

A contribution to the knowledge of Gerromorpha (Insecta: Hemiptera) of Myanmar, with seven new species, eight new records, and a catalogue

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Abstract

Based on collections in the Natural History Museum Vienna, taxonomic and faunistic results about the Gerromorpha of Myanmar are presented, including descriptions of new species and first species records. The following seven species are described: *Hebrus birmensis* sp.n., *Hebrus schillhammeri* sp.n., *Timasius goldmarie* sp.n., and *Timasius schaeferi* sp.n. of the Hebridae; *Geovelia orientalis* sp.n. and *Perittopus zimmermannae* sp.n. of the Veliidae; and *Metrocoris atlas* sp.n. of the Gerridae. Most new species are exclusively from the Alaungdaw Katthapa National Park in Sagaing Division, except for *Perittopus zimmermannae* sp.n. which was additionally collected in Chin State. Eight further species are recorded from Myanmar for the first time: *Mesovelia horvathi* LUNDBLAD, 1933 of the Mesoveliidae; *Hyrceanus varicolor* ANDERSEN, 1981 of the Hebridae; *Microvelia douglasi* SCOTT, 1874 and *Rhagovelia sumatrensis* LUNDBLAD, 1933 of the Veliidae; *Gerris gracilicornis* (HORVÁTH, 1879), *Amemboa cristata* POLHEMUS & ANDERSEN, 1984, *Pleciobates pacholatkoï* ZETTEL & CHEN, 1996, and *Ptilomera fang* POLHEMUS, 2001 of the Gerridae. A catalogue contains 64 species of Gerromorpha known from Myanmar. Among them 20 species have not been recorded from any other country.

Key words: Mesoveliidae, Hebridae, Hydrometridae, Veliidae, Gerridae, Gerromorpha, new species, first record, catalogue, Myanmar, Oriental Region.

Zusammenfassung

Auf Grundlage der Sammlung des Naturhistorischen Museums in Wien werden taxonomische und faunistische Ergebnisse über die Gerromorpha von Myanmar präsentiert, einschließlich der Beschreibungen neuer Arten und Landeserstnachweise. Sieben Arten werden für die Wissenschaft neu beschrieben: *Hebrus birmensis* sp.n., *Hebrus schillhammeri* sp.n., *Timasius goldmarie* sp.n. und *Timasius schaeferi* sp.n. aus der Familie Hebridae, *Geovelia orientalis* sp.n. und *Perittopus zimmermannae* sp.n. aus der Familie Veliidae sowie *Metrocoris atlas* sp.n. aus der Familie Gerridae. Die meisten neuen Arten stammen aus dem Alaungdaw Katthapa Nationalpark in der Sagaing Division, mit Ausnahme von *Perittopus zimmermannae* sp.n., welcher zusätzlich im Chin State gefunden worden ist. Weitere acht Spezies werden erstmals für Myanmar nachgewiesen: *Mesovelia horvathi* LUNDBLAD, 1933 (Mesoveliidae), *Hyrceanus varicolor* ANDERSEN, 1981 (Hebridae), *Microvelia douglasi* SCOTT, 1874 und *Rhagovelia sumatrensis* LUNDBLAD, 1933 (Veliidae) sowie die Gerriden *Gerris gracilicornis* (HORVÁTH, 1879), *Amemboa cristata* POLHEMUS & ANDERSEN, 1984, *Pleciobates pacholatkoï* ZETTEL & CHEN, 1996 und *Ptilomera fang* POLHEMUS, 2001. Ein Katalog beinhaltet 64 Gerromorpha-Arten, die aus Myanmar gemeldet sind. Davon sind 20 Spezies bisher aus keinem weiteren Land bekannt geworden.

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Introduction

Gerromorpha comprises a species-rich infraorder of true bugs which usually inhabit the water surface or the edge between water and land. It includes well known insects like water striders, sea skaters, water measurers, or riffle bugs. Although the Gerromorpha of neighbouring India and Thailand are comparably well studied, and checklists have been published (THIRUMALAI 1999, HUTACHARERN & al. 2007), hitherto no comprehensive study is available for Myanmar. In fact, the few species records are scattered in – chiefly taxonomic – literature. Only two papers contain more than three records: the revision of the genus *Metrocoris* (Gerridae) by CHEN & NIESER (1993) and a small study on water measurers, genus *Hydrometra* (Hydrometridae) by ZETTEL (2006a). The present study is a first attempt to improve our knowledge of Gerromorpha diversity in Myanmar. New data increase the total number of species by 30% from 49 to 64. However, it is certain that many more species will be discovered and described in the future. Therefore, the catalogue in this paper should be considered preliminary.

