# XIV. NOTES ON THE TRICHOPTERA IN THE COLLECTION OF THE INDIAN MUSEUM.

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This collection includes thirty species of Trichoptera of which eleven are described below as new. Among these thirty species there were some which are listed in this paper, the specimens of which were not in condition to admit of specific description. There were in addition a couple of species of Limnophilidæ and a *Rhyacophila* unfortunately so much damaged that they cannot be dealt with at all prope ly. In the case of most of the already described species referred to, notes and drawings are here added in the hope of improving our knowledge of these forms. The nomenclature of the wing veins adopted is not that commonly used in this order. I have therefore labelled veins only in those cases in which it was necessary to make the references in the text intelligible. In studying this collection it has been very convenient to have for reference Ulmer's list of Indian Trichoptera.[1]

## Fam. PHILOPOTAMIDÆ.

### Gen. STENOPSYCHE.

[*Stenopsyche griseipennis.*]

[*Stenopsyche griseipennis*, McLachlan, *Trans. Ent. Soc. Lond.* (3), vol. v, p. 265, pl. xvii, fig. 5 (1866); *Journ. Linn. Soc. Lond.*, Zool., vol. xi, p. 134 (1871).

,, ,, Ulmer, *Cat. Coll. Sélys*, fasc. 6, p. 77, figs. 116, 117 (1907).

,, ,, Ulmer, *Genera Insectorum*, fasc. 60, p. 201.

Numerous specimens of both sexes from Sikkim, Kulu (W. Himalayas) and Kurseong, Darjiling district (alt. 5,000 ft.). At the last place I found the species common in the last week in May, in 1906.

Unfortunately Dr. Betten's MS. has been damaged in transit, and the page containing his notes on this species is missing. The

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[1] Ulmer, Georg: *Notes from the Leyden Museum*, vol. xxix.

specimens referred to have been named by him. There are also specimens in the Museum which agree with them exactly, from Calcutta, Ramnee in British Garhwal, W. Himalayas (21-x-07), and Manipur, Assam.—*N. Annandale.*]

## Fam. HYDROPSYCHIDÆ.

### Subfam. *MACRONEMATINÆ.*

#### Gen. MACRONEMA.

#### *Macronema fastosum.*

(Pl. xiv, figs. 4—7.)

*Macronema fastosum*, Walker, *Cat. Neur. Brit. Mus.*, p. 76.
,, *fasciatum*, Albarda, *Veth's Midden-Sumatra*, vol. iv pt. 5, pl. v, fig. 2 (1881).
,, ,, Ulmer, *Stett. Ent. Zeit.*, vol. lxvi, p. 72.
,, *fastosum*, Ulmer, *Notes from the Leyden Museum*, vol. xxviii, p. 73.
,, ,, Ulmer, *Genera Insectorum*, fasc. 60, pl. xxxix, fig. 7.

Ulmer has shown that *Macronema fasciatum*, Albarda, is a synonym of *M fastosum*, and *fasciatum* is thus reduced to a variety. The half dozen specimens at hand all belong to the typical variety. One of the specimens is labelled "Sikkim" and they all agree in general with the description Ulmer gives of his material from that region, although there is a little variation in the extent and depth of the colour of the fore tibiæ. None of the descriptions call attention to the fact that the tips of the hind wings are black. The two veinlets in the costal area of the fore wing and the slender filaments on the posterior margin of the fourth abdominal segment seem also to have escaped notice. Figures are here added, because those by Albarda are in a publication not universally accessible and they are not wholly accurate, as Ulmer has indicated.

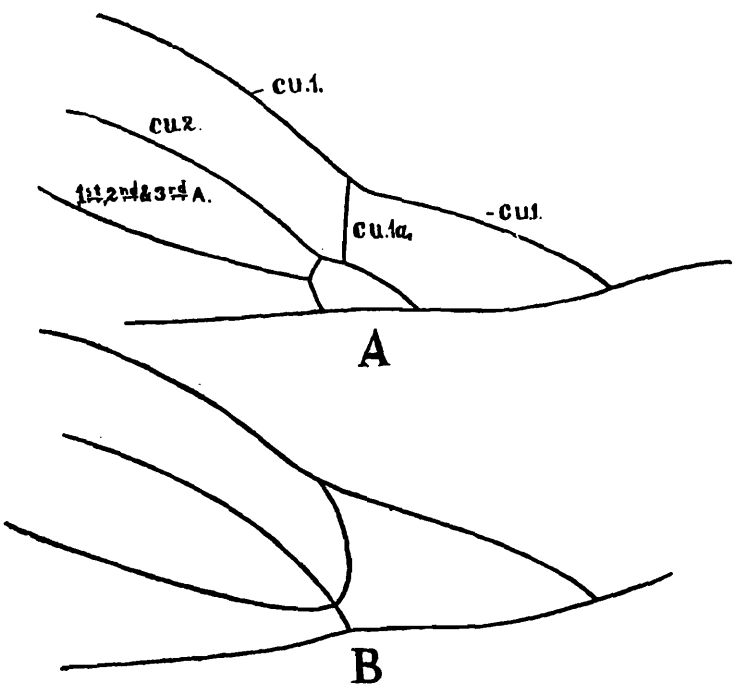
[I found this form very common at Kurseong in May, 1906. Numbers flew to the lamp in my room every evening.—*N. A.*]

