

NOTES ON A COLLECTION OF AQUATIC RHYNCHOTA FROM
THE PATNA STATE, ORISSA, WITH DESCRIPTIONS OF TWO
NEW SPECIES.

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INTRODUCTION.

The collection of Aquatic Rhynchota made from tanks, rivers and streams of the Patna State, Orissa, surveyed in March 1946, comprises twenty-eight species belonging to fourteen different genera of the following eight families :—

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| <p>Family PLEIDAE.
<i>Plea indistinguenda</i> Matsumura.
<i>Plea (Paraplea) frontalis</i> (Fieber).</p> <p>Family NOTONECTIDAE.
<i>Anisops (Anisops) sardea</i> (Herrich-Schäffer).
<i>Anisops (Anisops) breddini</i> Kirkaldy.
<i>Anisops nasuta</i> Fieber.
<i>Anisops (Anisops) nivea</i> (Fabricius).</p> <p>Family CORIXIDAE.
Subfamily <i>Micronectinae</i>.
<i>Micronecta (Basileonecta) scutellaris scutellaris</i> (Stål).
<i>Micronecta (Basileonecta) quadristrigata</i> Breddin.
<i>Micronecta (?Dichactonecta) haliploides</i> Horvath.</p> <p>Subfamily <i>Corixinae</i>.
<i>Corixa (Tropocorixa) distorta</i> Distant.
<i>Corixa (Tropocorixa) promontoria</i> Distant.</p> <p>Family NEPIDAE.
<i>Cercotmetus fumosus</i> Distant.
<i>Laccotrephes griseus</i> (Guér.).
<i>Laccotrephes ruber</i> (Linn.).
<i>Ranatra filiformis</i> (Fabricius).</p> | <p><i>Ranatra varipes</i> Stål.
<i>Ranatra elongata</i> Fabricius.
<i>Ranatra titilaensis</i>, sp. nov.
<i>Ranatra digitata</i>, sp. nov.</p> <p>Family HYDROMETRIDAE.
<i>Hydrometra vittata</i> Stål.</p> <p>Family VELIIDAE.
<i>Microvelia douglasi</i> Scott.</p> <p>Family GERRIDAE.
Subfamily <i>Gerrinae</i>.
<i>Cylindrostethus productus</i> (Spinola).</p> <p>Subfamily <i>Halobatinae</i>.
<i>Metrocoris stali</i> (Dohrn).</p> <p>Subfamily <i>Ptilomerinae</i>.
<i>Ptilomera</i> sp.</p> <p>Family BELOSTOMATIDAE.
<i>Sphaerodema molestum</i> (Duf.).
<i>Sphaerodema rusticum</i> (Fabr.).
<i>Sphaerodema annulatum</i> (Fabr.).
<i>Lethocerus indicus</i> (Lep. & Serv.).</p> |
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SYSTEMATIC ACCOUNT.

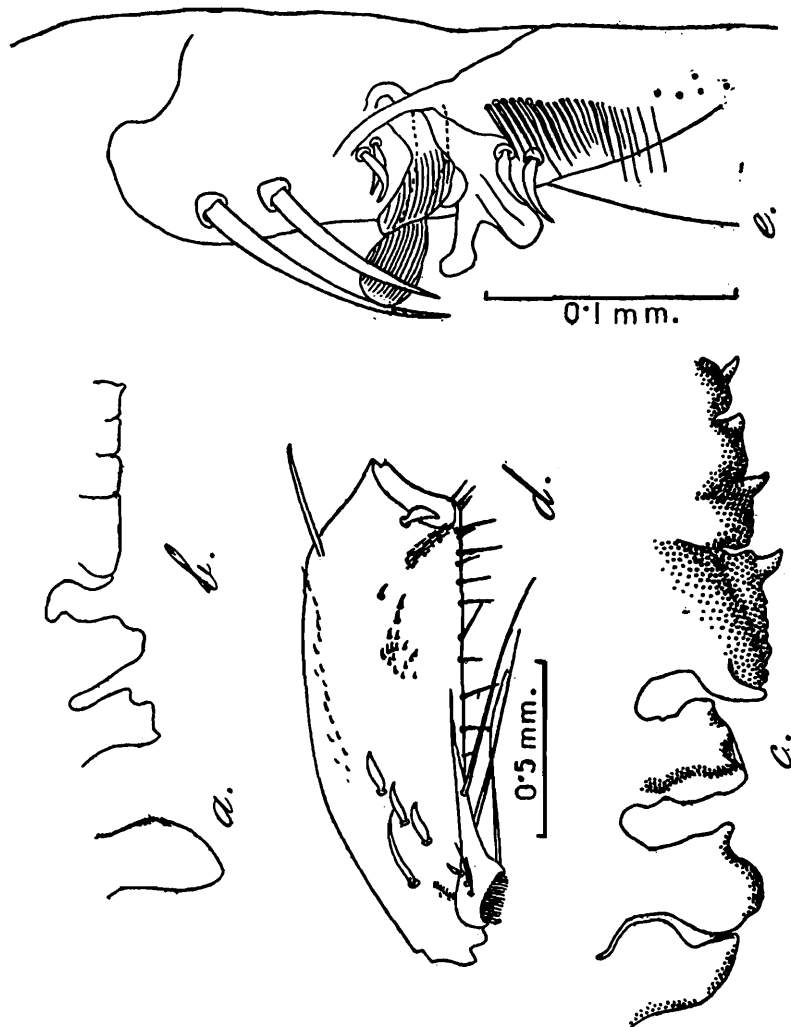
***Plea indistinguenda* Matsumura.**

1905. *Plea indistinguenda*, Matsumura, *J. Sapporo Coll. Agric.* II, pp. 59, 60. taf. 1, fig. 7.
1906. *Plea pallescens*, Distant, *Faun. Brit. Ind. Rhyn.* III, p. 48.
1939. *Plea (Paraplea) pallescens*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLI, p. 434.

This species is characterised by the structure of the prosternal keel and the presence of a dark castaneous streak at the basal margin of the head. The shape of the thoracic and abdominal keel offers a stable character for distinguishing the different species of the genus *Plea*. Previous descriptions of the species are rather inadequate and a more detailed

description based on four female specimens collected from the Patna State, Orissa, is given below :—

Head with a small, light brownish longitudinal stripe (0.27 mm. in length); frons and vertex finely punctate and covered with very fine short hairs; interocular space about twice the width of an eye; terminal joint of rostrum black, subterminal joint yellowish brown; basal margin of head with a dark castaneous streak extending upto the inner margins of eyes, the streak appearing somewhat wider about the middle of its length due to the presence of an irregular patch of dark brown spots slightly above the longitudinal stripe. Pronotum wider than long, reticulately punctate, not punctured along the middle line and appearing slightly gibbous in this region, usually unspotted but sometimes with a few irregularly arranged brown spots near the anterior margin. Scutellum pale, almost as wide as or slightly wider than long, never reticulately punctate, provided with few punctures,



TEXT-FIG. 1.—*a.* *Plea indistinguenda* Mats. Prosternal keel; *b.* *P. indistinguenda* Mats. Mesosternal, metasternal and abdominal keel; *c.* *P. frontalis* Fieb. Thoracic and abdominal keel; *d.* *Anisops (Anisops) sardea* (Herr.—Schäff.) Male anterior tibia; *e.* *A. (A.) breddini* Kirk. Part of the anterior tibia of male showing the stridulatory area.

usually unspotted but occasionally with a few small brown spots. Elytra pale with a series of dark brown spots arranged longitudinally close to their outer margin, clavus and corium coarsely and reticulately punctate, punctures in the hinder angle of clavus with brown spots and the remaining area of clavus almost unspotted, anterior half of corium more or less unspotted except for a few spots near the margin of clavus suture, the posterior half brownish owing to the presence of a large number of big brown spots. Colour of underside light brownish. Prosternal keel (text-fig. 1a) flap-like and without a notch, its anterior margin hairy; the keel of the abdominal sternites without prominent posteriorly directed spine-like processes (shape of thoracic and abdominal keel as in text-figs. 1a, b). Legs pale, apices of tibiae and tarsi somewhat infuscate, femora, tibiae and tarsi armed with short spines and spinous setae, the first tarsal joint of all the legs without spines, claws of the anterior and intermediate legs of equal length but those of the hind leg slightly longer.

An examination of ovipositors of three examples revealed that the number and arrangement of spines on them varies in different individuals; sixteen spines were observed on the ovipositor of one example and nineteen on each of the other two, the number of spines on the right and left ovipositors was, however, constant. The operculum ends in a single point with a bundle of bristles on either side.

Length of the specimens: 1.8 mm.

The specimens collected from the Patna State are slightly longer than *P. pallescens* Dist. which are described to be 1.5 mm. in length.

The species has been recorded from Takasago, Japan; Bengal; Bihar; United Provinces and Cochin State.

***Plea (Paraplea) frontalis* (Fieber).**

1906. *Plea frontalis*, Distant, *Faun. Brit. Ind. Rhyn.* III, p. 48.

1910. *Plea pelopea*, Distant, *Faun. Brit. Ind. Rhyn.* V. (Appendix), pp. 336, 337.

1934. *Plea (Paraplea) frontalis*, Lundblad, *Arch. Hydrobiol. Plankt.* XII, (Supplement), pp. 138-140, text-fig. 44.

1939. *Plea (Paraplea) frontalis*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLI, pp. 434, 435.

The specimens generally conform to previous descriptions except for certain details of characters omitted by previous authors.

Head with a small dark reddish-brown longitudinal stripe (length 0.23 mm., width 0.01 mm.) but the three short dashes on the front (*vide* Distant, 1906) are absent; both frons and vertex are finely but not reticulately punctate; the interocular space is almost twice the width of an eye. Pronotum is wider than long. Elytra with very fine hairs, coarsely and reticulately punctate. Structure of the Pro- and meso-sternal keel as described by Lundblad (1934) but the meta-sternal keel with a more or less irregular anterior margin and a shallow depression about the

middle in the ventral margin (Text-fig. 1c). The depression in the ventral margin of the metasternal keel is not indicated in Lundblad's (1934, p. 139, fig. 44H) figure.

Previous workers have mentioned nothing about the number of spines on the ovipositor of female specimens of this species, although Lundblad (1934, p. 134) has stated that the number of spines in *P. liturata* (Fieb.) is fairly constant and varies between 13-14. This statement led to the detailed examination of the ovipositors of three female examples, and permanent Balsam mounts were prepared with a view to finding out whether or not the number of spines was constant in this species as well, but it was found that the number and arrangement of spines on them varies not only in different individuals but also on the right and left ovipositor of the same individual. The number of spines was invariably greater on the left ovipositor as shown below :—

Right ovipositor.

17
14
17

Left ovipositor.

19
16
20

The male specimens are smaller in size than the females ; the length of the male and female specimens being 2.3 and 2.5 mm. respectively.

Nine specimens of the species were collected from the following localities :—One male from Deval bandh, three miles west of Patnagarh (17th March 1946) ; four males and four females from Gait Sarovar, Bolangir (11th March 1946).

The species has a wide range of distribution and has been recorded from Bengal, Bihar, United Provinces, Madras Presidency, Burma, Cochin China, Sumatra, Java, Formosa, Nicobar.

Anisops (Anisops) sardea (Herrich-Schäffer).

1906. *Anisops sardea*, Distant, *Faun. Brit. Ind. Rhyn.* III, p. 45, fig. 27.

1929. *Anisops (Anisops) sardea*, Hutchinson, *Ann. South Afric. Mus.* XXV, pp. 381-384.

1939. *Anisops (Anisops) sardea*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLI, pp. 432-433.

The number of flattened spine-like plates on the stridulatory comb and the arrangement of spines on the anterior tibia of male differ from the description given by Hutchinson (1929).

