REVISIONARY NOTES ON THE GENUS METROCORIS MAYR (HETEROPTERA, GERRIDAE), WITH DESCRIPTIONS OF FOUR NEW SPECIES

by

M. H. den BOER

with 65 text-figures

INTRODUCTION

The genus *Metrocoris* Mayr comprises a small, distinct group of water-striders, mainly inhabiting the Old World tropics. They are to be found on the surface of mountain streams and pools in the jungle. In general they are apterous, but in most species a small percentage of the individuals may have fully developed wings.

The species have been little collected and are generally rare in collections. The specimens in early collections are often either single females with eggs, or one male and one female — generally with copulatory organs still partly extended — which fact may suggest that it is very difficult to catch specimens, except when they are less quick or attentive.

An extensive description of the genus was given by Matsuda (1960: 302-304). Keys to the genus are to be found in the paper by Kenaga (1941: 170) and that by Hungerford & Matsuda (1960b: 7).

When studying the material of these insects in the Leiden Museum, I found that the structures of the male genitalia supply useful characters for distinguishing between the species. Within the species these organs appear to be constant.

Dissections were made by clearing the posterior abdominal segments in KOH (10%) for approximately 12 hours. The dissections were mounted in "terebinthina laricina" on glass slides of 9 by 14 mm, which were then fastened on the same pin as the specimen. This has the great advantage of keeping specimen and dissection together.

It soon became evident that this study would be impossible without the examination of the material preserved in other museums. Upon my request material was sent by many institutions all over the world. This has enabled me to study all previously described species, except *Metrocoris femoratus* (Paiva). In nearly all cases I have seen type material. The material on which this paper is based belongs to the institutions mentioned below; the names are preceded by the abbreviations used in the text of this paper.

BM	British Museum (Natural History), London.
CNHM	Chicago Natural History Museum.
IND	Zoological Survey of India, Calcutta.
KU	Entomological Laboratory, Kyushu University, Fukuoka.
LEN	Zoological Institute, Leningrad.
LEW	Laboratorium voor Entomologie, Landbouwhogeschool, Wageningen.
MA	Zoölogisch Museum, Amsterdam.
MBUD	Magyar Nemzeti Muzeum, Budapest.
MC	Universitetets Zoologiske Museum, Copenhagen.
ML	Rijksmuseum van Natuurlijke Historie, Leiden.
MP	Muséum National d'Histoire Naturelle, Entomologie, Paris.
NMW	Naturhistorisches Museum, Vienna.
NRS	Naturhistoriska Riksmuseet, Stockholm.
OUM	Hope Department of Entomology, University Museum, Oxford.
SING	University of Singapore, Zoology Department, Singapore.
SNOW	Snow Entomological Museum, Kansas University, Lawrence.
USNM	Smithsonian Institution, U.S. National Museum, Division of Insects, Washington, D.C.
WARS	Instytut Zoologiczny, Warsaw.
ZMB	Institut für Spezielle Zoologie und Zoologisches Museum der Humboldt-Universität, Berlin.

In this paper I give a bibliography of each species: it is not necessarily exhaustive, as the references to some papers of secondary importance are not included.

An exclamation mark before the data of the type material indicates that I have seen these specimens myself.

The measurements given are either based on ten individuals of each species or on all material when less than ten specimens were available.

The use of "series" indicates that more than ten individuals were available.

The data given under "Distribution" are those of specimens that I have seen myself, except in the instances of *Metrocoris strangulator* Breddin (the records given by Lundblad, 1933: 463) and of *Metrocoris histrio* Buchanan White (data supplied in a personal communication by Dr. T. Hidaka, Kyushu University, Japan).

ACKNOWLEDGEMENTS

For loan of material and for valuable help in various ways I am indebted to the institutions mentioned above and to Miss Cheng Lanna (Singapore) and Messrs. M. Beier (Vienna), H. C. Blöte (Leiden), J. Carayon (Paris), W. E. China (London), R. H. Cobben (Wageningen), C. J. Drake (Washington), S. Endrödy-Younga (Budapest), C. H. Fernando (Ceylon), J. A. Grant (London), K. K. Günther (Berlin), B. A. Harrison (Kansas), K. J. Hedqvist (Stockholm), T. Hidaka (Fukuoka), T. Jaczewski (Warsaw), C. A. W. Jeekel (Amsterdam), I. M. Kerzhner (Leningrad), I. Lansbury

(Oxford), K. S. Pradhan (Calcutta), S. L. Tuxen (Copenhagen), and R. L. Wenzel (Chicago).

A grant from the "Stichting Jan Joost ter Pelkwijk Fonds" enabled me to study the collections of the British Museum (Natural History), London, which are of special importance as they contain the types of the species described by Distant.

Metrocoris Mayr

Metrocoris Mayr, 1865: 445 (descr.); Mayr, 1866: 177 (do.); Meinert, 1888: 140 (class.; syn.: *Halobatodes* Buchanan White); Bianchi, 1896: 71 (key); Lethierry & Severin, 1896: 64 (cat.); Distant, 1904: 188 (descr.); Kirkaldy, 1904: 61 (key to species); Oshanin, 1908: 500 (cat.); Distant, 1910b: 158 (descr.); Bergroth, 1911: 184 (syn.: *Ventidius* Distant); Oshanin, 1916: 62-63 (cat.); Esaki, 1926a: 122-130 (syn.: *Metrocoropsis* Paiva); Esaki, 1928: 511-512 (descr.); Esaki, 1929: 417-419 (syn.: *Gerastratus* Distant, *Euodus* Distant); Kenaga, 1941: 170 (key); Miller, 1956: 129 (descr.); Hungerford & Matsuda, 1960b: 7 (key); Matsuda, 1960: 290-293, 302-304 (descr., class.).

Halobatodes Buchanan White, 1883: 58-63 (descr.), 72 (metamorphosis), 76 (ecology), 78 (distr.).

Gerastratus Distant, 1910a: 148 (descr. of nymph); Distant, 1910b: 160, fig. 87 (do.).

Euodus Distant, 1910a: 150 (descr. of nymph); Distant, 1910b: 162, fig. 88 (do.).

Metrocoropsis Paiva, 1919b: 365 (descr. apt. ♂).

Type species of *Metrocoris* Mayr: *M. brevis* Mayr, by monotypy; of *Halobatodes* Buchanan White: *Halobates lituratus* Stål, by original designation; of *Gerastratus* Distant: *G. foveatus* Distant, by monotypy; of *Euodus* Distant: *E. communis* Distant, by monotypy; of *Metrocoropsis* Paiva: *M. femorata* Paiva, by monotypy.

The genus *Metrocoris* was established by Mayr in 1865 for his new species *Metrocoris brevis,* a macropterous form. The author overlooked that the apterous form of the same species had been described already by Dohrn in 1860 as *Halobates ståli,* a fact which was established by Meinert (1888: 143). Buchanan White (1883) separated the genus *Halobatodes* from *Halobates* Eschscholtz, 1822; in this new genus he placed (as type species) *Halobates lituratus* Stål, 1854, two new species, and furthermore (though with some doubt) *Halobates stali* Dohrn, 1860. However, as *Halobates stali* Dohrn, 1860, is an older name for *Metrocoris brevis* Mayr, 1865 (the type species of the genus *Metrocoris* Mayr, 1865) and as *H. stali* and *M. lituratus* are considered congeneric by all recent authors, *Halobatodes* passes into the synonymy of *Metrocoris* as shown by Meinert (1888).

Since Buchanan White, several authors have described new species in the genus. Distant erected two new genera and described five new species, three of which are based on nymphs only. These two genera (*Gerastratus* and *Euodus*) were recognized as identical with *Metrocoris* Mayr by Esaki

(1929). The most important study of *Metrocoris* during this century is that of Esaki (1926a), he proposed to separate the African from the Oriental species, and erected for the African species a new subgenus *Eurymetra*. In 1928 (: 511-512) Esaki raised *Eurymetra* to generic status, an opinion adhered to by all subsequent authors.

Bergroth (1911: 186) regarded *Ventidius* Distant as a synonym of *Metrocoris* Mayr. Although Esaki (1926a: 122) followed this interpretation, later (Esaki, 1928: 511-512) he considered them to be distinct genera, as has been done by all other authors since.

Additional description of the male genitalia. — In the present paper special attention has been paid to the male genitalia. A description of these parts additional to that by Matsuda (1960) is given below.

Endosoma (fig. 1-2) with a distinct dorsal plate, represented dorsally by two slender sclerites, apically always curved back, basally indistinguishably fused with the ventral plate. The part which is reflexed may be small and simple (*M. nepalensis*), but usually it has extensions laterally in the horizontal plane, or vertically in the dorsoventral plane, or both. Ventral plate tapering towards the apex. Ductus seminis, projecting from ventral plate, in some species very long (e.g., *M. histrio*), in other species short. Lateral plates paired. First pair always distinct, extending from base of endosoma. In most species a second pair of lateral plates along the upper margin of endosoma distinctly visible, sometimes not strongly sclerotized and then only visible from above. In some species (*M. philippinensis, tenuicornis*) a third pair of lateral plates is visible between the parts of the second pair, more apically than the first pair. In most species, however, this third pair is not well sclerotized and not at all, or only with difficulty to be seen even from above.

Between the first pair of lateral plates and the apical part of the dorsal plate a well sclerotized piece can be found in a few species (e.g., *M. tenuicornis histrio*).

Metrocoris lituratus (Stål) (fig. 1-3; map, fig. 12)

Halobates lituratus Stål, 1854: 238 (descr. apt. form, — China, types (!), NRS); Stål, 1858: 264 (do.); Mayr, 1866: 177 (distr.); Frauenfeld, 1867: 433 (distr.).

Halobatodes lituratus: Buchanan White, 1883: 59, 63-66, 78, pl. 2 fig. 4 (key, descr. apt. form).

Metrocoris lituratus: Dahl, 1893: 8-9 (key); Lethierry & Severin, 1896: 64 (cat.); Kirkaldy, 1904: 61-62 (key); Esaki, 1926a: 123-125 (descr., distr.); Esaki, 1926b: 182 (distr.); Lundblad, 1933: 371, 373 (distr.); Matsuda, 1960: 302.

Metrocoris brevis: Esaki, 1925: 61, pl. 2 fig. 18-19 [misidentification, corrected by Esaki, 1926a].

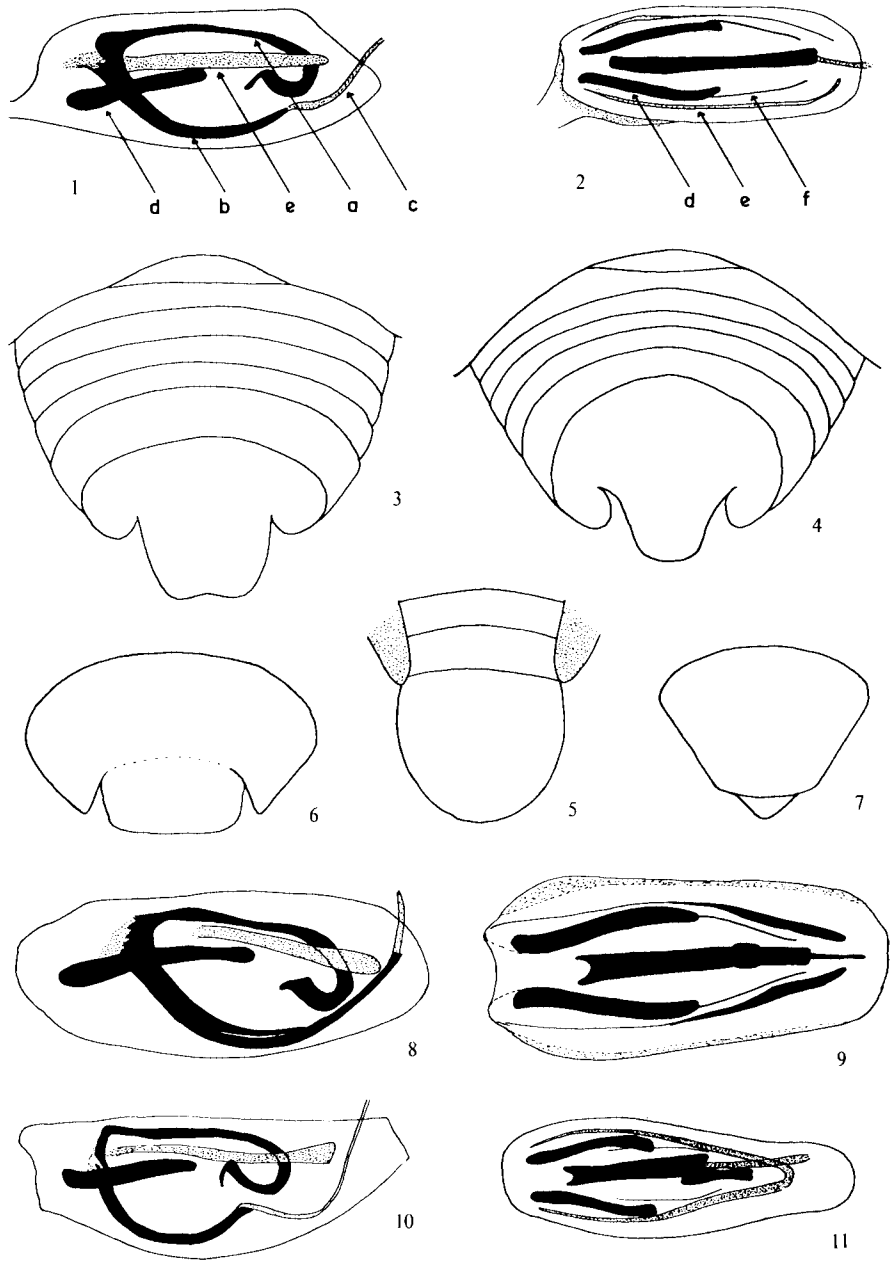


Fig. 1-3, *Metrocoris lituratus*. 1-2, male endosoma, × 80: 1, lateral view, 2, dorsal view; 3, ventral view of female abdomen, × 23. Fig. 4-9, *Metrocoris stali*. 4, ventral view of female abdomen, × 23; 5, dorsal view of last abdominal segments of male, × 23; 6-7, ventral view of last abdominal segments of female (7, specimen from Angulana, Ceylon), × 23; 8-9, male endosoma, × 80; 8, lateral view, 9, dorsal view. Fig. 10-11, *Metrocoris strangulator*, male endosoma, × 80. 10, lateral view; 11, dorsal view. a, dorsal plate; b, ventral plate; c, ductus seminis; d, first pair of lateral plates; e, second pair of lateral plates; f, third pair of lateral plates.