#### *Macronema punctatum*, sp. nov.

This species is undoubtedly closely related to *M. fastosum*, from which it differs in the following particulars. The length is 10 mm., the wing expanse 31 mm. The largest specimen of *M. fastosum* I have has an expanse of 26 mm. There is no trace of black on the tips of the wings of this species, and in the middle of the fore wing there is a black spot, not much longer than wide, instead of the band which occurs in *M. fastosum*. The most decided difference is in the venation. The difference in the course of branches of cubitus and anals near the wing-margin is shown in

the text-figure. I find no differences in the genitalia of the two species.

One male specimen from Kulu, W. Himalayas.




Tips of cubitus and the anals of the fore wing of, A, *Macronema fastosum*; B, *M. punctatum.*

## Gen. POLYMORPHANISUS.

### *Polymorphanisus nigricornis.*

(Pl. xiv, figs. 8, 9.)

*Œstropsis nigricornis*, Walker, *Cat. Neur. Brit. Mus.*, p. 79.
,, ,, McLachlan, *Ann. Soc. Ent. Belg*, 1872, p. 70.
,, ,, Brauer, *Verh. Zool.-Bot. Ges. Wien*, vol. xxv, p. 73.
*Polymorphanisus nigricornis*, Ulmer, *Ann. Soc. Ent. Belg.*, vol. xlix, p. 24, fig. 11.

There are in the collection a male and a female specimen of this species. They agree well enough with Walker's description. They have the two black spots on the mesonotum as described for *P. bipunctata*, Brauer, but not mentioned in the original description of *nigricornis*. I add complete figures of the venation and of the genitalia.

[One of these specimens is from Cachar, Assam.—*N. A.*]

Gen. ÆTHALOPTERA.

*Æthaloptera sexpunctata.*

(Pl. xiv, figs. 10—12.)

*Setodes sexpunctata*, Kolenati, *Genera et Spec. Trichopterorum*, vol. ii, p. 266, pl. iii, fig. 28.
*Polymorphanisus sexpunctata*, Brauer, *Verh. Zool.-Bot. Ges. Wien*, vol. xviii, p. 263.
*Æthaloptera* ,, Ulmer, *Stett. Ent. Zeit.*, vol. lxvi, p. 50, pl. i, fig. 40.

There are several specimens from Rajshahi, E. Bengal (February, 1907), and one from Sara Ghat, R. Ganges, in the collection of the Indian Museum, the latter dated December 1st. I have given figures of venation and of male genitalia.

Gen. PHANOSTOMA.

*Phanostoma* sp.

(Pl. xiv, figs. 13—15.)

This is probably a new species, since this genus has heretofore not been reported from India or Asia. The two male specimens from Sara Ghat in the collection are considerably damaged and hardly admit of description. I am able, however, to give figures of venation and of genitalia.

Subfam. *HYDROPSYCHINÆ.*

Gen. HYDROPSYCHE.

Of this cosmopolitan genus four species have hitherto been reported from India and the East Indies. In the collection at hand there are two species, one of which is *Hydropsyche asiatica*, Ulmer, adequately described in *Stett. Ent. Zeit.*, vol. lxvi, p. 91, pl. iv, figs. 122—124. Of this species there are two males from Kurseong (*Annandale*, May, 1906). The other species is new.

*Hydropsyche indica*, sp. nov.

(Pl. xv, figs. 1—4.)