The stridulatory comb, situated on a ridge-like tubercle at the base of the anterior tibia, is composed of fifteen narrow plates broadest at the proximal end. On the inner surface of the tibia below and behind the stridulatory comb there is a pair of spinous hairs and a short stout spine (text-fig. 1d) ; a little away from these are situated nine very short spines arranged in an oblique longitudinal row, and a long slightly curved stout spine-like seta more towards the extensor margin. Hutchinson (1929, p. 382) described the tibia as "rather stout with about six short spines on its anterior margin, some of which are flattened and spatulate and one short spine nearer the stridulatory comb." In the specimen

collected from the Patna State and also in several examples of the species in the collection of the Zoological Survey of India three stout spatulate spines arranged in an oblique longitudinal row are present. The anterior leg figured by Hutchinson (1929, Plate XXXI, fig. 1) shows only two spatulate spines. He has omitted to mention about (i) a group of twelve to fifteen or more short but prominent spines beyond the middle of the tibia, (ii) a fairly stout sub-apical spine at the distal end, (iii) one stout spinous bristle at the extensor margin in the distal region. In addition, there are a number of other irregularly scattered spines or spinous bristles on the anterior tibia.

The male specimens are longer than the females: males 7.5 to 8.0 mm.; females 7.0 mm.

According to Hutchinson the length of male and female specimens is 8.5-9.0 mm. and 8.0-8.5 mm. respectively; while Distant (1906, p.45) has mentioned the size as 6-7.5 mm. Kirkaldy¹ gives the dimensions as: ♂ 9-10.5, ♀ 7.7-8.7 mm. but Distant states that he has seen no Oriental specimens approaching that size.

This species is represented in the collections from the Patna State, Orissa, by two male and two female specimens collected from Jhitri bandh, Salebhata (7th March 1946).

The species is very widely distributed and has been recorded from Cape, Natal, Transval, S.W Africa, Mediterranean countries and Western Asia. It is represented in the collections of the Zoological Survey of India from Bengal, Bihar, Orissa, Madras Presidency, United Provinces, Punjab and Burma.

Anisops (Anisops) breddini Kirkaldy.

1910. *Anisops ? breddini*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), p. 333, fig. 194.

1939. *Anisops (Anisops) breddini*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XL1, p. 434.

This species is readily distinguished from other Indian species of the genus by the character of eyes which are contiguous along the interoposterior margin. The structure of the stridulatory comb on the anterior tibia of male affords a stable character for recognising the various species of the genus. There is no description or figure of the stridulatory area in the literature consulted. The characters not recorded previously and a figure of stridulatory area are, therefore, appended now.

Colouration pale above with the elytra pale-greyish. Abdomen beneath of dark brown colour with the keel reddish-yellow (in fresh specimens) for the greater part of its length and brownish-black at the posterior or terminal end.

Tibia of anterior leg of male slightly more than one and a half times as long as tarsus, which is about two and a half times as long as the longer claw and beset with a large number of short and minute spines on the outer surface, and two long stout spines near the base on the inner side in addition to several spinous hairs. Structure of stridulatory comb very characteristic, being composed of a few flattened and spatulate spines, other spines near the stridulatory comb as in text-fig. 1e.

¹ Kirkaldy, G. W., *Wien. ent. Zeit.* XXIII, p. 116 (1904).

Tibia of intermediate leg about twice as long as the first (1+2) tarsal joint, which is about twice as long as the third. The longer claw almost as long as the third tarsal joint.

Tibia of posterior leg about one and a quarter times as long as the tarsus.

Length of male specimen : 6.45 mm.

Length of female specimens : 5.9-6.3 mm.

Distant records the length as 7 mm.

This species is represented in the Patna State collection by one male and three female specimens collected from Jhitri bandh, Salebhata (7th March 1946).

The species is represented in the collections of the Zoological Survey of India from Bengal, Bihar, Orissa, Madras, and Malay Peninsula.

Anisops nasuta Fieber.

1906. *Anisops fieberi*, Distant, *Faun. Brit. Ind. Rhyn.* III, p. 46.

1934. *Anisops nasuta*, Lundblad, *Arch. Hydrobiol. Plankt.* XII (Supplement), pp. 168-171, fig. 58.

Distant (1906, p. 46) in a brief description described it under the name *A. fieberi* Kirk. Lundblad's reference to the species includes a complete list of synonymy.

The male specimens of the species are provided with a cephalic-horn like that of *A.(A.) sardea* with which it is usually confused, but the cephalic projection differs from that of the latter species in being shorter, less angulated and more or less rounded at the end. It would not be out of place here to give a detailed account of the structure of cephalic horn which differs considerably in minute details in the two species. When the cephalic horn is viewed from the ventral side two longitudinal ridges are seen running throughout its length; they, however, do not run parallel to each other as in *A.(A.) sardea* but extend somewhat obliquely towards each other to meet in front and thus enclose a concave triangular area between them (text-fig. 2c). Lateral to the ridges are two furrows in which, near the apical end, are two depressions. The two carinae which extend latero-longitudinally from the eyes forwards in *A.(A.) sardea* are absent in this species. The arrangement of spines on the anterior tibia of the two species is also different. The stridulatory comb at the base of the anterior tibia is composed of seventeen flattened plate-like spines.

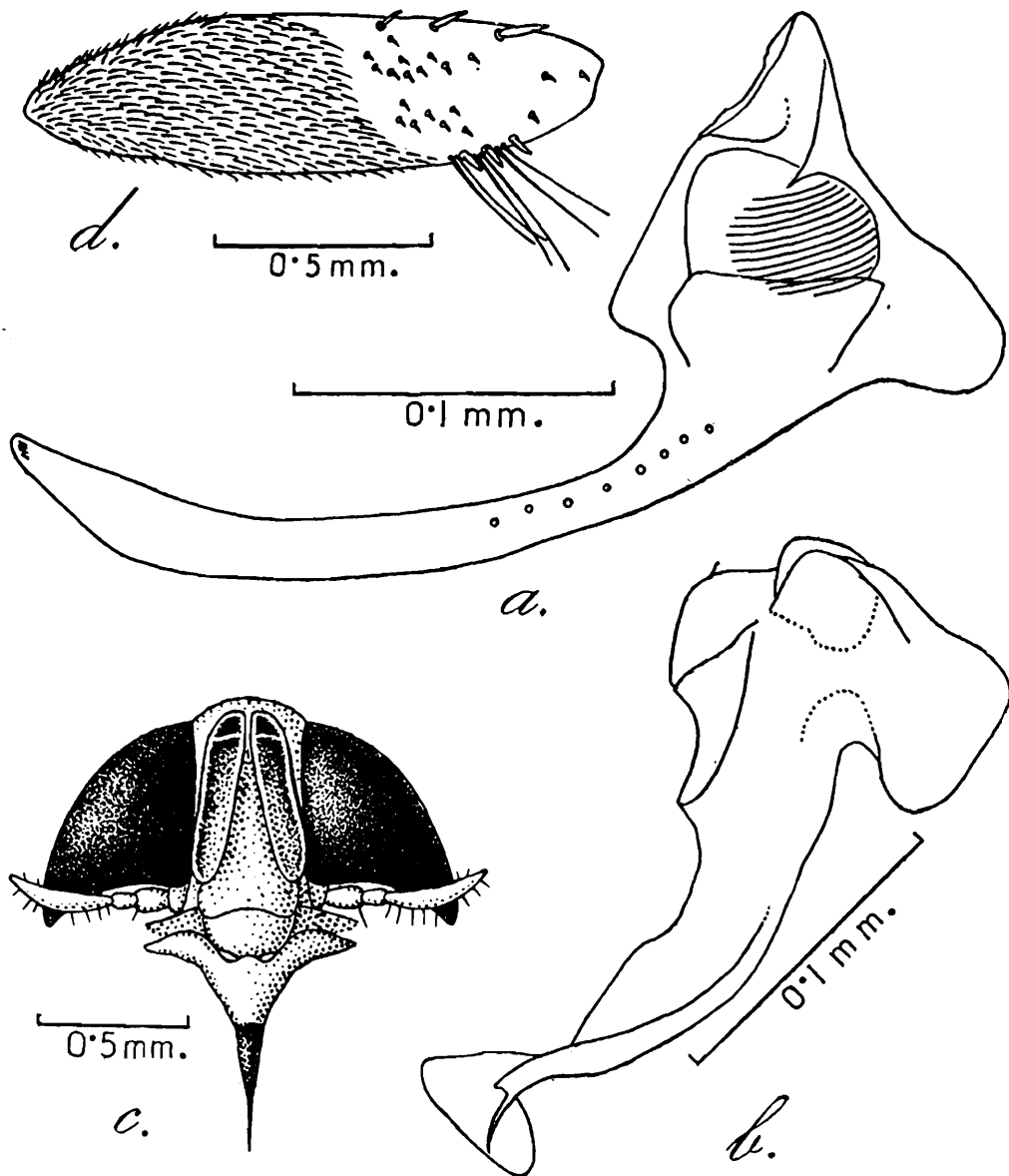
Intermediate tibia one and a three-fourth times as long as the first (1+2) tarsal joint, which is about twice as long as the terminal joint; the longer claw is almost as long as the third tarsal joint.

The tibia of posterior leg is a little longer than the tarsus.

The species is represented by a single male example collected from a tank at Titilagarh (20.3.46) and is recorded from this area for the first time. The specimen measures 6.2 mm. whereas Distant records the length of the male specimens as 5 mm.

The species is represented in the collections of the Zoological Survey of India from Nasratabad, Seistan; Siliguri, Bengal; Katmandu

and Nepal. It has also been recorded from Ceylon, China, Sumatra, Java, Formosa, Celebes, Newguinea, Australia and Samoa.



TEXT-FIG. 2.—*a.* *Micronecta (Basileonecta) quadristrigata* Breddin Right paramere ; *b.* *M. (B.) quadristrigata* Bredd. Left paramere ; *c.* *Anisops nasuta* Fieb. Front view of head showing the structure of cephalic horn ; *d.* *Corixa (Tropocorixa) distorta* Dist. Ventral view of posterior femur.

Anisops (Anisops) nivea (Fabricius).

1906. *Anisops niveus*, Distant, *Faun. Brit. Ind. Rhyn.* III, p. 46.

1929. *Anisops (Anisops) nivea*, Hutchinson, *Ann. South. Afric. Mus.* XXV, p. 385.

1934. *Anisops nivea*, Lundblad, *Arch. Hydrobiol. Plankt.* XII (Supplement), pp. 163—166, fig. 56.

1939. *Anisops (Anisops) nivea*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLI, p. 433.

This common species is represented by one hundred and forty-seven adult examples collected from the following localities in the Patna State :—

Forty-three male and seventy-one female specimens from Jhitri

bandh, Salebhata (7.3.46); one male and twenty-nine female specimens from Tahsil bandh, Patnagarh (14.3.46); two female specimens from Bhoosagar and Mainey bandh, Patnagarh (14.3.46); one male specimen from a tank at Titilagarh (20.3.46).

The species has been recorded from India, Burma and Sumatra. It is represented in the collections of the Zoological Survey of India from Bengal, Bihar, Orissa and S. Shan States.

Family CORIXIDAE.

The Indian species of this family, according to Hutchinson¹, fall into two subfamilies, viz., Micronectinae and Corixinae. The subfamily Micronectinae includes the genera *Micronecta* Kirkaldy, *Micronectella* Lundblad, and *Synaptonecta* Lundblad. Of these, only two have so far been recorded from India and the genus *Micronectella* Lund., which is not known from India, has been considered by Hutchinson as a subgenus of *Micronecta*. The subfamily Corixinae includes the genera *Cymatia* Flor, *Agraptocorixa* Kirkaldy, and *Corixa* Müller, which have been recorded from this region.

In the collection under study from the Patna State the family is represented by three species of the genus *Micronecta* and two of *Corixa*.

