

A REVIEW OF THE GENUS CERCOTMETUS AMYOT & SERVILLE,
1843 (HEMIPTERA-HETEROPTERA: NEPIDAE)

by

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ABSTRACT

The genus is defined and a key to species presented. *Cercotmetus asiaticus* Amyot & Serville, *asiaticus* var. *longicollis* Montandon, *brevipes* Montandon, *robustus* Montandon, *dissidens* Montandon, *pilipes* (Dallas), *fumosus* Distant, *strangulatus* Montandon and *compositus* Montandon are redescribed and figured. *Cercotmetus formosanus* Sonan is made a synonym of *brevipes* and the position of *horni* Montandon is discussed. All the available distribution data are given, based on material examined by the author. No new species are described in this review.

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INTRODUCTION

Ten species and one variety of *Cercotmetus* have been described making it the second largest Ranatrine genus. *Ranatra* F. with an almost cosmopolitan distribution is the largest with about 120 species. *Cercotmetus* has a limited distribution and appears to be confined to an area East of 70° longitude, the most northerly record is from Bhoutan and it is not found South or East of New Guinea *). The largest number of species are found in the Viet Nam-Thailand region.

Lundblad (1933) reviewed the species found in Sumatra and Java, redescribing and figuring *C. asiaticus* Amyot & Serville, *brevipes* and *compositus* Montandon. Hafiz & Pradhan (1949) redescribed and figured *fumosus* Distant, recording it from India for the first time.

Amyot & Serville (1843) described *Cercotmetus* very briefly, including one species, *asiaticus* which becomes the type species. Dallas (1849) added *pilipes* and Montandon (1903) described *compositus*. Between 1909 and 1911 Montandon described another

*) An immature specimen of *Cercotmetus* has since been discovered in the USNM Collections from Australia, Groote Eyland, collected June 5, 1948, R. R. Miller. It may be *dissidens* or a new species.

five species and a variety of *asiaticus*. Montandon's types of *strangulatus*, *brevipes*, *horni* and *asiaticus* var. *longicollis* have been lost, but as they may eventually be found I have not designated neotypes. I have been fortunate in finding specimens of *brevipes* and var. *longicollis* named by Montandon which enabled me to redescribe them fully. The types of *robustus* and *dissidens* are both extant and I have been able to study them. The type series of *compositus* is in the Paris Museum and was not available for study. Again however, I did find material named by Montandon in another Museum which enabled me to redescribe and figure the species. The unique type of *horni* is lost and I have not seen any specimens which could with certainty be attributed to this species. I have not been able to trace the whereabouts of the type series of *Cercotmetus formosanus* Sonan (1928), described from Formosa.

No new species are described in this review. All the distribution data given are based on material seen by myself, localities are spelt as on the original data labels, supplementary information is in square brackets. All illustrations are by the author.

The material used for this study is preserved in the collections of the following museums and private entomologists.

AMNH	=	American Museum of Natural History, New York, U.S.A.
BISH	=	Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.
BM	=	British Museum (Natural-History) London, England.
CNM	=	Colombo National Museum, Ceylon.
DEI	=	Deutsches Entomologisches Institut, Eberswalde, East Germany.
KU	=	University of Kansas, Lawrence, Kansas, U.S.A.
LAM	=	Los Angeles Country Museum, California, U.S.A.
MBUD	=	Hungarian Natural History Museum, Budapest, Hungary.
ML	=	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.
NMB	=	Naturhistorisches Museum, Basel, Switzerland.
NRS	=	Naturhistoriska Riksmuseum, Stockholm, Sweden.
OUM	=	Oxford University Museum, Oxford, England.
Pol. Coll.	=	Coll. of John T. Polhemus, Englewood, Colorado, U.S.A.
USNM	=	United States National Museum, Washington, U.S.A.
UZMC	=	Universitetets Zoologiske Museum, Copenhagen, Denmark.
ZMA	=	Zoologisch Museum Amsterdam, Netherlands.
ZMB	=	Zoologisches Museum der Humboldt-Universität, Berlin, East Germany.
ZMH	=	Zoological Museum, Helsinki, Finland.

BIOLOGY

Nothing is known about the biology of *Cercotmetus*. The strongly developed fringes of hairs on the middle and hind tibiae, very short fore legs and small robust respiratory siphon suggests an active predator more likely to be found in large lakes and running water, unlike its closest relative *Ranatra* which is most often found in stagnant conditions. Lundblad (1933) states that *C. asiaticus* was found in flowing water in Java and Sumatra, *brevipes* was found in Toba Lake, Sumatra. Hafiz & Pradhan (1949) found *fumosus* in the Tel River, Belgaon, Patna State.

The ovarian eggs of *Cercotmetus* are typically Ranatrine with two anterior respiratory horns (Fig. 1). Hinton (1962) distinguished the eggs of *Cercotmetus* from *Ranatra* by the length of the horns, those of *asiaticus* and *fumosus* being over 10 mm long, the

largest *Ranatra* horns then known being less than 8 mm long. Cobben (1968) illustrates a *Ranatra* species from West Africa which has horns clearly in excess of 8 mm. A specimen of *brevipes* from Sarawak contained eight ovarian eggs, the horn varying between 5—6 mm long. Ovarian eggs of *compositus* from Sumatra were found to be over 12 mm long.

TERMINOLOGY

To avoid lengthy descriptions several terms are used and defined as follows:

Interocular space = narrowest part of the vertex between the eyes.

Anterior collar = raised dorsal anterior margin of the prothorax.

Prothorax (pronotum) = distance dorsally from the anterior to posterior margin along the centre of the prothorax.

Transverse groove = division of the prothorax, always in the dorsal posterior half, only clearly visible laterally as a well defined sulcus.

Anterior lobe = distance dorsally from the anterior margin to the theoretical line of the transverse groove of the prothorax.

Posterior lobe = distance dorsally from the theoretical line of the transverse groove to the posterior margin of the prothorax.

Prothoracic pit = ventral depression at the distal end of the prothorax where it adjoins the mesosternum.

Cercotmetus Amyot & Serville, 1843

Cercotmetus Amyot & Serville, 1943: li & 441 (type species *asiaticus*). — Montandon, 1903: 107—108 (discussion & descript.). — Montandon, 1909: 63—65 (discussion & descript.). Lundblad, 1933: 45—51 (key to species & redescript.). — Hinton, 1961: 224—257 (physiol. ovarian egg). — Hinton, 1962: 65—68 (key to Nepid genera and some species using ovarian eggs).

Body subcylindrical and elongate with a posterior respiratory siphon which is about one fourth the length of the body.

Fore legs prehensile. Fore coxae elongate, always shorter than the femora. Middle and hind coxae small and rounded. Middle coxae always wider apart than hind coxae. Fore femora often irregularly annulated light and dark brown, shorter than the prothorax, with one tooth about midway along the ventral margin. Extending distally from the tooth a ventral sulcus fringed with short hairs. Fore tibiae and tarsus always shining and clearly marked compared with the femora. Fore tibiae about half as long as the femora, fore tarsus about one fourth the length of the tibiae, claws absent from fore legs. Middle and hind legs relatively long, greatly removed from the fore legs, tibiae with prominent fringes of long hairs. Middle femora always shorter than hind femora and middle tibiae always shorter than middle femora. All tarsi one-segmented.

Eyes large, outer margins reflexed downwards obscuring the ventral margin of the head. Clypeus very prominent, higher than the lora which are distinct from the inner margins of the eyes. Vertex variably raised above the eyes. The three-segmented antennae are not visible from above as they lie in ventral depressions between the eyes.

Prothorax dorsally divided into two lobes by a transverse groove which is only visible at lateral margins. Anterior lobe always much longer than the posterior lobe with two

short lateral sulci along antero-lateral margins Humeral width always greater than anterior width, humeral angles with short sulci. Posterior margin deeply concave.

Scutellum small and triangular, twice as long as broad. Clavus and corium coriaceous. Membrane with many small veins forming an irregular reticulate pattern. Tergites dark reddish brown and flat. Metasternum usually posteriorly emarginate. Sternites same colour as the elytra. First sternite not visible, second small and rounded between the hind coxae,

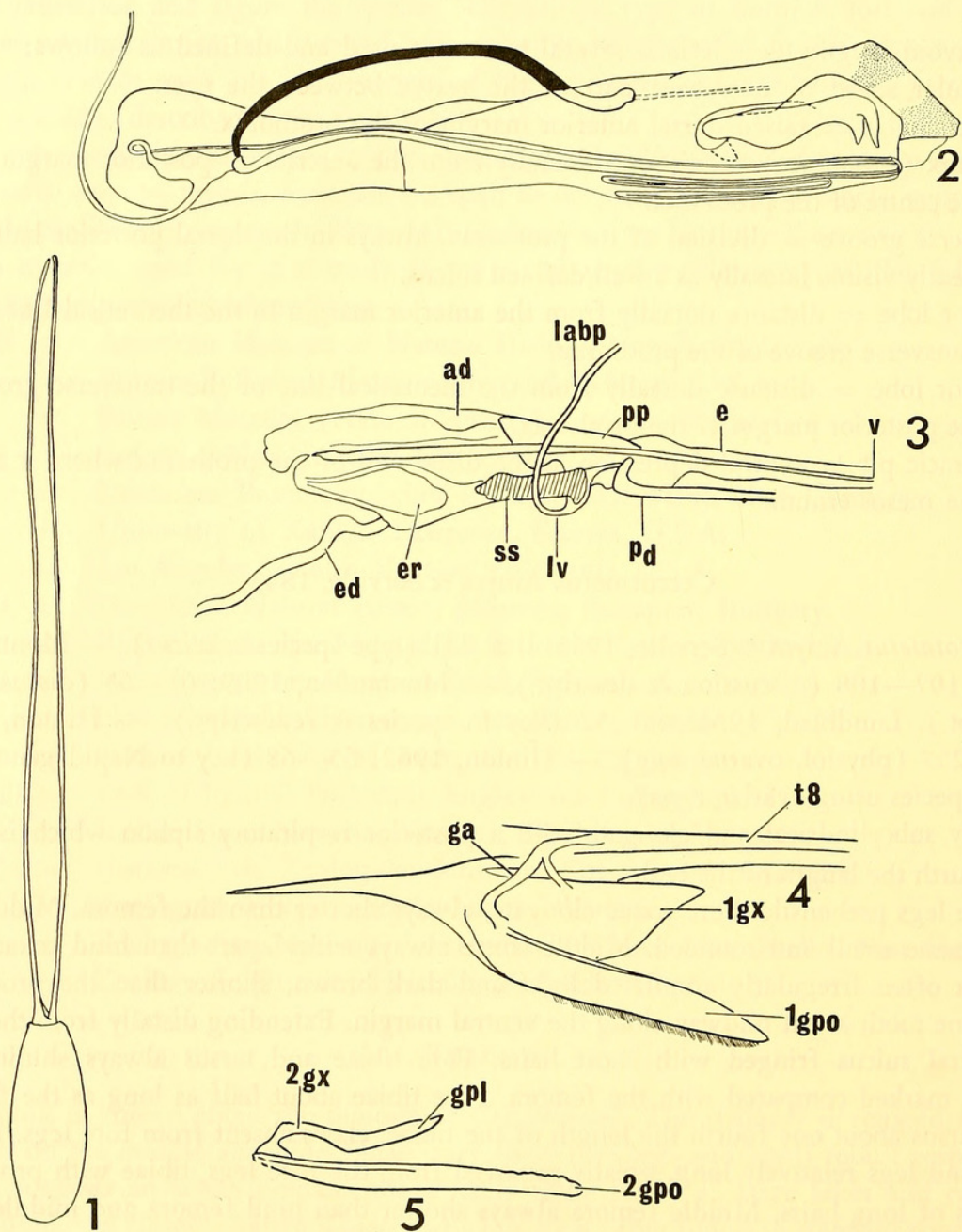


Fig. 1—5. 1, ovarian egg of *C. compositus* from Sumatra; 2, ♂ genital capsule of *asiaticus* from Java; 3, enlarged view of structures within anterior diverticulum of *compositus* from Sumatra; 4 and 5, diagrammatic view of ♀ genitalia of *compositus* from Sumatra, ad, anterior diverticulum; e, endosoma; ed, ejaculatory duct; er, ejaculatory reservoir; gpl, gonoplac; ga, gonangulum?; labp, lateral arms of the basal plate; lv, lamina ventralis; pd, posterior diverticulum; pp, phallothecal plates; ss, sclerotised strut; v, vesica; 1 gpo, 2 gpo, first and second gonapophysis; 1 gx, 2 gx, first and second gonocoxa; t8, paratergite 8

