEW MICRO LEPIDOPTERA  
FROM INDIA AND BURMA

By E. MEYRICK, B.A., F.R.S.

The following descriptions are from specimens taken by Dr. N. Annandale, and the types are in the collection of the Indian Museum.

CERACIDÆ.

*Cerace*, Walk.

I have formerly treated this genus as belonging to the *Plutellidæ*, but I now recognise that its neuration is essentially Tortricid in character, and that the smooth head cannot outweigh this. I propose, therefore, to constitute the *Ceracidæ* as a distinct family, agreeing with typical *Tortricidæ* in neuration and other important points, but differing from them by the smooth head.

*Cerace mesoclasta*, sp. nov.

♀ 41 mm. Head white, collar purple-blackish edged with white. Palpi white, with a grey streak along upper edge of second joint except at apex, terminal joint grey. Antennæ dark grey ringed with white. Thorax dark purple-fuscous, with five white spots, patagia edged with white. Abdomen blackish, segmental margins light ochreous-yellow, apex orange. Fore wings elongate, narrow, rather dilated posteriorly, costa gently arched, apex very obtuse, termen rounded so as to project rather beyond apex; dark purple-fuscous, covered with rows of numerous small whitish spots between veins, towards costa united into transverse strigæ which become larger towards base; in the middle of disc these spots coalesce into a longitudinal streak; an elongate orange spot on termen, extending from vein 2 to 6; cilia dark fuscous (imperfect). Hind wings whitish; a fuscous blotch suffusedly spotted with dark fuscous occupying apical fourth of wing; a row of dark fuscous spots along costa; about three rows of dark fuscous spots extending over dorsal area of wing from base to apical blotch, smaller towards base; cilia white, round apical blotch mostly dark fuscous.

Kurseong, E. Himalayas, at 5,000 feet, in May; one specimen. Nearest *C. stipatana*, but easily known by the discal white streak, less extensive orange patch, spotted dorsal area of hind wings, and blackish-banded abdomen. In the specimen described veins 6 and 7 are short-stalked in one fore wing by an abnormality, the other wing being quite normal.

## GELECHIADÆ.

*Ochmastis*, gen. nov.

Head smooth-scaled; ocelli absent; tongue developed. Antennæ  $\frac{4}{5}$ , in ♂ simple, basal joint elongate, without pecten. Labial palpi long, recurved, second joint rather short, with moderate projecting tuft of rough hairs towards apex beneath, terminal joint nearly twice as long as second, slender, acute. Maxillary palpi very short, filiform, drooping. Posterior tibiæ clothed with long hairs above. Fore wings with vein 16 furcate, 2 from near  $\frac{4}{5}$ , 3 and 4 approximated from angle, 5 parallel, 6 absent, 7 and 8 stalked, 7 to apex, 11 from middle. Hind wings 1, elongate-trapezoidal, termen scarcely sinuate, cilia over 1; 2 widely remote, 3-5 rather approximated at base, 6 and 7 long-stalked.

Belongs to the group of *Ypsolophus*, in which it is characterised by the neurulation.

*Ochmastis chionacma*, sp. nov.

♂ 16 mm. Head and thorax white sprinkled with dark fuscous. Palpi white, second joint blackish except towards apex, terminal joint sprinkled with grey; with three undefined blackish rings. Antennæ blackish ringed with white. Abdomen grey, anal tuft ochreous-yellowish. Fore wings elongate, narrow, costa gently arched, apex obtuse, termen very obliquely rounded; white, irregularly sprinkled with dark fuscous; two small dark fuscous spots near base above and below middle, upper marked with black; an irregular quadrate dark fuscous patch on dorsum before middle, reaching  $\frac{3}{4}$  across wing, enclosing an elongate pale yellow-ochreous blotch of somewhat raised scales dilated posteriorly and edged above with a few black scales; three subconfluent dark fuscous blotches forming an irregular streak from middle of disc to  $\frac{5}{8}$  of costa, crossed by an interrupted thick black streak in disc from before middle to  $\frac{3}{4}$ , and two or three short black streaks on veins beyond this; an elongate black mark on costa before middle; apical area forming a roundish clear white spot, edged by a marginal black line: cilia white, on costa with three black wedge-shaped spots, round apex with three dark fuscous bars towards tornus suffused with fuscous and sprinkled on basal half with dark fuscous. Hind wings grey, thinly scaled towards base; cilia pale grey towards base, ochreous-tinged.

Dawna Hills (2—3,000 feet), Lower Burma, in March; one specimen.

## ELACHISTIDÆ.

*Stathmopoda placida*, sp. nov.

♀ 10-11 mm. Crown whitish-ochreous irrorated with fuscous, face pearly white. Palpi whitish-ochreous, in front white.

Antennæ whitish-ochreous, tips dark grey above. Thorax whitish-ochreous irrorated with blackish, posterior extremity white. Abdomen grey, beneath white. Fore wings sub lanceolate, broadest near base, thence narrowed to acute apex; rather dark fuscous, with slight purplish tinge; two broad white fasciæ, first very broad dorsally, where it covers basal third of wing, much narrowed towards costa at beyond  $\frac{1}{4}$ , margins straight, enclosed basal area of costa ochreous-whitish irrorated with black; second fascia at  $\frac{2}{3}$ , rather narrowed towards costa, anterior edge straight, posterior convex, oblique: cilia fuscous. Hind wings and cilia grey.

Rangoon, in February; two specimens. I note here that the genus *Placostola*, Meyr., founded on a species allied to the above, cannot be maintained as distinct from *Stathmopoda*.

*Stathmopoda calyptrea*, sp. nov.

♀. 10 mm. Head shining white. Palpi white, terminal joint externally with a dark fuscous line. Antennæ whitish. Thorax white, on back with a curved dark fuscous transverse line near anterior margin. Abdomen yellowish-fuscous, beneath and at sides white. Fore wings very narrow, widest near base, thence narrowed to acute apex; dark fuscous; a white basal patch occupying  $\frac{2}{3}$  of wing, its outer edge inwardly oblique from costa; some undefined whitish suffusion about  $\frac{2}{3}$  and before apex: cilia fuscous. Hind wings and cilia fuscous.