Micronecta (Basileonecta) scutellaris **scutellaris** Stal.

1910. *Micronecta dione*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), p. 348.

1910. *Micronecta proba*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), p. 348.

1940. *Micronecta (Basileonecta) scutellaris scutellaris*, Hutchinson, *Trans. Conn. Acad. Arts. Sci.* XXXIII, pp. 365-371.

Of all the Indian species of *Micronecta* so far known, *M. scutellaris* is the largest in size. Its length has been recorded as varying from 3.6 to 4.0 mm. The length of the specimens now under study ranges from 3.45 to 4.0 mm.

Hutchinson (1940, p. 369) is of the opinion that *M. Proba* and *M. dione*, which have been referred to by Distant as distinct species, should be considered as a synonym of *M. scutellaris*. He writes, "continued study has failed to reveal any characters by which a satisfactory separation can be effected" Some structural details of the armature of male anterior leg which have not been mentioned by previous authors are: femora with a row of nine spines basally, two short stout spines a little above the row and rather centrally placed, one short stout subapical spine and two short slender spines along the anterior margin near the apical end.

This species is represented in the collection under study by seventy-eight specimens collected from the following localities:—One male from Farm Tank, Bolangir (10.3.46), eight males and seven females from Gait sarovar, Bolangir (11.3.46), twenty males and forty-two females from Mainey bandh and Bhoosagar, Patnagarh (14.3.46).

¹ Hutchinson, G.E., *Trans. Conn. Acad. Arts. Sci.* XXXIII, p. 346 (1940).

The species has been recorded from Burma, Ceylon, Palestine, South Arabia, Central Africa and is widely distributed in India.

Micronecta (Basileonecta) quadristrigata Breddin.

1910. *Micronecta minthe*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), p. 347.
 1934. *Micronecta quadristrigata*, Lundblad, *Arch. Hydrobiol. Plankt.* XII (Supplement), pp. 87-91, text-figs. 26, 27, pl. XIX, fig. 1.
 1939. *Micronecta quadristrigata*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLI, p. 435.
 1940. *Micronecta (Basileonecta) quadristrigata*, Hutchinson, *Trans. Conn. Acad. Arts and Sci.* XXXIII, pp. 376-377.

Hutchinson (1940, p. 376) records the size of male as varying from 2.67-2.89 mm., and of female from 3.03-3.28 mm. Lundblad's measurements of the species vary from 2.1 to 2.7 mm. The male and female specimens dealt with in this study range in length from 2.63 to 2.72 mm., and 2.72 to 2.90 mm. respectively.

The specimens under study conform to the descriptions given by Lundblad (1934) and Hutchinson (1940), except for certain differences in the structures of the male specimens as noted below.

The entire lateral margin of the free lobe of eighth abdominal tergite from the rounded proximal end is provided with conspicuous spine-like setae or bristles. In the illustrations of Lundblad and Hutchinson the hairs do not seem to extend upto the extreme proximal rounded end.

On the anterior femur are present three to four spines near the apex and one spine a little behind. The total number of spines in this region is, therefore, from four to five and not three as illustrated by Lundblad (1934, p. 88, fig. B). The entire outer surface from base upto the apex is covered with spine-like hairs.

The parameres are not exactly as figured by Hutchinson (1940, Plate VIII, figs. 105, 106). They are here figured as observed in the specimens under study (Text. fig. 2a, b).

This species is represented by twenty-three specimens collected from the following localities:—Six males and ten females from Gait sarovar, Bolangir (11.3.46); three males and four females from Mainey bandh and Bhoosagar, Patnagarh (14.3.46).

The species has been recorded from India, Ceylon, Java, Sumatra and Philippines.

Micronecta (Dichaetonecta) haliploides Horvath.

1910. *Micronecta merope*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), p. 351.
 1934. *Micronecta haliploides*, Lundblad, *Arch. Hydrobiol. Plankt.* XII (Supplement), p. 104.
 1939. *Micronecta haliploides*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLI, pp. 435, 436.
 1940. *Micronecta (?Dichaetonecta) haliploides*, Hutchinson, *Trans. Conn. Acad. Arts and Sci.* XXXIII, pp. 377, 378.

This species is readily recognised by the characteristic black irregular markings on the pale elytra and also by the structure of pronotum which is shorter and narrower than the head with the lateral margins obsolete.

One male example of the species was collected from Mainey bandh and Bhoosagar, Patnagarh (14.3.46). The length and breadth of the specimen are 2.72 mm. and 1.27 mm. respectively.

The species has been recorded from India, Burma, Ceylon, Sumatra, Java, Malay Peninsula and Siam.

Corixa (Tropocorixa) distorta Distant.

1910. *Corixa distorta*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), p. 343.

1940. *Corixa (Tropocorixa) distorta*, Hutchinson, *Trans. Conn. Acad. Arts and Sci.* XXXIII, pp. 440-445.

Hutchinson (1940) is of the opinion that *C. affinis* Dist., *C. verecunda* Dist. and *Sigara fissa* Lundblad should be regarded as synonyms of *C. distorta* Dist. He examined the type of *C. verecunda* Dist. and paratypes of *C. affinis* Dist. and found that the structure of the left paramere of male type specimen of *C. verecunda* was identical with that of *C. distorta*.

Though the structure of the genitalia of male specimens is exactly as described by Hutchinson (1940, pp. 442, 443) the specimens under study differ in the pattern of pronotum, in the number and arrangement of spines on the oblique row of anterior femur, and in the distribution of spines on the ventral surface of posterior femur.

The pronotum is short and a little more than twice as broad as long. It is marked with six yellow bands, the anterior four yellow bands anastomose laterally while the two posterior ones remain completely separated from each other due to the intervening black space that extends upto the extreme lateral margins.

On the anterior femur, distal to the stridulatory area, an oblique patch of eight spines has been recorded by Hutchinson (1940) but the number of spines arranged in the oblique row in this region has been found variable in the two male specimens examined in the present study. In one example there are only five spines and in the other there is a patch of nine spines arranged in two oblique rows. A little to the middle of the extensor margin only one short spine is present, but Hutchinson has described two short spines near the middle of the extensor margin. There are thirty-six pegs in the peg row that runs almost parallel to the flexor margin of pala. Of these, six distal ones are more pointed and directed less transversely than the other oval or more or less elliptical ones. Of the six elongate pegs, three proximal ones, namely 31st, 32nd, 33rd, are of almost equal size and longer than all the others of the series. Hutchinson records a row of thirty-eight pegs and of these he describes five distal ones as being more elongate and pointed than others.

Intermediate femur is provided with a well developed fringe of short swimming hairs and the dimensions of joints of intermediate leg, except for slight differences, are similar to those given by Hutchinson.

The ventral pubescence of posterior femur having a sigmoid border extends well beyond the centre of the mid-line (text-fig. 2*d*). In the non-pubescent distal portion on the flexor side of the mid-line there is a group of five spines in one and seven spines in another specimen. Hutchinson, however, describes only five spines in this region. The number of spines lying between the mid-line and the extensor margin separated from the former group by a non-spinous region is variable

as ten have been observed in one example and thirteen in another. Hutchinson records a group of thirteen spines lying just within the extensor margin. Besides the spines described by Hutchinson, dorsal surface of the femur is provided with a pair of almost apical spines near the extensor margin.

Hutchinson records the length of the specimens as 5.05 mm; the length of the specimens now under study varies from 5.18 to 5.4 mm.

Three examples, two males and one female, were collected from Jhitri bandh, Salebhata (7.3.46).

The species has been recorded from India, China, Danish Is. and Amoy.

***Corixa* sp., prox. *distorta* Distant.**

A single male specimen of the genus *Corixa* Müller with sinistral asymmetry (*i.e.*, male genital capsule directed to left and strigil on the left side of the sixth abdominal tergite) was collected from Jhitri bandh, Salebhata (7.3.46). It has not been possible to place this specimen in the systematic scheme by the help of structural characters and keys given by Hutchinson¹ in any of the subgenera or species described by him.

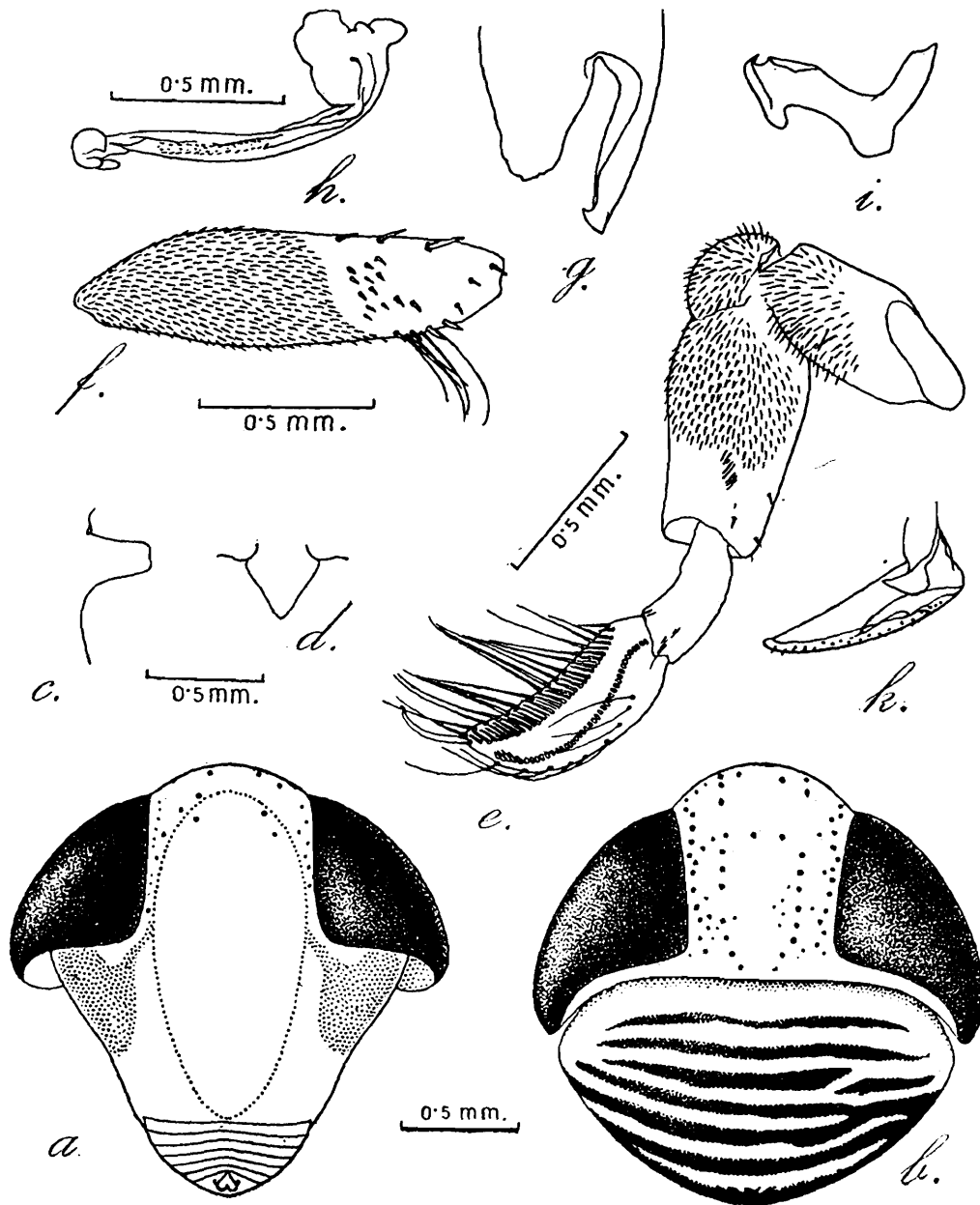
An examination of the genital capsule revealed that the characters of the right paramere of the specimen are reverse of the subgenus *Tropocorixa* Hutchinson otherwise the genitalia is like that of *C.(T.) distorta* Distant. Although the specimen differs in other structural details from *C.(T.) distorta* it is not considered desirable to propose a new subgeneric or specific name at this stage unless some more specimens of the kind become available either from the same or from any other locality. The characters observed in the specimen are however described below:—

Head (text-fig. 3a) brownish ochraceous about three times as wide as the least interocular space, vertex with a number of small dark-brown irregular spots, carina between two longitudinal rows of punctures obsolete, facial impression fairly prominent and somewhat deep with well developed margins extending high between the eyes, the latter reddish brown, moderately projecting between and behind the anterior pronotal angles; the head slightly produced in front and the area of the head immediately below the eyes brownish.