Length 9 mm. Expanse 18 mm. Head, prothorax and mesothorax covered with yellow hair. Antennæ yellow at base broadly ringed with black. Legs yellow with yellow and black hair. Fore wings brown, closely dotted with yellow, veins dark brown. Venation as usual in the genus; in the hind wing cell $R_2$ is very small and a median cross-vein is present (pl. xv, fig. 1). This species is distinctly smaller than *H. maligna*, Hag., and may be readily separated from the other three Indian species by the form of the genitalia (pl. xv, figs. 2, 4). In the

figure are shown two appendages of the penis, each consisting of a long membranous body, terminated by a strong chitinous hook. These appendages occur in all species of the genus I have observed, but they are not shown in figures of the genitalia heretofore published.[1] This is due to the fact that these appendages are generally retracted; they can be brought out easily by boiling in caustic soda. In this species these appendages are very long, reaching nearly to the end of the penis.

One male and one female from Kurseong (*Annandale*, May, 1906).

## Gen. HYDROMANICUS.

This genus has been set apart from *Hydropsyche* mainly on two characters—the intermediate tarsi of the female are not dilated and the outer claws of the males are normal. The latter character I do not find of great value, for the claw may not be very abnormal in *Hydropsyche*. As defined, the genus *Hydromanicus* includes two groups which should in all likelihood constitute separate genera. One of these groups corresponds very closely to *Hydropsyche* except that the tibiæ of the female are not dilated. Judging from the specimens before me, further points of difference are that there are no appendages (Titillatoren) on the penis as in *Hydropsyche*. Furthermore, the base of the 2nd anal vein of the fore wing is in part obsolete, as is not the case in *Hydropsyche*. Regarding both these points observations on the other species of *Hydromanicus* are desirable. The second group, while it agrees with the former in not having the intermediate tibiæ of the female dilated, differs from it and from *Hydropsyche* in several points. The shape of the wings is decidedly different, the apex being markedly truncate. This difference is particularly striking when the wings are folded at rest. The jugum is well developed in the second group, while in the first, as in *Hydropsyche*, it is not so. The most striking venational difference is in the hind wings where Sc and $R_1$ both arch towards the sector in the region of cell 1st $R_s$ and then separate widely as they go to the wing-margin. In *Hydropsyche* and in its nearest allies in *Hydromanicus* Sc and $R_1$ have their tips fused (pl. xv, figs. 1, 5, 13).

### *Hydromanicus truncatus*, sp. nov.

(Pl. xv, figs. 5—8.)

Length of body 8 mm. Expanse 17—19 mm. Head, prothorax, and mesothorax black with golden hair; metathorax brown, legs yellow, abdomen black. Antennæ black with an oblique white mark on each segment. Wings thickly covered with brownish black and with yellow hair, the yellow dots being distributed rather equally over the wings. Some of the light spots are in the wing membrane, as may be seen when the wing is denuded. Some

[1] Ulmer's latest figures are exceptions to this.

of these occur along the anterior margin, some along the posterior margin, particularly just before the tips of the anals, and a large patch of them is found at the wing apex. The shape of the claspers (Genitalfüssen) is very characteristic, the ends being truncate, at least as seen from above. The dark spots shown in pl. xv, fig. 8, are chitinized points on the dorsum of the ninth segment that can be distinguished only in specimens that have been cleared.

This species corresponds closely to the description of *H. luctuosus*, Ulmer. Some differences will be seen in the venation. The species agree, however, in having $R_2$ and $R_3$ of the fore wing fused further towards the wing-margin in the male than in the female. The two species are easily distinguished by the genitalia, the processes on the dorsal surface of the tenth segment being very slender in *truncatus*, and the ends of the claspers more or less truncate.

Several specimens from Kurseong (*Annandale*, May, 1906).

*Hydromanicus dilatus*, sp. nov.

(Pl. xv, figs. 9—12.)

Expanse 19-20 mm. Head and thorax dark brown with yellow hair. Antennæ yellow, narrowly ringed with brown, basal joint darker. Wings brown, with black and yellow hair, the yellow spots being distributed rather uniformly. The venation is of the type of *Hydropsyche* with no striking peculiarity except perhaps the transverse position of the tip of $R_2$ of the hind wing. The shape of the genitalia is characteristic, particularly that of the claspers. These have the first joint thickened distally, while the second joint is very long and slender.

One male and one female from Salatega, Java, sent by Dr. Zehntner.