Dawna Hills (2—3,000 feet), Lower Burma, in March; one specimen.

*Promalactis nebrias*, sp. nov.

♀ 9 mm. Head glossy ochreous-whitish, sides of crown sprinkled with grey. Palpi whitish, second joint yellowish-tinged and transversely striated with dark fuscous, terminal joint with a longitudinal line of dark fuscous irroration on each side. Antennæ white ringed with blackish. Thorax light ochreous-yellowish, shoulders black. Abdomen grey. Fore wings lanceolate, apex acute; light ochreous-yellowish, tinged with deeper yellow in disc posteriorly; a fine white line edged with black irroration beneath from middle of base to  $\frac{1}{4}$  of dorsum; two fine white acutely angulated transverse lines at  $\frac{1}{4}$  and  $\frac{1}{2}$ , edged with black irroration, each preceded on costa by an oblique wedge-shaped fuscous blotch irrorated with black, second followed on costa by a larger triangular similar blotch extending to  $\frac{2}{3}$ ; from angle of first a fine white line edged with some black scales proceeds to tornus; an irregular streak of blackish irroration along termen from tornus to apex, marked with small white spots in middle and at apex: cilia pale yellowish, towards base with some blackish specks. Hind wings grey; cilia pale grey.

Dawna Hills (2—3,000 feet), Lower Burma, in March; one specimen.

## GRACILARIADÆ.

*Acrocercops cyclopa*, sp. nov.

♂ ♀ 6 mm. Head and thorax shining ochreous-white. Palpi slender, white. Abdomen whitish. Legs white spotted with grey. Fore wings very narrowly elongate-lanceolate, acute; white; a slender light fuscous streak along basal third of costa; three light fuscous oblique fasciæ, first in middle, slender; second at  $\frac{3}{4}$ , somewhat broader; third very slender, separated by a fine line from a conspicuous roundish deep black apical spot: cilia whitish-fuscous, round apex white with two light fuscous shades. Hind wings grey; cilia whitish-grey.

Calcutta, in August; two specimens. Nearest to *A. sauropis*, Meyr.

*Acrocercops thraustica*, sp. nov.

♀ 9 mm. Head loosely haired, white, crown ochreous-tinged. Palpi white, second joint grey towards base, with short rough apical tuft beneath. Antennæ grey. Thorax white, sides grey. Abdomen grey, beneath white with lateral series of oblique blackish stripes. Legs white, obliquely striped with blackish. Fore wings very narrowly elongate, short-pointed; light fuscous; costa whitish-suffused on median third; a blackish longitudinal streak in disc from  $\frac{1}{4}$  to beyond middle, edged above with fuscous-whitish; an elongate white dorsal patch from base to beyond  $\frac{1}{4}$  of wing, edged with blackish above, and containing a series of four blackish dots; a white sub-dorsal streak from beyond this to beyond middle, rather oblique upwards, edged with blackish above and beneath; beyond apex of this is a blackish patch composed of three confluent oblique streaks, beneath which is a white dorsal dash, and followed by a very oblique white streak extending to  $\frac{5}{8}$  of disc, where it meets a very oblique black streak from middle of costa, whitish-edged above; a white elongate mark above tornus; a fine curved whitish line from  $\frac{3}{4}$  of costa to termen above tornus; apical area beyond this ochreous-whitish finely and irregularly striated with black, with a black apical dot: cilia white, with basal and posterior black lines, and two black apical hooks, towards tornus greyish-tinged. Hind wings and cilia grey.

Calcutta, in July, at light; two specimens.

## PLUTELLIDÆ.

*Atteva sciodoxa*, sp. nov.

♂ ♀ 23-28 mm. Head whitish, collar orange edged with white. Palpi white, terminal joint dark grey mixed with white. Antennæ grey. Thorax ochreous-orange, with a white spot on patagia, and two behind middle of back. Abdomen ochreous-orange. Posterior legs in ♂ thin, weak, tibiæ clothed with long whitish hairs, tarsi twisted. Fore wings elongate, narrow at base,



considerably dilated posteriorly, costa towards apex gently arched, apex rounded-obtuse, termen little oblique, slightly rounded; ochreous-orange, slightly violet-tinged; about 18—24 white spots, *viz.*, three large transverse ones and two or three small on dorsum, three more or less large rounded ones and two or three small in disc, one rather large transverse on termen above tornus, and the rest small, rounded, scattered along costa and towards apex: cilia whitish, base ochreous-orange. Hind wings grey, thinly scaled and sub-hyaline towards base; cilia whitish, base grey.

One specimen at base of Dawna Hills, Lower Burma, in March; and I possess three others from the island of Penang, and Labuan, Borneo.

#### TINEIDÆ.

##### *Tischeria ptarmica*, sp. nov.

♂ ♀ 4-5 mm. Head, palpi, and antennæ light greyish-ochreous. Thorax greyish-ochreous sprinkled with fuscous. Abdomen grey, apex greyish-ochreous. Fore wings lanceolate; 6 present; light greyish-ochreous irrorated with fuscous, with some scattered dark fuscous scales, on dorsal half more or less yellowish-tinged; undefined dorsal spots of dark fuscous irroration at middle,  $\frac{2}{3}$ , and apex: cilia pale greyish. Hind wings and cilia pale greyish.

Bred in plenty from larvæ mining small elongate blotches in leaves of *Zizyphus jujuba*, at Puri, Orissa, in January. The species occurred in great profusion, leaves an inch in diameter containing twenty or more larvæ, and the moths are described as "swarming like a cloud of midges round the tree." The mine, larval habits, and pupa are similar to those of European species.

##### *Crypsithyris spelæa*, sp. nov.

♂ ♀ 9-10 mm. Wholly pale whitish-ochreous except eyes, which are deep black. Fore wings elongate, narrow, costa gently arched, apex pointed, termen extremely obliquely rounded. Hind wings with transverse vein present, 2—7 separate.