This study is based on the Myanmar collections by Dr. Harald Schillhammer and fellows deposited in the Natural History Museum Vienna. Beside the material treated in this study or published elsewhere (ZETTEL 2006a), the collection keeps unpublished specimens from Myanmar of the following genera and species (full taxonomic authorships can be found in the catalogue below): Mesoveliidae: *Mesovelia vittigera*. Hebridae: *Hebrus* spp. indet. Hydrometridae: *Hydrometra greeni*. Veliidae: *Baptista* sp. indet., *Xiphovelia* sp. indet. Gerridae: *Amemboa lyra*, *Amemboides* sp. indet., *Eotrechus* sp. indet., *Limnogonus nitidus*, *Metrocoris nigrofascioides*, *Metrocoris* sp. indet., *Neogerris parvulus*, *Onychotrechus esakii*, *Ptilomera burmana*, *Ptilomera tigrina*, *Ventidius distanti*. I have also studied two specimens of *Aquarius paludum paludum* (Gerridae) from the southern Shan State deposited in the private collection of Filippo M. Buzzetti (Italy). Most of the unidentified taxa listed above may belong to further new species, but are not described in this study for various reasons: insufficient material (no males), insufficient taxonomic background (lacking revisions), or poor descriptions or lacking knowledge of variability of closely related species.

Material and methods

Specimens are dry-mounted, glued on card squares or pinned, and deposited in the Natural History Museum Vienna (NHMW). Some voucher specimens (including paratypes) will be sent to the Myanmar Biodiversity Museum, Hlawga Wildlife Park, Yangon (MBMY) and to the Zoological Reference Collection, Raffles Museum of Biodiversity Research, University of Singapore (ZRCS).

Material is referenced by citing the original locality labels. Each individual label is marked with ""; the backslash sign \ indicates the break of a line.

Terminology follows previous publications by the author, chiefly for Hebridae ZETTEL (2004a, b), Veliidae ZETTEL (2001a), and Gerridae CHEN & ZETTEL (1999).

A Leica WILD M10 binocular microscope (magnifications up to 128 ×) and a Nikon SMZ 1500 binocular microscope (magnifications up to 288 ×) were used for examina-

tion of specimens and preparing descriptions; drawings were made by using a camera lucida. Drawings of the genital structures of Hebridae and Veliidae were made with a OLYMPUS BX40 microscope with a camera lucida at magnification of 400 ×. Stacked digital images (Figs. 1–7) were taken with a Leica DFC camera attached to a Leica MZ16 binocular microscope with the help of Image Manager IM50 (only Fig. 6: Leica Application Suite V3), stacked with Auto-Montage Pro (only Fig. 6: ZereneStacker 64-bit), and processed with Adobe Photoshop 7.0. After having been studied, genitalia of males were imbedded in a transparent, water-soluble medium (dimethyl hydantoin formaldehyde resin) on the same cardboard as the specimen.

Measurements and indices (for Hebridae):

- A₂L Maximum length of antennomere 2 (in mm)
- AbI Abdomen index (referring to length of abdomen). Length of abdomen (measured from level of apex/apices of metanotal elevation to apex of abdomen) : median pronotum length
- AnI Antenna index (referring to antennal length). Length of antenna (composed length of antennomeres) : BL × 100
- AtI Antennal tubercle index (referring to lateral protrusion of tubercles). Maximum distance of lateral margin of antennal tubercles : HW × 100
- AW Maximum width of abdomen (in mm)
- BL Body length. Total length of specimen, measured in dorsal aspect (in mm)
- EI Eye width index (referring to eye size). Maximum width of eye (EW) in % of interocular distance (ID). For higher accuracy, eye width is calculated by the formula $EW = 100 \times (HW - ID) : 2 ID$. EW and ID measured in exact frontal aspect of head.
- HI Head index. HL : HW
- HL Median head length, measured dorsally along midline in perpendicular view to apex and posterior margin of head in same plane) (in mm)
- HW Maximum head width across eyes (including eyes; in mm)
- MMI Mesoscutellum-metanotal elevation index* (referring to size of metanotal elevation). Maximum combined length of mesoscutellum + metanotal elevation : median pronotum length × 100. Length of metanotal elevation measured at its maximum, if posterior margin is emarginate
- MtI Metatibia index* (referring length of legs). MtL : PW × 100
- MtL Maximum metatibia length (in mm)
- PHI Pronotum-head index*. PW : HW × 100
- PnI Pronotum index* (referring to shape of pronotum). PW : PL × 100
- PL Median length of pronotum including pronotal lobe (in mm)
- PW Maximum width of pronotum including pronotal lobe* (in mm)

* Note that these indices vary with wing polymorphism.