The three species next to be described belong to that division of the genus characterized above as being more distantly related to *Hydropsyche*. Their nearest allies among described forms are doubtless *H. aspersus*, Ulmer, and *H. papilionaceus*, Hagen. With these they agree in having cell 1st $R_3$ of both wings long and narrow. They differ, judging from Ulmer's figures of *aspersus* and of *papilionaceus*, in having a cross-vein between Sc and $R_1$ of the fore wing. Cell $R_2$ of the hind wing is equal in length to its pedicel, not decidedly less as in *aspersus* nor decidedly more as in *papilionaceus*. The cross-vein between $Cu_1$ and $Cu_2$ of the fore wing is near the middle of the wing, a little before the cross-vein M-Cu. In the figure of *aspersus* it appears far towards the wing-margin and in *papilionaceus* it is apposed to the cross-vein M-Cu.

*Hydromanicus marginatus*, sp. nov.

(Pl. xv, fig. 13.)

Expanse 20 mm. Head black with black hair, thorax black above, golden towards the sides. Antennæ yellow at base, ringed

black, further out the proportions of the colours change so that the antennæ appear black, ringed yellow. Legs yellow to brown, with darker hair particularly on the distal joints; coxæ brown. On the fore wing the hairs on the anterior part are dark brown with spots of yellow particularly at the apex; the posterior third of the wing is almost wholly yellow and the veins in this region are more indistinct. The difference in coloration is very slightly indicated in the wing membrane.

Two females from Kurseong (*Annandale*, May, 1906).

*Hydromanicus orientalis*, sp. nov.

(Pl. xv, figs. 14—16.)

This species is closely related to *H. marginatus* but does not have the peculiar coloration of the latter and is considerably smaller, the expanse being 16 mm. The hair on the head is yellow, while in *marginatus* it is black. In the fore wing the membrane is nearly uniform brown, the pubescence rather scant, forming very indistinct irrorations of yellow and black. These irrorations are more distinct on the anterior margin. In venational and other characters, I see no difference between this and the preceding species.

[Specimens from Kurseong (*Annandale*, May, 1906).]

*Hydromanicus brunneus*, sp. nov.

(Pl. xvi, figs. 1—4.)

Length to tip of the wings 8 mm. Head and thorax dark brown to black above with brown hair. Antennæ at base whitish ringed with brown; more distally the brown band is wider than the pale one. Legs dark brown, tarsi still darker; hind femora with long hair. Fore wings reddish brown with lighter spots particularly along the anterior margin and at apex. The alternate light and dark markings at the wing apex extend also over the marginal fringe. Venation practically as in the two preceding species. Genitalia very different from the preceding species as shown by the figures.

Several specimens from Upper Assam.

## Fam. POLYCENTROPIDÆ.

### Subfam. *POLYCENTROPINÆ.*

#### Gen. HYALOPSYCHODES, nov.

This genus is closely related to *Hyalopsyche*, Ulmer, reported from W. Africa. It differs from that genus mainly in having no labial palpi. The maxillary palpi are like those figured by Ulmer for *Hyalopsyche*, but the fifth joint is comparatively longer. In addition it may be noted that the disparity of length in the spurs

is more striking on the first pair of legs than on the second and third pairs as described for *Hyalopsyche.* This is the first genus described as having maxillary palpi but no labial palpi.

*Hyalopsychodes rivalis*, sp. nov.

(Pl. xvi, figs. 5—7.)

Length 10 mm. Expanse 20 mm. Head, prothorax, and mesothorax dark brown, metathorax yellow. Wings brown. Head, thorax and wings covered with short yellowish hair. Antennæ with globose basal joint, the others longer; the joints near the base are thicker than those at the tip and have dark brown bands near their distal ends. Legs yellow. The venation is strikingly similar to that of *Hyalopsyche palpata*, Ulmer. The abdomen of the female is modified into an ovipositor as in *Hyalopsyche.*

The specimens at hand are females taken at Rajshahi, Eastern Bengal, 1—6-ii-07 (*Annandale*).

Gen. DIPSEUDOPSIS.

(Pl. xvi, figs. 8—13.)

The species of this genus have been differentiated mainly on the form of the abnormal spur on the hind tibiæ of the male. In this collection there are four specimens of a species of this genus but they are all in bad condition. I add figures of venation, the palpi, genitalia, and of the abnormal spur. The spur is unlike any I have seen figured.

Fam. CALAMOCERATIDÆ.

Gen. GANONEMA.

*Ganonema brunneum.*

*Ganonema brunneum*, Ulmer, *Stett. Ent. Zeit.*, vol. lxvi, p. 31, pl. i, fig. 26.

Of this species there is one female specimen from Sibsagar, Assam.

*Ganonema salsum*, sp. nov.

(Pl. xvi, figs. 14—17.)