Khayon ("Farm") Cave, Moulmein, Burma, in March; three specimens. This is a very curious and interesting species, apparently a true cave-dweller, found permanently resident "in total darkness" (Annandale), being the only known species of *Lepidoptera* adapted to such conditions; but since the eyes are fully developed and the power of flight maintained, it would seem probable that the darkness is not quite absolute, but such that eyes accustomed to it can still perceive faintly. The absence of light has, however, sufficed to prevent the development of colour, the insects being practically bleached or colourless. The larvæ of four Indian species of *Crypsithyris* are known, and all are lichen-feeders, so that probably this may feed the same way, in portable cases on the rock-walls. Other Indian caves should be examined for similar species.

*Melasina apracta*, sp. nov.

♀ 15-18 mm. Head with appressed hairs, pale greyish-ochreous. Palpi moderate, rather curved, pointed, pale greyish-ochreous, second joint sometimes infuscated. Antennæ pale greyish-ochreous. Thorax pale greyish-ochreous suffused with fuscous anteriorly. Abdomen pale ochreous, more yellowish posteriorly, with large anal tuft of long hairs. Fore wings elongate, rather narrow, costa moderately arched; apex round-pointed, termen extremely obliquely rounded; pale greyish-ochreous, sometimes yellowish-tinged, suffusedly irrorated throughout with fuscous; a cloudy spot of darker fuscous suffusion in disc at  $\frac{2}{3}$ ; cilia ochreous-grey-whitish sprinkled with fuscous. Hind wings light greyish; cilia pale greyish-ochreous.

Mandalay, in March; two specimens.



## XL NOTES ON SOME CHRYSOMELID BEETLES IN THE COLLECTION OF THE INDIAN MUSEUM

By C. A. PAIVA, *Assistant, Indian Museum.*

The greater number of the specimens of this family in the collection are still unnamed, but those that have been identified have, with a few exceptions, been examined either by M. Baly or by the late Mr. Jacoby. The latter does not, however, appear to have made use of his notes on the collection in compiling the volume in the *Fauna of British India, Burma and Ceylon*, Coleoptera, ii, 1908, published shortly after his death, which has probably deprived coleopterists in India of a full account of the family.

As many of the new specimens are "types" and as all reference to several fully described Indian species has been omitted from the "Fauna," although they belong to the sections of the family dealt with, I have been asked by the Superintendent to prepare the following notes on some specimens in the Museum collection.

I have merely compiled the information to be obtained from Jacoby's, Baly's and Clavareau's labels, adding certain quotations and references to published literature.

### *Lema mandarensis*, Jac.

Jacoby, *Fauna of British India*, Coleoptera, Chrysomelidae, vol. i, 1908, p. 69.

A "type" specimen of this species is in the collection of the Indian Museum, and it is the only named representative of the species in the collection. Jacoby when describing this species mentioned in the *Ann. Soc. Entom. Belgique*, xli, 1897, p. 421, that several specimens of this small species were obtained at Mandar in Bengal by Mr. P. Cardon.

### *Crioceris quadripustulata*, Fabr.

Jacoby, *Fauna of British India*, Coleoptera, Chrysomelidae, vol. i, 1908, p. 78.

This species is worthy of note as Jacoby records it only from Tenasserim, Siam and Java, whereas there are specimens in the Indian Museum collection determined by him from Sikhim, Calcutta, and Sibsagar, Assam.

*Pseudolema suturalis*, Jac.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 83.

One specimen from Mandar, Bengal, named by Jacoby as *Clythra suturalis*, Jac., and labelled "Type." This specimen agrees with the description of the above species and has probably been forgotten by Jacoby.

*Pseudoclytra plagiata*, Duviv.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 102.

The type of this species was originally described by Duvivier from Konbir-Nowatoli. In the Museum collection there are specimens from Mandar, Bengal, which were returned named by Jacoby, having been compared with the "type" by Clavareau.

These two localities are not mentioned by Jacoby who only gives Southern India, Madras, as the distribution of the species.

*Gynandrophthalma crassipes* (Duviv.).

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 112.

A "type" of Duvivier's species from Konbir, Eastern Bengal, is in the Indian Museum collection, but no mention of the fact is made either by Jacoby in his new book or by Duvivier in the *Ann. Soc. Entom. Belgique*, 1891, p. 31, where he describes this species.

*Ætheomorpha nigropicta* (Lefèv.).

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 124.

One specimen from Calcutta in the Museum collection was doubtfully determined by Jacoby as a variety of the above species. There is no doubt that it is a varietal form, having the black lateral stripe on the elytra very much abbreviated and the anterior spot on the elytra entirely absent.

*Labidostomis humeralis*, Schneider.

C. O. Waterhouse, Trans. Linn. Soc. (Ser. 2.), Zool., vol. v, 1887, p. 131.

Five specimens, two males and three females from Badghis, Afghanistan, were named by C. O. Waterhouse. These specimens were collected by Dr. J. E. I. Aitchinson, attached to the Afghan Delimitation Commission, and are in the Museum collection. They agree very closely with Jacoby's description of *Labidostomis cummingi*, Jac. The only difference I can find is in respect to the size of the males, which (Waterhouse's specimens) are 9.5 mm. to 10 mm. in length, the females being 7 to 8 mm. in length.

*Labidostomis cummingi*, Jac., was obtained at Ormarah in Baluchistan by Cummings.

*Clytra succincta*, Lacord.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 152.

This species is recorded by Jacoby only from Bengal, China, and Java. It is, as he says, an abundant species and there are several specimens in the Museum collection from Bangalore (Mysore) and Karachi (Sind).

Evidently a very widely distributed species.

*Clytra lefevrei*, Jac.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 154.

There are two specimens in the Museum collection from Mandar, Bengal, labelled "*Clytra occipitalis* Jac. type." This latter species has now been sunk by Jacoby as being a variety of *C. lefevrei*, Jac. The above locality has not been mentioned in the "Fauna" by Jacoby.

*Clytra orientalis*, Lefèv.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 157.