Material. — Kangting: Tatsienlu, 1 ♂ 1 ♀ (apt.), LEN.

Kiangsi: 1874, leg. A. David, 1 ♂ 1 ♀ (apt.), MP.

Kwantung: Lau Tau Island (near Hong Kong), 7/9-viii-1934, leg. W. E. Hoffmann, 1 ♂ (apt.), BM; Macao, Lappa Island, 1 ♂ (apt.), SNOW.

Hong Kong: Novara Expedition, 1 ♀ (apt.), NMW; 15-x-1902, leg. Berezowsky, 2 ♂ 2 ♀ (apt.), LEN; 21/30-vi-1925, leg. W. E. Hoffmann, 1 ♂ 1 ♀ (apt.) 1 ♀ (macr.), BM.

Fukien: Foochow, leg. C. F. Wu, 1 ♂ 1 ♀ (apt.), BM; Kwangtseh Hsien, East Gate, 1 ♂ 2 ♀ (apt.), USNM; Chungan, Bohea Hills, 1942, leg. T. C. Maa, 1 ♂ (apt.), USNM.

Taiwan (Formosa): Shushu (= Chip-chip), leg. Sauter, 4 ♂ 13 ♀ (apt.), MBUD; Kosempo, leg. Sauter, 3 ♂ 4 ♀ (apt.), MBUD.

"China": 2 ♂ 1 ♀ (apt.), NRS (type and paratypes).

Distribution. — South and East China, Taiwan; see map (fig. 12).

Additional description. — An extensive diagnosis has been given by Buchanan White (1883: 64-66). Pronotum as broad as width of head including the eyes or slightly narrower, approximately 3.5-4 times as broad as median length; laterally overlapping about half of propleura. First antennal segment of male as long as second and third together, which are approximately equal in length; distal segment shortest. Endosoma (fig. 1-2): apical part of dorsal plate without extensions in lateral directions, top with a slender projection directed ventrally. Second pair of lateral plates readily visible, third pair very indistinct.

Length: ♂, 4.9-6 mm; ♀, 4.2-5 mm. Maximum width: ♂, 2.4-2.8 mm; ♀, 2.3-2.8 mm. One of the specimens (Macao) is only 4.2 mm long, but is otherwise normal.

Metrocoris stali (Dohrn) (fig. 4-9; map, fig. 26)

Halobates ståli Dohrn, 1860: 408 (descr. apt. form, — Ceylon, type(!), WARS); Kirby, 1891: 124 (cat.).

Halobates brevis: Kirby, 1891: 124 (cat.).

Halobatodes(?) *stali*: Buchanan White, 1883: 63, 69-70, 78 (orig. descr. copied, key, distr.).

Metrocoris brevis Mayr, 1865: 445 (descr. macr. form, — Ceylon, types(!), NMW); Dahl, 1893: 8-9 (key).

Metrocoris ståli: Meinert, 1888: 143 (class., = *Metrocoris brevis* Mayr); Kirkaldy, 1904: 62 (key); Distant, 1904: 190 (distr.); Breddin, 1905: 134 (compared with *M. strangulator* Breddin); Distant, 1910b: 158 (distr.); Oshanin, 1912: 86 (cat.) [in part; specimens from S. Iran excluded]; Paiva, 1919a: 154 (distr.); Esaki, 1925: 61 (distr.); Esaki, 1926a: 123, 129, fig. 3a-b (class., distr.); Esaki, 1928: 512 (cat.); Lundblad, 1933: 371, 373 (distr.); Brown, 1950: 479-480, fig. (compared with *Metrocoris omanensis* Brown [= *Metrocoris communis* Distant]); Stichel, 1955: 159 (distr.) [in part; specimens from S. Iran excluded]; Miller, 1956: 129, fig. 50 (class., fig. apt. male); Mendes & Fernando, 1962: 83 (cat.), fig. 2 (fig. apt. male).

Metrocoris stali (?): Matsuda, 1960: 38, 113, 121, 126, 302, fig. 76-77, 785, 786, 789, 790 (descr.).

Metrocoris illustrarius Distant, 1904: 189-190 (descr. of nymph, — Ceylon, type(!), BM); Lundblad, 1933: 371, 373 (cat.); Mendes & Fernando, 1962: 83 (cat.).

Material. — S. India: Pulney Hills, Kodalkanal, Silver Cascades, iv-1953, leg. P. Susai Nathan, series ♂ ♀, SNOW; Nilghiri Hills, 6000 ft., leg. P. Susai Nathan, series ♂♀, SNOW; Conoor, 1902, leg. M. Maindron, series ♂ ♀, MP; Anamalai Hills, Cinchona, 3500 ft., v-1960, leg. P. Susai Nathan, series ♂ ♀, ML, SNOW; Trichinopoli, 1898, leg. Noualhier, series ♂ ♀, MP; Shembaganur, 1 ♂ (macr.), MBUD.

Ceylon: Angulana, 7-i-1958, leg. K. L. A. Perera, 1 ♀ (apt.), SNOW; Belihul Oya, 14-ix-1959, leg. K. L. A. Perera, 2 ♂ 1 ♀ (apt.), SNOW; Chiya, viii-1906, leg. T. Bainbrigge Fletcher, 3 ♂ 1 ♀ (apt.), BM; Chiya, iv-1929, 1 ♂ (apt.), BM; Diatalawa, ix-1907, leg. T. Bainbrigge Fletcher, 1 ♀ (apt.), BM; Sita Eliya, 4-viii-1957, leg. C. H. Fernando, 1 ♂ 1 ♀ (apt.), SNOW; N. Eliya, 2-iii-1907, leg. E. Bugnion, 1 ♂ 1 ♀ (apt.), MP; N. Eliya, Hakgala, 16-viii-1929, 2 ♂ (apt.), BM; 14-ix-1959, leg. K. L. A. Perera, 1 ♂ 2 ♀ (apt.), 18-ix-1959, series ♂ ♀ (apt.), SNOW; Haputale, 4800 ft., viii-1907, leg. T. Bainbrigge Fletcher, 1 ♂ 2 ♀ (apt.), 1 ♀ (macr.), 30-viii-1907, 2 ♀ (apt.), 18-ix-1907, 2 ♂ 2 ♀ (macr.), 19-ix-1907, 1 ♂ (macr.), all BM and ix-1907, 1 ♂ (macr.), MP; Kandapola, 6700 ft., 27-ix-1926, 2 ♂ (apt.), BM; Laxapathiya, 21-vi-1958, leg. K. L. A. Perera, 1 ♀ (apt.), SNOW; Madulsima, 20-v-1908, leg. T. Bainbrigge Fletcher, 1 ♂ (apt.), 1 ♀ (macr.), Distant Coll., BM, 1911:383; Mousakande, Gammadousa, 5-ix-1929, 1 ♀ (macr.), BM; Pattipola, 2000 m, 1902, leg. Biro, 4 ♂ (apt.), MBUD; Pattipola, 3-vii-1910, 1 ♀ (apt.), IND; Punduloya, iv-1897, leg. E. E. Green, 1 ♂ 3 ♀ (apt.), NMW, SNOW; "Ceylon": leg. Nietner, 1 ♂ (apt.), WARS (type *M. stali*); 1 ♀ (apt.), MC; 1861, leg. Felder, 2 ♂ (macr.), NMW (syntypes *M. brevis*); leg. E. E. Green, 1 ♂ 2 ♀ (apt.), 5 nymphs, BM (one nymph, type *M. illustrarius*).

Distribution. — South India, Ceylon; see map (fig. 26).

Additional description. — Eyes overlapping approximately half of propleura. Pronotum 2-3 times as broad as median length in ♂; 2.8-3.5 times in ♀; as broad as width of head including the eyes or slightly broader. Endosoma (fig. 8-9): apical part of dorsal plate slightly extended laterally, top with a projection directed ventrally. Apical part of second pair of lateral plates always clearly visible in lateral view; basal part moderately sclerotized, sometimes not visible from the side.

Length: ♂, 5.2-7.2 mm; ♀, 4.7-5.8 mm. Maximum width: ♂, 2.6-3.8 mm; ♀, 2.7-3.7 mm.

Remarks. — The median ventral prolongation of the abdomen in females shows considerable variation; it may be narrow as shown in fig. 4, but there are also specimens in which it is much broader (fig. 6); the latter have been collected at different localities. Some specimens from Angulana (Ceylon) have this prolongation so much broadened, that it is not scale-like at all (fig. 7).

Metrocoris strangulator Breddin (fig. 10-11, 17; map, fig. 12)

Metrocoris strangulator Breddin, 1905: 134 (descr. apt. form, — Tjibodas, Java; types in Naturhistorisches Museum, Hamburg); Bergroth, 1915: 123 (descr., distr.); Esaki, 1926a: 129 (class.); Lundblad, 1933: 7-10 (cat.), 371, 373, 463 (distr.), fig. 126 (descr.), 442 (ecol.); Hungerford & Matsuda, 1960b: 18, fig. 45 (fig. apt. male); Matsuda, 1960: 168, 302, fig. 781, 783, 784, 788, 792, 795.

Material. — Peninsular Thailand: Nakon Si Thammarat, Khao Luang, 4350 ft., on stream, 13-iii-1922, leg. H. M. Pendlebury, 1 ♀ (apt.) 1 ♀ (macr.), BM.

Malaya: Perak, Taiping Intake, 9-iii-1927, leg. Dover, 4 ♂ 4 ♀ (apt.), BM.

Sumatra: Karo Batak, Toba Lake, Lau Gumba (Brastagi), 25-xii-1916, leg. J. E. A. den Doop, 11 ♂ 10 ♀ (apt.), MA; Brastagi, pond, xii-1951, leg. Naezer 1 ♂ 2 ♀ (apt.), LEW; Si-rambas, xii-1890/iii-1891, leg. E. Modigliani, 2 ♂ (apt.), SNOW; Gunung Singgalang, 1800 m, 1925, leg. E. Jacobson, 1 ♂ 1 ♀ (apt.), ML.

Java: Tjibodas, 1600 m, cave, v-1922, leg. K. W. Dammerman, 1 ♂ 1 ♀ (apt.), ML; Bogor, iv/xii-1896, leg. D. G. Fairchild, 1 ♂ (apt.), SNOW; Preanger, Lebak Sioe, Gunung Gedeh, 3000-4000 ft., leg. M. E. Walsh, 1 ♂ (apt.), SNOW; Gunung Gedeh, iii-1911, leg. E. Jacobson, 1 ♂ (apt.), MA; Gunung Gedeh, v-1937, leg. F. C. Drescher, 1 ♂ 1 ♀ (apt.), ML: Gunung Salak, xi-1907, leg. E. Jacobson, 2 ♀ (apt), MA; Tosari, leg. Kohlbrugge, 2 ♀ (apt.), ML; Gunung Unggaran, xii-1909, leg. E. Jacobson, 1 ♂ 1 ♀ (apt.), MA; Gunung Murjo, N. side, 7/30-xii-1935, leg. M. E. Walsh, 1 ♂ (macr.), SNOW.

Distribution. — Thailand, Malaya, Sumatra, Java, Bali; see map (fig. 12).

Additional description — Endosoma (fig. 10-11): apical part of dorsal plate a little widened laterally, top with a narrow projection directed ventrally. Second pair of lateral plates clearly visible, moderately sclerotized. Ductus seminis scarcely protruding from endosoma.

Metrocoris nigrofasciatus Distant (fig. 13-16; map, fig. 12)

Metrocoris nigrofasciatus Distant, 1903: 257, pl. 15 fig. 9 (descr. apt. male, — Bukit Besar, Nawngchik; type(!), BM); Distant, 1910b: 160 (descr. apt. and macr. male); Paiva, 1918: 25 (distr.); Kemp, 1925: 93-94 (= *Metrocoropsis femorata* Paiva, distr.); Esaki, 1926a: 130 (class., = ? *Metrocoris femorata*); Lundblad, 1933: 371, 373 (distr.); Matsuda, 1960: 302 (cat.).