Pronotum (text-fig. 3b) pale ochraceous, disc marked with six yellow transverse bands more or less wider than the intermediate black spaces, second yellow band anastomosed with the third owing to the discontinuity of the intermediate black space towards the right, fourth band stops short on the right and not extending upto the extremity; elytra brownish-ochraceous with vermiculations, clavus brownish with broken yellow vermiculations wider than the intervening spaces, which fuse to form irregular longitudinal lines, corio-membranal suture pale yellow, right membrane brownish with vermiculate yellow markings throughout, the intero-apical part of the left membrane sub-hyaline; ectocorium yellow, brown markings of corium transgressing sub-apically, body beneath more or less pale ochraceous, legs pale stramineous.

¹ Hutchinson, G. E., *Trans. Connect. Acad. Arts and Sci.* XXXIII, pp. 401-404 and 414-416 (1940).

Lateral lobe of prothorax with the dorsal margin slightly concave, ventral margin almost straight and apex as in the text. fig. 3c.



TEXT-FIG. 3.—*Corixa*-sp., prox. *distorta* Dist.

a. Front view of head ; *b.* Dorsal view of head and pronotum ; *c.* Lateral lobe of prothorax ; *d.* Metasternal process ; *e.* Anterior leg ; *f.* Posterior femur ; *g.* Apex of genital capsule ; *h.* Inner penis sheath ; *i.* Left paramere ; *k.* Right paramere (*g-k* of same magnification).

Metasternal process short, almost equilateral with the apex somewhat bluntly angulated as in text-fig. 3*d.*

Anterior trochanter with a few spine-like hairs in the proximal region and with an almost uniform pubescence in the remaining portion ; anterior femur (text-fig. 3*e.*) with a fairly well developed stridulatory area composed of a number of small stout spines, distal to this seven long spines set in an oblique longitudinal row extending from the well differentiated stridulatory area towards the extensor margin, two short spines (the proximal smaller than the distal) between the mid-line and extensor margin, two spines near the extensor margin (one subapical

and the other set more proximally), one subapical spine at the extensor margin; tibia in the distal region with a few spine-like hairs arranged in an oblique longitudinal row between mid-line and extensor margin, two subapical long spines and a few spinous hairs near the flexor margin; pala simple with a curved row of forty-one pegs of which the distal five pointed and slightly more elongate than the others, extensor margin with nine long hairs, lower or posterior flexor margin with seventeen and upper or anterior flexor margin with thirty-two long spinous hairs.

Intermediate femur with a fringe of long swimming hairs, length of joints of intermediate leg: femur 2.13 mm., tibia 1.0 mm., tarsus 0.63 mm., claw 0.9 mm.

Posterior femur (text-fig. 3f) with three spines on extensor margin, four spines (the proximal two smaller than the distal ones) and a number of long spinous hairs on the flexor margin; dorsal surface with two spines between mid-line and flexor margin, a pair of almost apical stout spines of moderate size near the extensor margin, an oblique row of spinous hairs across the femur in the proximal region (the hair between the mid-line and the extensor margin—especially near the latter—longer than those between the mid-line and flexor margin); ventral surface of the posterior femur with a proximal pubescent area having a sigmoid border and extending beyond the middle of its length, the glabrous area of femur—distal to the pubescent border—with a group of thirteen irregularly distributed spines, besides these one short spine between the mid-line and flexor margin near the distal most spine of the flexor row, one central subapical spine and one almost apical spine near the extensor margin; dimensions of the posterior leg; femur 1.81 mm., tibia 1.0 mm., proximal tarsus 1.27 mm., distal tarsus 0.54 mm.

Fifth abdominal tergite with a short central lobe and with its lateral margins as in text-fig. 4a.

Sixth abdominal segment (text-fig. 4b) with a moderately large almost subquadrate strigil on the left side of the sixth abdominal tergite; strigil composed of five combs and the apical comb appearing irregularly fragmented.

Seventh abdominal segment (text-fig. 4c) with a rather reduced median lobe and provided with a few long setae, the margin on the left side produced into a lobe-like structure that lies immediately behind the strigil.

Apex of ninth abdominal segment (*i.e.* genital capsule) simple (text-fig. 3g). Inner penis sheath with the whole apex broad, more or less plate-like and with a short process directed towards the right (text-fig. 3h), the base of the process with a deeply chitinised spot. Left paramere broad in the basal half and narrowed beyond the middle; its ventral and outer lateral margin near the apex recurved and the dorso-lateral margin with a fairly prominent semi-circular emargination (text-fig. 3i). Right paramere elongate, more or less triangular; its ventral margin with a long thin lobe separated from the main body by a narrow cleft (text-fig. 3k).

Length.—5.36 mm.

Specimen.—No. 5985/117 to 5988/117, Zoological Survey of India.

Locality.—Patna State, Orissa (Salebhata, Jhatri bandh).

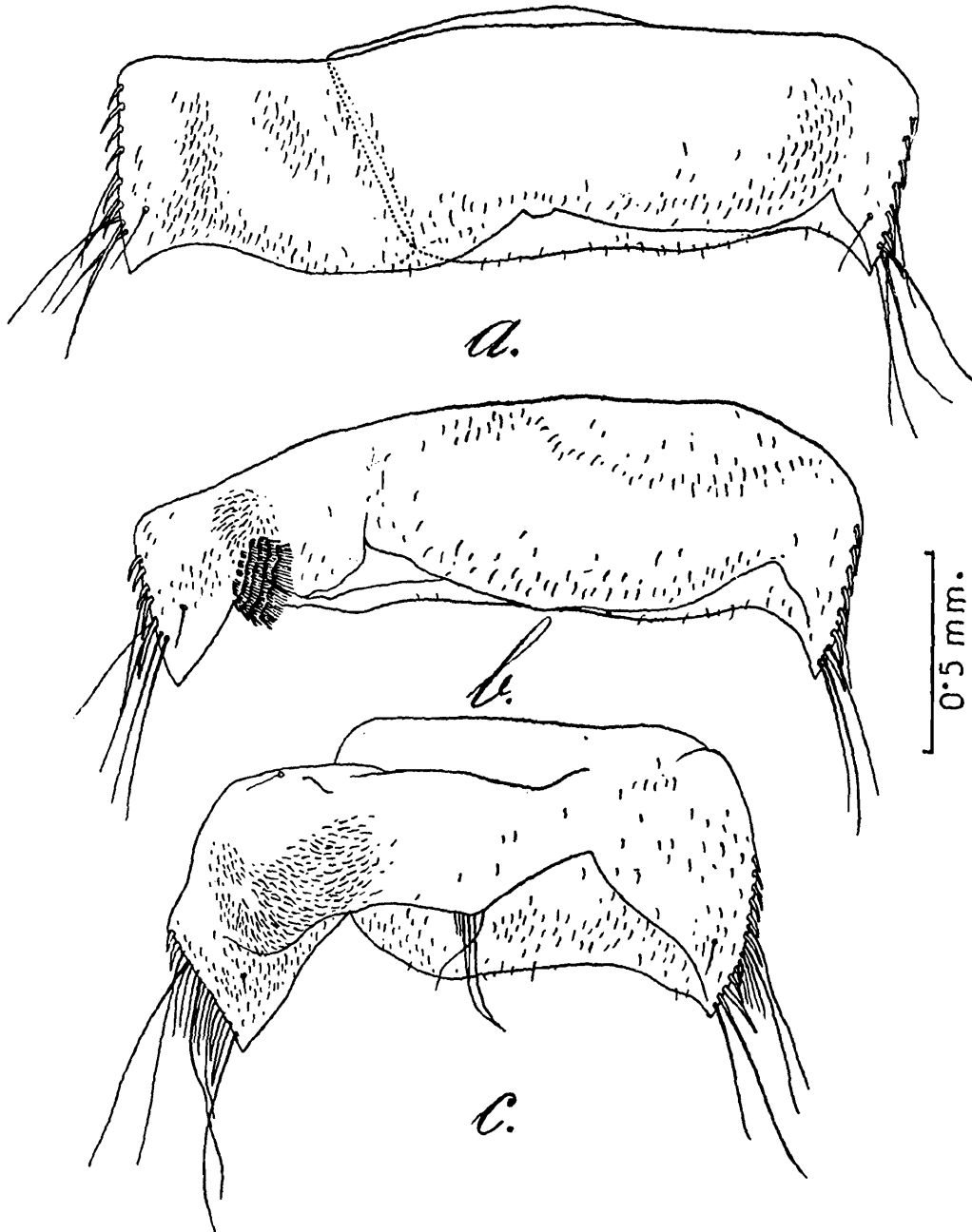
***Corixa (Tropocorixa) promontoria* Distant.**

1910. *Corixa promontoria*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), p. 341.

1922. *Corixa ribeiroi*, Paiva and Dover, *Rec. Ind. Mus.* XXIV, p. 333.

1940. *Corixa (Tropocorixa) promontoria*, Hutchinson, *Trans. Conn. Acad. Arts and Sci.* XXXIII, pp. 437-440.

Except for certain differences in the number of paler pegs and arrangement of spines on the anterior and posterior femora of male, the specimens collected from Patna State conform to the account given by Hutchinson (1940).



TEXT-FIG. 4.—*Corixa* sp., prox. *distorta* Dist.

a. Fifth abdominal segment ; b. Sixth abdominal segment ; c. Seventh abdominal segment.

Hutchinson describes two pairs of small spines on the anterior femur just distal to the well developed stridulatory area but the specimen examined revealed the presence of seven spines in this region arranged in two oblique rows (2+5).

Hutchinson records the pala as having eight long hairs on the extensor margin and provided with thirty-four pegs, of which the last ten are more elongate than others; but the pala of the specimen examined is provided with nine long hairs on the extensor margin and a curved peg row of only thirty pegs, of which the distal eight are slightly more elongate than the others.

The non-pubescent ventral surface of the posterior femur is provided with two stout spines arranged in a longitudinal row situated more or less centrally and two spines (one apical and one subapical) set near the extensor border. Hutchinson describes only one small spine situated centrally and two set apically and subapically near the extensor border. On the dorsal surface of posterior femur between the mid-line and flexor margin three spines have been recorded by Hutchinson but only two have been observed in this region in the specimen under study.

Two specimens, one male and one female, were collected from Jhitri bandh, Salebhata (7.3.46).

The species has been recorded from the United Provinces: Amman-garh, Nainital, Lucknow, Malwa Tal, Kumaon; Mysore State: Gundlepet; Bengal: Berhampore Court; Bihar: Santal Parganas; and Orissa: Cuttack.

***Cercotmetus fumosus* Distant.**

1906. *Cercotmetus fumosus*, Distant, *Faun. Brit. Ind. Rhyn.* III, p. 23.