A single specimen, from Bangalore, of this species is in the collection, and was returned named by the Paris Museum, among a number of other named members of this family. The ticket on the specimen is in Lefèvre's handwriting.

It is the only species mentioned in the new work by Jacoby as being represented in the "Calcutta Museum" collection.

*Clytra insularis*, Lefèv.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 155.

There is a specimen in the collection, from the Andamans, named by Baly as *Diapromorpha dejeani*, Lac. It clearly resembles specimens in the Museum collection which have been returned named by the Paris Museum, bearing a label in Lefèvre's handwriting, as *Clytra insularis*, Lefèv. These specimens are also from the Andamans.

The markings on the thorax and elytra are totally different in the two species, apart from their belonging to two different genera.

*Diapromorpha turca* (Fab.).

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 169.

Although Jacoby states that this is rather a common and

widely distributed species in India, he gives no definite localities whence he had seen specimens. In the Museum collection there are a few specimens from Bangalore (Mysore) and Sahibgunge (Bengal). The specimen from the latter locality is totally different in appearance from the typical form. It was returned named by the Paris Museum and seems to belong to var. D. of the species.

There are five specimens identified by Baly as *Diapromorpha pallens*, Oliv. These do not resemble the specimens in the collection named *D. melanopus*, Lacord., of which species Jacoby makes *D. pallens*, Oliv., a synonym, but agree with a single specimen named by Jacoby as *Gynandrophthalma pallida*, Jac., which appears to be a *nomen nudum*.

*Cryptocephalus analis*, Oliv.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 247.

Recorded by Jacoby from Bengal, the Nilgiris, Coromandel and Tranquebar.

There is one specimen from Kulu named by Baly in the Museum collection.

*Cryptocephalus colon*, Suffr.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 247.

This species is evidently distributed through Assam and Burma to Siam. Jacoby records it from Assam and Siam and there is one specimen from Pegu (Burma) in the Museum collection.

*Pagria kanaraensis* (Jac.).

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 360.

There are two specimens from Calcutta determined by Jacoby as belonging to this species. He has omitted this locality and records it only from Southern India : Belgaum ; S. Kanara.

*Scelodonta vittata* (Oliv.).

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 382.

As Jacoby has given Pusa and Bombay as the only Indian localities whence this species has been recorded, and as the species is not uncommon, it would be as well to give the localities of the specimens representing it in the collection of the Indian Museum, some of which were named by Jacoby. Those from Murshidabad (Bengal) and Tavoy (Burma) were named by Jacoby. The others from Berhampore, Maldah (Bengal) and the Andamans were returned named by the Paris Museum.

*Scelodonta indica*, Duviv.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 383.

Recorded by Jacoby only from Konbir, E. Bengal. Undoubtedly a very common species in Calcutta, from which locality a rather large series of specimens were named for the Museum by Jacoby.

There are two specimens which were returned named by the Paris Museum. One is *Colasposoma cæruleatum*, Baly, and the other *Colasposoma ornatum*, Jac. Both are from Maldah (Bengal).

Five specimens from Bangalore were identified by Jacoby as *Colasposoma nitida*, Fabr., and four specimens from Ranchi (Bengal) were doubtfully identified by him as *Colasposoma affine*, Lefèv.<sup>1</sup> No mention of either of these species is made by him in the "Fauna."

*Abirus angustatus*, Lefèv.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 456.

Jacoby states he was unable to refer any Eastern form known to him to this species, as he knew no species of *Abirus* with a thorax nearly twice as long as broad. Among the specimens returned by the Paris Museum are two specimens named as belonging to this species, evidently a male and a female. The specimens bear a label in Lefèvre's handwriting. They are from Southern India. In neither of the specimens does the thorax appear to be twice as long as broad, as it is stated to be by Lefèvre in his description ("prothorace fere duplo longiore parum latiore").

*Abirus andamansis*, Lefèv.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ vol. i, 1908, p. 457.

A "type" of this species is in the Indian Museum collection and was returned by the Paris Museum. It bears Lefèvre's label. Unfortunately the head and thorax are missing. There are no other examples of the species in the collection and it is apparently rare, as Jacoby did not see any specimens of it.

*Corynodes andamanensis*, Lefèv.

Jacoby, Fauna of British India, Coleoptera, Chrysomelidæ, vol. i, 1908, p. 503.

Lefèvre, in his original description (Bull. Soc. Ent. Belgique, xxxv, 1891, p. cclxxvi) called this species "*andamansis*," but Jacoby has changed it into *andamanensis*. The type specimen,

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<sup>1</sup> Recorded by Duvivier from Konbir, Bengal, Ann. Soc. Ent. Belg., xxxvi, 1892, p. 414.

which is in the Museum collection, is labelled *C. andamansis*, in Lefèvre's handwriting.

The following are a few species which have been recorded from within Indian limits and which have been omitted by Jacoby. The author's description of each species is quoted, so that it may be available to workers in the group in India.

*Coptocephala dubia*, Baly.

Baly, Scient. Results, Second Yarkand Mission, 1878-91, Coleoptera, p. 25.

"*Subelongata, subcylindrica, nitida, subtus nigra, argenteo sericea, prothorace pedibusque fulvis; supra fulva, capitis vertice nigro; thorace lævi; scutello piceo; elytris tenuiter punctatis, fasciâ communi baseos, extrorsum abbreviata, alterâque vix pone medium nigris.*"

"Long.  $2\frac{1}{3}$  lin."

"Vertex black, impunctate, lower face fulvous, a ray of the same colour extending upwards on the vertex; front deeply excavated between the eyes, irregularly punctured; anterior margin of clypeus concave-emarginate. Thorax rather more than twice as broad as long; sides rounded, converging from behind the middle to the apex; the anterior angles obtuse, the hinder ones rounded; disc transversely convex, shining, impunctate, excavated on either side near the lateral margin. Scutellum trigonate, piceous. Elytra scarcely broader than the thorax, parallel, very finely punctured; the black markings on their surface extend from the base nearly to the middle of the disc, and again from the middle itself nearly to the apex, leaving only an irregular flavous transverse band across the middle, which sends a narrow ramus along the suture nearly to the base."