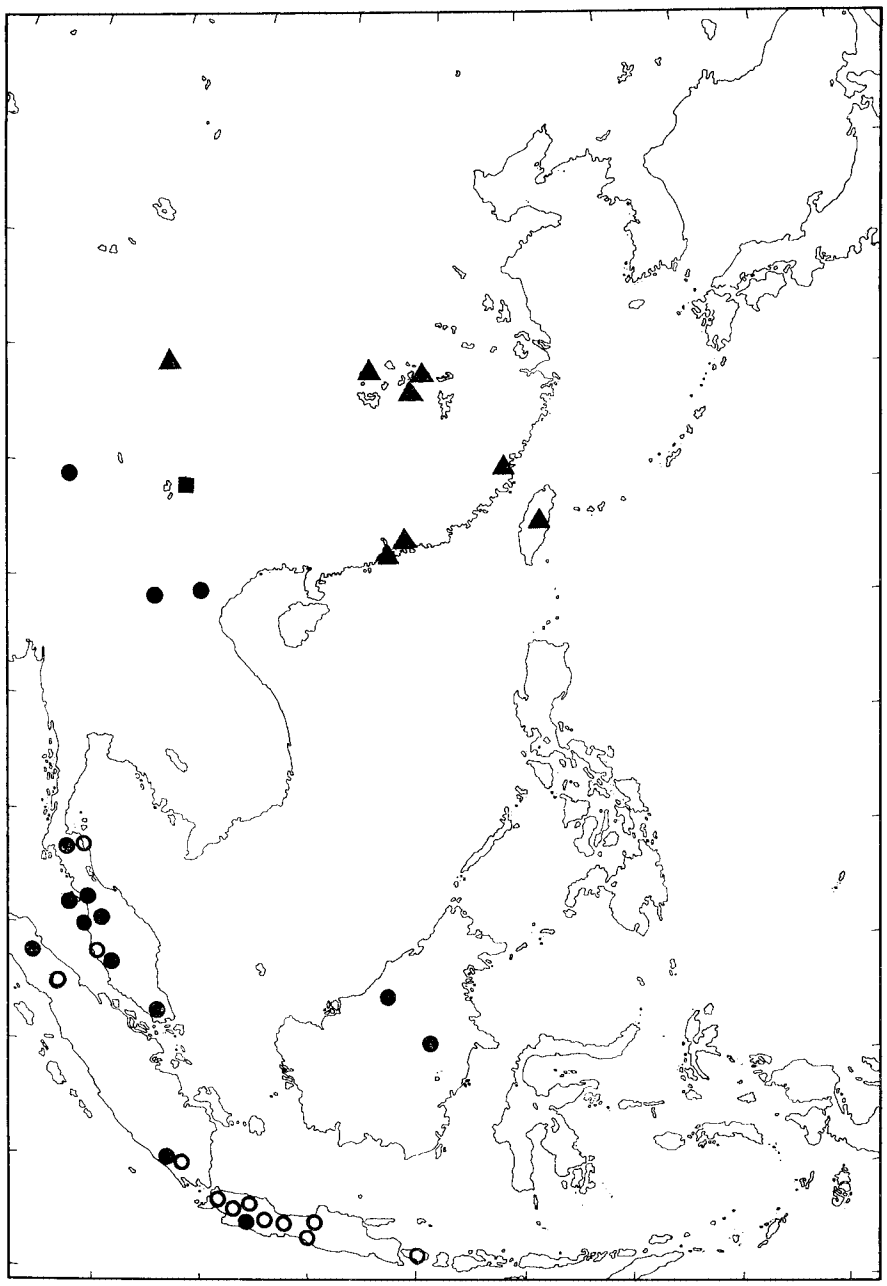


Fig. 12, distribution of *Metrocoris lituratus* (black triangles), *M. strangulator* (open circles), *M. nigrofasciatus* (black dots) and *M. bilobatus* (black square).

Metrocoris squamifer Lundblad, 1933: 10, 371, 398, fig. 127, 463, 466 (descr. apt. female, — Ranau, Sumatra; type(!), NRS), **syn. nov.**; Hungerford & Matsuda, 1960: 7-9, pl. 1-2 (descr. apt. male); Matsuda, 1960: 302 (cat.).

Lundblad (1933) described *Metrocoris squamifer* from a single apterous female. Hungerford & Matsuda (1960a) gave a description of the male of this species from specimens that had been compared by Lundblad to the type of *Metrocoris squamifer,* an apterous female from Sumatra. However, these authors did not study the types in BM and they overlooked Distant's *Metrocoris nigrofasciatus,* described from the male only, although one male and two females were available. The female of this species agrees very well with the description by Lundblad, especially as regards the pointed abdomen and the scape of the antennae. As the characters of the endosoma of the male also are identical in both forms, the species must be regarded identical.

Material. — Burma: Shingbwiyang, 11-viii-1944, leg. L. C. Kuitert, 2 ♂ (apt.), SNOW.

Vietnam: Tonkin, 1 ♂ (macr.), SNOW.

Laos: Luang Prabang, Hat Tiang, 14-xii-1917, leg. R. Vitalis de Salvaza, 1 ♂ 2 ♀ (apt.), BM.

Thailand: Bukit Besar, Nawngchik, 2500 ft., 26-viii-1901, running on surface of clear jungle stream in shade, leg. N. Annandale & R. Robinson, 1 ♂ apt. (type) 2 ♀ (apt.), BM; Nakon Si Thammarat, Khao Luang, in stream, 2000 ft., 14-iv-1922, leg. H. M. Pendlebury, 1 ♀ (macr.), BM.

Malaya: W. Coast, Langkawi Island, 30-iv-1928, 1 ♂ (apt.), BM; Kedah Peaks, 3000 ft., 2-xii-1915, 2 ♀ (apt.), BM; Kedah Peaks, 1200-1300 m, roadside, 18-ii-1963, leg. M. A. Lieftinck, 1 ♀ (apt.), ML; Penang, Batu Feringgi, 23-ii-1963, leg. M. A. Lieftinck, 1 ♂ (apt.) 1 nymph, ML; Perak, Taiping Intake, S. Hill, 9-iii-1927, 1 ♂ (apt.), BM; Perak, Hill Stream near Reservoir, 9-iii-1927, 4 ♂ (apt.), BM; Perak, Padang Hill Stream near Jor Camp, 1 ♂ (macr.), BM; Perak, Kuala Kangra Waterfall, on stream, 10-iii-1927, 2 ♂ (macr.), BM; Selangor, Gombak Valley, 1500 ft., 16-x-1921, leg. H. M. Pendlebury, 1 ♂ (apt.), BM; 11-ix-1921, 3 ♀ (apt.), BM; 11-ix-1926, leg. Dover, 2 ♀ (apt.), BM; 11-x-1926, leg. Dover, 2 ♀ (apt.), BM; Selangor, Hill Stream near Klang Gates, 21-viii-1926, 1 ♂ (apt.), BM; 31-i-1926, 1 ♂ 1 ♀ (apt.), BM; Johore, Gunung Pulai, on mountain stream, 10-ii-1961, leg. C. H. Fernando, 1 ♂ 4 ♀ (apt.), SNOW; 13-iii-1963, leg. C. H. Fernando, 1 ♂ 1 ♀ (apt.), SING.

Sumatra: Soligo-Lolewan, brook, 9-ix-1931, leg. J. C. van der Meer Mohr, 3 ♂ 1 ♀ (apt.), NRS, SNOW; Ranau, 600 m, leg. Thienemann, 1 ♀ (apt.), NRS (type *Metrocoris squamifer* Lundblad).

Java: Preanger, 1 ♂ 1 ♀ (apt.), ML; Preanger, 1936, leg. E. le Moult, 1 ♀ (apt.), ML.

Borneo: Mt. Dulit, leg. R. Koyan, 2500 ft., primary forest, on surface of river, fast water, 17-ix-1932, leg. B.M. Hobby & A. W. Moore (Oxford University Expedition), 1 ♂ (macr.), BM; Central Borneo, River Boh, 1925, leg. Mjöberg, 1 ♂ (macr.), MA.

Distribution. — Burma, Laos, Vietnam, Thailand, Malaya, Sumatra, Java, Borneo; see map (fig. 12).

Additional description. — Endosoma (fig. 13, 14): apical part of dorsal plate without extensions in lateral direction, top with a narrow projection directed ventrally. Second pair of lateral plates clearly visible. Third pair only moderately sclerotized but in most specimens still clearly visible.

Metrocoris communis (Distant) (fig. 18-20; map, fig. 26)

Euodus communis Distant, 1910a: 151 (descr. of nymph, — Kumaon; type(!), BM); Distant 1910b: 162-163, fig. 88 (orig. descr. copied, fig.); Esaki, 1929: 419 (= *Metrocoris* species).

Metrocoris stali: Oshanin, 1912 [nec Dohrn, 1860]: 86 (distr.) [in part, specimens from S. Iran only]; Stichel, 1955: 159 (distr.) [do.].

Metrocoris omanensis Brown, 1950: 477-480 (descr. of apt. male and female, fig., compared with *Metrocoris stali* (Dohrn), — Oman, types(!), BM); Stichel, 1955: 159 (distr.), **syn. nov.**

Metrocoris spec.: Esaki, 1926a: 124 (reference to Oshanin, 1912).

I have compared three nymphs of *Metrocoris omanensis* Brown, collected together with the adults, with the type of *Metrocoris* (*Euodus*) *communis* Distant, also a nymph. They agree in the yellow underside and the relative shortness of the front femur (length: maximum width, approximately 5: 1). The adults have been compared with the type series of *Metrocoris omanensis* Brown and are definitely the same: this species must therefore be regarded as a synonym of *Metrocoris communis* (Distant).

The nymphs of this species are easily distinguished from the nymphs of other species occurring in this region (*Metrocoris compar* Buchanan White, *Metrocoris nepalensis* Distant) since these latter have a dark underside and the front femur is more than six times as long as wide.

Material. — Arabia: Oman, Ras-al-Khaima, 16-v-1949, leg. G. V. Popov, 5 ♂ 16 ♀ (apt.), BM (type material *M. omanensis* Brown).

Iran: Baghin, 35 km W. of Kerman, 1/3-vi-1928, leg. Sijzov, 2 ♂ (apt.), LEN; S. E. of Kerman, between Tagab and Kaskin, 6-vii-1898, leg. Zarudnyi, 1 ♂ 1 ♀ (apt.), LEN; Bampur, 9-vii-1898, leg. Zarudnyi, 1 ♂ (apt.), LEN; Mir Kala, Dzhalk [= Jalq], 30-i-1901, leg. Zarudnyi, 1 ♂ 1 ♀ (apt.), LEN; Khorzan, Gulmirun, 14/15-vii-1901, leg. Zarudnyi, 1 ♂ 1 ♀ (apt.), LEN.

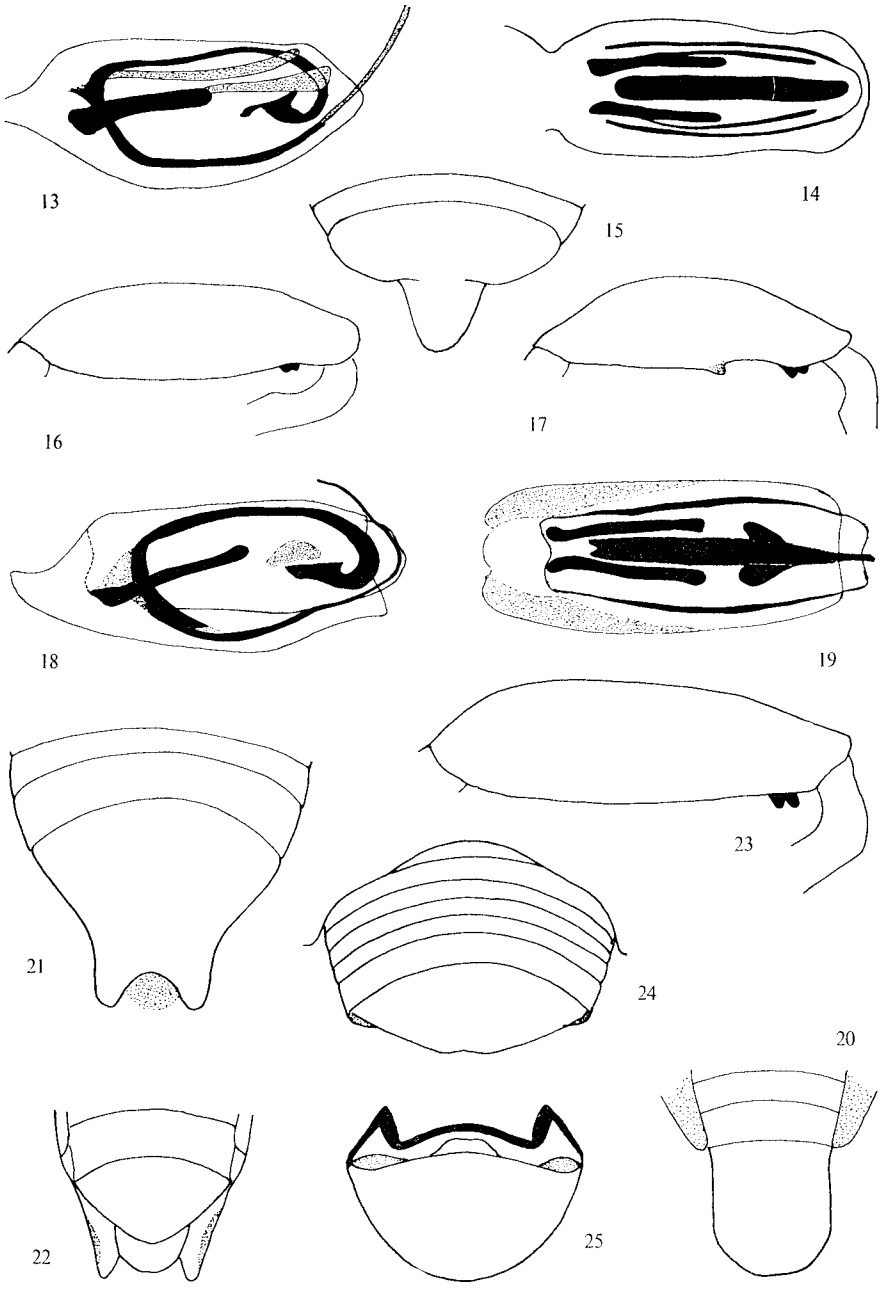


Fig. 13-16, *Metrocoris nigrofasciatus*. 13-14, male endosoma, × 80: 13, lateral view, 14, dorsal view; 15, ventral view of last abdominal segments of female, × 23; 16, front femur of male, × 13. Fig. 17, *Metrocoris strangulator*, front femur of male, × 13. Fig. 18-20, *Metrocoris communis*. 18-19, male endosoma, × 80: 18, lateral view, 19, dorsal view; 20, dorsal view of last abdominal segments of male, × 23. Fig. 21-23, *Metrocoris bilobatus*. 21-22, last abdominal segments of female, × 23: 21, ventral view, 22, dorsal view; 23, front femur of male, × 13. Fig. 24-25, *Metrocoris compar*, female abdomen, × 23. 24, lateral view; 25, caudal view.

Afghanistan: Pirzada, 3-vi-1948, leg. N. Haarløv, 1 ♂ 2 ♀ (apt.), MC.