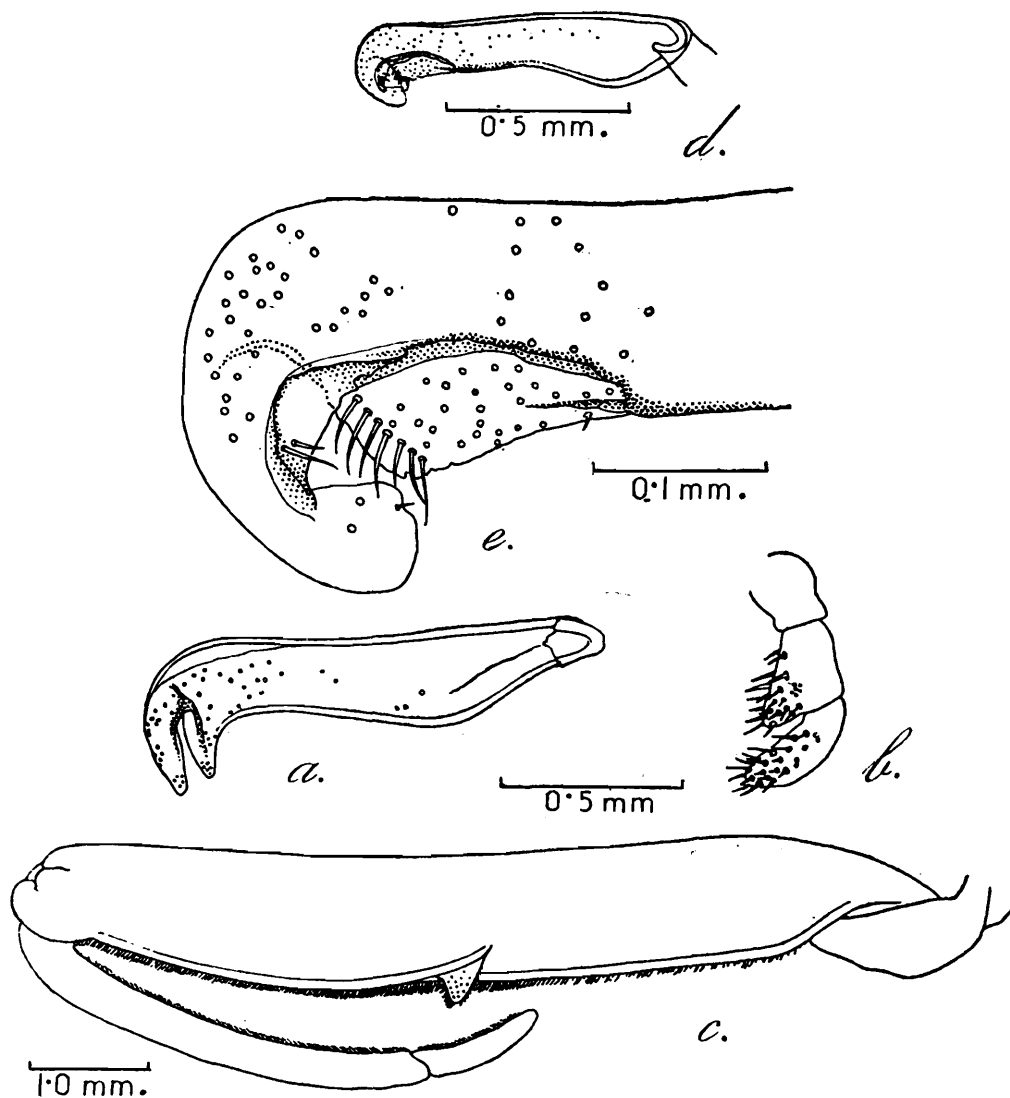
Two male specimens, one dark fuscous and the other light fuscous are referred to this species. Vertex of both the specimens is provided with a pointed tubercle as described by Distant, and pronotum is almost as long as the intermediate femur. Abdomen beneath is strongly keeled and metasternum is provided with a distinct keel along the middle line. In the dark fuscous example, the area of the meta-sternum bearing keel is of lighter colour and when viewed with the naked eye, the keel appears as a thin longitudinal pale yellowish streak; the continuation of the pale streak forward and its presence approximately in the posterior two-thirds of the meso-sternum gives a false indication of the presence of a keel in this region as well, but a closer examination has revealed the total absence of carination in the meso-sternum. In the other example which is of lighter shade, there is no trace of a pale yellowish streak and the mesosternum like the darker example is devoid of a keel. Distant (1906, p. 23) writes, "abdomen beneath strongly keeled, the keel continued on sternum as far as anterior coxae" This statement clearly indicates that mesosternum also is keeled. Lundblad¹ (1934), in providing a key for a number of species of *Cercotmetus*, has placed *C. fumosus* along with those species in which the mesosternum is not keeled. This is, however, not in agreement with the statement made by Distant. It was, therefore, considered necessary to reinvestigate the matter further and reach a conclusion on the exact condition of the mesosternum in various examples of the species. Since no authentically named specimens of *C. fumosus* were available in the named Collections of the Zoological Survey of India, the matter was referred to the British Museum

¹ Lundblad, O., *Arch. Hydrobiol. Plankt.* XII (Supplement), pp. 49, 50 (1934).

with a view to having an authentic report based on a careful examination of the named specimens present there. The report received from Dr. Hinton (Brit. Mus.) read "that the abdominal keel is continued across the metasternum to the anterior coxae in the manner described by Distant, the keel on the metasternum being quite distinct" Lundblad has taken the character of carination of mesosternum as of primary importance and arranged the various species into two groups namely (i) the species *C. pilipes*, *C. horni*, *C. asiaticus* and *C. asiaticus var. longicollis* in which the mesosternum is provided with a distinct keel; (ii) the species *C. brevipes*, *C. dissidens*, *C. robustus*, *C. fumosus*, *C. strangulatus* and *C. compositus* in which the mesosternum is without a keel.

The specific determination of the examples collected from Patna State is, therefore, based on the key as set forth by Lundblad (1934, pp. 49, 50).

The illustrations of the paramere, antenna, and anterior femur are not available in the literature consulted and hence they are presented in the text-fig. 5*a, b, c*.



TEXT-FIG. 5.—*a.* *Cercotmetus fumosus* Dist. Paramere; *b.* *C. fumosus* Dist. Antenna; *c.* *C. fumosus* Dist. Anterior leg; *d.* *Laccotrephes griseus* (Guer.) Paramere; *e.* *L. griseus* (Guer.) Apical part of paramere highly magnified.

Length of body and abdominal appendages respectively of the two examples are as follows :—

(i) 39.2 and 11.2 mm.

(ii) 38.6 and 9.6 mm.

The examples from the Patna State are shorter in length than those described from Ceylon by Distant for according to him the length, excluding abdominal appendages, is 47 mm.

The two male specimens were collected from Tel river, Belgaon (19.3.46).

C. fumosus is recorded for the first time from this region. It has been recorded by Distant from Ceylon.

Laccotrephes griseus (Guérin).

1910. *Laccotrephes griseus*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), p. 314.
1939. *Laccotrephes griseus*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLJ, p. 430.

The description of the species (*vide* Distant, 1910) is very meagre. The characters observed in the examples collected from the Patna State are as noted below :—

The specimens are fuscous in colour. Anterior femora and tibiae are marked with prominent fuscous shadings but the markings on the intermediate and posterior femora and tibiae are feeble and less pronounced. Prosternum is convex along the middle line and is provided with a tubercle in the anterior region. Abdominal appendages are distinctly shorter than the body, although Distant (1910, p. 314) is of the opinion that the abdominal appendices are a little longer than the body. Pronotum is wider than long and scutellum is almost as long as wide. Claval commissure is slightly shorter than the anterior femora. Intermediate femora are always longer than the intermediate tibiae but distinctly shorter than the femora of anterior legs. Posterior femora and tibiae are almost equal in length. The parameres (text-figs. 5*d*, *e*) of two male examples examined on permanent mounts were found to be identical.

The parameres of this species have not been figured or described by previous workers.

Length of male and female specimens has been found varying from 15.1 to 17 mm. and 16.9 to 19 mm. respectively.

Eighteen specimens of the species were collected from the following localities :—One male from Jhitri bandh, Salebhata (7.3.46); two males and two females from Ang river, Salebhata (8.3.46); one male from Ang river, Agalpur (9.3.46); one female from Gait sarovar, Bolangir (11.3.46); three males and four females from Tahsil bandh (14.3.46); one female from Deosar tank no. 2 (18.3.46).

The species is represented in the collection of the Zoological Survey of India from Bengal, Bihar, Orissa, United Provinces, Punjab, Bombay Presidency, Madras Presidency, Ceylon, Cochin State and Siam. It has also been recorded from Burma.

Laccotrephes ruber (Linn.).

1906. *Laccotrephes ruber*, Distant, *Faun. Brit. Ind. Rhyn.* III, pp. 18, 19.

1939. *Laccotrephes ruber*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLI, pp. 429, 430.

The anterior femora and tibiae of all the specimens are marked with prominent fuscous shadings but the markings on the posterior femora and tibiae are feeble and less conspicuous. Prosternum is convex along the middle line and provided with a tubercle in the anterior region and a slightly raised tubercle-like area medially near the posterior margin. Abdominal appendages of all but one specimens are distinctly longer than the body. [In one female example collected from Tahsil bandh, Patnagarh (14.3.46) abdominal appendages and body are of equal length.] Pronotum is wider than long and claval commissure is shorter than the length of the anterior femora. Posterior femora and tibiae are of almost equal length. Anterior femora are more or less equal to posterior femora but distinctly longer than the intermediate femora. Neither a description nor an illustration of the paramere of this species is recorded in the available literature consulted and the latter is now presented in text-fig. 6*d*, *e*.

Lengths of male and female specimens vary from 27.0 to 27.3 and 28.0 to 30.6 mm. respectively.

Nineteen specimens collected from the following localities are referred to this species:—two females from Purnibandh, Salebhata (7.3.46); two females from Ang river, Salebhata (8.3.46); one male and two females from Farm tank, Bolangir (10.3.46); two females from Tahsil bandh, Patnagarh (14.3.46); two males from Sukhtel river, down stream, Hari-shanker (16.3.46); two males and six females from Deosar Tank No. 2 (18.3.46).

The species has been recorded by Distant from India, Burma, Ceylon, China, Japan and Formosa. It is represented in the collections of the Zoological Survey of India from Bengal, Bihar, United Provinces, Madras Presidency, Bombay Presidency, Ceylon and Burma.

Ranatra filiformis Fabricius.

1906. *Ranatra filiformis*, Distant, *Faun. Brit. Ind. Rhyn.* III, p. 21.

1906. *Ranatra sordidula*, Distant, *Faun. Brit. Ind. Rhyn.* III, p. 22.