"*Hab.*—Murree." (Baly.)

One specimen from Murree, W. Himalayas, is in the Indian Museum collection; it was named by Baly and is a "type" or "co-type."

*Cryptocephalus interjectus*, Baly.

Baly, Scientific Results, Second Yarkand Mission, 1878-91, Coleoptera, p. 26.

"*Elongato-oblongus* ♂, *oblongus* ♀, *convexus, nitidus, subtus niger, pedibus nigro-piceis; supra flavus, capite hic illic parce fortiter punctato, fronte sulco longitudinali impresso; vertice, maculis duabus inter oculos, labro, antennisque nigris, his basi, sulco longitudinali, mandibulisque piceis; thorace lævi, limbo angusto et utrinque maculâ subrotundatâ nigris; scutello subcordato, nigro; elytris fortiter punctato-striatis, punctis piceis, apicem versus minus fortiter impressis; interspatiis convexis, transversim rugulosis; utrisque limbo angusto, externo ante medium excepto, maculisque quinque 2, 2, 1, dispositis nigris.*"



"Long.  $2\frac{1}{2}$  lin."

"Var. A. *Pygidio corporeque subtus flavis, illo maculâ cuneiformi pectore, abdominisque disco nigris.*"

"Var. B. *Corpore nigro, antennarum basi, clypeo, faciei signaturis, thoracisque lineâ longitudinali sordide flavis.*"

"Head rather coarsely but not closely punctured, the puncturing varying in degree in different individuals; front impressed with a distinct longitudinal groove; clypeus broader than long, trigonate; antennæ three-fourths the length of the body in the ♀, rather longer in the ♂, the three lower joints pale piceous, the rest black. Thorax rather more than twice as broad as long at the base; sides moderately rounded and obliquely converging from base to apex; basal margin concave-emarginate on either side, the outer angles produced backwards, acute; above convex, minutely but not closely punctured. Elytra slightly broader than the thorax, oblong quadrate, convex, rather strongly punctate-striate, the punctures piceous, finer, and less strongly impressed towards the apex; interspaces faintly but distinctly convex, transversely wrinkled; each elytron with the extreme outer limb (interrupted on the lateral margin before its middle) and five large patches black; these spots are arranged as follows: two transversely below the base, the outer one oblong, covering the humeral callus and attached to the basal margin, the inner one subrotundate, placed on the inner disc; two just below the middle also placed transversely, both subrotundate, the outer one usually attached to the lateral margin; and lastly, one apical, transversely oblong, either free or attached to the apical border; these patches are often more or less confluent, and occasionally, as in var. B, cover the entire surface of the elytron. Pygidium and body beneath clothed with griseous hairs. Apical margin of prosternum obliquely produced, deflexed, slightly emarginate, the hinder margin concave, armed on either side with a deflexed, obtuse tooth; mesosternum transverse, its apical border angulate-emarginate. Apical segment of abdomen in the ♂ impressed with a shallow fovea; the same segment in the ♀ deeply excavated, the fovea large, rotundate. Basal joint of the four anterior tarsi in the ♂ dilated, elongate-ovate, longer than the following two united."

"The form of the prosternum will separate this species from any nearly allied species."

"Hab.—Murree." (*Baly.*)

There are three specimens in the Museum collection named by Baly. The "type" and var. B, from Murree, and var. A, from the Jhelum Valley, N.-W. Kashmir.

*Paria cuprescens*, Baly.

Baly, Scient. Results, Second Yarkand Mission, 1878-91, Coleoptera, p. 28.

“ *Anguste ovata, subtus cum capite picea, pedibus, antennarumque basi pallidus ; supra cuprea, thorace sub-conico, vage punctato ; elytris regulariter punctato-striatis, interspatiis planis, impunctatis.* ”

“ Long.  $1\frac{1}{4}$  lin. ”

“ Vertex swollen, shining, impunctate ; clypeus transverse, its anterior border emarginate ; antennæ, rather more than half the length of the body, piceous, the two lower joints paler. Thorax broader than long at the base ; sides straight and obliquely converging from base to apex, the hinder angles very acute ; basal margin oblique on either side, the median lobe obtusely rounded ; disc sub-cylindrical, impressed, but not closely, with very shallow punctures. Elytra ovate, attenuated at the apex, regularly punctate-striate, the interspaces plane, each impressed with an irregular row of minute punctures ; humeral callus thickened. ”

“ Hab.—Jhelam Valley. ” (*Baly.*)

The collection contains a specimen of the above species, named by Baly, from the Jhelum Valley. It is not in very good condition, having one elytron missing.

*Corynodes bengalensis*, Duviv.

Duvivier, Bull. Soc. Entom. Belgique, xxxiv, 1890, p. cxliii.

The short diagnosis of this species is given below. A more detailed description in French, comprising about three-quarters of a page will be found in the above work, p. cxliv.

“ *Oblong, convexe, entièrement d'un vert brillant mélangé de pourpre et de violet. Antenne noires à reflets violacés avec la base brune. Massue de cinq articles. Tête et elytres densément ponctuées ces dernières à ponctuation subsériale. Corselet à ponctuation éparse. Crochets des tarses appendiculés.* ”

“ Long. 10 mill.—Tetara (Mission du Bengale occidental). ” (*Duvivier.*)

There are two specimens in the collection. One from Mādar, Bengal, was returned named by Jacoby, Clavareau having compared it with the “ type,” and the other without a locality was named by the Paris Museum.



## XLI SIX NEW CICINDELINÆ FROM THE ORIENTAL REGION

By DR. WALTHER HORN, *Berlin*.