India: Base of W. Himalayas, Kalaka, leg. N. Annandale, 1 ♀ (apt.), IND; Punjab, Kangra, 2700 ft., small rocky stream flowing from Bazar beyond civil Rest House, 14-v-1926, leg. S. L. Hora, 4 ♂ 5 ♀ (macr.), 1 ♀ (apt.), IND; Punjab, Shapur, 2469 ft., small rocky stream N.W. of Dak Bungalow, 25-v-1926, leg. S. L. Hora, 1 ♂ (macr.), IND; Kumaon [Punjab], Sath Tal, 4000 ft., leg. N. Annandale, 1 nymph, BM (type *E. communis* Distant); United Provinces, Dehra Dun, 9-vi-1951, leg. R. N. Kuthari, 1 ♂ (apt.), USNM; United Provinces, Dehra Dun, Majra, 1 ♂ 1 ♀ (macr.), 2 ♂ (apt.), USNM; Assam, Khasia Hills, Chenapungi, leg. M. Burr, 1 ♀ (apt.), SNOW; Orissa, Jeypore, 1775 ft., ix-1958, leg. P. Susai Nathan, 2 ♂ 2 ♀ (macr.), SNOW; South India, Shevary Hills, Yercaud, 4500 ft., ii-1955, leg. P. Susai Nathan, series ♂ ♀ (apt.), 6 ♀ (macr.), 2 nymphs, SNOW; South India, Ootacamund, vi-1912, leg. Sewell, 1 ♂ (apt.), IND.

Distribution. — Arabia, Iran, Afghanistan, India; see map (fig. 26).

Additional description. — Endosoma (fig. 18, 19): apical part of dorsal plate with two lobes projecting laterally. Above these lobes a moderately sclerotized but always clearly visible part present.

Length: ♂, 4.9-5.9 mm; ♀, 4.1-5.1 mm. Maximum width: ♂ 2.3-3.0 mm, ♀ 2.5-3.2 mm.

Remark. — Generally the specimens are somewhat smaller than those described by Brown (♂, 4.9-5.2 mm; ♀, 4.1-4.6 mm). The specimens from Afghanistan, however, are larger (♂, 5.9 mm; ♀ 4.9 mm).

Metrocoris bilobatus spec. nov. (fig. 21-23, 37; map, fig. 12)

Material. — China: Yunnan, Yunnan-Fou, San-nen-Kai, leg. E. le Moult, 1 ♀ (holotype) 1 ♂ (allotype), ML.

Distribution: Yunnan; see map (fig. 12).

Description. — Yellow-brown with black markings. Surface dull, pronotum scarcely shining, covered with short adpressed hairs, on ventral side with longer silvergrey hairs.

Head with black central marking bifurcate posteriorly; frontal part of face and insertion of antennae black. Rostrum shining yellow, apical part of third and last segments black. Eyes overlapping less than half of propleura. First segment of male antennae yellow with very short adpressed hairs, second one black with a narrow brown streak on inner side (last two segments missing in specimen examined). Antennae of female dark, first segment more than twice as long as the second; last three segments approximately in ratio 8 : 9 : 7. Pronotum 2.5 (♂) to 3 times as broad as median length, anterior border sinuate, posterior margin nearly straight; as

broad as or slightly broader than width of head including the eyes. Black areas of mesonotum not reaching the meso-metanotal suture, anteriorly connected with the black anterior margin by a narrow fascia. Underside pale yellow-brown with a distinct black fascia along the edges of the meso-acetabular sutures. Front femur (fig. 21) in male thickened (length: maximum width 3: 1), broadest approximately at the middle, apically with two obtuse black teeth on underside. From these teeth a black fascia with numerous very small black spinelets extends nearly to the base. Femur with three dark brown-black areas. Seventh abdominal segment of female (fig. 22, 23) strongly developed, longer than all other abdominal segments together, apically projecting into two distinct lobes as shown in fig. 23.

Length: ♀, 5.6 mm (♂ damaged). Maximum width: ♀, 2.9 mm; ♂, 3.1 mm.

Remark. — This species can be distinguished easily from all other known species by the peculiar terminal segment of the female abdomen. As the abdomen of the male specimen is damaged, the description is necessarily incomplete.

Metrocoris femoratus (Paiva) (map, fig. 26)

Metrocoropsis femorata Paiva, 1919b: 365, pl. 34 fig. 5 (descr. macr. male, — Assam); Kemp, 1925: 93-94 (= *Metrocoris nigrofasciatus* Distant).

Metrocoris femorata: Esaki, 1926a: 130 (class.); Lundblad, 1933: 371, 373 (*M. femoratus*, distr.).

I have not seen this species. The type material is said to be in the collection of the Zoological Survey of India, No. 8381/Hl (five macropterous males from a stream in dense jungle, above Tura, Assam, 3800 ft., 15-vii/31-viii-1917), but it was not available for my study. Kemp (1925: 94) stated that the species is identical with *Metrocoris nigrofasciatus* Distant, but I have never seen a specimen of *M. nigrofasciatus* with a tooth on the front femur as shown in the figure given by Paiva. However, the shape of this tooth resembles that of the tooth of the front femur of *Metrocoris lituratus* (Stål). Probably a study of the genitalia will solve the problem of the identity of the present form.

Distribution. — Assam; see map (fig. 26).

Metrocoris compar (Buchanan White) (fig. 24-25, 27-29; map, fig. 26)

Halobatodes compar Buchanan White, 1883: 63, 68-69, 78, pl. 2 fig. 6 (descr. apt. form, key, distr., — India; types (!), OUM).

Metrocoris compar: Dahl, 1893: 8-9 (key); Lethierry & Severin, 1896: 64 (cat.); Distant, 1904: 189, fig. 135 (descr.); Kirkaldy, 1904: 61-62 (key, distr.); Lundblad, 1933: 371 (distr.).

Metrocoris spec. from Nepal: Matsuda, 1960, fig. 793 (male abdomen).

The type series of this species in OUM consists of four specimens of which I designate the male with the label "TYPE HEM 413 5/6 HOPE DEPT OXFORD" as lectotype. This specimen has been figured by Buchanan White. The other specimens, no. 413 3/6 (♂), no. 413 2/6 (♀) and no. 413 6/6 (nymph) must be considered paralectotypes.

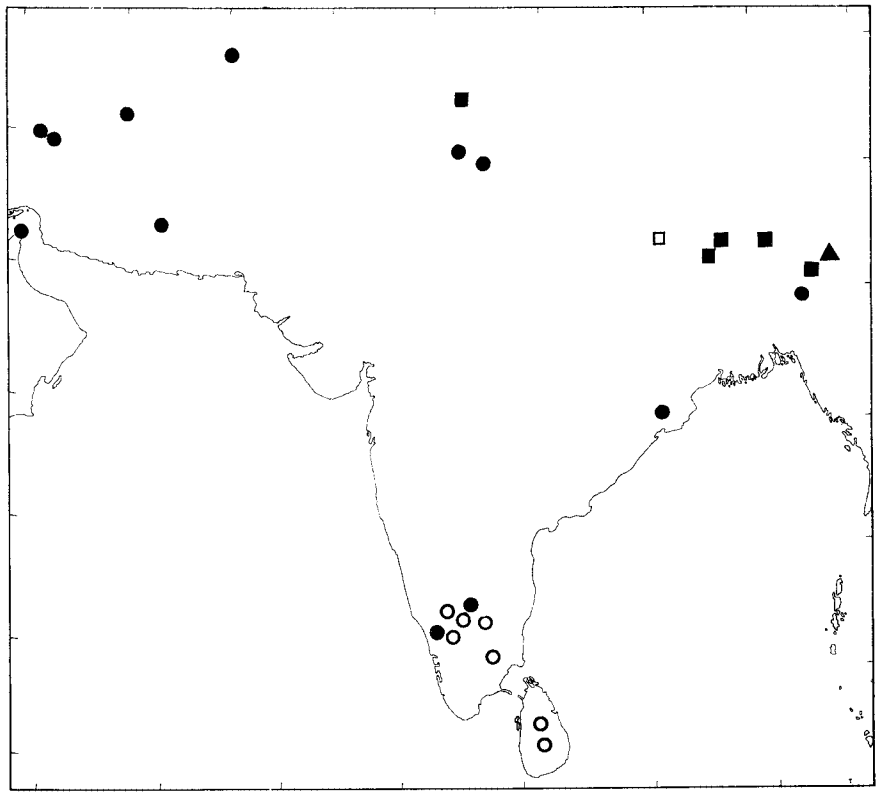


Fig. 26, distribution of *Metrocoris stali* (open circles), *M. communis* (black dots), *M. femoratus* (black triangle), *M. nepalensis* (open square) and *M. compar* (black squares).

With this type series are placed two specimens, nos. 413 1/6 and 413 4/6, which bear also a label "*Metrocoris compar* Buchanan White". These specimens, however, do not even belong to the Halobatinae. It is evident from his description that Buchanan White did not have these last two specimens before him when he described the species.

It may be of interest to note that the "ex libris" of Donald Mac Gillavry contains an illustration by C. N. de Wilde of an apterous male of *M. compar*.

Material. — India: United Provinces, Dehra Dun, Mussoorie, Mossey Nullah, 5-vii-1930, leg. B. N. Chopra, 1 ♂ 1 ♀ (apt.), 1 ♀ (macr.), IND; Mussoorie, Mackenzie Khudd, 2 ♀ (apt.), 2 nymphs, BM; Darjeeling, Gopaldhara, 4720 ft., 28-iv-1914, leg. H. Stevens, 1 ♂ (apt.), BM; Assam, Mishmi Hills, Delai River, 1700 ft., 6-ii-1935, leg. M. Steele, 1 ♂ (apt.), BM; "India", 2 ♂ 1 ♀ (apt.), 1 nymph, OUM (types).

Sikkim: Gangtok, 6150 ft., 10-ix-1909, 2 ♀ (apt.), BM.

Bhutan: ("Bhoutan Anglais"), 1900, leg. R. Oberthür, 1 ♂ (apt.), MP.

Distribution. — North India, Sikkim, Bhutan; see map (fig. 26).

Additional description. — Eyes overlapping approximately one fourth of propleura. Pronotum as broad as width of head including the eyes, approximately three times as broad as median length. Front femur of male with a little notch about the middle. Abdomen laterally with very small but distinct black bristles; underside black except for a yellow streak near the meso-acetabular sutures, and the last abdominal segments which are yellow-brown (see also Buchanan White, 1883, pl. 2 fig. 6a). Seventh abdominal segment of female strongly curved upwards as shown in figures 24, 25. Endosoma (fig. 27, 29): apical part of dorsal plate projecting in ventral direction, without extensions in lateral direction. First pair of lateral plates with a projection, usually moderately sclerotized, extending to the top of the dorsal plate. Ductus seminis protruding from endosoma.

Metrocoris nepalensis Distant (fig. 33-35; map, fig. 26)

Metrocoris nepalensis Distant, 1910a: 148 (descr. apt. form, — Nepal; types(!), BM); 1910b: 158, fig. 85 (do.); Lundblad, 1933: 371, 373 (distr.).

The apterous male from Katmandu in the British Museum (Natural History), is here designated the lectotype.

Material. — Nepal: Katmandu, 1 ♂ (type), 1 ♂ 3 ♀ (apt.), 2 nymphs, Distant collection, BM, IND; Soondrijal, 2 ♀ (apt.), BM.

Distribution. — Nepal; see map (fig. 26).

Additional description. — First segment of male antennae a little more than twice as long as second; last three segments approximately in ratio 8 :7 :6. Eyes overlapping half of propleura at most. Pronotum 2.5-3 times as broad as median length. Front femur of male slender (length: maximum width 6.5-7: 1), with a very small tooth on underside at apex (fig. 33). Endosoma (fig. 34, 35); apical part of dorsal plate without any extension. First pair of lateral plates somewhat projecting in ventral direction near base. Second pair of lateral plates not visible from the side.

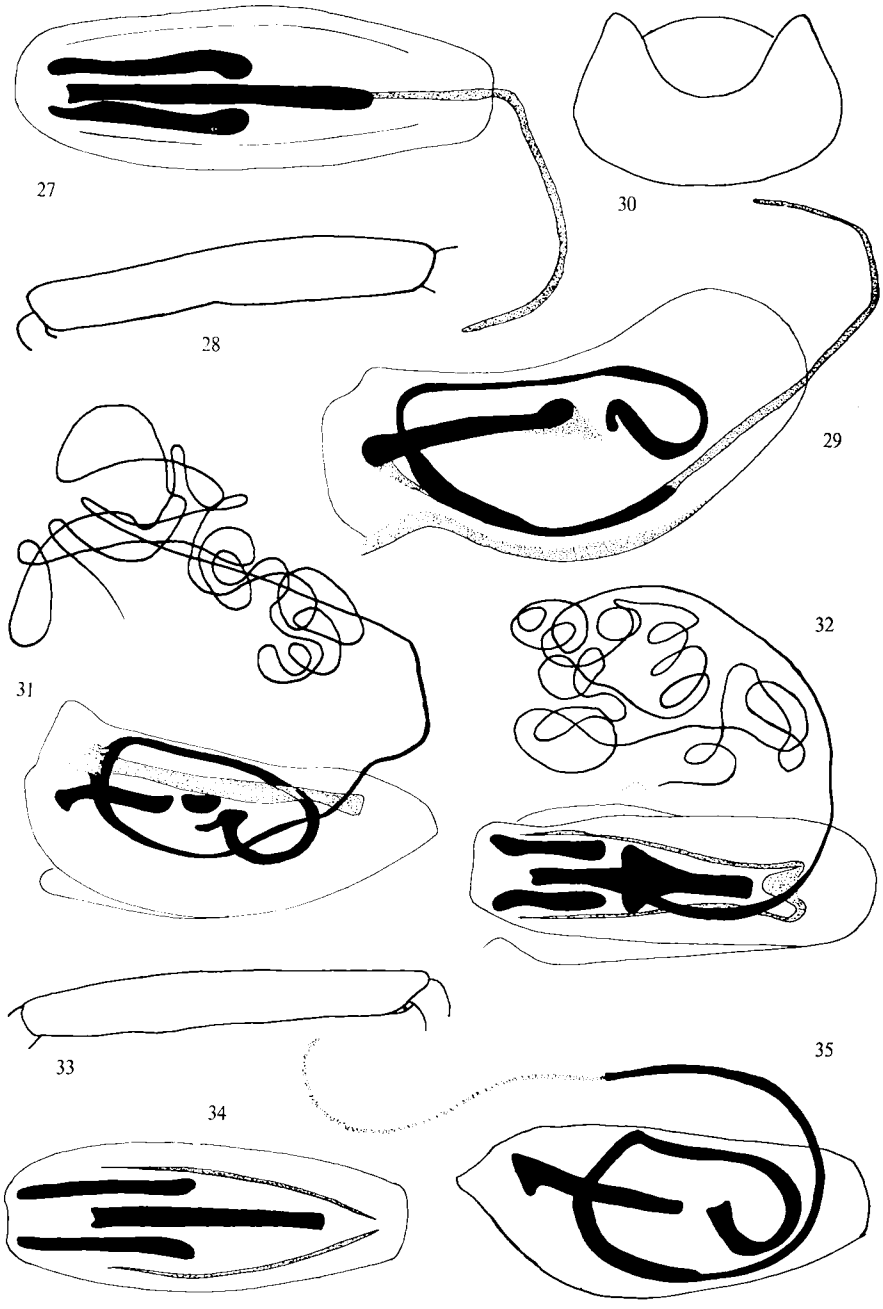


Fig. 27-29, *Metrocoris compar*. 27 and 29, male endosoma, × 80: 27, dorsal view, 29, lateral view; 28, front femur of male, × 13. Fig. 30-32, *Metrocoris histrio*. 30, female abdomen, caudal view, × 23; 31-32, male endosoma, × 80: 31, lateral view, 32, dorsal view. Fig. 33-35, *Metrocoris nepalensis*. 33, front femur of male, × 13; 34-35, male endosoma, × 80: 34, dorsal view, 35, lateral view.