Length to tip of wings 9-10 mm. Expanse 21 mm. Almost wholly brownish yellow, with hair of the same colour. Basal joint of antenna thick, second very small, the third longest, the succeeding ones about equal to the first. Palpi hairy, the proportions of the segments as figured (pl. xvi, fig. 17). By Ulmer's key to the genus (*Notes from the Leyden Museum*, vol. xxviii, p. 50) this species runs to *G. brevipenne*, Ulmer. The description also agrees fairly well but there appear to be decided differences in venation and in

the genitalia. The following points in the venation may be noted as different from those in *G. brevipenne*. The cross-vein RM is at the apex of cell $M_1$ and does not touch cell $R_4$; cell $M_3$ reaches back on cell 1st M for two-thirds the length of the latter. The venation of the hind wing seems to be like that of *brevipenne* although the shape is not the same.

Several specimens from Upper Assam.

### Gen. ASOTOCERUS.

### *Asotocerus fuscipennis.*

(Pl. xvii, figs. 1—3.)

*Asotocerus fuscipennis*, Albarda, Veth's *Midden-Sumatra*, vol. iv, pt. 5, p. 17, pl. v, fig. 1.

Figures of the venation and of the male genitalia are here given. The venation differs from Albarda's figure mainly in the presence of the cross-vein $Cu_{1a}$ to Cu and the cross-vein between Sc and $R_1$ of the fore wing. The latter is very distinctly indicated. In the hind wing also there is a cross-vein between Sc and $R_1$.

[Specimens from Kulu, W Himalayas.]

## Fam. ODONTOCERIDÆ.

### Gen. MARILIA.

Of this family no species have yet been reported from India. In this collection there is a single specimen, too poorly preserved to admit of description, which I regard as a species of *Marilia*, in spite of the fact that it differs from other species of that genus in not having $R_1$ and $R_2$ of the fore wing fused. As in females of other species of this genus, the spur formula is 2-4-4 and the hind wings are narrow. The venation of the fore wing is somewhat more generalized than those of this genus hitherto published, but these latter are probably of males (pl. xvii, fig. 4).

The specimen is from Bhim Tal, Kumaon, 4,500 ft., 22—27-ix-06 (*Annandale*).

## Fam. LEPTOCERIDÆ.

## Subfam. *TRIPLECTIDINÆ.*

### Gen. NOTANATOLICA.

### *Notanatolica magna.*

*Notanatolica magna*, Walker, *Cat. Neur. Brit. Mus.*, p. 73.
,, ,, McLachlan, *Trans. Ent. Soc. Lond.* (3), vol. v, p. 257, pl. xix, fig. 3.
,, ,, Ulmer, *Notes from the Leyden Museum*, vol. xxviii, p. 32.

Of this species there are two female specimens from Calcutta.

*Notanatolica opposita* (?).

(Pl. xvii, figs. 5—8.)

*Notanatolica opposita*, Walker, *Cat. Neur. Brit. Mus.*, p. 73.
,, ,, McLachlan, *Trans. Ent. Soc. Lond.* (3), vol. v, pp. 257, 258.
,, ,, Ulmer, *Notes from the Leyden Museum*, vol. xxviii, p. 32.

There are two male specimens of what I take to be this species. Doubt is cast on this determination by the fact that while $R_2$ and $R_3$ of the hind wing are fused, the cell 1st $R_5$ of the fore wing is not of the shape described for the female of this species by Ulmer. Nor do the cross-veins connecting that cell occupy the positions indicated by him. I add figures of the genitalia.

[One specimen from Calcutta (*Alcock*).]

Subfam. *LEPTOCERINÆ*.

Gen. SETODES.

*Setodes argentifera*.

(Pl. xvii, figs. 9—11.)

*Setodes argentifera*, McLachlan, *Journ. Linn. Soc. Lond.*, Zool., vol. xi, p. 129, pl. iii, figs. 13, 13*a*.

This pretty little species is easily recognized from McLachlan's description. I add figures of venation and of genitalia because they differ somewhat from those of McLachlan's paper. In the venation the chief point of difference is that I find the radial cross-vein of the hind wing running to Sc and $R_1$ rather than to the wing-margin. In the drawings of the genitalia there is considerable difference. McLachlan has failed to show the bristly two-pronged appendage which appears to be an upper branch of the clasper. The slender spines referred to by McLachlan I suppose are those running close alongside of the strongly curved penis.

Fam. SERICOSTOMATIDÆ.

Subfam. *GOERINÆ*.

Gen. GOERA.