### *Cicindela lefroyi*, sp. nov.

Differt a *Cicindela vittigera*, Dej., prothoracis parte intermedia et antica latiore; elytris postice minus distincte serrulatis, spina suturali ♀ minus retracta, margine laterali ad angulum apicalem externum magis rotundato declivi; signatura: puncto basali minore et obliquo (extus et posticem versus descendente), maculis juxta-suturalibus vix brevioribus, fascia media discoidali et antice et postice evidenter abbreviata (antice non extus, postice vix intus curvata); macula apicali anteriore rotundata (non oblonga), posteriore hujus minus approximata; genis nudis plus minusve cyaneis; iv antennarum articulo ♂ non penicillio longo sed solummodo setis 2 brevibus flavis distantibus ornato. Long.  $12\frac{3}{4}$ - $15\frac{1}{2}$  mm. (sine labro).

♀ ♂, Pusa, Chapra (Bengal), collected by Mr. H. Maxwell Lefroy and sent to me by my friend Mr. H. E. Andrewes.

The bald cheeks, the broad prothorax and the shortened middle band of the elytra, which is almost straight, are the principal features of this new species, which has been caught together with *Cicindela vittigera*, Dej. Front and pronotum are coppery with a bluish-greenish tinge at the ordinary places; the elytra show an opaque velvet-like black, except at the lateral margin and the base, both of which are (not velvet-like) dark green or bluish black. The pro-episterna are densely clothed towards the coxæ with white bristles, elsewhere bald. The margins of the abdomen and of the metasternum, the meta-episterna (bald in the centre), meso-epimera and meso-episterna (laterally bald) also clothed with white bristles. The apex of the suture of the elytra of the ♂ only a little, of the ♀ moderately, retracted.

### *Cicindela alleni*.

Species intermedia inter *Cicindela nivicineta*, Chvr., et *C. limosa*, Saund., genis pilosis; ceteris capitis partibus nudis, quibusdam pilis supra antennarum insertionem positis exceptis; fronte inter oculos excavata (oculos versus etiam perparum magis erecta quam in *C. limosa* subtilissimeque—fere aequaliter atque in *C. nivicineta*, subtilius quam in *C. limosa*—striolata); prothorace omnino ut in hac specie, i.e., lateribus leviter rotundatis, basi angustata, marginibus lateralibus pronoti sparsim pilosis; elytris

angustioribus quam *C. nivicinca* (multo angustioribus quam *C. limosa*), postice obliquius quam in his duabus speciebus prolongato-truncatis, spina suturali perparum (ut in *C. limosa*, ♂) retracta. Cetera ut in illis 2 speciebus. Long. 9 mm.

One ♂ sent to me by Mr. *John Hewitt*, Director of the Sarawak Museum, caught by the Rev. *Dexter Allen* near Betong (Borneo).

Very closely allied to *C. limosa* and *nivicinca*, agreeing in the brassy-greenish coloration of the whole body. The first four segments of the antennæ are green, the legs brassy-green with reddish knees, the palpi, trochanters and almost the whole tibiæ testaceous, the tarsi testaceous and green. The labrum is short, transversely truncated, with only two short teeth arranged at a certain distance from the middle. Front, vertex, pronotum exceedingly finely shagreened, elytra closely and not finely punctured, with a narrow, yellow, marginal line, running from the shoulder to the tip. The striking features of the plain-looking new species are: the hairy cheek, the few bristles above the insertion of the antennæ, the very fine striation of the fairly erected part of front towards the eyes, the slightly rounded prothorax narrowed to the base, the small elytra and the hardly retracted sutural spine.

*Cicindela crassipalpis.*

Species *Cicindela westermanni*, Schaum, affinis; labro ♀ antice perparum magis angustato-producto (♂ *C. westermanni* mihi deest!); fronte latiore in partibus medianis irregularius minusque longitudinaliter striolata; prothorace multo latiore, lateribus valde rotundatis, maxima latitudine pone strangulationem anticam rita (formam *C. tetragrammicæ* referens, sed latera minus recta), pronoto-toto (disco sparsim) setosa; elytris in medio fere eadem latitudine atque in *C. westermanni* sed minus convexis, basim versus multo minus angustatis, totis sat velutinis (margine lato aenescente excepto), solummoda serie una foveolarum minorum viridium juxta suturam ornatis; signatura differente: macula apicali virguliformi fere eadem, altera brevi obliqua (intus et posticem versus descendente: aut recta aut in medio angustata) discoidali pone medium sita margini magis approximata quam suturae, puncto minore rotundato fere in medio inter hanc et angulum humeralem posito (a margine aequaliter atque macula media distante). Long. 9-12½ mm. (sine labro).

One ♂, two ♀ ♀, in the collection of my friend *A. E. Andrewes*, *Capt. Downing* and my own. Collected by *Capt. A. K. Welt Downing* in October 1907 at 1,000 feet elevation at Potanur (Coimbatore district).

Labrum testaceous, ♀ long, roundly prolonged with only one (strong) tooth in the middle, ♂ broad and transverse (the only middle tooth smaller); head and prothorax coppery, sculptured somewhat as in *C. catena*, much broader in ♀ than in ♂; the whole head bald; the elytra rather parallel, ♂ very little (♀ moderately)

ampliated near the middle, with a velvet-like surface (the broad lateral margin excepted), brown in ♀, greenish-blackish in the only ♂, rather convex (although less than in *C. westermanni*), broadly rounded behind, with a minute not retracted sutural spine. Punctuation of the elytra fine, little visible (margin excepted); pattern broad, as described above. Under side coppery, abdomen bluish-cyaneous with the whole of the lateral parts of the pectoral region of the metasternum and of the first 4-5 abdominal sternites densely clothed with white bristles. First four segments of antennæ coppery; legs, ♂, more greenish above, more coppery below, ♀ as well as almost all tibiæ and tarsi ♀ ♂ more or less testaceous; palpi testaceous, only tips of last joint darkish.

*Therates spinipennis*, Latr., *xanthophobus*.

Differt a forma prioritatis (*spinipennis*, Latr.) macula flava humerali elytrorum nulla, labro aut toto aut maxima ex parte (solummodo antice medio testaceo), palpis maxillaribus totis, maxima mandibularum primique antennarum articuli parte nigricantibus; femoribus longius obscuratis; pronoti parte intermedia plerumque paullo minus globosa. Long. 11-13½ mm. (sine labro spinaque).