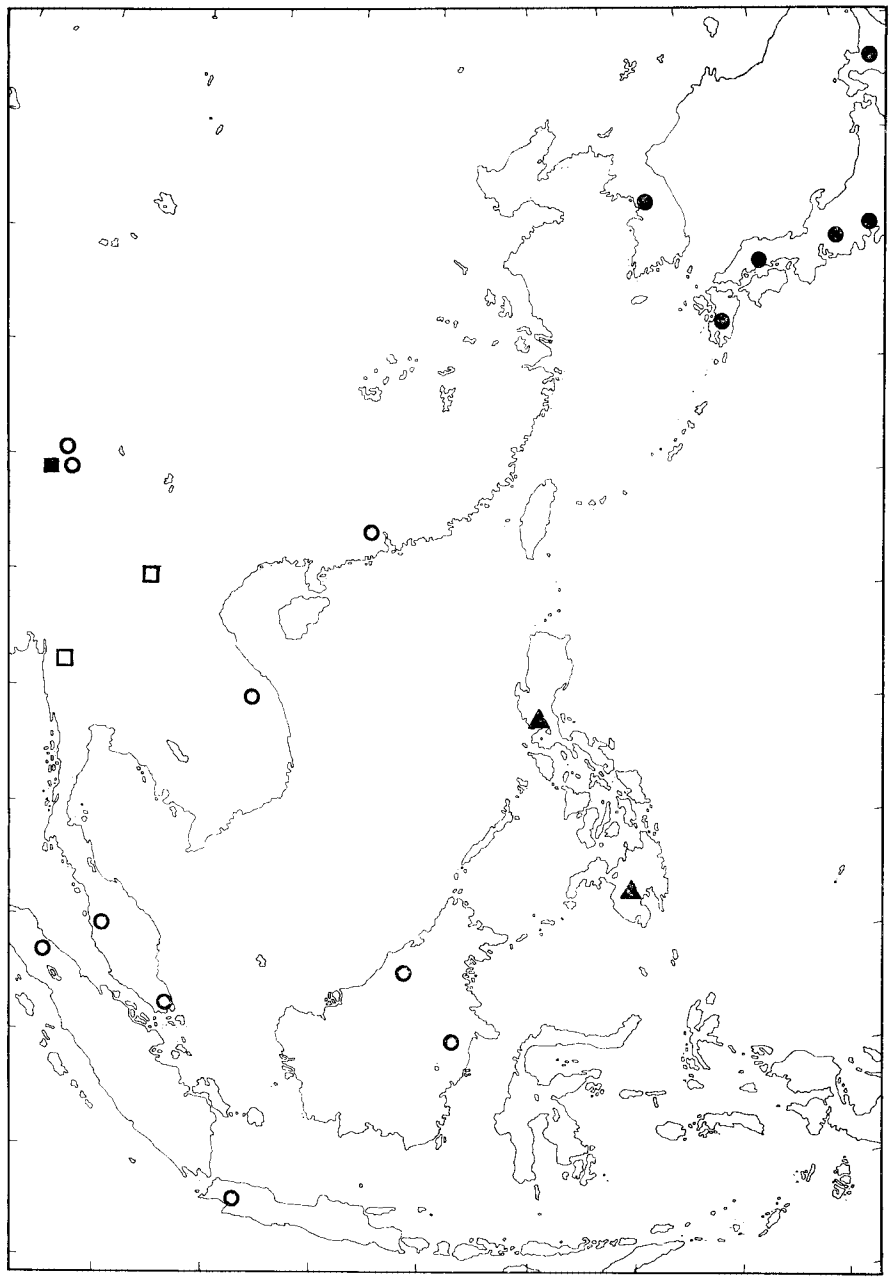


Fig. 36, distribution of *Metrocoris histrio* (black dots), *M. ciliatus* (open square), *M. hungerfordi* (black square), *M. tenuicornis* (open circles) and *M. philippinensis* (black triangles).

Metrocoris histrio (Buchanan White) (fig. 30-32, 38-39; map, fig. 36)

Halobatodes histrio Buchanan White, 1883: 63, 66-68, 78, pl. 2 fig. 5 (descr. apt. female, key, distr., — Japan; type(!), ZMB).

Metrocoris histrio: Dahl, 1893: 8-9 (key); Lethierry & Severin, 1896: 64 (cat.); Kirkaldy, 1904: 61-62 (key); Matsumura, 1904: 186, pl. 14 fig. 13 (distr.); Oshanin, 1908: 500 (cat., distr.); Oshanin, 1912: 86 (cat., distr.); Esaki, 1925: 62, pl. 2 fig. 20-21 (fig. apt. and macr. form); Esaki, 1926a: 123 (distr.); Lundblad, 1933: 371 (distr.); Esaki, 1952: 242, fig. 627 (fig. apt. form); Esaki, 1955: 54, pl. 20 no. 249 (fig. apt. form); Stichel, 1955: 159 (distr.); Matsuda, 1960: 87, 90, 91, 92, 93, 102, 103, 113, 121, 126, 130, 135, 302, 412, fig. 108, 139, 777, 778, 782, 787, 791, 794 (descr., fig. apt. form).

Judging from the text, Buchanan White's description of this species (1883: 67) seems to have been based on only two females, one of which is in the collection of ZMB, cat. no. 3350 (Esaki, 1926a: 123). Since the other specimen (not in the collection of Buchanan White) probably is lost, I designate this remaining female as lectotype. Besides this specimen, the collection of ZMB contains six more specimens, cat. no. 8319. All these specimens are labelled "syntype". The series no. 8319, however, cannot be regarded as type material.

Material. — Japan: Honshu, Maiko, Yoshino (Yamato), 1-ix-1928, leg. T. Esaki, 1 ♀ (apt.), KU; Honshu, Inunakiyama (Izami), 10-viii-1933, leg. K. Iwata, 1 ♂ (apt.), KU; Honshu, Takao-san, 13-vii-1937, leg. Dzhendzhurist, 1 ♀ (apt.), 25-viii-1938, 1 ♂ 2 ♀ (apt.), LEN; Yokohama, leg. E. von Martens, 1 ♂ 5 ♀ (apt.), ZMB (cat. no. 8319); Hiroshima, x-1939, leg. S. Myamoto, 7 ♂ 1 ♀ (apt.), SNOW; Shikoku, Sugigate, near Matsuyama, 12-ix-1951, leg. Y. Hirashima, 1 ♂ (macr.), KU; Hozuyama, Kuwadagari, Tamba, vi-1897, 8 nymphs, SNOW; "Japan", 1893, Weltreise Erzhertog Franz Ferdinand, 1 ♂ (apt.), NMW; "Japan", 1 ♀ (apt.), ZMB, cat. no. 3350 (holotype).

Korea: Seoel, 31-viii-1928, leg. Dzhendzhurist, 1 ♀ (apt.), LEN; "Korea", 10-vii-1953, leg. Lipovsky, 1 ♂ (apt.), 2 ♀ (macr.), SNOW.

Distribution. — Japan, Korea; see map (fig. 36).

Additional description. — An extensive description was given by Buchanan White (1883: 66-68). Eyes overlapping approximately half of propleura. First segment of male antennae a little longer than second, last three segments approximately in ratio 5: 4 : 3. Front femur slender (length: maximum width about 6 : 1), cylindrical, or very slightly notched about the middle, with a tuft of hairs in this notch. Endosoma (fig. 31-32): apical part of dorsal plate laterally with an extension, which has a narrow projection directed ventrally. The part between the first pair of lateral plates and the top of the dorsal plate well sclerotized. Second pair of lateral

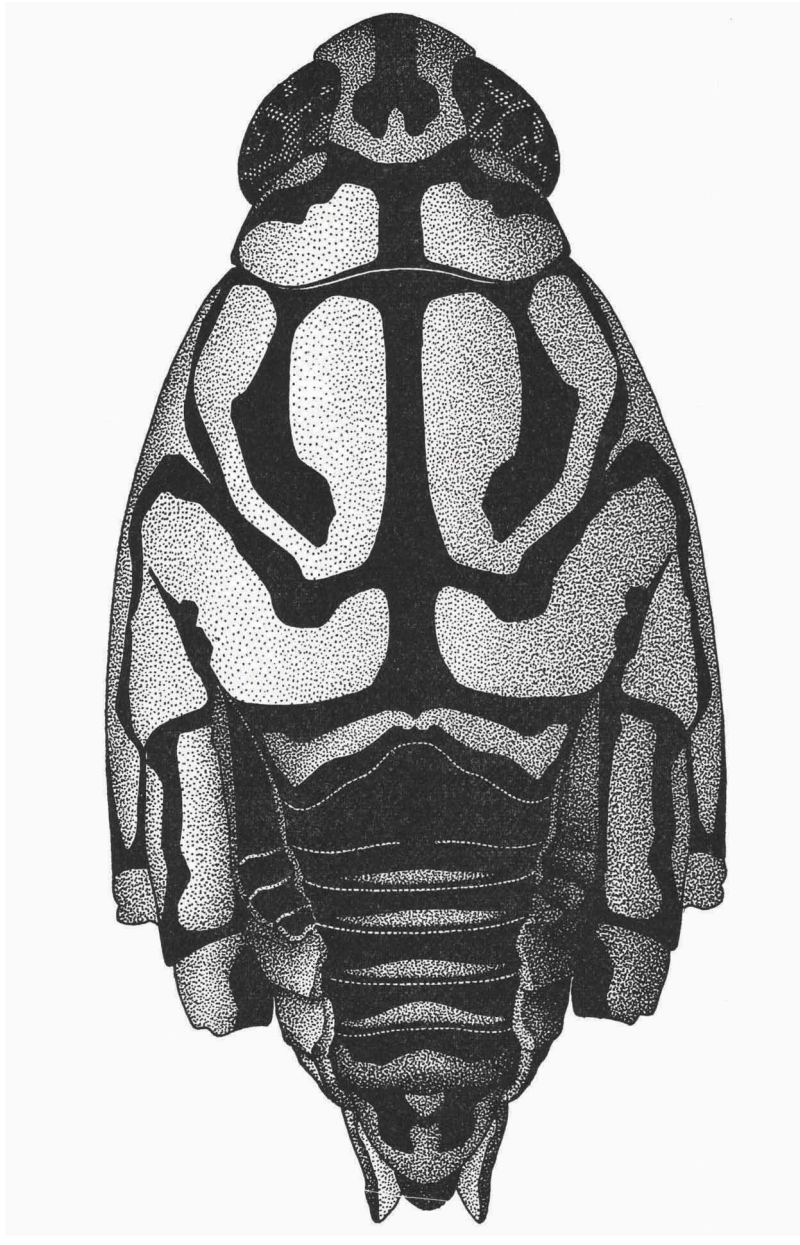


Fig. 37, *Metrocoris bilobatus,* holotype, × 28.

plates only moderately sclerotized but still clearly visible. Ductus seminis very long.

Macropterous form: only three specimens were availably for study. Maximum width of pronotum slightly smaller than median length (approximately 9 : 10).

Length ♂ ♀, 10-13 mm. Maximum width: ♂, 5-7 mm; ♀, 6-8 mm.

Metrocoris ciliatus spec. nov. (fig. 40-46, 49; map, fig. 36)

Material. — Burma: Lower Burma, Dawna Hills, 2000-3000 ft., 2/3-iii-1908, leg. N. Annandale, 1 ♂ (apt.), BM (holotype); Haut Mekong, Nam Tiene, 14-iv-1918, leg. R. Vitalis de Salvaza, 2 ♀ (macr.), BM.

Distribution. — Burma; see map (fig. 36).

Description. — Apterous form. Dull yellow with black markings. Head with a central black marking, posteriorly connected with black fasciae along the posterior part of the inner margins of the eyes. Frontal part of face and insertion of antennae black. Rostrum yellow with apical part of third and entire length of last segment shining black. Antennae of female dark: basal part of first, and sometimes of second segment, paler. First segment twice as long as second, last three segments approximately in ratio 21 : 19 : 16. Eyes overlapping approximately half of propleura. Width of pronotum three times its median length, slightly narrower than width of head including the eyes. Laterally with long black bristles. Mesonotum with oblong black areas, which do not reach the meso-metanotal suture. Dorso- to ventro-lateral part of body covered with long black bristles. Underside pale with the meso-acetabular sutures black. Sometimes an oblique dark area between the front and the middle acetabula. Metasternum large, generally concolorous with the rest of the underside; at most, anterior margin somewhat darkened. Seventh abdominal segment of male relatively small (fig. 41); in female this segment simple, posterior margin slightly reflexed, laterally folded upwards, approximately as long as all other abdominal segments combined. Endosoma (fig. 42, 43): apical part of dorsal plate with a small extension directed laterally, the top with one oblique projection directed dorsally and ventrally. Ventral plate with long ductus seminis. Second pair of lateral plates only moderately sclerotized but still clearly visible. Without a sclerotized part between the apical part of the dorsal plate and the somewhat curved first pair of lateral plates. Front femur of male (fig. 45) not thickened (length: maximum width approximately 7: 1), cylindrical. Maximum width about at the middle, with a very slight notch at the apex; without any tooth or spine. All femora yellow with some dark streaks, tibiae and tarsi black. Hind femur slightly longer than middle femur.