third-sixth longitudinally carinate, seventh variably developed as the operculum.

Male genitalia (Fig. 2 & 3) genital capsule 'U'-shaped, lateral margins sclerotised, dorsally enclosed by a membrane, ventrally the capsule is lightly sclerotised. Attached to the anterior end of the capsule is a large membranous anterior diverticulum within which part of the genitalia is enclosed (Fig. 2). Posteriorly the capsule is open allowing the anal cone and posterior diverticulum to protrude. Parameres symmetrical extending through clefts of the capsule.

Basal plates and bridge thin and lightly sclerotised, lateral arms of the basal plates long and lightly sclerotised extending well back into the anterior diverticulum. The lateral arms curve round the very small lightly sclerotised phallothecal plates uniting ventrally and joining a very short lamina ventralis. Attached to the other end of the lamina ventralis is a lightly sclerotised strut directed cephalad, the membranous ejaculatory reservoir is joined to the free end of the sclerotised strut. The ejaculatory duct enters the reservoir anterior of the lateral arms of the basal plate. The seminal duct enters the heavily sclerotised vesical rod which extends the entire length of the capsule (Fig. 3).

The posterior diverticulum is very long, thin and "V" shaped. The upper lateral margins are lightly sclerotised, the base more heavily so. Within the posterior diverticulum the vesical rod is enclosed in a membranous endosoma, ventrally the endosoma is joined to the anterior end of the posterior diverticulum, the dorsal margin is joined to the phallothecal plates.

Female genitalia (Fig. 4 & 5). Eighth paratergite elongate extending caudad and forming the respiratory siphon. First gonocoxa elongate, antero-dorsal margin produced cephalad as a long thin apodeme. First gonapophysis elongate, tapering caudad and sclerotised, dorsal edge of the first gonapophysis with rami extending about half way. Gonangulum? short and sclerotised, fused to paratergite nine?. Second gonapophysis very long, sclerotised and fused at the base. Second ramus extending along basal half of second gonapophysis and interlocking with first ramus. Second gonocoxa slender and curved, joined posteriorly by a lightly sclerotised bridge to the opposite second gonocoxa. Gonoploc sclerotised and elongate. Single median spermatheca present.

The genitalia of *Cercotmetus* are basically similar to those of *Ranatra*. I was unable to identify with certainty the gonangulum and ninth tergite of the first gonocoxa of the female genitalia as described by Scudder (1959).

SYSTEMATIC POSITION OF *Cercotmetus*

Cercotmetus clearly belongs to the *Ranatrinae* by having the parasternites concealed by the ventral laterotergites and eggs with two anterior respiratory horns. Lansbury (1972) has split the Oriental *Ranatra* into several species groups, *Cercotmetus* has many affinities with the *R. gracilis* Dallas group (*stali*, *distanti* and *spinifrons* Montandon and *parmata* Mayr) . . . short respiratory siphon, clypeus higher than lorum, vertex conspicuously raised or tuberculate, metasternum posteriorly emarginate, middle coxae wider apart than hind coxae and the ends of the hind femora do not reach the posterior margin of the sixth sternite . . .

This combination of similar features between all the species of one genus and about 20 % of the species of a very similar genus in the same faunistic region may be due to convergence. The data available do not so far support the possibility that species of

Cercotmetus are found in the same type of habitats as species of the *gracilis* group of *Ranatra*.

Cercotmetus is easily distinguished from *Ranatra* by a number of characters viz., outer margin of eyes reflexed downwards obscuring ventral margin of head, fore femora always shorter than prothorax and not sharply constricted in region of ventral tooth, middle and hind tibiae with conspicuous fringes of long hairs, phallotheca and ancilliary structures not contained within the sclerotised genital capsule but in the large membranous anterior diverticulum and the ejaculatory duct entering reservoir anterior of lateral arms of the basal plate.

KEY TO THE SPECIES OF *Cercotmetus*

Cercotmetus is a very homogeneous genus. Lundblad (1933) split *Cercotmetus* into two groups dependent upon whether the mesosternum was longitudinally keeled or smooth; this character I have found to be a little unreliable, because it is likely to be associated with the development of flight muscles. Since males are so far unknown of *C. robustus*, *dissidens* and *fumosus*, non-sexual characters have been used in separating the species in the key. Colour is of no use in naming *Cercotmetus*, in general they are some shade of brown and often covered with a layer of debris which obscures most of the ground colour and external features. The male genitalia are completely hidden by the operculum. To examine the genitalia, it is necessary to relax and lever down the operculum and partially withdraw the capsule from within the abdomen.

- | | | |
|-------|--|-----------------------------------|
| 1 | Vertex raised between the eyes, but without a prominent tubercle (Fig. 23, 36) | 2 |
| — | Vertex with a prominent tubercle (Fig. 56, 61) | 4 |
| 2 (1) | Not more than 42 mm long, middle femora clearly shorter than prothorax | <i>brevipes</i> Montandon |
| — | More than 47 mm long, middle femora longer than the prothorax | 3 |
| 3 (2) | Eyes widely separated (Fig. 36), fore femoral tooth small (Fig. 40) | <i>robustus</i> Montandon |
| — | Eyes larger (Fig. 43), fore femoral tooth larger (Fig. 48) | <i>dissidens</i> Montandon |
| 4 (1) | Middle femora not more than one fifth longer than the prothorax | 5 |
| — | Middle femora between one third and one half longer than the prothorax | 6 |
| 5 (4) | Not more than 40 mm long | <i>pilipes</i> (Dallas) |
| — | At least 48 mm long | <i>fumosus</i> Distant |
| 6 (4) | Mesosternum with a prominent keel (Fig. 15) | <i>asiaticus</i> Amyot & Serville |
| — | Mesosternum not keeled (Fig. 14) | 7 |
| 7 (6) | Respiratory siphon about twice as long as the operculum | <i>strangulatus</i> Montandon |
| — | Respiratory siphon about three times as long as the operculum | 8 |
| 8 (7) | Distal third of sixth tergite raised and often very hairy (Fig. 89, 90), middle and hind femora with long hairs distad ventrally | <i>compositus</i> Montandon |
| — | Distal third of sixth tergite not unduly raised and never hairy (Fig. 12, 13), middle and hind femora bare distad ventrally | <i>asiaticus</i> Amyot & Serville |

DESCRIPTION OF SPECIES

Cercotmetus asiaticus Amyot & Serville
(Fig. 6—21)

Cercotmetus asiaticus Amyot & Serville, 1843: 441 (type species *asiaticus* by monotypy). — Montandon, 1903: 107—109 (descr. note, distrib.). — Montandon, 1909: 63—64 (discussion). — Montandon, 1911: 93 (comp. note). — Montandon, 1911A: 653 (discussion). — Montandon, 1913: 408 (comp. note). — Sonan, 1928: 379 (comp. note). — Lundblad, 1933: 44—48 (key, descr. figs and distrib.).

Males: 46—50 mm long, respiratory siphon 10—12 mm; females 49—53 mm long, respiratory siphon 11—16.5 mm.

Two forms of *asiaticus* have been found, the principal distinction being in the degree of dorso-ventral development of the posterior lobe of the prothorax and the length of the keel on the mesosternum. If the posterior lobe is slightly expanded dorso-ventrally, then the mesosternum is broader and more rounded and only carinate posteriorly between the middle coxae (Fig. 14 & 16). The antennae of this form (Fig. 19) do not differ significantly from the form with a reduced posterior lobe with a much longer keel on the