♀ ♂, Palembang (Sumatra), my collection, caught by Mr. Bouchard.

The most remarkable feature is that even the greatest part of the labrum becomes blackish (at least the base of both of the lateral margins). A small patch near the base of the mandibles seems always to be testaceous. The hind hips have only a yellow tip.

*Therates spinipennis*, Latr., *xanthophilus*.

Differt a forma prioritatis (*spinipennis*, Latr.) labro, primo et antennarum (supra perparum obscurato) et palporum maxillarium (articulis 2 ultimis obscurioribus) articulo, mandibulis (apice excepto), maxima coxarum posticarum parte (solummodo parte basali et laterali nigricante), totis femoribus, tota parte basali elytrorum (macula scutellum versus angustata et plerumque huius apicem attingente), abdomine flavis; tibiis tarsisque plerumque brun, nescentibus; statura minore; elytris nigris, non aut vix metallice indutis, brevioribus, totis paullo grossius punctatis, disco quoque sparsim punctato. Long. 10¼-11½ mm. (sine labro spinaque).

♀ ♂, Mentawai Island, Sipora; collected by Modigliani, v-vi, 1894.

The contrast between the obscure black (almost always without any metallic lustre) coloration of the elytra and the enlarged straw-like yellow humeral patch is very striking. The last is almost as broad as long. *Therates spinipennis versicolor*, Bat., is described as being larger than the typical form and metallic on the disc of the elytra, which are not punctured and show a small humeral spot.

*Therates gestroi annandalei*, sub-sp. nov.

Differt a forma prioritatis (*T gestroi*, W Horn, from Lakhon) orbitis altius rectiusque positis, intermedia prothoracis parte angustiore, lunula humerali flava multo longiore (tertiam elytrorum partem evidenter superante), macula basali item majore et cum illa connata et suturem versus paullulum descendente, macula discoidaei media flava transversa vix majore, tota elytrorum parte apicali (aut quarta aut quinta) indistincte flavescente. Long. 7-8 mm. (sine labro).

♀ ♂, Kurseong, 5,000 feet, common in damp shady places, 3-5-vi-1908, caught by Dr. N. Annandale.

The anterior half of the elytra shows exactly the pattern of *Therates kraatzi*, W Horn, from Penang, but the discoidal patch of the latter is much larger; on the other hand the apex of the elytra of the new form is much more broadly yellowish coloured. The two deep longitudinal sulci in the middle part of the front of *T gestroi* and its sub-species are parallel, its interspace flat and smooth; in *T kraatzi* there is a slight depression in the centre of this part towards which the two sulci converge a little: only the anterior part before the convergence is smooth, all the remainder of the middle part is just a little obliquely, longitudinally striated. The prothorax of the Penang species is broader than that of *T gestroi annandalei* and its extreme apex shows a distinct but slight transverse emargination.

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XLII. DESCRIPTION OF AN *AGRIOLIMAX*  
FROM GYANTSE, TIBET, COLLECTED BY  
CAPTAIN F. H. STEWART, INDIAN MEDI-  
CAL SERVICE, WITH DETAILS OF ITS  
ANATOMY

By *Lieut.-Col.* H. H. GODWIN-AUSTEN, *F.R.S., F.Z.S., etc.*

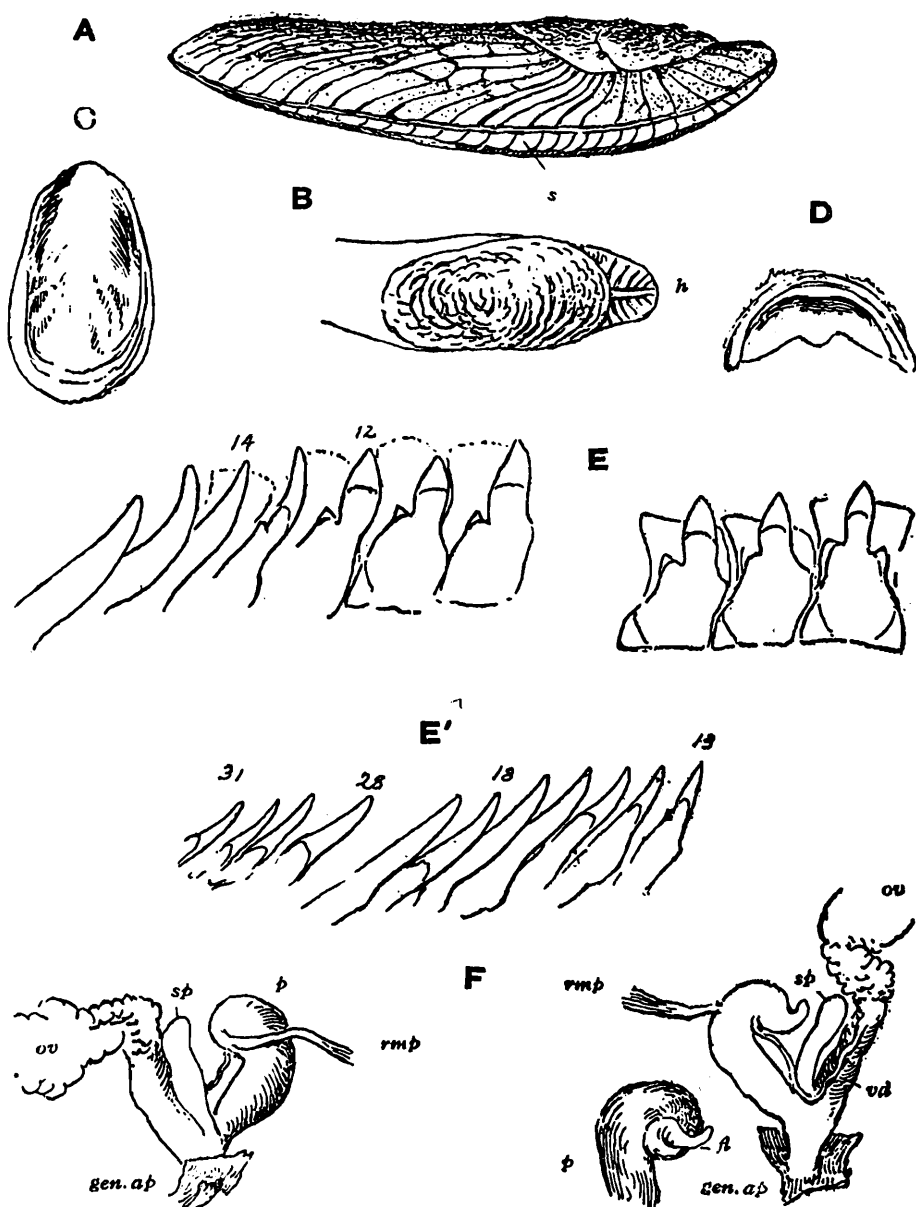
Some specimens of slugs have lately been placed in my hands by Dr. Nelson Annandale, Superintendent of the Indian Museum, Calcutta. Considerable is the interest attached to them because they were collected by Captain F. H. Stewart, I.M.S., on the 11th September, 1907, at Gyantse, in Tibet, at an altitude of 14,500 feet, and are the first slugs to have been obtained in that part of Tibet.