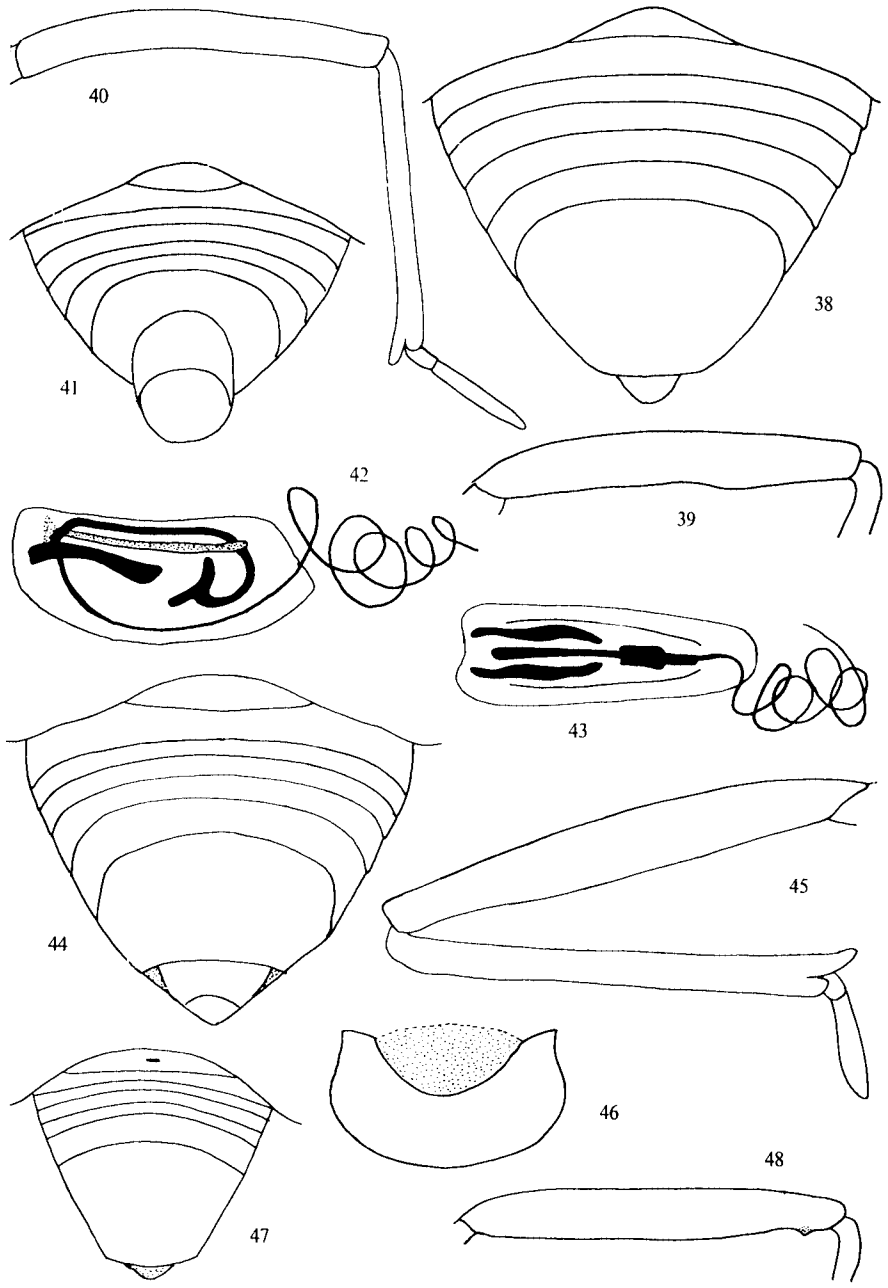


Fig. 38-39, *Metrocoris histrio.* 38, ventral view of female abdomen, × 23; 39, front femur of male, × 13. Fig. 40-46, *Metrocoris ciliatus.* 40, front femur of female, × 13; 41, ventral view of male abdomen (genital segments removed), × 23; 42-43, male endosoma, × 80: 42, ventral view, 43, dorsal view; 44, ventral view of female abdomen, × 23; 45, front femur of male, × 23; 46, caudal view of female abdomen, × 23. Fig. 47, *Metrocoris hungerfordi,* ventral view of female abdomen, × 23. Fig. 48, *Metrocoris tenuicornis,* front femur of male, × 13.

Fig. 49, *Metrocoris ciliatus,* macropterous female, × 28.

Macropterous form. Pronotum 0.75-0.80 as broad as median length, markings as shown in fig. 49. Otherwise equal to apterous form.

Length: ♂ (apt.), 4.7 mm; ♀ (macr.), 5.7 mm. Maximum width: ♂, 2.5 mm; ♀, 3 mm.

Remarks. — This species appears to be close to *Metrocoris hungerfordi*, judging from the long, black lateral bristles and the structure of the male endosoma. However, it is easily distinguished from this species by the morphology of the abdomen, the eyes (which overlap approximately half of propleura only) and the absence of any tooth or spine in the front of the male.

Metrocoris hungerfordi spec. nov. (fig. 47, 50-55; map, fig. 36)

Material. — Burma: Shingbwiyang, 17-viii-1944, leg. L. C. Kuitert, 1 ♂ (holotype) 3 ♀ (apt.), 1 ♂ 1 ♀ (macr.) (allotype and four paratypes), 1 nymph, SNOW.

Distribution. — Burma; see map (fig. 36).

Description. — Apterous form. Dull pale yellow with black markings. Surface somewhat shining, laterally with long black bristles; underside pale with short white hairs. Omphalium and fasciae along the meso-acetabular sutures dark brown to black. Head with a central black marking which connects with black fasciae along the inner margins of the eyes. Frontal part of face and insertion of antennae black. Rostrum shining yellow; apical part of third and fourth segments black. Eyes overlapping the greater part of the propleura. Antennae black, basal part of first segment yellow. Second segment in male a little thickened apically; this apical part and that of the third segment thickly covered with short, stiff hairs. First segment a little shorter than remaining three segments together, of which the middle one is shortest (approximately in ratio 7 : 5 : 6). First segment in female twice as long as second; last two segments of equal length, slightly shorter than second. Pronotum with anterior margin sinuate, posterior margin nearly straight; its width 3.5-4.0 times its median length, slightly narrower than width of head including the eyes. Mesonotum with the two black areas reaching the meso-metanotal suture, leaving two oblong yellow areas along the black median line. Metasternum and omphalium rather large (fig. 50). Male abdomen (fig. 55) rather small; seventh segment long, median length longer than that of all other abdominal segments combined; laterally somewhat concave. Seventh abdominal segment of female (fig. 47) large, posterior margin simple, somewhat projecting, longer than all other abdominal segments together; lateral margin reflexed upwards (fig. 54). Front femur (fig. 53) slightly curved, not thickened in male (length: maximum width, approximately 9 : 1), basal third yellow, the rest black to dark brown. Male with an obtuse spine on inner side of front femur,

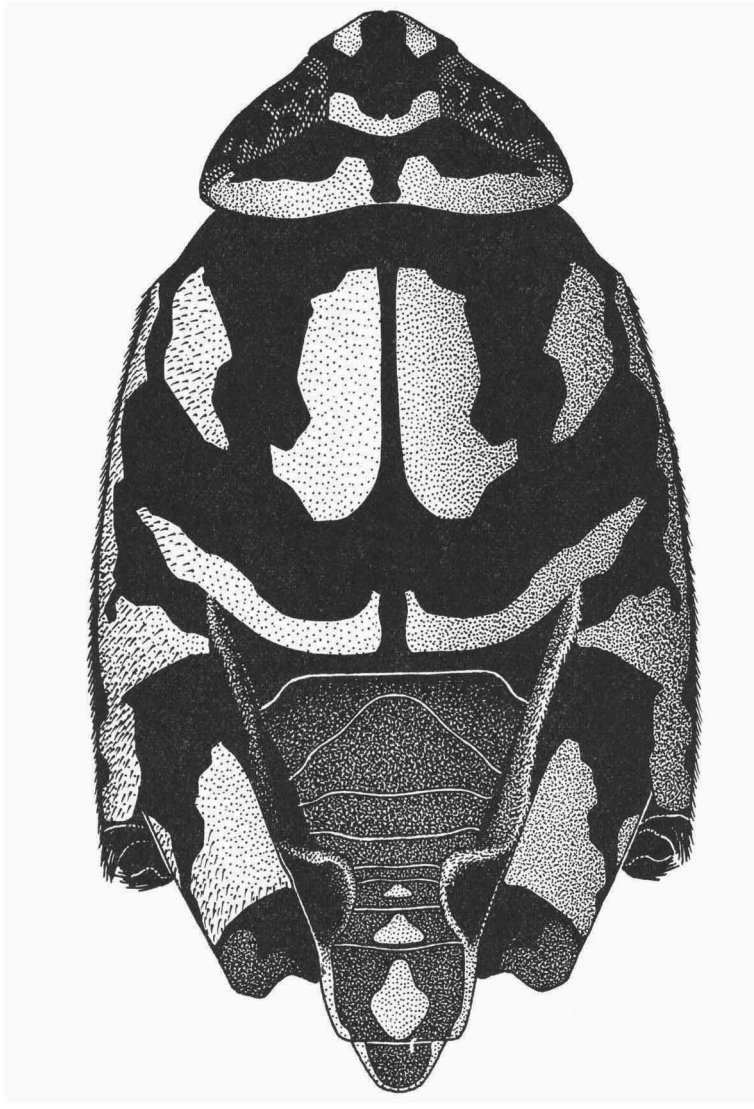


Fig. 50, *Metrocoris hungerfordi,* apterous male, × 36.

at about one third from the apex and pointing back towards base. Middle and hind femora, and all tibiae and tarsi dark. The measurements of the leg parts are given in the following table (in mm).

	femur	tibia	tarsus
front leg	2.8-3.2	2.5-2.8	1.1-1.3
middle leg	5.2-5.5	3.5-3.8	1.9
hind leg	5.6-5.9	2.4-2.6	±0.6

Endosoma (fig. 51, 52): apical part of dorsal plate produced laterally into two lobes, which project obliquely in dorsal and in ventral directions. Ventral plate with rather long ductus seminis. Second pair of lateral plates only moderately sclerotized but still readily visible. A small but well developed sclerite present between the apical part of the dorsal plate and the long, somewhat curved, first pair of lateral plates.

Macropterous form. Pronotum longer than broad (ratio 10: 8-9), dark with a transverse yellow marking on each side near base. Postero-lateral margins and two oblong areas along the dark median line pale yellow. These oblong areas may be connected with the marginal fasciae or may be broadly separated from it. Otherwise equal to apterous form.

Length: apterous form 3.7-4.0 mm; macropterous form (including wings) 5.2-5.3 mm. Maximum width: 2.0-2.3 mm.

Remarks. — This species can be distinguished easily from all other species of the genus by the peculiar spine of the front femur in the male, and by the eyes which overlap the greater part of the propleura.

This species is named after Professor H. B. Hungerford in recognition of his many contributions to the knowledge of the waterstriders and his stimulating work concerning this group.

Metrocoris tenuicornis Esaki (fig. 48, 63-64; map, fig. 36)

Metrocoris tenuicornis Esaki, 1926a: 125, fig. 3c-e (descr. apt. and macr. form, — Annam; types(!), MBUD); Lundblad, 1933: 371, 373 (cat. distr.).

Material. — India: United Provinces, Bhura, Naini Tal. 14/17-iv-1907, 1 ♂ (apt.), BM; Ledo Assam, 3-vii-1944, leg. L. C. Kuitert, 14 ♂ 15 ♀ (apt.) 1 ♀ (macr.), SNOW.

China: Kwantung, 1924, leg. W. E. Hoffmann, 1 ♂ 5 ♀ (apt.), BM.

Vietnam: Annam, 1 ♂ (macr.) 1 ♀ (apt.) 2 nymphs, MBUD (type material); Annam, Dankia, 26-x-1920, leg. R. Vitalis de Salvaza, 1 ♂ (macr.) 1 ♂ 1 ♀ (apt.), ML.

Burma: Myitkyina, leg. L. C. Kuitert, 22-ii-1944, 3 ♂ (apt.), 7-ii-1945, 1 ♂ (apt.), 31-iii-1945, 1 ♂ (macr.) 1 ♂ 17 ♀ (apt.), SNOW; Shingbwiyang, leg. L. C. Kuitert, 22-ii-1944, 1 ♀ (macr.) 2 ♂ 9 ♀ (apt.), 7-iii-1944, 1 ♂ (apt.), 21-iii-1944, 6 ♂ 9 ♀ (apt.), SNOW.

Malaya: Perak, Batang Hill Stream, 1 ♀ (macr.), BM; Singapore, 1 ♂ 1 ♀ (apt.), SING.

Riouw Arch.: Doerian, leg. K. W. Dammerman, 1 ♂ 1 ♀ (apt.), SNOW.

Sumatra: "Sumatra's Oostkust", 18-vi-1931, leg. J. C. van der Meer Mohr, 1 ♂ 2 ♀ (apt.), ML.

Java: Panoembangan, xi-1915, leg. P. Uyttenboogaart, 1 ♀ (apt.), ML.

Borneo: Sarawak, Foot of Mt. Dulit, junction of rivers Tinjar and Lejok, 23-viii-1932, leg. B. M. Hobby & A. W. Moore (Oxford University Expedition), 1 ♂ (macr.) 1 ♀ (apt.), BM; Batu Ajo, leg. A. W. Nieuwenhuis, 1 ♂ (apt.), ML; "Central Borneo", 1 ♂ (apt.), coll. D. Mac Gillavry, MA.

Distribution. — India, S. China, Vietnam, Malaya, Sumatra, Java, Borneo; see map (fig. 36).