Of this genus there appear to be at least three species, represented by material in very bad condition. But one of these species is here described.

*Goera relicta*, sp. nov.

(Pl. xviii, figs. 1—5.)

Expanse about 13 mm. Distinguished from other species mainly by the venation and the genitalia. In the fore wing $R_2$

and $R_3$ separate before the middle of cell 1st $R_3$, not beyond it as in *G. pilosa*. In the hind wing cell $R_2$ is decidedly shorter than cell $R^4$, not longer as in *G. longispina*; there is no cross-vein $R_2$-$R_3$ as in *G. conclusa*. On the sixth ventral segment there is a single blunt elongate tooth with no spines alongside of it as there are in *G. pilosa* and *G. japonica*. This tooth is about one half as long as the segment. The male palpi are difficult to make out satisfactorily. The basal joint is short, one-and-a-half times as long as wide; the second is apparently wider than long; the third is about as long as the first and second. It is densely covered with very small club-shaped striate scale hairs.

## Subfam. *LEPIDOSTOMATINÆ.*

### Gen. GOERODES.

*Goerodes* sp.

(Pl. xviii, figs. 6—9.)

The three specimens belonging to this species are all females hardly admitting of specific determination. Ulmer's description of *G. cornigera* and his notes on *G. vulpina*, Hag., and *G. ursina*, Hag., seem to exclude these as possible determinations for this species. The figures and notes here added may make later determination of this material possible.

Length to tip of wings 7 mm. Expanse 13 mm. First joint of antennæ covered with long yellow and fewer black hairs, succeeding joints darker at their distal ends. Legs yellow with dark hair, particularly externally. Spurs 2-4-4, subapical spurs of intermediate tibiæ three-eighths the way from the proximal end, those of the hind tibiæ three-fourths the way; hind tibiæ somewhat curved in the region of the subapical spurs. Wings light brownish with short yellow and longer black hair. The venation differs from that of *G. vulpina* figured by Ulmer (*Cat. Coll. Sélys.*, fasc. 6, p. 40, fig. 64) mainly in that cell $Cu_{1a}$ does not extend as far back as cell 1st R , and that Cu is not arched strongly near its branching; in the hind wing Sc and R are fused beyond the apex of cell $R_2$, there is no cross-vein $R_3$-$R_4$, cell $M_2$ does not extend further back than cell $R_5$.

Three specimens from Upper Assam.

### Gen. DINARTHRELLA.

*Dinarthrella* sp.

(Pl. xviii, figs. 10—12.)

There are two specimens (♂ and ♀) of *Dinarthrella* doubtless representing a new species but in such very bad condition that I do not propose a specific name and content myself with giving figures of venation, the first joint of the antennæ, and the genitalia

of the male. *D. destructa*, Ulmer, is apparently a close ally but the genitalia and the first antennal joint are different.

Specimens from Kurseong, May, 1907 (*N. Annandale*).

## Fam. PHRYGANEIDÆ.

### Gen. NEURONIA.

Three species of this genus are reported from Asia: *N. melaleuca* and *N. regina* from Japan and *N. maclachlani* from India. Of the latter there are a female and male specimens in this collection. There is besides a male specimen of a new species.

### *Neuronia maclachlani.*

(Pl. xviii, figs. 13, 14.)

*Neuronia McLachlani*, White, *Proc. Ent. Soc. Lond.*, 1862, p. 26.
,, ,, McLachlan, *Trans. Ent. Soc. Lond.* (3), vol. v, p. 249, pl. xvii, fig. 1.
,, ,, Hagen, *Verh. Zool.-Bot. Gesellsch. Wien*, 1873, p. 395.

[Specimens from Kulu (W. Himalayas), Darjiling (E. Himalayas) and Shillong (Khasi Hills, Assam).]

### *Neuronia asiatica*, sp. nov.

(Pl. xviii, figs. 15, 16.)

Length of body 15 mm. Expanse 41 mm.

Head and thorax dark brown, eyes black, ocelli yellow. Fore wings orange with brown spots, the largest spots along the costa and apical margins, covering the tips of the veins, a particularly large spot on the tip of Sc ; there is an irregular brown band following the line of anastomosis from the first branching of media to the tip of the anal veins. The hind wing has the basal two-thirds dark brown; the distal third is yellow. There is an interrupted apical band of brown, the brown spots being on and along the tips of the veins. The abnormality of venation shown in the anal veins of the hind wing occurs in both wings of the specimen.

[Type from Sibsagar, Assam (*S. E. Peal*).]