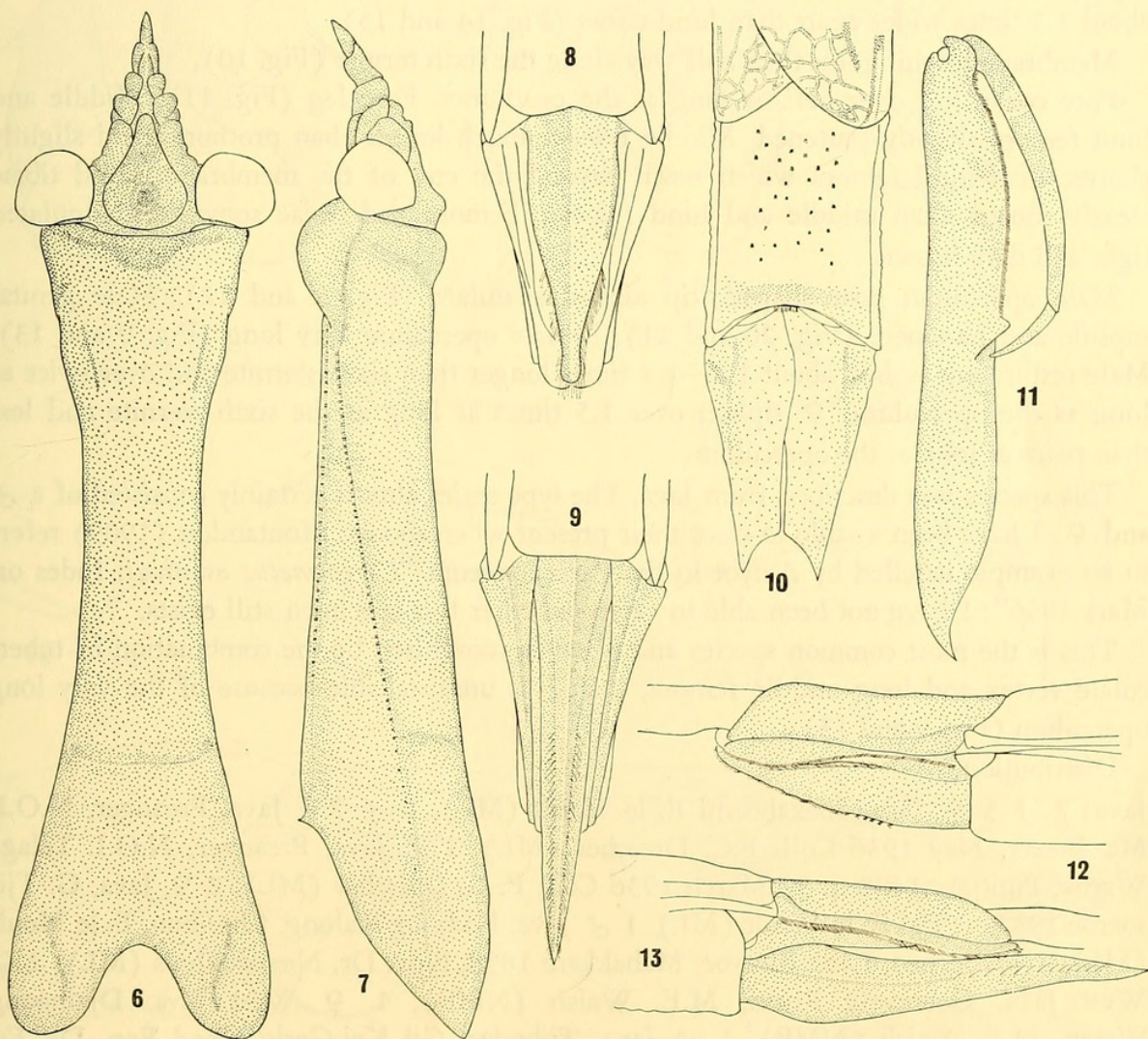


Fig. 6—13. *Cercotmetus asiaticus*, 6—8 and 10—12 ♂, 9 and 13 ♀ Java, 6, head and prothorax from above; 7, id. from the side; 8, 9, 12 and 13, operculum; 10, 6th tergite; 11, fore leg

mesosternum (Fig. 15, 17 & 18). The expanded posterior lobe and ancillary external changes may be associated with "flight" muscle development. A similar phenomenon has been found in several species of *Ranatra*. The expanded prothoracic form of *asiaticus* is very uncommon, of the fifty or so specimens studied, four males and one female have been found of this form.

Interocular space slightly greater than the width of an eye. Vertex tuberculate between the eyes (Fig. 7).

Prothorax elongate "hour-glass" shaped. Anterior collar raised. Anterior lobe between 2.5—2.9 times longer than the posterior lobe (Fig. 6).

Prothorax ventrally tricarinate, each keel with small irregular nodules along their apices. Central keel commencing from between the fore coxae, becoming rather indistinct towards the shallow prothoracic pit. Lateral keels not so conspicuous, becoming obsolescent posteriorly. The sides of the prothorax behind the eyes with short lateral keels, also with a row of nodules reaching the posterior lobe (Fig. 7).

Meso- and metasternum carinate (Fig. 15 and 17), occasionally the mesosternum is only carinate between the middle coxae, if so the posterior lobe of the prothorax slightly expanded (Fig. 16). Posterior margin of metasternum always emarginate. Middle coxae about 1.5 times wider apart than hind coxae (Fig. 14 and 15).

Membrane reaching less than half way along the sixth tergite (Fig. 10).

Fore coxae just over half as long as the prothorax. Fore leg (Fig. 11). Middle and hind femora slightly flattened. Middle femora much longer than prothorax and slightly shorter than hind femora which reach beyond the end of the membrane. Hind tibiae clearly shorter than middle and hind femora. Femora and tibiae sometimes annulated light and dark brown.

Male operculum boat shaped, tip almost spatulate (Fig. 8 and 12). Male genital capsule and paramere (Fig. 20 and 21). Female operculum very long (Fig. 9 and 13). Male respiratory siphon about 1.2—1.4 times longer than sixth sternite and over twice as long as the operculum, ♀ siphon over 1.5 times as long as the sixth sternite and less than twice as long as the operculum.

This species was described from Java. The type series almost certainly consisted of a ♂ and ♀. I have been unable to trace their present whereabouts. Montandon (1909) refers to an example labelled by Amyot in the Paris Museum "*Cercotmetus asiaticus*, Indes or. Mars 1836"; I have not been able to verify whether this specimen still exists.

This is the most common species and is easily recognised by the combination of tuberculate vertex and long middle femora, the ♀ is unmistakable because of the very long operculum (Fig. 9 and 13).

Distribution.

Java: 7 ♂ 5 ♀ Java, Soekaboemi E. le Moul't (ML), 1 ♂ 2 ♀ Java, Preanger, N.O.I. Mt. Besser, May 1936 Coll. F.C. Drescher (ML), 1 ♂ Java, Preanger, N.O.I. Telaga Warna, Puntjak, 1480 m 30 March 1936 Coll. F. C. Drescher (ML), 2 ♀ Java, G. Tji-soeroe 1935—1936 E. le Moul't (ML), 1 ♂ Java, Bodjong Kalong, Cheribon, E. le Moul't (ML), 1 ♂ Borneo, Long Bloe-oe, Mahakkam 1898, Nov. Dr. Nieuwenhuis (ML), 2 ♀ West Java, Goenoeng Roesa, M.E. Walsh (NMB), 1 ♀ West Java, Djampang Wetan, M.E. Walsh (NMB), 1 ♂ Java, Tjibodas, Gil Kei-Gerlu Dend Exp. Dr. Fr. Motium (UZMC), 1 ♂ Java, Hj. Jensen 30 Sept. 1908 (UZMC), 1 ♂ 1 ♀ Batavia, December 1815 Mus. Westerm. (UZMC), 1 immature Java, Djombang July 1922, P.

Bouvien (UZMC), 1 ♀ Det. Montandon 1911, Java Occident. Mons Gede, 4000' August 1892 H. Fruhstorfer (DEI), 1 ♀ Det. Montandon 1911, Süd Java (DEI), 1 ♂ 1 ♀ Det. Montandon 1909, Java, Malang (MBUD), 1 ♀ Java, Xantus (MBUD), 1 ♂ Java, Malang (AMNH), 1 ♀ Java, alte Sammlung (KU), 1 ♂ Java, Malang (LAM).

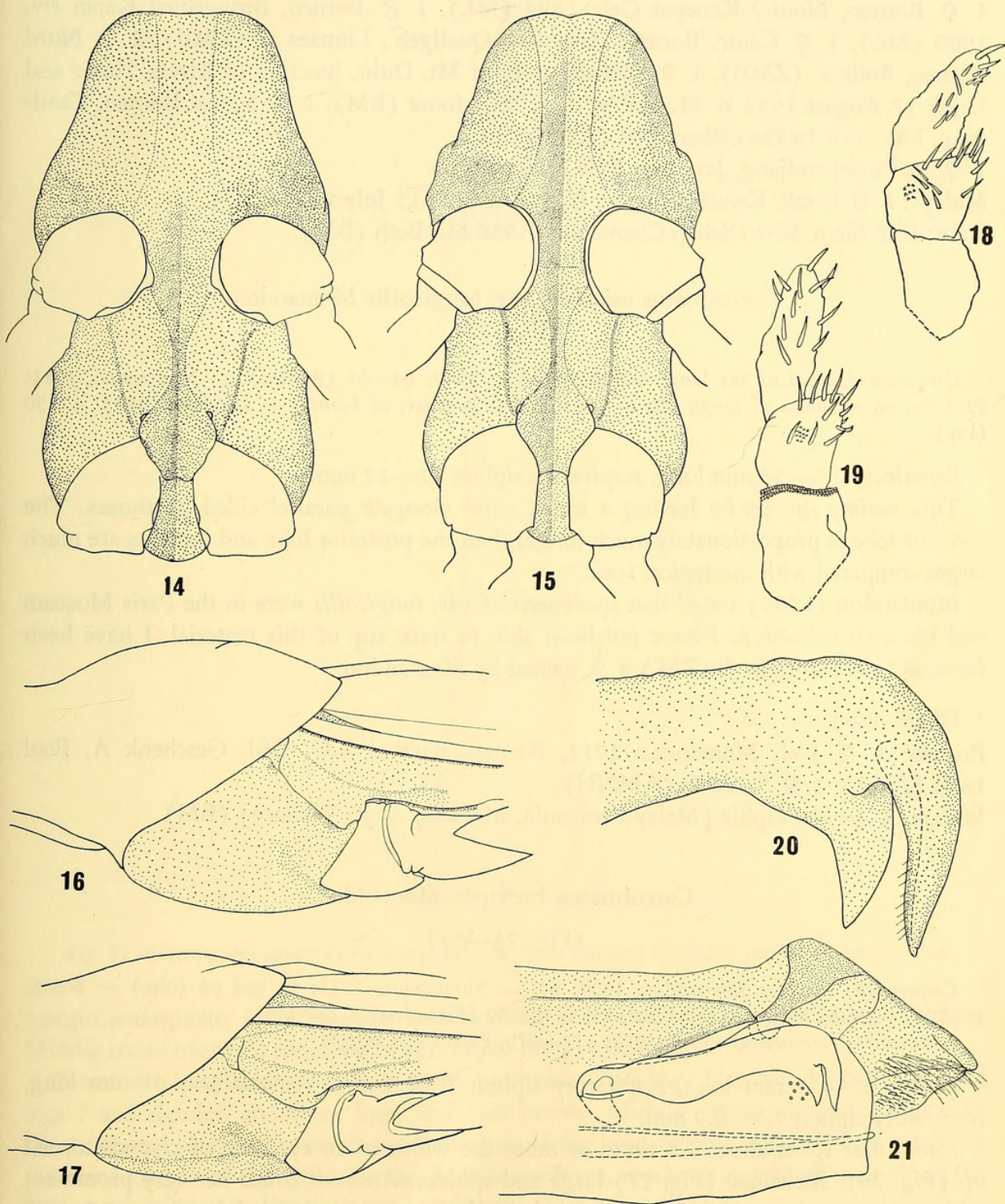


Fig. 14—21. *Cercotmetus asiaticus* ♂ from Java; 14 and 15, meso and metasternum; 16, side view of 14; 17, side view of 15; 18 and 19, antennae; 20, paramere; 21, end of the genital capsule

Sumatra: 1 ♀ Sumatra Medan Mjöberg (NRS), 1 ♀ Sumatra, Battack Coll. Schneider (NMB), 1 ♀ Sumatra, Silago April 1877 (ML).