Additional description. — Endosoma (fig. 63, 64): apical part of dorsal plate broadly produced, reaching to apex of endosoma, laterally extending into two lobes, which are directed obliquely towards the base of the endosoma and are curved downwards at the top. A small but well developed sclerite present between the first pair of lateral plates and the top of the dorsal plate. Second pair of lateral plates always clearly visible, third pair moderately sclerotized. Ductus seminis long.

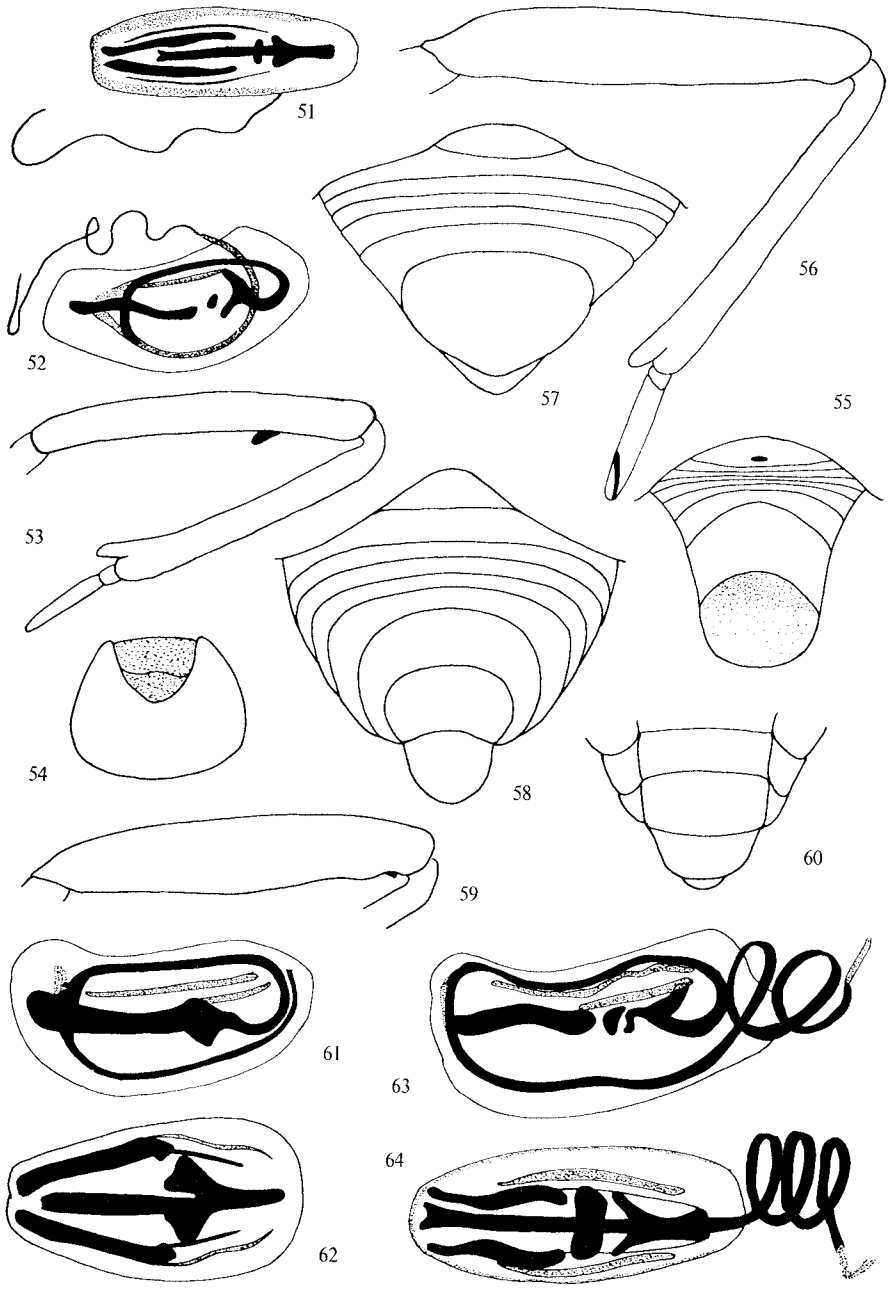
Metrocoris philippinensis spec. nov. (fig. 56-62, 65; map, fig. 36)

Metrocoris spec.: Matsuda, 1960: fig. 779-780 (fig. of fore wing and hind wing, specimen from Philippines).

Material. — Philippines: Holotype (♂) and allotype: Mindanao, Davao Province, East Slope Mt. Mac Kinley, 3000 ft., stream through "original" [= virginal?] forest, leg. H. Hoogstraal, 1 ♂ 1 ♀ (apt.), CNHM. Paratypes: Mindanao, Davao Province, Mainit, East Slope Mt. Apo, 4300 ft., stream through "original" forest, xi-1946, leg. H. Hoogstraal, 1 ♀ (apt.), CNHM; Mindanao, Davao Province, Caburan, sea level, i-1947, leg. H. Hoogstraal, 2 ♀ (macr.), CHNM; Luzon, Manila, 1 ♀ (apt.), MP.

Distribution. — Philippines (Mindanao, Luzon); see map (fig. 36).

Description. — Apterous form. Dull yellow with black markings. Surface rather dull, scarcely shining, covered with very short, stiff, black hairs. Underside with white hairs. Head dull with a black central marking, connected with a black lateral fascia along the inner margins of the eyes. This marking may be very large, almost reaching the antennal groove; alternatively it may be only faintly visible. Rostrum shining, yellow, apical part of third and last segment black. Eyes overlapping more than half of propleura. Antennae brown, basal part of first segment pale yellowish brown; in the


51
52
53
54
55
56
57
58
59
60
61
62
63
64

male approximately as long as body, first segment about as long as the remaining segments together, which are subequal in length. In the female the first segment is slightly longer than the remaining segments together, of which the middle is the longest (ratio approximately 7 : 9 : 3). The first three segments of the male are covered with a short erect pubescence, in the female with very short and adpressed hairs. Pronotum as broad as or slightly broader than width of head including the eyes, approximately three and a half times as broad as median length; anterior and posterior margins slightly sinuate. Mesonotum with the two longitudinal black areas usually reaching the meso-metanotal suture. Underside entirely pale yellow, only omphalium somewhat darker. Eighth tergite of male (fig. 60) as long as or slightly shorter than seventh. Seventh abdominal segment of female large, posterior margin obtusely projecting (fig. 57). Front femur in male (fig. 59) more or less cylindrical, broadest about at the middle, but only slightly thickened (length: maximum width approximately 5 : 1), with a notch at the underside about one fourth from the apex and a notch with an obtuse tooth near the apex. Front femur in the female (fig. 56) broadest before the middle, with a very shallow notch, but without a tooth, dorsally with rather strong black bristles, ventrally with a few very long thin hairs near the base. All tibiae and tarsi dark brown to black. The measurements of the leg parts are given in the following table (in mm).

		femur	tibia	tarsus
front leg	♂	3.2	3.1	1.2
	♀	1.9-2.3	1.6-2.0	0.6-0.9
middle leg	♂	10	8.2	2.6
	♀	5.3-6.5	3.5-5.0	1.8-2.2
hind leg	♂	7.5	—	—
	♀	4.4-5.6	3.5-3.8	0.6-0.7

Endosoma (fig. 61, 62): apical part of dorsal plate greatly produced in lateral direction and in the dorsoventral plane. Laterally forming two lobes; the margin of these is somewhat reflexed. Second and third pair of lateral plates only moderately sclerotized but still clearly visible.

Fig. 51-55, *Metrocoris hungerfordi*. 51-52, male endosoma, × 80: 51, dorsal view, 52, ventral view; 53, front femur of male, × 13; 54, caudal view of female abdomen, × 23; 55, ventral view of male abdomen (genital segments removed), × 23. Fig. 56-62, *Metrocoris philippinensis*. 56, front femur of female, × 13; 57, ventral view of female abdomen, × 23; 58, ventral view of male abdomen, × 23; 59, front femur of male, × 13; 60, dorsal view of last abdominal segments of male, × 23; 61-62, male endosoma, × 80: 61, lateral view, 62, dorsal view. Fig. 63-64, *Metrocoris tenuicornis*, male endosoma, × 80, 63, lateral view; 64, dorsal view.

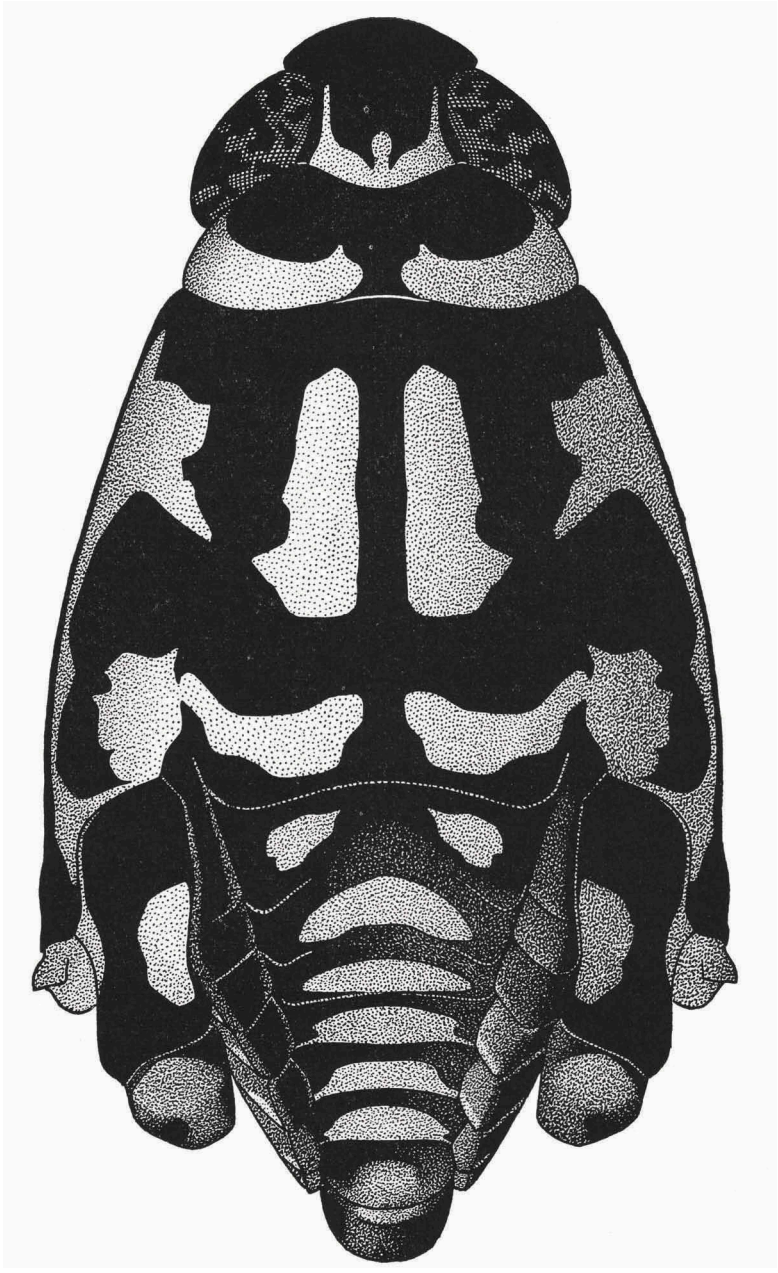


Fig. 65, *Metrocoris philippinensis,* apterous female, × 32.

Macropterous form. Pronotum yellowish brown, anterior part as in apterous form; with a black fascia extending posteriorly along the median

central line, beginning at a point somewhat ahead of the maximum width; a large yellow brown area on either side of the central fasciae; margins pale yellow.

Length: apterous ♂, 5.8 mm; ♀, 4.5-5.2 mm; macropterous (including wings) ♀, 5.6-5.7 mm. Maximum width: ♂, 3.2 mm; ♀, 2.7-3.1 mm.

Remark. — This species can easily be distinguished from all other species of the genus by the following characters: in the male by the relatively long slender front femur bearing a tooth and by the relatively short eighth tergite, in the female by the long third antennal segment and by the long seventh abdominal segment.

Unidentified species

Gerastratus foveatus Distant, 1910a: 148 (descr. of nymph, type(!), BM); 1910b. 160, fig. 87 (do.).

This specimen is not further discussed here since it is not possible to say to which species this nymph from N. India belongs. Esaki (1929: 417) suggested that it belongs to *M. stali,* but the distribution of this species (S. India, Ceylon) is not in accordance with his opinion.

Zoogeography

The centre of distribution of *Metrocoris* (as defined by the area where most species are found today) is in the eastern Himalayas, Assam and Upper Burma. Representatives of the genus, however, reach Arabia to the west and Japan to the north. In the south-east the genus is confined to the Sunda shelf, thus not crossing Wallace's line. In the Philippines there is one endemic species.

Classification

The author is well aware that his attempt to classify the species of *Metrocoris* into groups, should be considered as tentative.

On the basis of the structure of the front femur and the endosoma of the male and the morphology of the abdomen of the female, the genus can be divided into four groups:

(1) the *lituratus*-group. — Front femur of male thickened, length at most four times the maximum width; with one or more teeth on the underside near the apex. Ductus seminis generally not protruding from endosoma.

Seventh abdominal segment of female generally forming a scale-like, median, ventral prolongation.

To this group belong the species:

M. lituratus *M. communis*
M. stali *M. bilobatus*
M. strangulator ?*M. femoratus*
M. nigrofasciatus

In the group there appears to be an especially close relationship between the species *M. lituratus, M. stali* and *M. strangulator,* based on general similarities in both the male genitalia (fig. 1-2, 8-11) and the female abdomen (fig. 3-4).

This group occurs throughout the distribution area for the genus, Japan and the Philippines excepted.

(2) the *compar*-group. — Front femur of male long and slender, length approximately six to seven times the maximum width; without a distinct tooth on the underside near the apex. Ductus seminis generally slightly protruding from endosoma.

Seventh abdominal segment of female very short with only a small, median ventral prolongation.

To this group belong the species:

M. compar *M. nepalensis*

Both these species are mainly black in colour

This group is confined to the foothills of the Himalayas.