Measurements and indices (for Veliidae and Gerridae):

A₂L, AnI, AW, BL, EI, HW, MtI, MtL, PnI, PL, and PW as in Hebridae. In addition:

BW Maximum body width, measured in dorsal aspect of specimen (in mm)

HL Median head length, measured in dorsal aspect of whole specimen (in mm)

Measurements refer to the holotype, if not stated otherwise. If minimum and maximum values are given, all type specimens were measured.

Descriptions of new species**Family Hebridae*****Hebrus birmensis* sp.n.** (Figs. 1, 8–12)

Etymology: Named after the historical name of Myanmar, Birma. Used as a Latinized adjective.

Type locality: Myanmar, Sagaing Division, Alaungdaw Kathapa National Park, Wakya Stream, 400 m a.s.l., 22° 19.094' N 94° 28.823' E (GPS).

Type material: Holotype (macropterous male, NHMW, Fig. 1) labelled "MYANMAR: Sagaing Div.\ Alaungdaw Kathapa NP\ Wakya Stream, 400 m\ 22° 19.173' N 94° 29.654' E\ 8.5.2003, lg. Boukal & al. (115)".

Description of macropterous male (holotype):

Measurements: BL 2.32 mm, HL 0.61 mm, HW 0.46 mm, A₂L 0.25 mm, PL 0.51 mm, PW 0.92 mm, MtL 0.86 mm, AW 0.81 mm. Indices: HI 132, ÅtI 80, EI 48, AnI 70, PHI 200, PnI 177, MMI 50, MtI 92, AbI 220. Relative lengths of antennomeres 1–4 (in % of antennomere 2): 156 : 100 : 161 : 238. Relative lengths of leg segments (in % of metatibia): profemur 71, protibia 77, protarsus 21, mesofemur 69, mesotibia 75, mesotarsus 21, metafemur 87, metatibia 100, metatarsus 26.

Colour: Body mainly blackish. Head apically brown, ventrally yellowish. Pronotum anterolaterally black, other parts dark brown. Mesoscutellum dark brown. Metanotal elevation and corium veins blackish. Cell of endocorium whitish, of exocorium light brown; membrane with some small, indistinct, whitish markings. Legs and antennomere 1 yellow, antennomeres 2–4 brown.

Pilosity: Head, pronotum, mesoscutellum, and metanotal elevation with small, pale, greyish or bluish scales and with long, brown, erect setae (those on mesoscutellum and metanotal elevation oblique). Corium with pale yellowish to golden appressed pubescence and with long, brown, obliquely dorsocaudal directed setae. Venter of abdomen with short, whitish, appressed pilosity and with moderately long, pale brown, erect setae.

Structures: Body relatively slender, with long antennae. Head (Figs. 8, 9) relatively long, sides between anterior margin of eyes to rounded antennal tubercles straight, divergent. Preocular tubercles small. Anteclypeus without swelling. Buccula (Fig. 9) moderately high, with three small, circular impressions; posteriorly with wide, apically



Figs. 1–4: Habitus, dorsal aspect, of new species of Hebridae: (1) *Hebrus birmensis* sp.n. (holotype male; body length 2.32 mm). (2) *Hebrus schillhammeri* sp.n. (holotype male; body length 1.82 mm). (3) *Timasius goldmarie* sp.n. (holotype male; body length 2.32 mm). (4) *Timasius schaeferi* sp.n. (holotype male; body length 2.25 mm).

rounded process. Pronotum only anteriorly with impressed midline; along anterior and posterior margins and around humeri with rows of rather small, deep grooves, similar grooves scarcely dispersed all over posterior part. Metanotal elevation (Fig. 10) apically with half-circular incision. Forewing reaching apical margin of abdomen. Legs moderately long. Legs and abdomen without special modifications; metatibia straight. In dorsal aspect, sides of abdomen anteriorly subparallel, posteriorly ovate, apically evenly rounded.

Genitalia of male: Pygophore very small, subovate. Proctiger (Fig. 11) very small, posterior part almost circular, with pair of distinct tufts consisting of stout, obliquely directed setae. Paramere (Fig. 12) strongly reduced, pale, weakly sclerotized, curved, with hardly visible subapical hook, apically rounded and with numerous short setae.