Borneo: 1 ♂ 1 ♀ Borneo, Long Bloe-oe, Nov.—December 1898 Dr. Nieuwenhuis (ML), 1 ♂ Borneo, Long Bloe-oe, Mahakkam, Nov. 1898 Dr. Nieuwenhuis (ML), 2 ♀ Borneo, Long Bloe-oe, Mahakkam April 1899 Dr. Nieuwenhuis (ML), 1 ♀ Borneo, 3 April 1903 M. C. Piepers (ML), 1 ♂ 1 ♀ Borneo, Smitau J. v. Veldhuizen (ML), 1 ♀ Borneo, Mout.? Kenepat Geb. 1894 (ML), 1 ♂ Borneo, Brongebied Kajan riv. 1900 (ML), 1 ♀ Centr. Borneo, Koetei-Fl.-Quellgeb., Linnaea v. (ZMB), 2 ♀ Nord Borneo, Rolle v. (ZMB), 1 ♀ Sarawak, foot of Mt. Dulit, junction of Rivers Tinjar and Lejok 17 August 1932 B. M. Hobby & A. W. Moore (BM), 1 ♀ Sudost Borneo, Tandjong, Fitz Such 18 December 1894 (KU).

1 ♀ Ile de Sepandjang, Java Sea, E. le Moulton (ML).

Malaya: 1 ♀ Perak, Kwala Kangsar, B. Jachan vend 15 July 1900 (KU).

Siam: 1 ♂ Siam, Khao Sabap Chantaboon 1936 MacBeth (BM).

Cercotmetus asiaticus var. *longicollis* Montandon (Fig. 22)

Cercotmetus asiaticus var. *longicollis* Montandon, 1909: 64—65 (Borneo). — Montandon, 1911: 91 (obs. on elevation of *longicollis* to species level in descr. of *horni*). — Lundblad, 1933: 47, 50 (key).

Females: 52.5—54 mm long, respiratory siphon 11—12 mm.

This variety differs by having a much more elongate parallel sided prothorax. The anterior lobe is proportionately much longer than the posterior lobe and the eyes are much larger compared with the typical form.

Montandon (1909) stated that specimens of var. *longicollis* were in the Paris Museum and his own collection. I have not been able to trace any of this material. I have been fortunate in finding in the ZMA a ♀ named by Montandon.

Distribution.

Borneo: 1 ♀ Det. Montandon 1911, Borneo, Barabai Z.O. Afd. Geschenk A. Pool 1883 (ZMA), 1 ♀ Sarawak (AMNH).

Malaya: 1 ♀ Mt. Ophir [Malay Peninsula, Malacca, A. R. Wallace] (BM).

Cercotmetus brevipes Montandon (Fig. 23—35)

Cercotmetus brevipes Montandon, 1909: 65. — Montandon, 1911: 91 and 93 (obs.) — Sonan, 1928: 379 (comp. note). — Lundblad, 1933: 48—49 (Figs. descrip. and key).

Cercotmetus formosanus Sanan, 1928: 377—379, Figs. (Syn. nov.).

Males: 32—35 mm long, respiratory siphon 7—7.5 mm; females 38—41 mm long, respiratory siphon 7.5—8.9 mm.

Interocular space about 1.5 times or more the width of an eye. Tip of clypeus turned up (Fig. 24). Antennae (Fig. 27) large and spinose. Anterior collar not very prominent with an inconspicuous blunt projection behind the eyes. Anterior lobe about 2.5—2.9 times longer than posterior lobe and with a blunt ridge posteriorly, not so conspicuous in the ♀.

Prothorax ventrally tricarinate, central keel commencing from between the fore coxae becoming evenly rounded and raised posterior of the line of the transverse groove. Outer keels slightly shorter, becoming obsolescent about the line of the transverse groove.

Anterior lateral margins of the mesosternum with two small nodules. Mesosternum evenly rounded between the middle coxae. Metasternum bluntly carinate, posterior

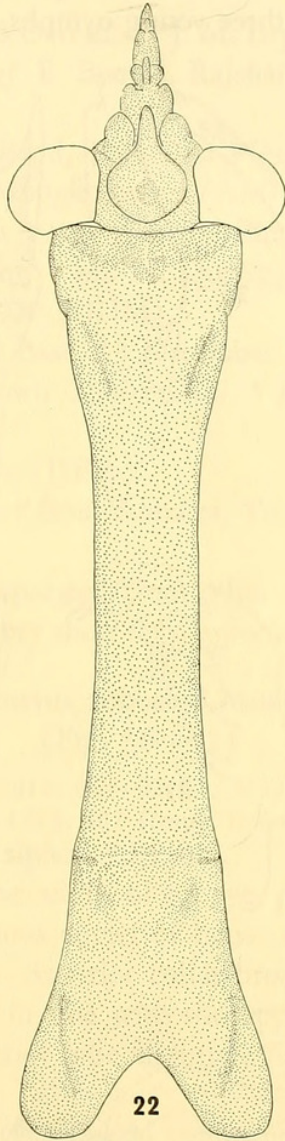


Fig. 22. *Cercotmetus asiaticus* var *longicollis* ♀ from Borneo; head and prothorax from above

margin emarginate, sometimes the emargination is obscured by the deposition of debris. Middle coxae over two times wider apart than hind coxae (Fig. 25).

Fore coxae less than half as long as the prothorax. Fore leg (Fig. 26). Middle and hind legs ? and slender, annulated light and dark brown. Middle femora clearly shorter than the prothorax and about two thirds the length of the hind femora which almost reach the posterior margin of the fifth sternite. Membrane large, reaching about half way along the sixth tergite which is slightly expanded distally (Fig. 30 and 33).

Male operculum narrow and sharply carinate (Fig. 32 and 34). Male genital capsule and paramere (Fig. 28 and 29). Female operculum very narrow and sharply carinate

(Fig. 31 and 35). The respiratory siphon in both sexes is between 1.5—1.75 times longer than the sixth sternite and just over twice as long as the operculum.

Montandon (1909) described this species from a male in his own collection of unknown provenance and a female from Sumatra in Kirkaldy's collection, both these specimens have proved untraceable. In the DEI Collections I found a male and female named by Montandon which has enabled me to fix this species. Sonan (1928) described *C. formosanus* from Formosa, Jitsugetsu-tan Lake 13 September 1928, R. Takahashi, the type series consisting of one male and three young nymphs. The figure and description leave

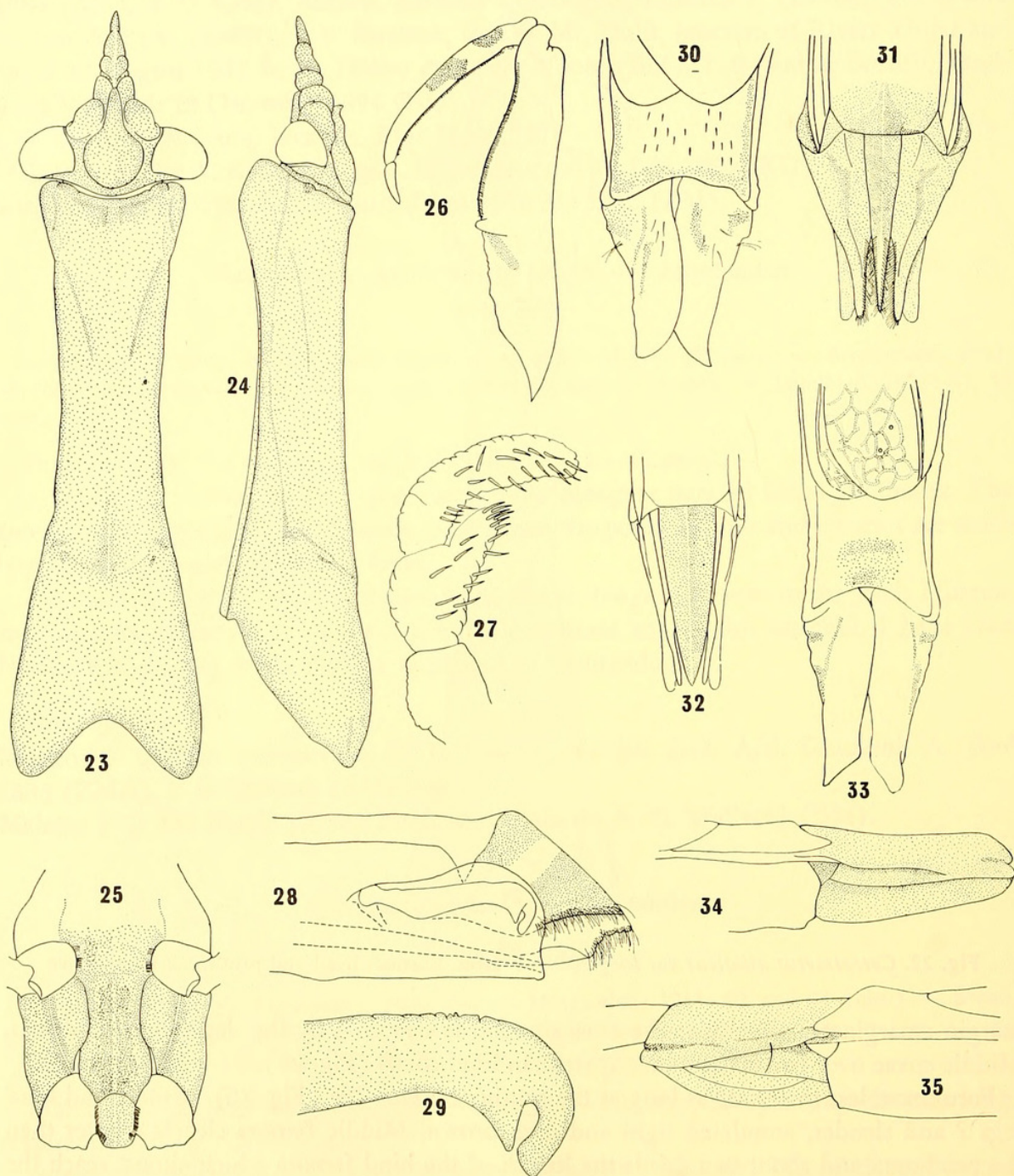


Fig. 23—35. *Cercotmetus brevipes*, 23—29 and 32—34 ♂ from Sarawak, 30 ♀ from Annam and 31 and 35 ♀ from Thailand. 23, head and prothorax from above; 24, id. from the side; 25, metasternum; 26, fore leg; 27, antennae; 28, end of genital capsule; 29, paramere; 30 and 33, 6th tergite; 31, 32, 34 and 35, operculum

no doubt that *formosanus* is a synonym of *brevipes*. Despite extensive enquiries, I have not been able to find Sonan's specimens.

Distribution.

Sumatra: 1 ♀ Sumatra, August 1916; Soengei gloegoen? Beekje met zandige leem op terras van Bohorok bij Bohorok, Boven Langkol S.O. leg J. E. A. den Doop (ZMA), 1 ♀ N.O. Sumatra, Tandjong Morawa Serdang, B. Hagen (ML).

Java: 1 ♀ Java, Muller (ML).

Sarawak: 2 ♂ 1 ♀ Sarawak, Ban 6 December, J. M. Bryan (BM).

India: 1 ♂ Bengal (UZMC), 1 ♂ E. Bengal, Rajshai 1—6 February 1907, N. Annandale (BM).