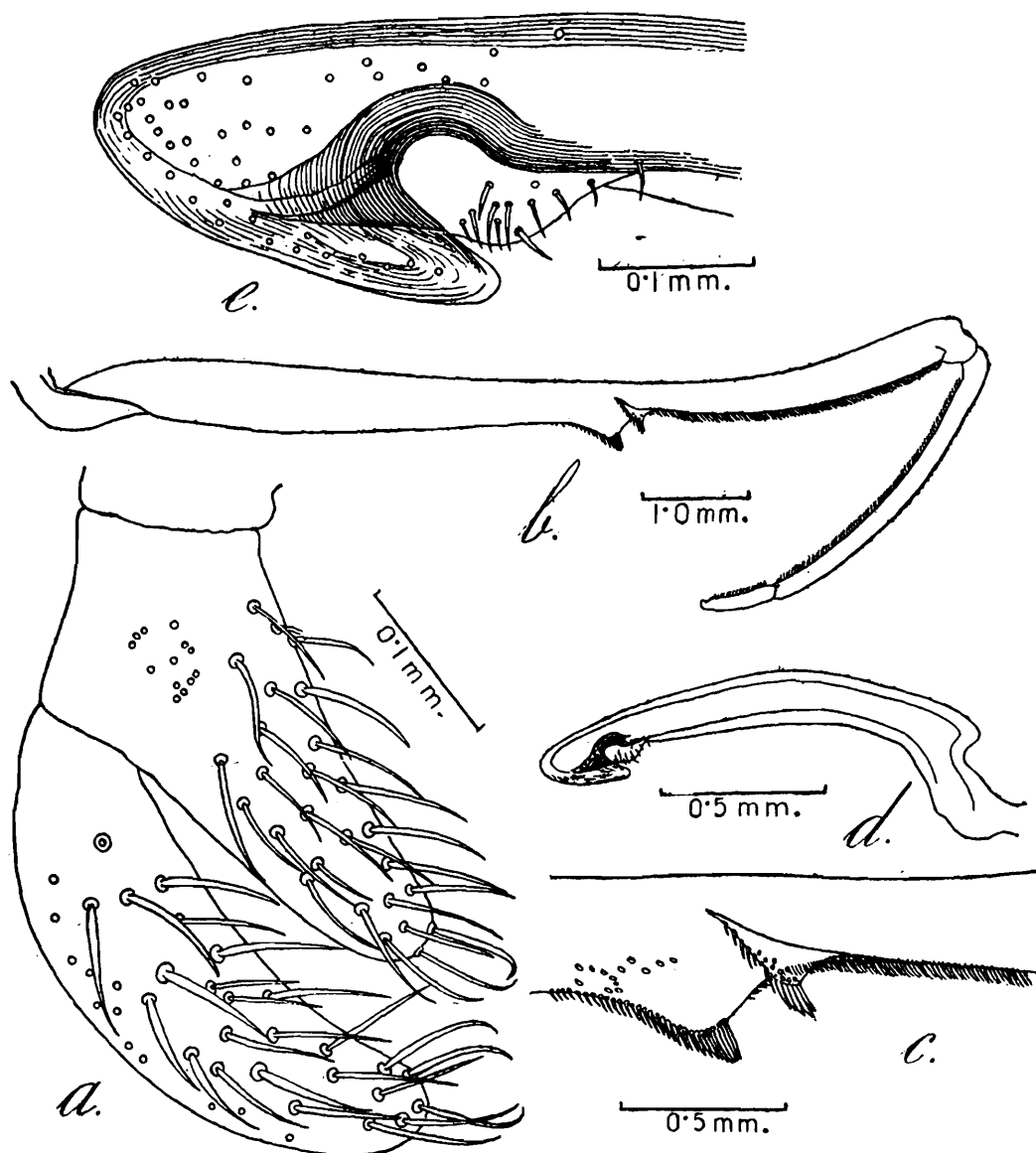
1934. *Ranatra filiformis*, Lundblad, *Arch. Hydrobiol. Plankt.* XII (Supplement), pp. 36-38, text-fig. 7.

1939. *Ranatra filiformis*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLI, p. 430.

The description of this species (Distant, 1906) is meagre as it is mostly based on colouration only. The characters observed in fifteen examples of the species collected from the Patna State are given below:—

Head is usually provided with a minute distinct tubercle or sometimes with a blunt slightly elevated area on the vertex between eyes. Distant (1906, p. 21) omitted to mention anything about the structural characters of antenna, anterior femoral dentation and the presence or absence of a tubercle on the vertex. Interocular space is slightly greater than the width of the eye. Second antennal joint is blunt and somewhat triangular, usually a little shorter than the third. It is pale in the basal region

but tinged with brown apically. Third antennal joint is slightly curved and tinged with brown distally. Outer surfaces of both the joints are covered with thorny bristles (text-fig. 6a). In some specimens the second



TEXT-FIG. 6.—a. *Ranatra filiformis* Fabr. Antenna; b. *R. filiformis* Fabr. Anterior leg; c. *R. filiformis* Fabr. Part of the anterior femur highly magnified in the teeth region; d. *Laccotrephes ruber* (Linn.) Paramere; e. *L. ruber* (Linn.) Apical part of paramere highly magnified.

and third antennal joints are of the same length. Anterior femora are bidentate; they are about as long as or slightly longer than the head and pronotum together; the shape, size and distance of the inner or dorsal tooth from the ventral one is as in the text-figs. 6b, c. Metasternal process is broadly triangular and slightly carinate posteriorly with its point rounded. Abdominal appendages are distinctly shorter than the body. The hemelytra extend upto the base of the last abdominal segment or slightly beyond it and posterior femora upto the anterior half of the last abdominal segment. In some specimens posterior femur extends only upto the base of the last abdominal segment. All the legs are marked with obscure fuscous annular shadings, and the intermediate and posterior tibiae and tarsi are infuscate.

The parameres of male specimens are figured by Lundblad (1934, p. 36, fig. 7).

The length of the body and abdominal appendages vary from 21.1 to 25.4 mm. and 18.2 to 22.7 mm. respectively.

The actual measurements in mm. of the body, abdominal appendages, anterior femur, etc., are given below :—

Sex		Length of body	Length of abdominal appendages	Length of anterior femur	Length of head and pronotum together
♂	..	21.1	19.3	7.5	7.1
		22.9	19.5	8.0	7.9
	..	21.9	19.8	8.2	7.2
	..	23.0	18.9	8.2	7.5
	..	24.8	19.9	8.7	8.2
	..	25.4	22.7	9.1	8.2

Fifteen examples of the species were collected from the following localities :—Two male and two female specimens from Ang river, Salebhata (8.3.46) ; one male specimen from Farm Tank, Bolangir (10.3.46) ; two male and four female specimens from Deo sar Tank no. 2 (18.3.46) ; one female specimen from Tel river, Belgaon (19.3.46) ; one male and two female specimens from Titilagarh Tank (20.3.46).

The species is represented in the collections of the Zoological Survey of India from Assam, Bengal, Bihar, United Provinces, Chota Nagpur, Ceylon and Siam.

Ranatra varipes Stål.

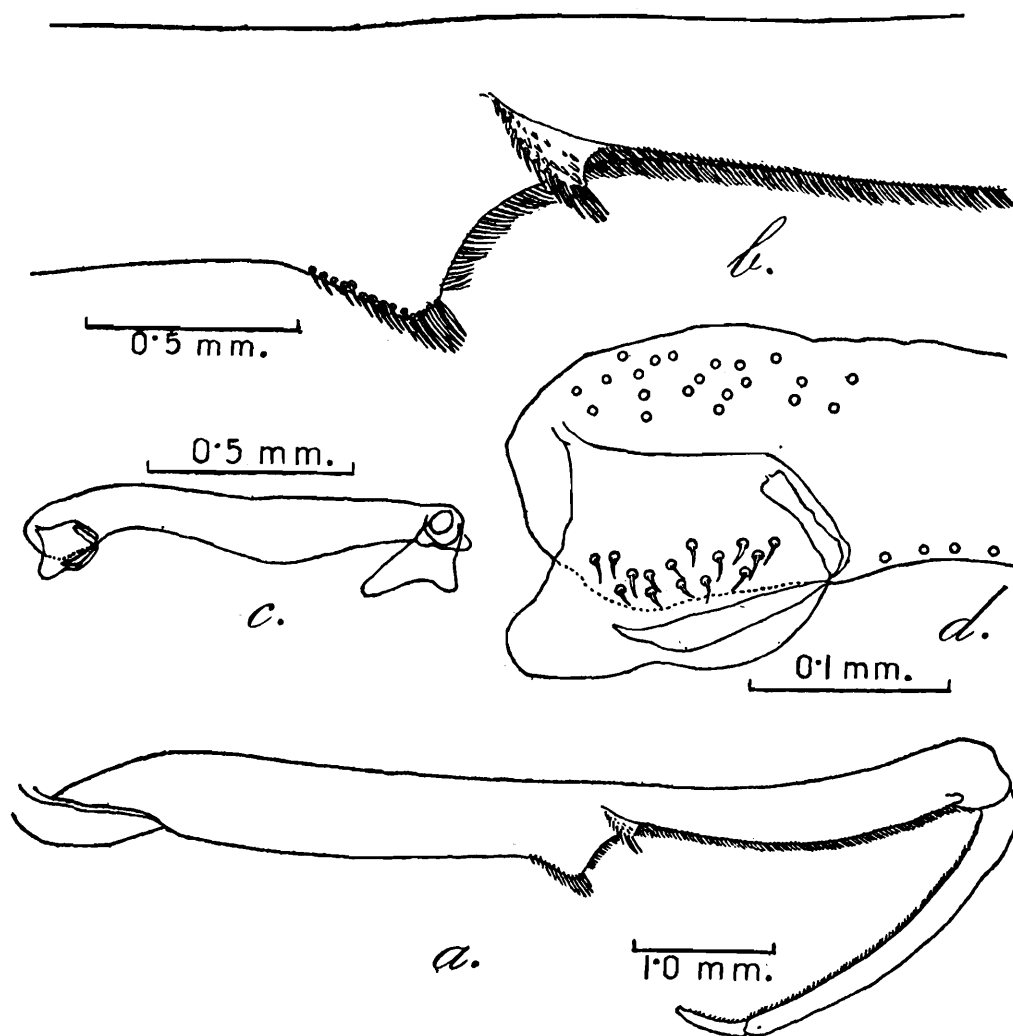
1910. *Ranatra varipes*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), p. 316.

1934. *Ranatra varipes*, Lundblad, *Arch. Hydrobiol. Plankt.* XII (Supplement), pp. 34-36, text-fig. 6.

Montandon, quoted by Distant (1910), has described the species as "very near *R. longipes* Stål and from the same localities, hardly to be separated except by the posterior legs and the abdominal appendices which are shorter ; the length is proportionally less and the intraocular space a little less constricted. The pronotum is of the same form in the two species" This account is obviously quite insufficient. The species has been confused with *R. filiformis* and *R. longipes* by previous workers. Lundblad (1934), however, pointed out that the structure of the paramere is quite characteristic of the species and by the help of this character the male specimens can be easily distinguished from those of other species. The following account which is based on a study of the specimens collected from the Patna State and also on those present in the named collection of the Zoological Survey of India has been used to separate the specimens of both the sexes from closely allied species.

General colouration ochraceous, with abdomen above dark brownish-ochraceous and its lateral margins pale ochraceous ; the terminal segment of the abdomen above greyish ; all legs marked with annular fuscous shadings ; middle and posterior tibiae and tarsi infuscate at their apices ;

head devoid of a tubercle on the vertex between eyes, eyes small and more or less rounded, interocular space slightly greater than the width of the eye; second antennal joint smaller than the third, both pale with slight tinge of brownish and covered with a few thorny bristles; metasternal process short and narrow, slightly carinate posteriorly with its point bluntly rounded; abdominal appendages distinctly shorter than the body; hemelytra reaching slightly beyond the base of the last abdominal segment; posterior femora extending upto the base of the last abdominal segment and in some cases even upto the anterior—third of the last segment; anterior femora bi-dentate and a little longer than the head and pronotum together, the dorsal or inner tooth of anterior femur short, triangular and at a distance from the ventral tooth (text-figs. 7a, b).



TEXT-FIG. 7.—*Ranatra varipes* Stål.

a. Anterior leg; b. Part of the anterior femur highly magnified in the teeth region; c. Paramere; d. Apical part of the paramere highly magnified.

The paramere of male specimens is very characteristic and appears hatchet-shaped as in text-figs. 7c, d.

The length of body, abdominal appendages, etc. of two male examples is as follows :—

Sex	Body length	Length of abdominal appendages	Length of anterior femur	Length of head and pronotum together
♂	19.1 mm.	15.0 mm.	6.7 mm.	5.5 mm.
	18.5 mm.	14.1 mm.	6.1 mm.	5.4 mm.

The species is represented in the collection of the Zoological Survey of India from Bengal, United Provinces, Madras Presidency, Malay Peninsula, Southern Shan States and Siam.

Ranatra elongata Fabricius.