Comparative notes: *Hebrus birmensis* sp.n. is very similar to *H. polysetosus* ZETTEL, 2004 from Thailand and Laos but the long setae on corium veins are directed obliquely dorsocaudad in *H. birmensis* sp.n. and straight dorsad in *H. polysetosus*; this character should also hold for females. The male of *H. birmensis* sp.n. has a remarkable pair of tufts of thick setae on the proctiger (Fig. 11) which is absent in *H. polysetosus* (comp. ZETTEL 2004b: fig. 21).

Hebrus schillhammeri sp.n. (Figs. 2, 13–17)

Etymology: Dedicated to my colleague Dr. Harald Schillhammer (Natural History Museum Vienna), who provided much material for this study.

Type locality: Myanmar, Sagaing Division, Alaungdaw Katthapa National Park, Pagoda Stream, 350 m a.s.l., 22° 19.094' N 94° 28.823' E (GPS).

Type material: Holotype (macropterous male, NHMW, Fig. 2) labelled "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 9.5.2003, lg. Boukal & al (118)".

Description of macropterous male (holotype):

Measurements: BL 1.82 mm, HL 0.51 mm, HW 0.42 mm, A₂L 0.17 mm, PL 0.41 mm, PW 0.78 mm, MtL 0.65 mm, AW 0.63 mm. Indices: HI 121, AtI 69, EI 82, PHI 185, PnI 190, MMI 56, MtI 82, AbI 214. Relative lengths of antennomeres 1–2 (in % of antennomere 2, antennomeres 3–4 broken off): 171 : 100. Relative lengths of leg segments (in % of metatibia): profemur 73, protibia 78, protarsus 31, mesofemur 73, mesotibia 81, mesotarsus 29, metafemur 92, metatibia 100, metatarsus 32.

Colour: Head and thorax dorsally and laterally medium brown, ventrally yellowish; on pronotum, a small area anteromedially and small marks on humeri blackish; apex of mesoscutellum pale. Forewing blackish, cell of endocorium whitish, of exocorium light brown; membrane with three small, whitish marks. Abdomen blackish. Legs and antennomere 1 yellow, antennomere 2 distally infuscated.

Pilosity: Head, pronotum, mesoscutellum, and metanotal elevation with few small, pale, whitish or bluish scales and with very long, brown, curved, erect setae. Corium with golden, appressed pubescence and with long, brown, erect, apically hooked setae. Venter of abdomen with short, whitish, appressed pilosity and with moderately long, pale, erect setae.



Figs. 5–7: Habitus, dorsal aspect, of new species of Veliidae and Gerridae: (5) *Geovelial orientalis* sp.n. (paratype female, body length 2.15 mm). (6) *Perittopus zimmermannae* sp.n. (holotype male, body length 3.22 mm). (7) *Metrocoris atlas* sp.n. (holotype male, body length 6.20 mm).

Structures: Body moderately slender. Head (Figs. 13, 14) relatively short, sides between anterior margin of eyes to rounded antennal tubercles straight, divergent. Preocular tubercles vestigial. Anteclypeus without swelling. Buccula (Fig. 14) moderately high, with three small, circular impressions and posteriorly with narrow, apically rounded process. Pronotum with impressed midline; along anterior margin, anteromedially, and around humeri with rather large, deep grooves; similar grooves scarcely dispersed all over posterior part. Metanotal elevation (Fig. 15) apically with deep, half-circular incision. Forewing reaching apical margin of abdomen. Legs rather short. Legs and abdomen without special modifications; metatibia straight. In dorsal aspect, sides of abdomen anteriorly subparallel, posteriorly ovate, apically evenly rounded.

Genitalia of male: Pygophore very small, short. Proctiger (Fig. 16) very small, posterior part almost circular, with minute, weakly pointed apex. Paramere (Fig. 17) strongly reduced, pale, weakly sclerotized, ovate, about twice as long as wide, apically rounded and with two long and some short setae.

Comparative notes: *Hebrus schillhammeri* sp.n. is very similar to *H. cebuensis* ZETTEL, 2006 from the Philippines, but smaller; it has much larger eyes and longer setae on the distal parts of all femora (comp. ZETTEL 2006b). As the males' genitalia are much reduced in both species, they are almost identical, except for the presence of two long apical setae on the paramere of *H. schillhammeri* sp.n.

Timasius goldmarie sp.n. (Figs. 3, 18–23)

Etymology: Referring to the prominent golden pubescence on the species' dorsum, this species is named after a character in Grimms' fairy tale "Frau Holle": The poor girl Goldmarie is lavished with gold coins for being helpful. The epithet is used as a noun in apposition.

Type locality: Myanmar, Sagaing Division, Alaungdaw Katthapa National Park, Pagoda Stream, 360 m a.s.l., 22° 19.084' N 94° 28.744' E (GPS).