Thailand: 1 ♀ 3 immature Thailand, Ban Dan Ngui Amphur Kabinburi, Parjinburi Prov. 2—5. December 1965 Kol. Mongkolpanya (AMNH).

Viet Nam: 1 ♀ Det. Montandon 1911, Annam, Phuc Son, November—December H. Rolle (DEI), 1 ♂ Rep. Viet Nam, 1 mi. N. Quang Tri, 9 June 1970, A. R. Gillogly (OUM), 1 ♀ as before 15 June 1970 (OUM).

Philippines: 1 ♂ Clark Air Force Base, 13 December 1970, W. R. Reisen (Pol. Coll.).

China: 1 ♂ S. China, Fukien Shaowu' Shui-PeiKai, 5 June 1941, T. C. Maa (BISH).

1 ♂ Telaga Pabila (ML).

1 ♂ Det. Montandon 1911, no data (DEI).

Lundblad (1933) recorded *brevipes* from Sumatra, Tobasee and commented on the male from Annam in the DEI.

Cercotmetus brevipes is easily separated from other species of the group by the shape of the fore femora (Fig. 26) and very short legs, especially the middle femora.

Cercotmetus robustus Montandon

(Fig. 36—42)

Cercotmetus robustus Montandon, 1911: 92—92. — Montandon, 1911A: 652—653 (Obs. and comp. with *dissidens*). — Montandon, 1913: 407 (comp. notes). — Lundblad, 1933: 50 (key).

Female 50 mm long, respiratory siphon 7.25 mm.

Interocular space about twice the width of an eye, posterior part of the vertex raised (Fig. 37). Vertex with a conspicuous circlet of hairs. Antennae (Fig. 39) small, second segment spinose, third sparsely so. Anterior collar broadly rounded, not very prominent with a slight "step" more or less in line with the upper margin of the eyes (Fig. 36). Prothoracic sulci prominent, posterior lobe slightly striate and about half as long as the anterior lobe.

Prothorax ventrally tricarinate, central keel commencing from between the fore coxae and reaching the prothoracic pit which has a vestigial median carina. Lateral keels shorter, not so prominent with irregular nodules, becoming obsolescent at the line of the transverse groove.

Anterior margin of the mesosternum slightly depressed, carinate between the middle coxae which are twice as wide apart as the hind coxae. Metasternum carinate, posteriorly emarginate (Fig. 41).

Fore coxa slightly less than half as long as the prothorax. Fore leg (Fig. 40). Middle and hind legs slightly flattened, femora expanded distally. Middle femora slightly longer than prothorax. Hind tibiae much longer than middle tibiae and almost as long as the hind femora which almost reach the anterior margin of the sixth sternite. Membrane small, reaching less than half way along the sixth tergite (Fig. 38).

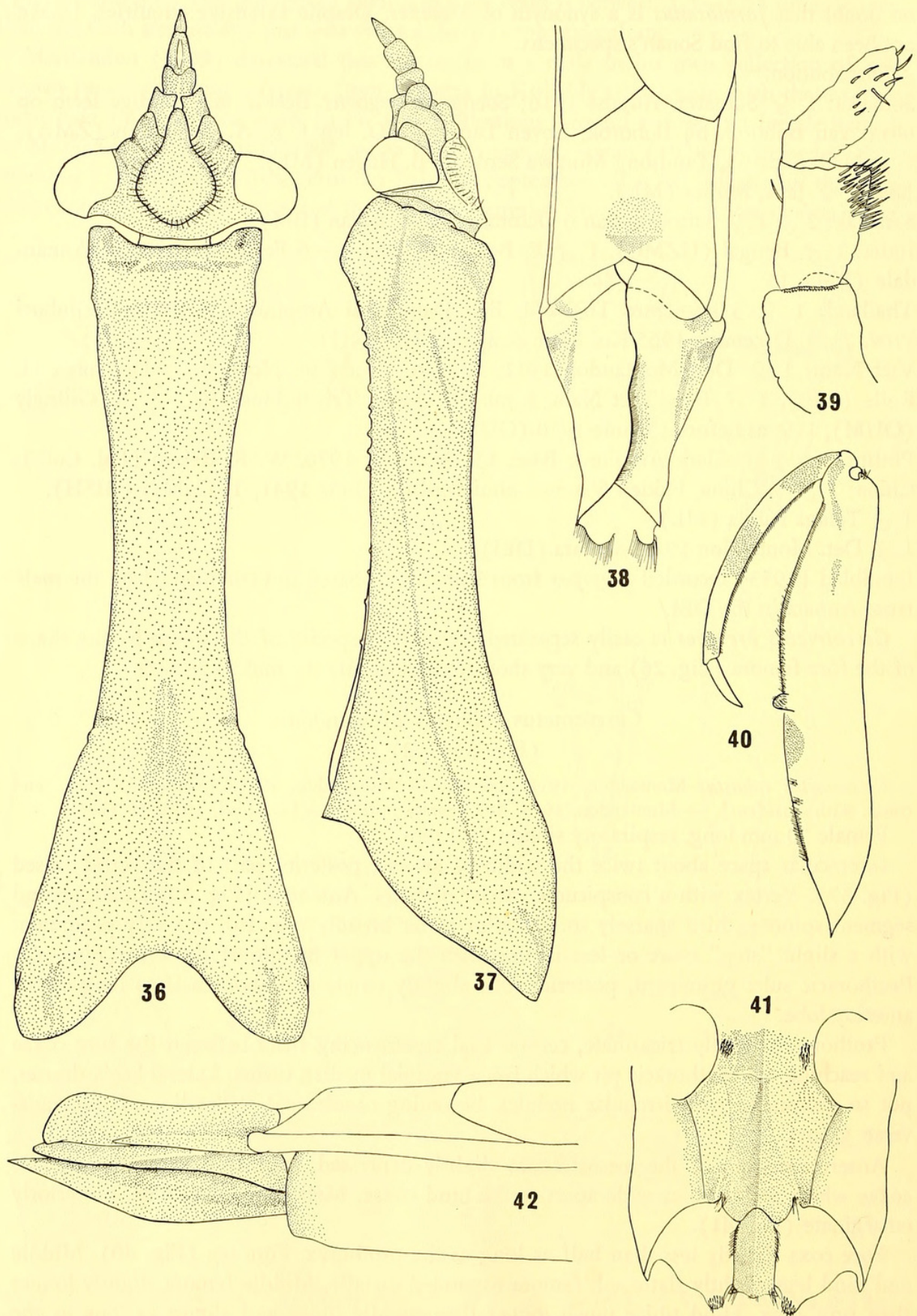


Fig. 36—42. *Cercotmetus robustus* holotype ♀; 36, head and prothorax from above; 37, id. from the side; 38, 6th tergite; 39, antennae; 40, fore leg; 41, metasternum; 42, operculum

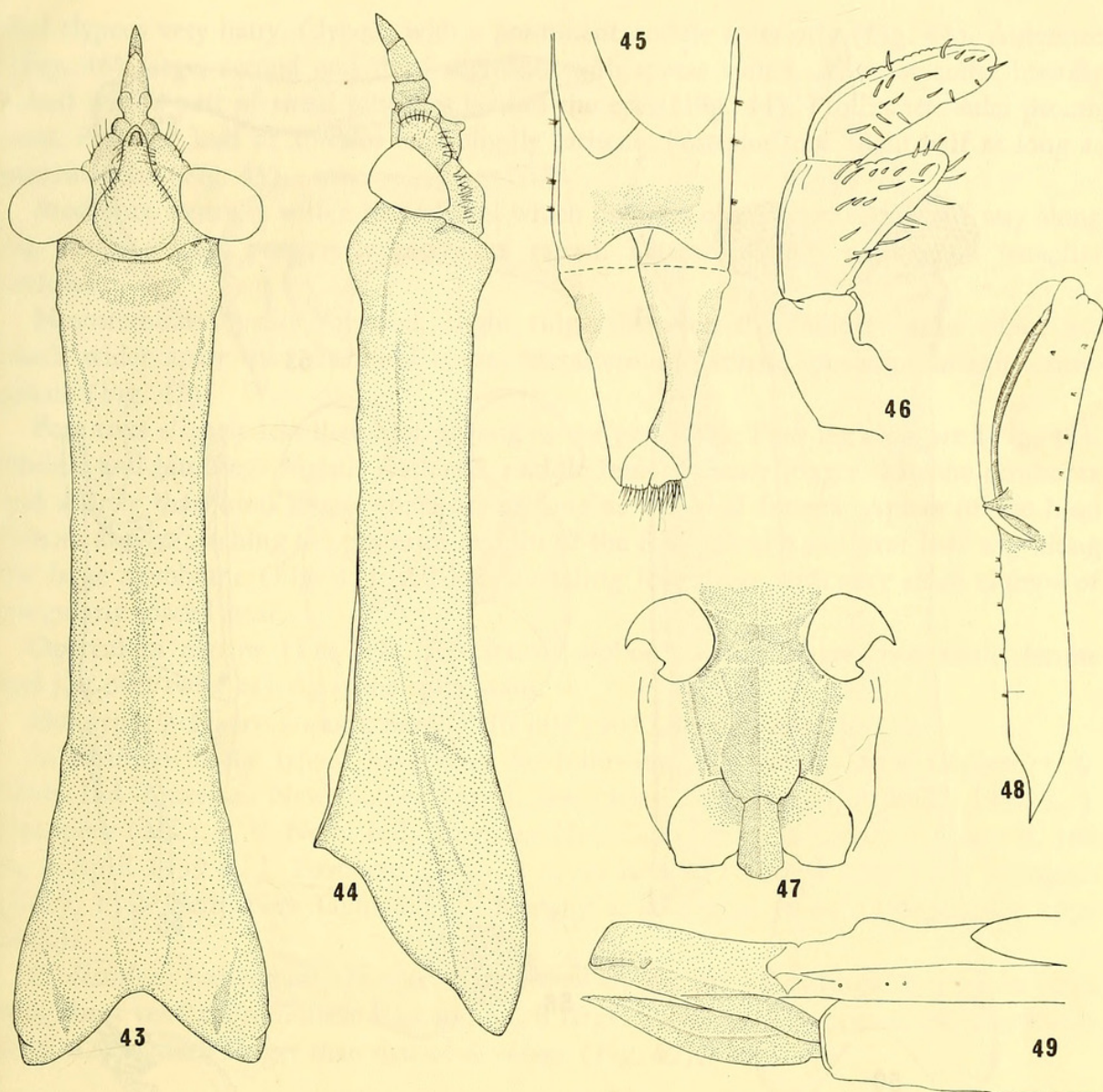


Fig. 43—49. *Cercotmetus dissidens* holotype ♀; 43, head and prothorax from above; 44, ibid from the side; 45, 6th tergite; 46, antennae; 47, metasternum; 48, fore leg; 49, operculum

Operculum long and carinate (Fig. 42). Respiratory siphon slightly longer than the sixth sternite and one third longer than the operculum.

Holotype ♀ Celebes, Gegend um den Posso See, February 1895, Sarasin (DEI).