(3) the *histrio*-group. — Front femur of male long and slender, length six to nine times the maximum width; without a distinct tooth on the underside near the apex. Ductus seminis ranging from rather long to very long, protruding from endosoma.

Seventh abdominal segment of female simple, without any scale-like, median ventral prolongation.

To this group belong the species:

M. histrio *M. hungerfordi*
M. ciliatus *M. tenuicornis*

This group occurs in the central and eastern parts of distribution area of the genus.

(4) the *philippinensis*-group. — Front femur of male not thickened, rather long and slender, length about five times the maximum width; with a distinct tooth on the underside near the apex. Ductus seminis not protruding from endosoma.

Seventh abdominal segment of female without a median, ventral prolongation.

To this group belongs the species:

M. philippinensis

This species is confined to the Philippines.

KEY TO THE SPECIES OF METROCORIS

(*M. femoratus* (Paiva) excluded)

1. ♂ 2
— ♀ 14
2. Underside of front femur with one or more prominent, apically directed, obtuse teeth near apex 3
— Underside of front femur without any such teeth or, if a tooth (usually vestigial) is present, femur long and slender (length: maximum width more than 6 : 1) 9
3. Underside of front femur with two teeth or a single bicuspid tooth (fig. 16, 17, 21) 4
— Front femur with only one simple tooth 6
4. Front femur strongly thickened and with another tooth apically directed roughly halfway along its length (length: maximum width approximately 3.5 : 1) (fig. 17). Thailand, Malaya, Sumatra, Java, Bali . . . . . *M. strangulator*
— Front femur without a distinct tooth at the middle of the underside 5
5. The two teeth on underside near apex of front femur well developed and of equal length (fig. 21). Yunnan . . . . . *M. bilobatus*
— With only a single bicuspid tooth or with one large tooth and a small denticle proximally adjacent to it (fig. 16). Burma, Vietnam, Laos, Thailand, Malaya, Sumatra, Java, Borneo . . . . . *M. nigrofasciatus*
6. Eighth tergite shorter than, or as long as seventh (fig. 60), eyes overlapping distinctly more than half of propleura. Philippines . . . . . *M. philippinensis*
— Eighth tergite approximately twice as long as seventh, eyes overlapping not more than half of propleura 7
7. Underside of front femur with a small tooth approximately at the middle. China, Taiwan . . . . . *M. lituratus*
— Underside of front femur without such a tooth 8
8. Eighth tergite semicircular in outline (fig. 5). South India, Ceylon . . . *M. stali*
— Eighth tergite with subparallel sides (fig. 20). Arabia, Iran, Afghanistan, India . . *M. communis*
9. Underside largely black 10
— Underside yellow to yellow-brown 11
10. Underside of front femur with a notch at the middle (fig. 29). Bhutan, Sikkim, North India . . . . . *M. compar*
— Underside of front femur without a notch at the middle, with a very small tooth at apex (fig. 33). Nepal . . . . . *M. nepalensis*
11. A basally directed spine arising from the underside of the front femur at a point roughly three-quarters along towards the apex (fig. 53). Burma *M. hungerfordi*
— Underside of front femur without such a spine 12
12. Underside of front femur with a notch near apex containing a vestigial tooth. Without long black bristles laterally (fig. 48). India, South China, Vietnam, Burma, Malaya, Sumatra, Java, Borneo . . . . . *M. tenuicornis*
— Underside of front femur without a notch near apex or, if a slight notch is present, then with long black bristles laterally 13
13. With very small black bristles laterally; underside of front femur slightly notched approximately at the middle, in this notch a tuft of hairs (fig. 39). Japan, Korea . *M. histrio*

— With long black bristles laterally; underside of front femur slightly curved near apex (fig. 45). Burma . . . . . *M. ciliatus*
14. Underside largely black 15
— Underside yellow to yellow-brown 16
15. Laterally broadly yellow with a black fascia. Bhutan, Sikkim, North India. . . *M. compar*
— Laterally black with a yellow brown fascia. Nepal . . . . . *M. nepalensis*
16. Posterior margin of seventh abdominal segment with two distinct lobes (fig. 22-23). Yunnan . . . . . *M. bilobatus*
— Posterior margin of seventh abdominal segment at most somewhat protruding 17
17. Posterior margin with a conspicuous tuft of silvery hairs on each side at the lateral angles. Arabia, Iran, Afghanistan, India . . . . . *M. communis*
— Posterior margin without such a tuft of hairs 18
18. Antennae with third segment at least 1.3 times as long as second 19
— Antennae with third segment approximately as long as second 21
19. Seventh abdominal segment with a more or less scale-like median ventral prolongation (fig. 15). First antennal segment distinctly longer than second and third together. Burma, Vietnam, Laos, Thailand, Malaya, Sumatra, Java, Borneo . . . *M. nigrofasciatus*
— Seventh abdominal segment simple, reflected upwards laterally, but without a median ventral prolongation. First antennal segment approximately as long as second and third together 20
20. Posterior margin of seventh abdominal segment slightly protruding (fig. 57), median length equal to or greater than that of the other abdominal segments together. Philippines. . . . . *M. philippinensis*
— Posterior margin of seventh abdominal segment slightly reflexed, nearly straight, median length smaller than that of other abdominal segments together. India, South China, Vietnam, Burma, Malaya, Sumatra, Java, Borneo . . . *M. tenuicornis*
21. Seventh abdominal segment nearly twice as long as all other abdominal segments together (fig. 54). Laterally with long black bristles. Eyes overlapping nearly the whole of the propleura. Burma. . . . . *M. hungerfordi*
— Seventh abdominal segment less than 1.5 times as long as other abdominal segments together; if longer, the body without long black lateral bristles; the eyes overlapping approximately the half of the propleura 22
22. Posterior margin of seventh abdominal segment simple, not forming a median ventral prolongation. This segment distinctly less than 1.5 times as long as the other abdominal segments together 23
— Seventh abdominal segment with a more or less scale-like median ventral prolongation, or its length more than 1.5 times greater than that of the other abdominal segments together 24
23. First antennal segment as long as second and third together. Japan, Korea . . . *M. histrio*
— First antennal segment distinctly shorter than second and third together; with long black bristles laterally. Burma. . . . . *M. ciliatus*
24. Posterior margin of seventh abdominal segment always somewhat convex (fig. 4, 6, 7). South India, Ceylon . . . . . *M. stali*
— Posterior margin of seventh abdominal segment slightly reflexed, sometimes nearly straight, but never convex 25
25. Pilosity of lateral angles of seventh abdominal segment including conspicuous long dark hairs. Thailand, Malaya, Sumatra, Java, Bali. . . . . *M. strangulator*
— Pilosity of lateral angles of seventh abdominal segment always uniform. China, Taiwan . . . . . *M. lituratus*

References

BERGROTH, E., 1911. On some recently described Hemiptera, chiefly from India. — Ann. Soc. ent. Belg. **55**: 184-189.

——, 1915. Some Javanese Hemiptera collected by E. Jacobson and Th. H. Mac Gillavry. — Zool. Meded. **1**: 109-123.

BIANCHI, V., 1896. On two new forms of the heteropterous family Gerridae. — Annu. Mus. zool. St. Pétersb. **1**: 67-76.

BREDDIN, G., 1905. Rhynchota Heteroptera aus Java, gesammelt von Prof. K. Kraepelin 1904. — Mitt. naturh. Mus. Hamb. **22**: 109-159, 23 fig.

BROWN, E. S., 1950. A small collection of Hemiptera, mostly aquatic, from Oman. — Ann. Mag. nat. Hist. (12) **3**: 474-480, 1 fig.

BUCHANAN WHITE, F., 1883. Report on the pelagic Hemiptera procured during the voyage of H. M. S. Challenger, in the years 1873-1876. — Rep. sci. Res. Challenger, Zool. **7**: 1-80, 3 pl.

CHINA, W. E., 1957. The marine Hemiptera of the Monte Bello Islands, with description of some allied species. — J. Linn. Soc. London (Zool.) **43**: 342-357, fig. 1-6.

DAHL, F., 1893. Die Halobates-Ausbeute der Plankton-Expedition. — Erg. Plankt. Exp. **2** (G) (a) (α): 1-9.

DISTANT, W. L., 1903. Report on the Rhynchota, part i, Heteroptera. — Fasciculi Malayensis, Zool. **1**: 219-274, pl. 15-16. University Press, Liverpool.

——, 1904. Fauna of British India. Rhynchota **2**: 1-503, fig. 1-319. Taylor & Francis, London.

——, 1910a. Some undescribed Gerrinae. — Ann. Mag. nat. Hist. (8) **5**: 140-153.

——, 1910b. Fauna of British India. Rhynchota **5**: 1-362, fig. 1-214. Taylor & Francis, London.

DOHRN, A., 1860. Zur Heteropteren-Fauna Ceylon's. — Stett. ent. Zeit. **21**: 399-409.

EKBLOM, T., 1926. Morphological and biological studies of the Swedish families of Hemiptera-Heteroptera, part i. — Zool. Bidr. Uppsala **10**: 31-180.

ESAKI, T., 1925. New or little-known water striders from the Oriental Region. — Philipp. J. Sci. **26**: 57-66.

——, 1926a. The water-striders of the subfamily Halobatinae in the Hungarian National Museum. — Ann. hist.-nat. Mus. Hung. **23**: 117-164, 12 fig.

——, 1926b. Verzeichnis der Hemiptera-Heteroptera der Insel Formosa. — Ann. hist.-nat. Mus. Hung. **24**: 136-189.

——, 1928. New or little-known Gerridae, i. Ceylonese Species. — Ann. Mag. nat. Hist. (10) **2**: 505-513.

——, 1929. New or little-known Gerridae, ii. Indian Species. — Ann. Mag. nat. Hist. (10) **4**: 412-419.

——, 1952. In: Iconogr. Insectorum Japonicorum (ed. 2 reformata): 1-1737, fig. 1 - 4967. Hokuryukan, Tokio.

——, 1955. In: Coloured Illustrations of the Insects of Japan: 1-287. Kichizo Takeuchi, Hoikusha, Osaka.

FRAUENFELD, G. VON, 1867. Zoologischen Miscellen i. — Verh. zool.-bot. Ges. Wien **17**: 97-502.

HUNGERFORD, H. B. & R. MATSUDA, 1960a. The male of Metrocoris squamifer Lundblad (Heteroptera: Gerridae). — J. Kans. ent. Soc. **33**: 7-9, 2 fig.

——, 1960b. Keys to subfamilies, tribes, genera and subgenera of the Gerridae of the World. — Kans. Univ. Sci. Bull. **41**: 3-23, fig. 1-64.

KEMP, S., 1925. Rhynchota of the Siju Cave, Garo Hills, Assam. — Rec. Indian Mus. **26**: 93-97.

KENAGA, S., 1941. The genus Telmatometra Bergroth. — Kans. Univ. Sci. Bull. **27**: 169-183, pl. 12.

KIRBY, W. F., 1891. Catalogue of the described Hemiptera Heteroptera and Homoptera of Ceylon, based on the collection formed (chiefly at Punduloya) by Mr. E. E. Green. — J. Linn. Soc. (Zool.) **24**: 72-76, pl. 4-6.

KIRKALDY, G. W., 1904. Notes on the genus Metrocoris (Rhynchota). — Entomologist **37** (490): 61-62.

LETHIERRY, L. & G. SEVERIN, 1896. Catalogue général des Hémiptères **3**: 1-275. Friedländer & S., Berlin.

LUNDBLAD, O., 1933. Zur Kenntnis der aquatilen und semiaquatilen Hemiptera von Sumatra, Java und Bali. — Arch. Hydrobiol. (Plankt.) (suppl.) **12**: 1-195, 263-489.

MATSUDA, R. 1960. Morphology evolution and a classification of the Gerridae (Hemiptera-Heteroptera). — Kans. Univ. Sci. Bull. **41**: 25-632, fig. 65-1151.

MATSUMURA S., 1904. Thousand Insects of Japan **1**: 1-184, pl. 1-15. Keisheisha, Tokyo.

MAYR, G. L., 1865. Diagnosen neuer Hemipteren ii. — Verh. zool.-bot. Ges. Wien **15**: 429-446.

——, 1866. Hemipteren. Reise der Österreichischen Fregatte Novara um die Erde, (Zool.) **2** (1): 1-204, 5 pl. Wien.

MEINERT, F., 1888. Slaegten Metrocoris Mayr og dens „forma praematura" Halobatodes Buchanan White. — Ent. Medded. **1**: 140-144.

MENDES, A. S. & C. H. FERNANDO, 1962. A guide to the freshwater fauna of Ceylon. — Bull. Fish. Res. Stat. Ceylon **12**: 1-160.

MILLER, N. C. E., 1956. The biology of the Heteroptera: 1-62. Leonard Hill Ltd., London.

OSHANIN, B., 1908. Verzeichnis der Palaearctischen Hemipteren **1**: 1-1087. Leningrad.

——, 1912. Katalog der palaearctischen Hemipteren: 1-187. Friedländer & S., Berlin.

——, 1916. Vade mecum destiné à faciliter la détermination des Hemiptères. — Hor. Soc. ent. ross. **42** (2): 1-106.

PAIVA, C. A., 1918. Aquatic Rhynchota from the southern Shan States. — Rec. Indian Mus. **14**: 19-38, pl. 8-9.

——, 1919a. Aquatic and semi-aquatic Rhynchota from the Satara and Poona Districts. In: N. ANNANDALE, The fauna of certain small streams in the Bombay presidency. — Rec. Indian Mus. **16**: 152-156.

——, 1919b. Rhynchota from the Garo Hills, Assam. — Rec. Indian Mus. **16**: 349-377.

STÅL, C., 1854. Nya Hemiptera. — Öfv. K. Vet.-Ak. Förh. **11**: 231-255.

——, 1859. Hemiptera. Vetenskapliga Iaktagelser Kongliga Svenska Fregatten Eugenies Resa omkring Jordan **2** Zool. (1) Insekter: 219-298. Stockholm.

STICHEL, W., 1955. Illustrierte Bestimmungstabellen der Wanzen (2, Europa) **1**: 1-168. Hermsdorf, Berlin.

INDEX TO SPECIES

* denotes a name new to science; synonyms in *italics*.