There were two tubes, one marked No. 88 containing two specimens, the largest of the lot, and another, No. 58, twelve specimens much smaller in size of a paler colour: colour, however, in spirit specimens is not of much value, and I can detect no difference in the outward form, nor in the groovings on the body of the large and small specimens, nor in the formula of the radula. The internal anatomy of the two largest was well seen and proves these slugs to belong to the genus *Agriolimax*, the nearest species being *Agriolimax campestris* var. *hyperborea*, as described in the Monograph of the Land and Freshwater Mollusca of the British Isles by Mr. John W. Taylor, p. 135,—a species with a northern habitat in both the Old and New Worlds. As I shall show further on, there are differences between the two, which, considering the very small differences which constitute varieties of *campestris* (such as *occidentalis*, Cooper, of California; *montanus*, Ingersoll; *castanea*, Ingersoll; *intermedius*, Cockerell; and *tristis*, Cockerell, of Colorado) I think render this Tibetan form quite worthy of similar distinction.

*Agriolimax tibetanus*, sp. nov.

Animal 17 mm. in length, pale umber brown in spirit; the mantle and dorsal surface of foot much darker, nearly black. The mantle is anterior in position and has semi-concentric foldings on the hinder part, concentric and given off from the right anterior edge on the fore part; two parallel grooves run down the top of the neck, which are joined on both sides by the main lateral grooves. These last on the side of the animal are very distinctive, deep and well defined; on the rounded dorsal side of the foot these lateral intervals are first broken up into parallelograms, and then, running closer together, form oblong

close-set tubercles. The sole of the foot is tripartite, and it has an edge of narrow elongate tubercles, and the outermost area of the sole is broken up into quadrate spaces corresponding in their length to the spaces between the lateral grooves. Tentacles black.



*Agriolimax tibetanus*, sp. nov.

- A = Animal viewed from right side,  $\times 3.6$ ; s. = sole of foot.  
 B = Mantle viewed from above showing dorsal grooves,  $\times 3.6$ .  
 C = Shell,  $\times 7$ .  
 D = Jaw,  $\times 20.5$ .  
 E = Teeth of the radula, central and admedians,  $\times 720$ .  
 E' = " " " " laterals,  $\times 316$ .  
 F = Genitalia,  $\times 7$ .

The internal anatomy showed that both the largest specimens (No. 88) were adult, the oviduct being large and jelly-like. The albumen gland was also large and of conspicuous ruddy brown colour, and occupied the posterior median portion when the animal



was removed from its enveloping integument. There were not enough specimens to determine the coils of the intestine, but the rectum was well seen. The retractor muscles of the eye-tentacles are situated on the posterior end of the mantle, and the branchial cavity, the heart lying on the anterior side.

The generative organs were well seen and mounted.

The penis is a simple, short, thick tube with a globose head giving off a small, tightly-coiled, what may be termed flagellum, or rather its homologue; the vas deferens joins it on one side and the retractor muscle on the other. The spermatheca is short, club-shaped, and lies close against the free oviduct. The vas deferens is very short. I could not find any *excitatory* organ, which Semper shows exists in *Agriolimax laevis* (*vide* p. 122, Moll. British Isles). The generative organs are of the same type, only differing in minor details.

The peculiar character of this species is the strong lateral grooves on the side of the foot, running from the peripodial groove upwards. Taylor's description of *Agriolimax agrestis* does not apply to this species. The teeth of the radula are similar in form to those of *Agriolimax hyperborea* (Westerland); the laterals being curved and aculeate, but there are far fewer of them. I got the radula out in a very perfect state, and the formula is 17.2.12.1.12.2.17. or 31-1-31; in *hyperborea* it is 42-1-42, laterals 12 in number, marginals about 30; it shows the two species are very close to one another.

Jaw moderately arched with a small central projection.

Shell thin, glassy, transparent, milky white, flat, elongately ovate, widening in breadth gradually to the anterior edge, with a rounded apex.

[NOTE.—The specimens described above by Colonel Godwin-Austen were found under stones in a small mountain stream at High Hill Gompā. The smaller specimens (from tube No. 58) were taken on the 16th July, the larger (tube 88) on the 11th September. On the 29th March I had found under stones in the same locality two eggs which presumably belong to this species. They were spherical, 2 mm. in diameter, and had very thick, tough, laminated, membranous shells. Floating loose in the cavity of the shell was an embryo in an early stage of development, roughly spherical and showing a differentiation into a thin outer layer and an inner cellular mass. These two eggs were placed in water in a tube and kept in a room of the Trade Agency at Chang-lo. On the 10th April the embryos had begun to assume a slug-like form, but they showed no haste to break through their shells, and it was not until the middle of May that they introduced themselves to the outer world. Although this collecting-ground was regularly visited, no adult slugs were found until July.—F. H. STEWART.]

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