This species is very distinctive, the circlet of hairs on the vertex, large size and small eyes are diagnostic. This species is only known by the holotype on which the description and figures are based.

***Cercotmetus dissidens* Montandon**
(Fig. 43—49)

Cercotmetus dissidens Montandon, 1911A: 652—654. — Montandon, 1913: 407—408 (repeat of 1911A). — Lundblad, 1933: 50 (key).

Females: 45—51.5 mm long, respiratory siphon 7.5—9 mm.

Interocular space clearly greater than the width of an eye which are very large. Vertex

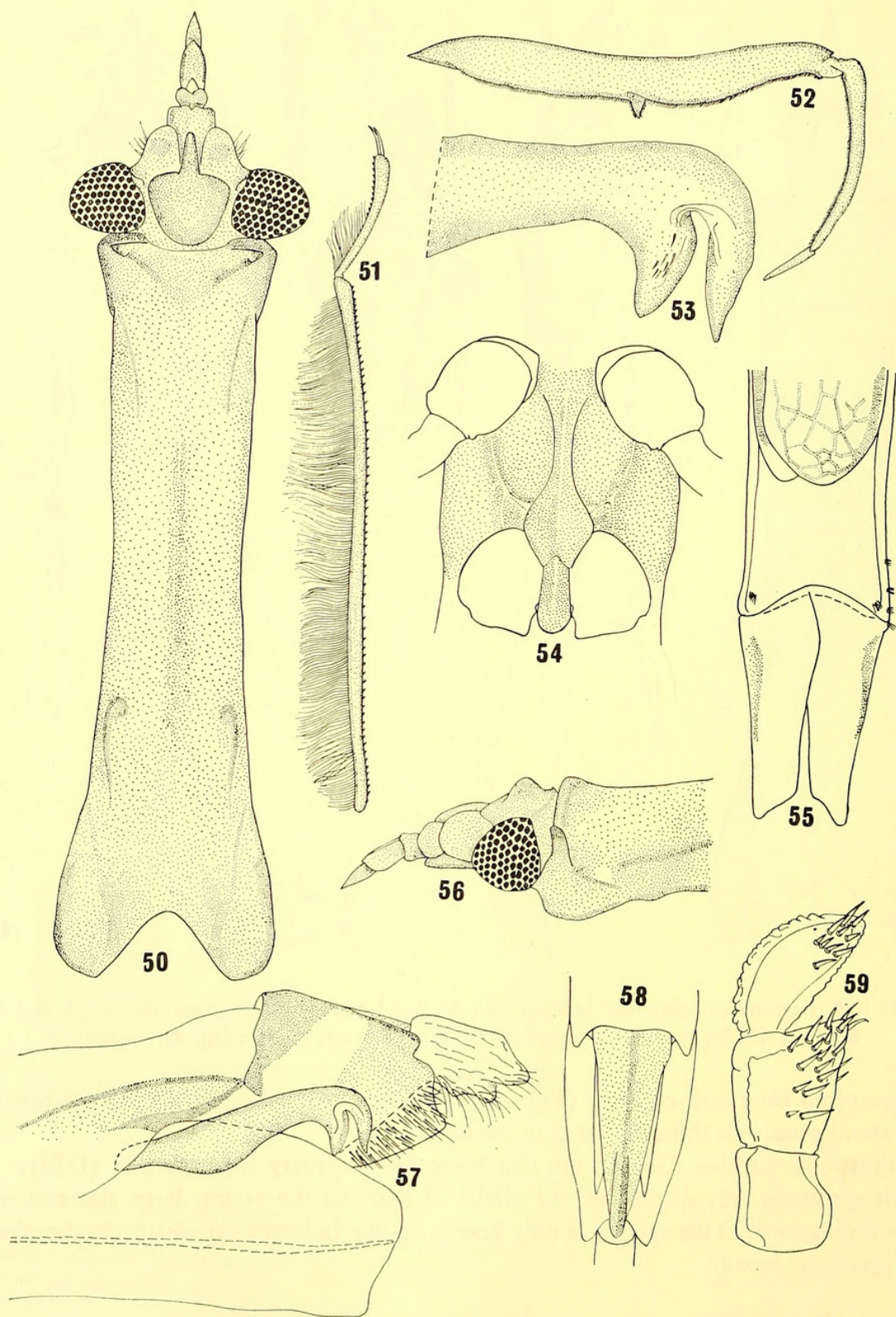


Fig. 50—59. *Cercotmetus pilipes* holotype ♂; 50, head and prothorax from above; 51, middle tibia; 52, fore leg; 53, paramere; 54, metasternum; 55, 6th tergite; 56, head and part of prothorax from the side; 57, end of genital capsule; 58, operculum; 59, antennae

and clypeus very hairy. Clypeus with a prominent nodule anteriorly (Fig. 44). Antennae (Fig. 46) large, second and third segments with sparse spines. Anterior collar broadly raised with a pair of small tubercles behind the eyes (Fig. 44). Prothoracic sulci prominent. Posterior half of anterior lobe bluntly carinate. Posterior lobe about half as long as anterior lobe (Fig. 43).

Prothorax ventrally with a central keel which becomes obsolescent about half way along the anterior lobe, posteriorly prothorax raised. Lateral margins with small irregular nodules.

Mesosternum broadly rounded, slight ridges between the middle coxae which are much wider apart than the hind coxae. Metasternum carinate, posterior margin emarginate (Fig. 47).

Fore coxa slightly less than half as long as the prothorax. Fore leg elongate (Fig. 48). Middle and hind legs slightly flattened, middle femora clearly longer than the prothorax and shorter than hind tibiae which are as long as the hind femora. Apices of the hind femora almost reaching the posterior margin of the fifth sternite and over half way along the large membrane (Fig. 45). All legs including fore coxae with very small clumps of irregularly spaced setae.

Operculum narrow (Fig. 49). Respiratory siphon slightly longer than sixth sternite and just over twice as long as the operculum.

Holotype ♀ Nieuw Guinea, Sabang, 10 July 1907 Lorentz (ZMA).

In addition to the type I have seen the following material: — New Guinea: 1 ♀ Neth. Ind.-American New Guinea Exped. Araucaria Camp, 800 m, 8 March 1939 L. J. Toxopeus (ML), 1 ♀ Neth. Ind.-American New Guinea Exped. Bernhard Camp B, 100 m, 3 April 1939 L. J. Toxopeus (ML), 1 ♀ as before, 10 April 1939 L. J. Toxopeus (ML), 1 ♀ Neth. New Guinea, Exp. Manang a. d. Digoel 10 m, 12 September 1959 (ML).

C. dissidens has certain affinities with *robustus*, but can be distinguished by its large eyes, short ventral prothoracic keel and much larger antennae. The operculum of *robustus* (Fig. 42) is much longer than that of *dissidens* (Fig. 49).

Cercotmetus pilipes (Dallas)

Ranatra (*Cercotmetus*) *pilipes* Dallas, 1850: 9—10, pl. 2, f. 6. — *Cercotmetus pilipes*, Montandon 1903: 110 (note on *pilipes*). — Distant, 1906: 23—24 (precis of Dallas, 1850). — Montandon, 1909: 63 (comp. note). — Montandon, 1911: 93 (comp. note). — Sonan, 1928: 379 (comp. note). — Lundblad, 1933: 50 (key). — Hafiz & Pradhan, 1949: 362 (discussion).

Male: 38 mm long, respiratory siphon 10 mm.

Greatest width of an eye less than the interocular space. Vertex with a prominent tubercle (Fig. 56). Antennae (Fig. 59) with stout sparse spines. Anterior collar with distinct tubercles behind the eyes (Fig. 56). Anterior lobe posteriorly carinate, slightly more than twice as long as the posterior lobe which is carinate anteriorly.

Prothorax ventrally tricarinate, central keel commencing posterior of the fore coxae, terminating anterior of the prothoracic pit, lateral keels becoming obsolescent at the line of the transverse groove.

Mesosternum rounded with a pair of nodules on anterior lateral margins, slightly ridged between the middle coxae which are wider apart than the hind coxae. Metasternum carinate, posteriorly emarginate (Fig. 54).

Fore coxa just over half as long as the prothorax. Middle and hind legs flattened, tibiae with very prominent fringes of hairs (Fig. 51). Middle femora slightly longer than prothorax. Hind tibiae longer than middle tibiae, but clearly shorter than hind femora. Apices of hind femora reaching about one third beyond anterior margin of the sixth sternite, but not reaching the end of the large membrane which extends over half way along the sixth tergite (Fig. 55).

Operculum constricted distally (Fig. 58). Male genitalia (Fig. 53 and 57). Respiratory siphon twice as long as the sixth sternite and three times as long as the operculum.

Holotype ♂ Bhoutan (OUM). The type was discovered amongst the foreign Nepidae with *Ranatra gracilis* Dallas which was described in the same paper. Originally these specimens were in the collection of the Honourable East India Company and were acquired by the Hope Department, Oxford in about 1860—1861.

This species appears to be rather uncommon and may be separated from the remainder by its small size, tuberculate vertex, dense fringes of hairs on the middle and hind tibiae and posteriorly carinate mesosternum.

Cercotmetus fumosus Distant

(Fig. 60—67)

Cercotmetus fumosus Distant, 1904: 278. — Distant, 1906: 23, f. 15 (redescript.). — Montandon, 1909: 64—65 (comp. with *asiaticus* var *longicollis* and *brevipes*). — Montandon, 1911: 93 (comp. with *robustus*). — Montandon, 1911A: 650 (comp. with *strangulatus*). — Sonan, 1928: 379 (comp. note). — Lundblad, 1933: 50 (key). — Hafiz & Pradhan, 1949: 361—363 (redescript. and first record for India).

Females: 47.9—51 mm long, respiratory siphon 9.5 mm.

Interocular space slightly exceeding the width of an eye, occasionally eye width greater than interocular space. Vertex tuberculate (Fig. 61). Antennae (Fig. 65 and 66) large and spinose, third segment with a prominent nodule on reserve, hidden) side. Anterior collar slightly raised with blunt nodules behind the eyes. Anterior lobe twice as long as posterior lobe (Fig. 60).

Prothorax ventrally tricarinate, marginal keels reaching the line of the transverse groove becoming obsolescent posteriorly. Central keel extending from between fore coxae to prothoracic pit, rather poorly defined posterior of the line of the transverse groove.

Anterior margin of the mesosternum with a pair of small nodules, slightly ridged between the middle coxae which are about twice as wide apart as the hind coxae. Metasternum bluntly carinate, posterior margin emarginate (Fig. 64).

Fore coxa slightly less than half as long as the prothorax. Fore leg (Fig. 62) the sulcate area of the femora is distinctly flattened. Middle and hind femora slightly flattened. Middle femora slightly longer than the prothorax and clearly shorter than the hind femora which reach about one third beyond the anterior margin of the sixth sternite and between half and two thirds of the way along the membrane. Hind tibiae slightly longer than middle femora and almost as long as the hind femora.