1906. *Ranatra elongata*, Distant, *Faun. Brit. Ind. Rhyn.* III, pp. 20, 21.

This species is readily distinguished by the structure of the anterior femur which is provided with one big triangular tooth beyond the middle of its length and a pair of short teeth a little before the apex at the proximal border of a shallow notch and by its characteristic metasternal process which is sub-triangular and centrally longitudinally foveately sulcate. The paramere of the male specimen examined is shaped as figured by Lundblad¹. Some structural details are added here.

Head devoid of a tubercle on the vertex between eyes. Interocular space almost equal to the width of the eye. Second joint of the antenna triangular while the third curved and stout; both the joints somewhat dark brownish and covered with thorny bristles. Hemelytra reaching upto the middle of the subterminal segment. Posterior femora extending either upto the middle or in some cases only upto the base of the last abdominal segment.

The abdominal appendages are invariably longer than the body as mentioned by Distant. Length of the body and respiratory tube (or abdominal appendages) of a few male and female specimens as below :—

Sex	Body length	Length of abdominal appendages
♂	39.9 mm.	48.8 mm.
	40.9 mm.	52.1 mm.
	.. 41.5 mm.	57.8 mm.
	.. 44.2 mm.	50.8 mm.
	.. 43.9 mm.	49.0 mm.
	.. 46.8 mm.	55.1 mm.

¹ Lundblad, O., *Arch. Hydrobiol. Plankt.* XII (Supplement), p. 41, fig. 9B (1934).

Fifty-six adult and two juvenile specimens of the species were collected from the following localities :—

Four female specimens from Jhitri bandh, Salebhata (7.3.46); twenty-three male and fifteen female specimens from Tank no. 2 and three male specimens from Tank no. 3, Bolangir (11.3.46); three male, seven female and two juvenile specimens from Tahsil bandh, Patnagarh (14.3.46); one male specimen from Titilagarh tank (20.3.46).

The species is represented in the collections of the Zoological Survey of India from Bengal, Bihar, Orissa, Chota Nagpur, United Provinces and Madras Presidency.

Ranatra titilaensis, sp. nov.

Brownish-ochraceous; short, thin and slender; head and pronotum castaneous or ochraceous, posterior area of pronotum slightly darker in hue; abdomen beneath, legs and abdominal appendages pale ochraceous; abdomen above ochraceous; intermediate and posterior tibiae and tarsi infusate; head without a distinct pointed tubercle on the vertex between eyes; interocular space almost equal to the width of the eye; second joint of antenna pale in colour, somewhat tapering towards the end, equal or subequal to the third joint, the latter pale ochraceous, elongate, slightly curved and bluntly rounded at the end, both the joints covered with a few thorny bristles (text-fig. 8a); metasternal process broad, truncate and slightly carinate posteriorly; abdominal appendages considerably shorter than the body (approximately by about $\frac{1}{3}$ the total length of body); hemelytra reaching upto the base of the last abdominal segment; posterior femur reaching upto the base of the last abdominal segment; anterior femora slender and bi-dentate, the teeth lying beyond the middle of their length, inner or dorsal tooth short, narrow and convexly rounded, ventral tooth flattened and not much projected as in other species, the shape, proportionate size and distance between the teeth as in the text-figs. 8b, and c; length of head and pronotum together almost equal to the anterior femur; paramere of male hook-shaped, narrow at the proximal end and appearing somewhat bulged out ventrally about the middle of its length, at the extremity slightly flattened, bent inward and upward towards the dorsal side, and with a small tooth-like process (clearly visible under the high power of a microscope) projecting obliquely upward and forward as in the text-figs. 8d, e.

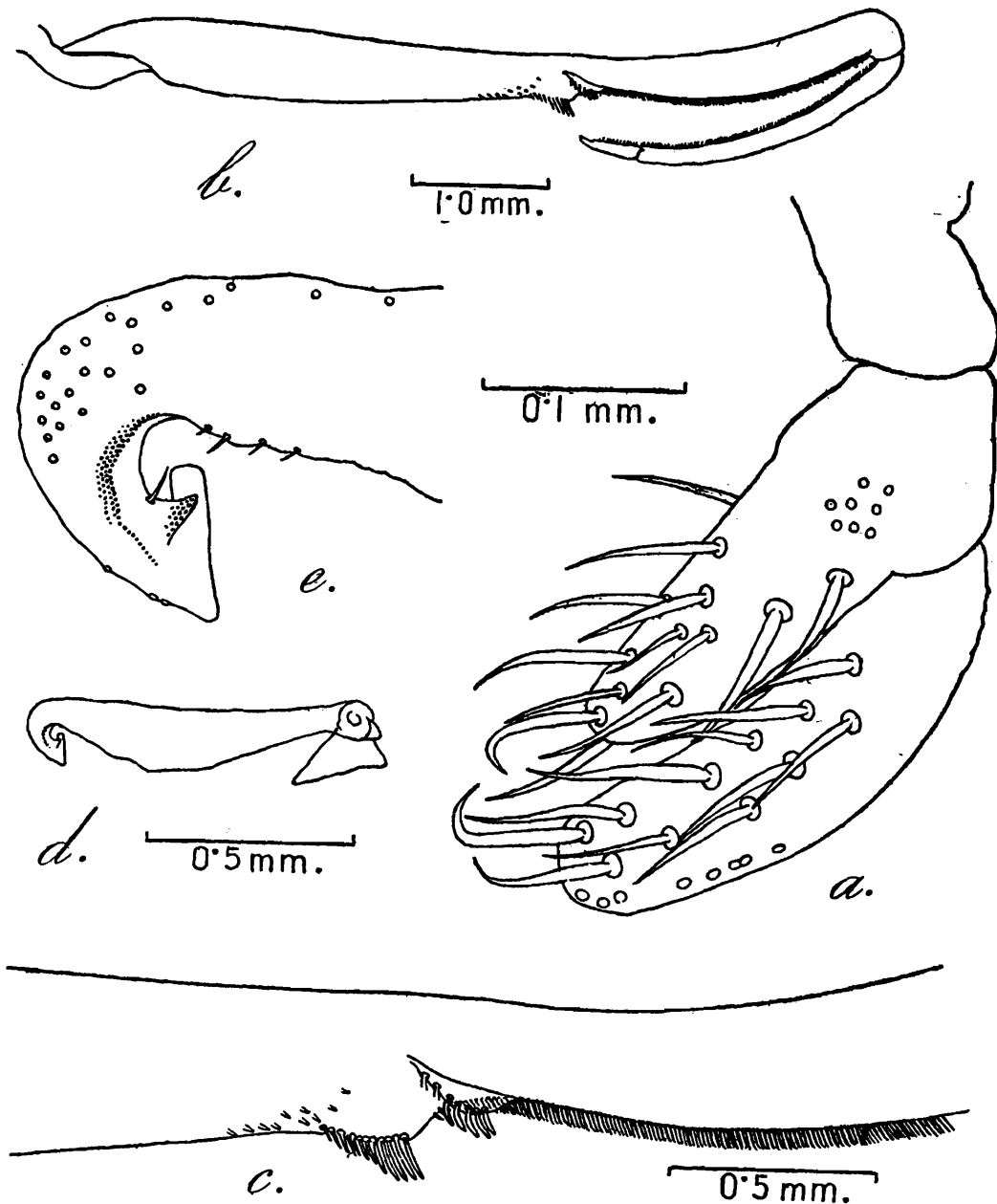
Both male and female specimens are readily recognised by the help of the structure of the anterior femur, while the male specimen alone is distinguished by the structure of the paramere.

Length of the body 17.5 mm.; length of abdominal appendages 13.1 mm.

Type-specimen.—No. $\frac{5990}{H_7}$, Zoological Survey of India.

Locality.—Titilagarh, Patna State, Orissa.

The measurements of the body, abdominal appendages, etc., of a few male and female examples are as follows :—



TEXT-FIG. 8.—*Ranatra titilaensis*, sp. nov.

a. Antenna; b. Anterior leg; c. Part of the anterior femur highly magnified in the teeth-region; d. Paramere; e. Apex of paramere highly magnified.

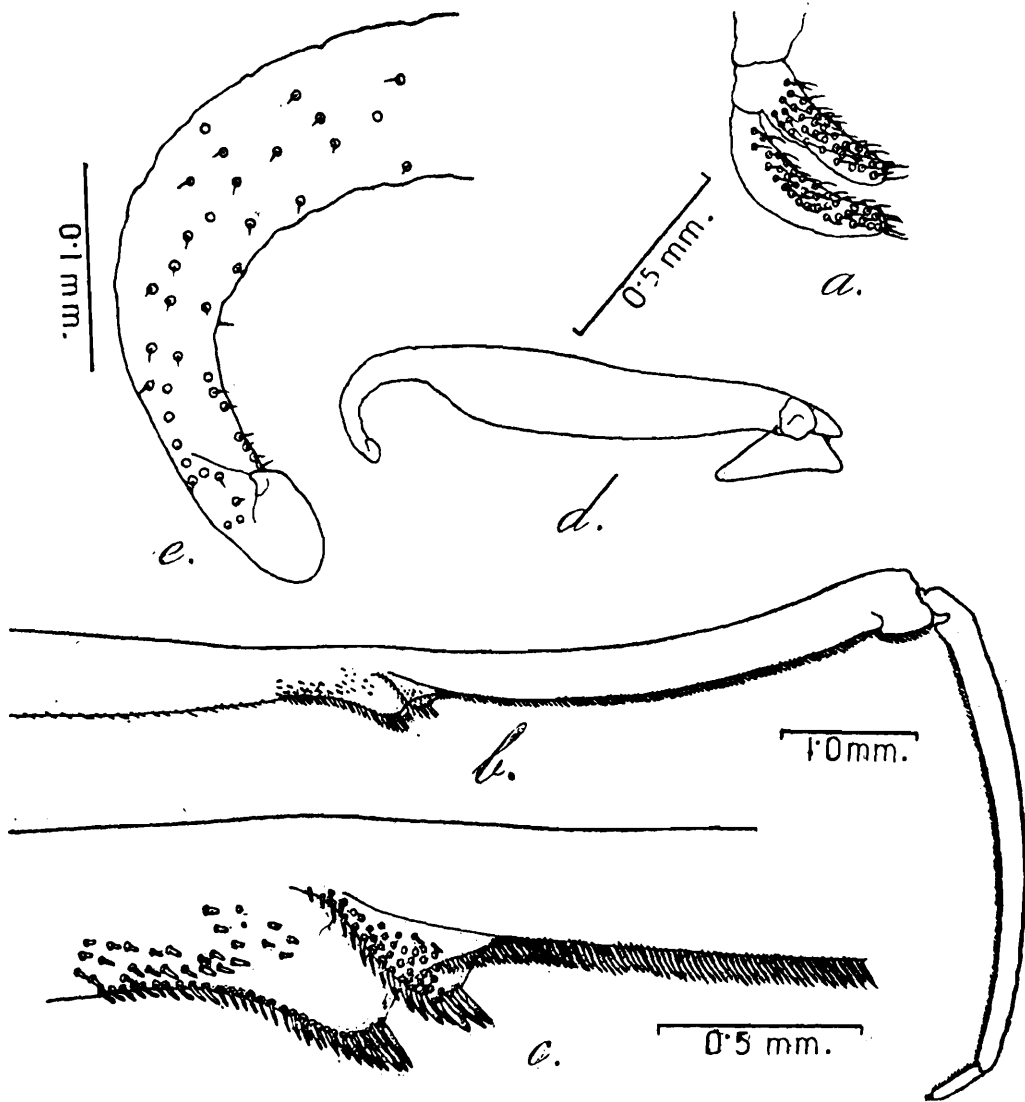
Sex	Body length	Length of the abdominal appendages	Length of anterior femur	Length of head and pronotum together
♂	17.5 mm.	13.1 mm.	5.7 mm.	5.4 mm.
♀	17.3 mm.	12.6 mm.	5.8 mm.	5.4 mm.
♀	18.4 mm.	12.5 mm.	6.1 mm.	5.6 mm.
♀	18.7 mm.	12.9 mm.	5.9 mm.	5.7 mm.
♀	19.3 mm.	13.3 mm.	5.9 mm.	5.8 mm.
♀	19.5 mm.	13.8 mm.	6.0 mm.	6.0 mm.

Thirteen specimens of the species were collected from the following localities in the Patna State, Orissa :—Two male and seven female speci-

mans from Deosar tank (18.3.46); two male and two female specimens from Titilagarh tank near the Inspection bungalow.

***Ranatra digitata*, sp. nov.**

Dark brownish-ochraceous; moderately stout; head and anterior area of pronotum pale castaneous; abdomen beneath, legs and abdominal appendages pale ochraceous, abdomen above dark fuscous with a fuscous longitudinal linear fascia extending upto the apex of the penultimate segment of the abdomen, lateral margins of the abdomen pale ochraceous, terminal abdominal segment grayish; femora of all legs with a narrow annular blackish tinge at the apices; middle and posterior tibiae and tarsi infusate; head without any tubercle or blunt elevation on the vertex between eyes; interocular space slightly narrower than the width of the eye; second joint of antenna elongate, digitate (or finger-like) and blackish for its whole length, third joint curved and longer than the second, its concave surface dark-brownish from base to apex, both the joints covered with thorny bristles (text-fig. 9a); metasternal



TEXT-FIG. 9.—*Ranatra digitata*, sp. nov.

a. Antenna; b. Anterior leg; c. Part of the anterior femur highly magnified in the teeth region; d. Paramere; e. Apex of paramere highly magnified.

process broadly convexly rounded with a slight median keel posteriorly ; abdominal appendages are a little shorter than the body ; hemelytra reaching a little beyond the base of the last abdominal segment ; anterior femora with two teeth beyond the middle of their length, inner or dorsal tooth broadly triangular and not very distant from the ventral one ; the shape, size and relative distance between the two teeth as in the text-figs. 9*b, c* ; length of head and pronotum together almost equal to the anterior femur ; paramere of male hook-shaped, broadest beyond the middle, narrower and somewhat semi-circularly curved in the distal region and with a short recurved apical blunt process directed upward and backward as in the text-figs. 9*d, e*.

Length of the body 27.5 mm. ; abdominal appendages 27.0 mm.

Type-specimen.—No. $\frac{5989}{H_7}$, Zoological Survey of India.

Locality.—Titilagarh, Patna State, Orissa.

Measurements of the body, abdominal appendages, etc., are given below :—

Sex	Body length ¹	Length of abdominal appendages	Length of anterior femur	Length of head and pronotum together
♂	27.3 mm.	26.4 mm.	9.3 mm.	9.3 mm.
	26.2 mm.	26.9 mm.	9.3 mm.	8.7 mm.
	27.8 mm.	27.0 mm.	9.3 mm.	9.1 mm.
	27.8 mm.	28.2 mm.	9.5 mm.	9.3 mm.
	28.1 mm.	25.4 mm.	9.2 mm.	9.4 mm.
	28.1 mm.	26.2 mm.	9.5 mm.	9.5 mm.

Six specimens of the species were collected from the following localities in the Patna State, Orissa :—One male specimen from Tahsil bandh and one female specimen from Bhoosagar and Mainey bandh, Patnagarh (14.3.46) ; one male specimen from Deosar tank (18.3.46) ; one male specimen from Tel river, Belgaon (19.3.46) ; one male and one female specimen from a tank at Titilagarh near Inspection bungalow (20.3.46).

Family HYDROMETRIDÆ

Distant^{1a} (1904) included under the family Hydrometridae four sub-families, namely, Mesoveliinae, Hydrometrinae, Veliinae and Gerrinae. Bueno² (1925) did not include the above subfamilies under the family Hydrometridae but recognised them as distinct families. Lundblad³ (1934) also considered Mesoveliidae, Hydrometridae, Veliidae and Gerridae as distinct families and this system is followed in the present work.

Hydrometra vittata Stål.

1904. *Hydrometra vittata*, Distant, *Faun. Brit. Ind. Rhyn.* II, p. 170.

This species is represented in the collection under study by two examples and the hemelytra in both the specimens extend upto the middle

¹ Body length does not include the length of the rostrum or the abdominal appendages.

^{1a} Distant, W. L., *Faun. Brit. Ind. Rhyn.* II, p. 168 (1904).

² Bueno, J. R. de la Torre, *Spolia zeylanica* XIII, pp. 225-234 (1925).

³ Lundblad, O., *Arch. Hydrobiol. Plankt.* XII (Supplement), pp. 185-195 and 285-435 (1934).

of the fifth abdominal segment although Distant (1904) described them as reaching upto the base of the fifth abdominal segment. The colour of the underside is paler in thoracic region and dark brownish in the abdominal region.

Distant mentioned the length of the specimens of the species as 11 to 12 mm. The specimens collected from Patna State are slightly smaller in size, the actual measurements being 10.5 mm.

Two examples were collected from Deosar tank (18.3.46) in the Patna State, Orissa.

The species has been recorded by Distant from India, Ceylon, Burma Malay Peninsula, Philippines and Japan.

Family VELIIDAE

Microvelia douglasi Scott.

1874. *Microvelia douglasi*, Scott, *Ann. Mag. Nat. Hist.* (4) XIV, p. 448.

1934. *Microvelia douglasi*, Lundblad, *Arch. Hydrobiol. Plankt.* XII (Supplement), pp. 347-357.

This species is represented in the collection under study by five male and twelve female examples collected from Sukhtel river at Gandh Mardan Pervat, Harishanker (15.3.46).

M. repentina Dist., *M. singalensis* Kirk., *M. Kumaonensis* Dist. and *M. samoa* Esaki have all been referred to *M. douglasi* as synonyms by Lundblad (1934).

The species has been recorded from India, Ceylon, Samoa, Sumatra, Java and Japan.

Family GERRIDAE

Cylindrostethus productus (Spinola).

1904. *Cylindrostethus productus*, Distant, *Faun. Brit. Ind. Rhyn.* II, p. 184, fig. 132.

1910. *Janias elegantulus*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), pp. 148, 149, fig. 80.

1939. *Cylindrostethus productus*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLI, pp. 428, 429.

This species is represented in the collection under study by eleven male and seventeen female examples collected from Sukhtel river at Gandh Mardan Pervat, Harishanker (15.3.46).

Specimens of both the sexes collected from the above locality are macropterous.

Length of body of male and female specimens varies from 22.3 to 23.4 mm. and from 23.2 to 24.0 mm. respectively.

The species is represented in the collection of the Zoological Survey of India from Bihar, Travancore, Bombay Presidency and Ceylon.

Metrocoris stali (Dohrn).

1904. *Metrocoris stali*, Distant, *Faun. Brit. Ind. Rhyn.* II, p. 190.

1910. *Metrocoris stali*, Distant, *Faun. Brit. Ind. Rhyn.* V (Appendix), p. 158.

1926. *Metrocoris stali*, Esaki, *Ann. Hist.-nat. Mus. Nat. Hungar.* XXIII, pp. 123-124.

Two apterous examples, one male and one female, of this species were collected from Sukhtel river, Gandh Mardan Pervat, Harishanker (16.3.46).

Length of male and female specimen being 4.4 and 4.2 mm. respectively.

The species is represented in the collections of the Zoological Survey of India from Bengal, Bihar, United Provinces, Punjab and Bombay Presidency.

It has also been recorded by Distant from Madras, Sikkim, Nepal and Ceylon.

Ptilomera sp.

The subfamily Ptilomerinae is represented in the collection under study by two examples which are referred to the genus *Ptilomera*. When a large series of material becomes available it will be possible to refer these to a species of the genus.

Two specimens, one male and one female were collected from Sukhtel river, Gandh Mardan Pervat, Harishanker (15.3.46).

Family BELOSTOMATIDAE

Sphaerodema molestum (Duf.)

1906. *Sphaerodema molestum*, Distant, *Faun. Brit. Ind. Rhyn.* III, pp. 36, 37.

Distant's (1906) account of the species is insufficient and, therefore the following characters are added. Hemelytra are longer than broad and with a rounded or oval shining spot of very fine close-set short bristles beyond the middle of their length at the inner margin. A similar spot is described by Lundblad¹ in the closely allied species *S. rusticum* (Fabr.). Anterior tarsus one-jointed and anterior tarsal claws are moderately well developed. The ventro-lateral stripe of fine hair on the abdomen is broad.

Two female specimens, one from the tank Purni bandh and the other from Jhutel bandh, measuring 15.6 and 16.9 mm. in length were collected from Salebhata (7.3.46).

The species has been recorded by Lundblad from India, Malacca and Sumatra.

Sphaerodema rusticum (Fabricius).

1906. *Sphaerodema rusticum*, Distant, *Faun. Brit. Ind. Rhyn.* III, p. 36.

1934. *Sphaerodema rusticum*, Lundblad, *Arch. Hydrobiol. Plankt.* XII (Supplement), pp. 55-61.

The head is almost as long as greatest width between eyes. Hemelytra are longer than broad and with a rounded spot of very fine close-set

¹Lundblad O., *Arch. Hydrobiol. Plankt.* XII (Supplement), p. 56, fig. 16 (1934).

short hairs beyond the middle of their length near the inner margin. Anterior tarsus is one-jointed and the tarsal claws are very short. The ventro-lateral stripe of fine hair on the abdomen is narrower than *S. molestum* (Duf.).

Length 17.5 mm., greatest breadth 10.5 mm.

Hemelytra 13.5 mm. long.

The species is represented in the collection by one female specimen collected at Salebhata on 7.3.46 from the tank Jhutel bandh.

The species is widely distributed and has been recorded from India, Burma, Ceylon, Siam, Malay Peninsula, Sumatra, Java, Philippines, China, Japan, Formosa, Newguinea and Australia.

Sphaerodema annulatum (Fabricius).

1906. *Sphaerodema annulatum*, Distant, *Faun. Brit. Ind. Rhyn.* III, pp. 35, 36.

1939. *Sphaerodema annulatum*, Hafiz and Ribeiro, *Rec. Ind. Mus.* XLI, p. 431.

Hemelytra are invariably longer than broad and without a rounded spot of fine close-set short hairs as in the other two species of the genus dealt with in this paper. Anterior tarsus is two-jointed and the tarsal claws are well developed.

The species is represented by nine specimens collected from the following localities :—Four male and three female specimens from Deval bandh tank, three miles west of Patnagarh (17.3.46) ; one female specimen from Deosar tank (18.3.46) ; one male specimen from a tank near the Inspection bungalow at Titilagarh (21.3.46).

The species has been recorded from India and Formosa and is represented in the collections of the Zoological Survey of India from Assam, Bengal, Bihar, Orissa and Chota Nagpur.

Lethocerus indicus (Lepeletier and Serville).

1906. *Belostoma indicum*, Distant, *Faun. Brit. Ind. Rhyn.* III, pp. 38, 39, fig. 24.

1934. *Lethocerus indicus*, Lundblad, *Arch. Hydrobiol. Plankt.* XII (Supplement), pp. 52-55, text-fig. 15, pl. XVI, figs. 3-4.

This very common species is represented in the collection by two examples, one male and one female collected from a tank at Titilagarh (20.3.46).

The species has a wide range of distribution in the Oriental region and is known in India from Darjeeling district, Eastern Himalayas; Assam; Bengal; Bihar; Orissa; the United Provinces; Sind; the Bombay Presidency and the Madras Presidency. It has also been recorded from Ceylon, Burma, Siam, China, Formosa, Sumatra, Java and the Philippines.