Distant (1904) states that the corium was "with some amount of brownish ochraceous pubescence" this is not noticeable on the type now. Membrane large reaching well over half way along the sixth tergite (Fig. 63).

Operculum narrow and carinate (Fig. 67). Respiratory siphon about two and a half times longer than the operculum and one fourth longer than the sixth sternite. The

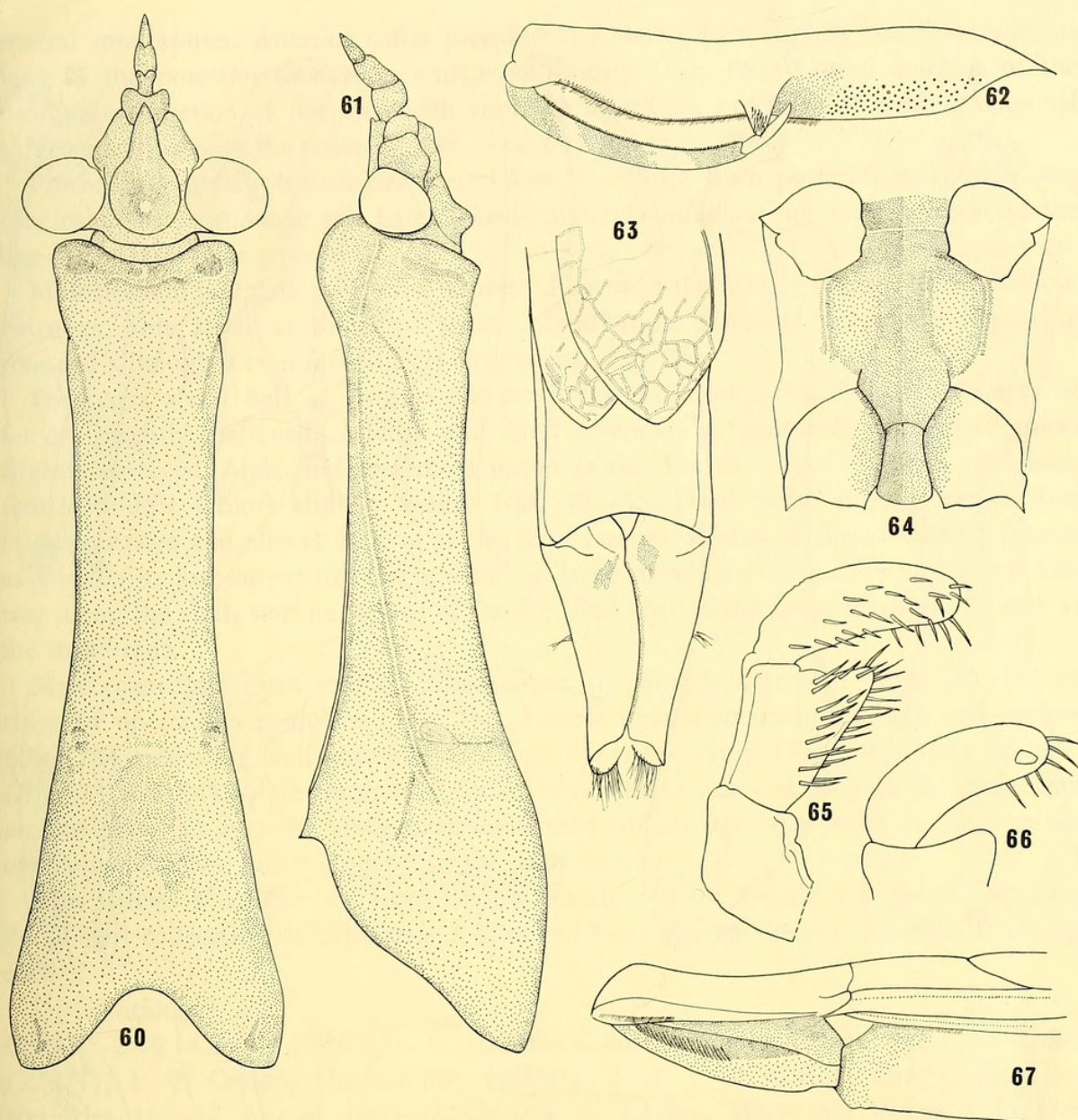


Fig. 60—67. *Cercotmetus fumosus* holotype ♀; 60, head and prothorax from above; 61, id. from the side; 62, fore leg; 63, 6th tergite; 64, metasternum; 65, antennae; 66, detail of reverse of 3rd antennal segment; 67, operculum

siphon of the type was missing when it was first described.

Holotype ♀ Ceylon, Green Coll. (BM).

In addition to the type I have seen material from the following areas of Ceylon: 1 ♀ Ceylon, Anuradhapura, 19—21 December 1910 A. Luther (ZMH), 1 ♀ Ceylon, Det. Montandon, 1910 as *compositus* (MBUD), 1 ♀ Ceylon, Ambanganga near Parakrama Samudra. Anicut Angamedalla Pelonnaruwa, C. H. Fernando (CNM), 1 ♀ Ceylon, Magalla Wema near Nikaweratiya, 18 March 1962 C. H. Fernando (CNM).

See *strangulatus* for comments on this species.

Cercotmetus strangulatus Montandon (Fig. 68—79)

Cercotmetus strangulatus Montandon, 1911A: 650—651. — Lundblad, 1933: 50 (key). — Hafiz & Pradhan, 1949: 362 (discussion).

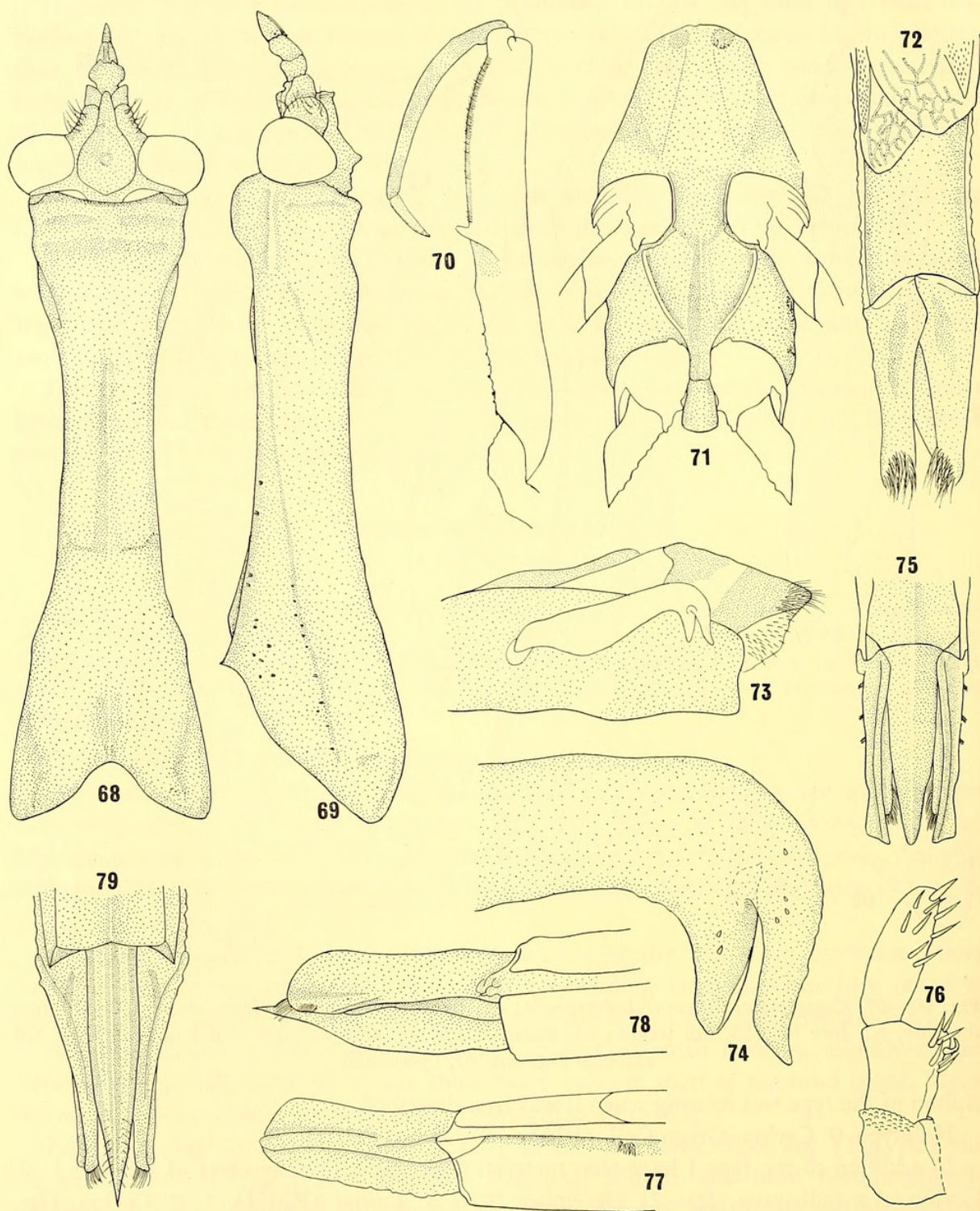


Fig. 68—79. *Cercotmetus strangulatus*, 68—77 ♂ from Knuckles, Ceylon, 78 and 79 ♀ from Ceylon. 68, head and prothorax from above; 69, id. from the side; 70, fore leg; 71, meso and metasternum; 72, 6th tergite; 73, end of genital capsule; 74, paramere; 75 and 77—79, operculum; 76, antennae

Males: 40—42 mm long, respiratory siphon 9.5—10 mm; females: 45—47 mm long, respiratory siphon 10—11 mm.

Eye width equal to or greater than the interocular space. Vertex tuberculate, tip of clypeus nodulate (Fig. 69). Antennae (Fig. 76) small, second and third segments with

several stout spines. Anterior collar prominent. Anterior lobe slightly less than twice as long as the posterior lobe and carinate posteriorly (Fig. 68). Lateral margins of the prothorax posterior of the eyes with short blunt ridges, posterior of these a diagonal ridge extending onto the posterior lobe (Fig. 69).

Prothorax ventrally tricarinate, central keel extending from posterior margins of the fore coxae to prothoracic pit. Lateral keels minutely nodulate not reaching beyond the line of the transverse groove.

Mesosternum nodulate anteriorly, depressed between the middle coxae which are about twice as wide apart as the hind coxae. Metasternum carinate, posteriorly appearing rounded although it is in fact slightly emarginate (Fig. 71).

Fore coxa about half as long as the prothorax. Fore leg (Fig. 70), sulcate area of femora slightly flattened. Middle and hind femora also flattened with their apices slightly enlarged. Male middle femora just over one fourth longer than the prothorax, female middle femora slightly longer 100: 30—35. Hind tibiae slightly longer than middle femora and almost as long as the hind femora. Apices of the male hind femora as long as or just surpassing the end of the large membrane (Fig. 72) and about half way along the sixth sternite, apices of female hind femora not quite reaching the end of the membrane.

Male operculum carinate, long and narrow, tip slightly narrowed (Fig. 75), central ridge of operculum crenulate (Fig. 77). Female operculum carinate, long and narrow (Fig. 78) extending well beyond the end of the connexivum (Fig. 79). Male genitalia (Fig. 73 and 74). Male respiratory siphon about three times as long as the operculum and twice as long as the sixth sternite, female siphon just over twice as long as the operculum and two thirds longer than the sixth sternite.

This species was described from Ceylon, Kandy and the female type was in Montandon's own collection; unfortunately I have not been able to discover its present whereabouts.

Distribution.

Ceylon: 2 ♀ Ceylon (BM), 1 ♀ Ceylon, Colombo 11 December 1910 A. Luther (ZMH), 1 ♀ Ceylon, Hobburunne (NMB), 2 ♂ 1 ♀ Ceylon, Central Province, Knuckles 15—24 August 1965 (CNM), 1 ♀ Ceylon, Homadala Estate, Udugama, Southern Province, from the edge of a stream 15 March 1965 P.B. Karuneratne (CNM).

This species is most likely to be confused with *fumosus*, female *strangulatus* can be easily recognised by the much longer operculum (Fig. 78) compared with *fumosus* (Fig. 67).

Cercotmetus compositus Montandon (Fig. 80—91)

Cercotmetus compositus Montandon, 1903: 109—110. — Montandon, 1909: 63—64 (discussion). — Montandon, 1911: 91—93 (comp. with *horni* and *robustus*) — Montandon, 1911A: 651 (comp. with *strangulatus*). — Paiva in Annandale, 1917: 80—81 (Descript. & figs.). — Lundblad, 1933: 50—51 (key, discussion & figs.).

Males: 48—53 mm long, respiratory siphon 13—15.5 mm; females: 50—60 mm long, respiratory siphon 13.5—16 mm.

Interocular space variable, usually slightly less than the width of an eye, occasionally more, anterior inner margins of eyes sharply concave (Fig. 80). Vertex tuberculate (Fig.

81). Antennae (Fig. 84) large with stout spines. Anterior collar variable never very prominent. Anterior lobe over twice as long as the posterior lobe, sometimes nearly three times as long. Occasionally the distal fourth of the anterior lobe and proximal third of the posterior lobe slightly carinate.

Prothorax ventrally tricarinate, lateral keels reaching the line of the transverse groove. Central keel extending from the posterior margin of the fore coxae to distal fourth of the prothorax, becoming more rounded and raised distally.

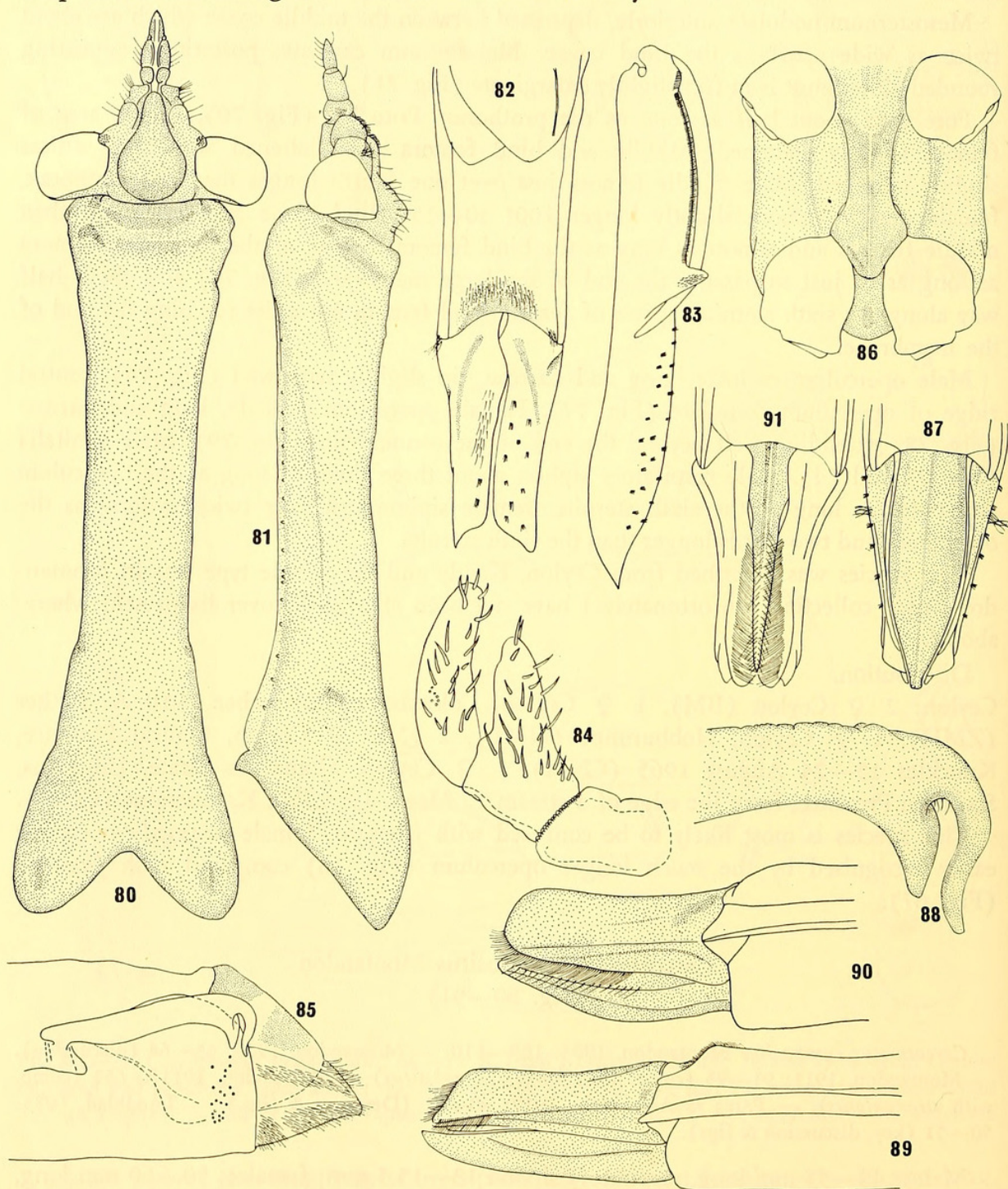


Fig. 80—91. *Cercotmetus compositus*, 80—89 ♂ and 90 and 91 ♀ from Sumatra. 80, head and prothorax above; 81, id. from the side; 82, 6th tergite; 83, fore leg; 84, antennae; 85, end of genital capsule; 86, metasternum; 88, paramere; 87 and 89—91, operculum

Mesosternum anteriorly slightly raised, not carinate but depressed anterior of the middle coxae which are about twice as wide apart as the hind coxae. Metasternum carinate (Fig. 86). The posterior margin of the metasternum is rather variable, about half the material studied had the posterior margin rounded (Fig. 86) the remainder were emarginate, two specimens had distinctly "lop-sided" emarginations. This variation occurred in both sexes from all the localities studied.

Fore coxa always more than half as long as the prothorax. Fore leg (Fig. 83) sulcate area distinctly flattened, middle and hind femora also flattened, distally enlarged and with a conspicuous fringe of hairs along distal ventral margins. Middle femora about one third longer than prothorax. Middle and hind tibiae fringed with very long hairs, proximal apices of middle tibiae bare and nearly as long as the middle femora. Hind tibiae about the same length as the middle femora and slightly shorter than the hind femora which reach about half way along the sixth sternite and the end of the membrane. Distal margin of the corium with short golden hairs. Sixth tergite raised and pilose (Fig. 89 and 90).

Male operculum "boat-shaped" broad and carinate (Fig. 87) slightly longer than the connexivum (Fig. 89). Female operculum very narrow and sharply carinate (Fig. 90 and 91). Male genitalia (Fig. 84 and 85). Respiratory siphon length three times or more that of the operculum and always more than twice as long as the sixth sternite, female siphon similar but slightly less than twice as long as the sixth sternite.

Montandon (1903) described *compositus* from a series of specimens (Laos, Horman 1876; Bangkok, Mahe; Balasore) in the Paris Museum. Lundblad (1933) figured the parameres of a male from Laos and Balasore showing that two forms of *compositus* were apparently present in Montandon's type series. Unfortunately, I have not been able to see any of the material in the Paris Museum and have had to rely upon material named by Montandon from other Museums. My figures are based on a series from Sumatra, the parameres agree extremely well with Lundblad's figure based on the male from Laos in the Paris Museum.

Distribution.

Siam: 2 ♂ 4 ♀ Lower Siam, Trong W. L. Abbott (of this series 1 ♂ 1 ♀ Det. Montandon 1909 as *compositus*; 1 ♂ 2 ♀ Det. Montandon 1909 as *asiaticus* var *longicollis* and 1 ♀ Det. Montandon 1909 as *asiaticus* (USNM), 1 ♀ Siam, Sikuki River, Ban Ban, November 1923 Hugh Smith (USNM).

Viet Nam: 1 ♂ 1 ♀ Annam, Phuc Son, November—December, H. Rolle, H. Fruhstorfer, Det. Montandon 1911 as *compositus* (DEI), 2 ♂ Rep. Viet Nam 1 mile north of Quang Tri, 23 June 1970, taken alongside sides of stream just returned to normal level after flooding, A. R. Gillogly (Pol. Coll.), 1 ♂ 3 ♀ Cochin China, October 1923 (ML).

Sumatra: 4 ♂ 4 ♀ N.O. Sumatra, Tandjong (ML).

This species is easily recognised by its very large size, raised sixth tergite and the long hairs on the middle and hind femora disto-ventrally.

Paiva in Annandale (1917) recorded *compositus* from Cambodia with details as follows: "Two specimens. One from a small pool or ditch at the edge of the lake, Tale Sap, Patalung, 13.i.16, another from Koh Si Hah, Tale Sap, Singora Province". The figure of the hind leg showing the prominent distad ventral patch of hairs on the femora confirms the identity of these two specimens with the present concept of *compositus*.

SPECIES NOT SEEN

Cercotmetus horni Montandon

Cercotmetus horni Montandon, 1911: 91—92. — Lundblad, 1933: 50 (key).

Female 42.5 mm long, respiratory siphon 9 mm.

According to Montandon (1911) *horni* may be distinguished from the other species by the following characters:

Large subglobose eyes, interocular space slightly wider than the width of an eye. Vertex not tuberculate. Prothorax "hour-glass" shaped. Membrane small like *asiaticus*. Mesosternum posteriorly slightly carinate.

It was described from New Guinea and dedicated to Dr. W. Horn of the Entomological Museum, Berlin. I have not been able to locate the unique type.

This species is very similar to *dissidens* and in my key comes out at the same couplet. Montandon must have described *dissidens* very shortly after *horni* since both were published in 1911. In his description of *dissidens* he does not refer to *horni*, comparing the former with *robustus* and *asiaticus*. I feel there is a possibility that *horni* and *dissidens* may be the same species.

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