Type material (all macropterous): Holotype (male, NHMW, Fig. 3) labelled "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 360 m\ 22° 19.084' N 94° 28.744' E\ 4.5.2003, lg. Boukal & al. (102)". Paratypes (6 males, 7 females, NHMW, MBMY, ZRCS), all from the surrounding of the type locality: 3 males, 3 females "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 5.5.2003, lg. Boukal & al. (107)"; 1 male "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 9.5.2003, lg. Boukal & al (118)"; 1 female "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 360 m\ 22° 19.09' N 94° 28.82' E\ 7.5.2003, l. Boukal & al. (112)"; 1 male, 2 females "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 360 m\ 22° 19.084' N 94° 28.744' E\ 7.5.2003, lg. Boukal & al. (113)"; 1 male, 1 female "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Wakya Stream, 400 m\ 22° 19.173' N 94° 29.654' E\ 8.5.2003, lg. Boukal & al. (115)".

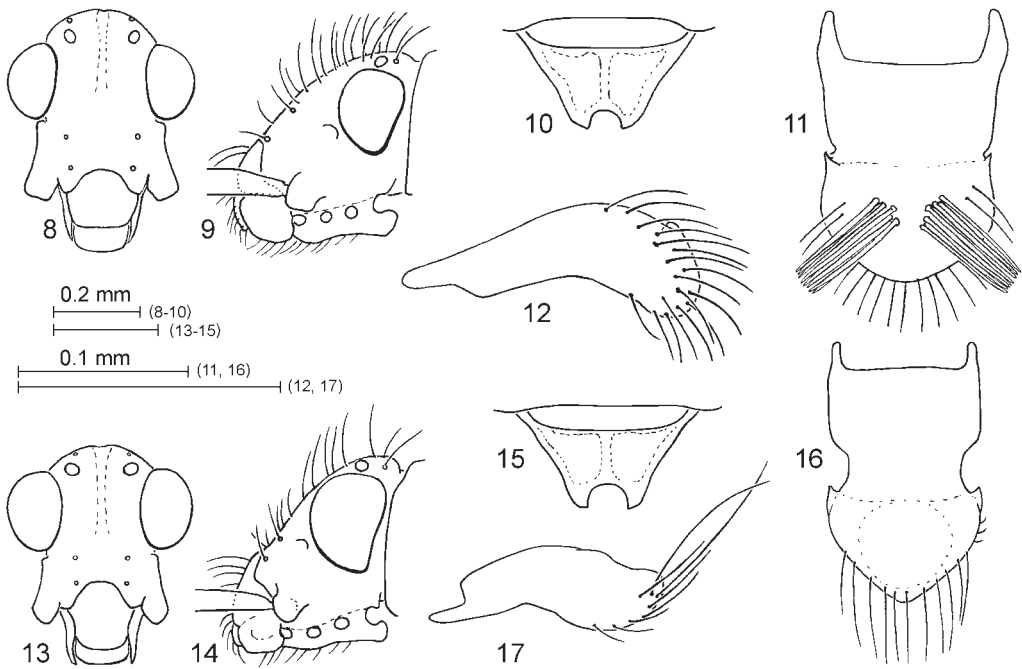
Description of macropterous males (holotype and paratypes):

Measurements of holotype: BL 2.32 mm, HL 0.55 mm, HW 0.44 mm, A₂L 0.21 mm, PL 0.49 mm, PW 1.01 mm, MtL 0.83 mm, AW 0.97 mm. Indices: HI 125, AtI 79, EI 76, AnI 51, PHI 228, PnI 208, MMI 69, MtI 81, AbI 231. Relative lengths of antennomeres 1–4 (in % of antennomere 2): 142 : 100 : 126 : 193. Relative lengths of leg segments (in % of metatibia): profemur 53, protibia 59, protarsus 24, mesofemur 62, mesotibia 64, mesotarsus 25, metafemur 80, metatibia 100, metatarsus 30.

Measurements of paratypes: BL 2.30–2.39 mm, HL 0.55–0.57 mm, HW 0.43–0.45 mm, A₂L 0.20–0.21 mm, PL 0.51–0.54 mm, PW 1.00–1.06 mm, MtL 0.78–0.85 mm, AW 0.92–1.02 mm.

Colour: Black; buccula yellow. Each forewing at base with two large, variably distinct, frosted areas; membrane with variably distinct whitish marks. Antennomere 1 yellow, 2–4 brown. Legs yellowish, extreme apices of femora, bases of pro- and mesotibia, metatibia, and all tarsi variably infuscated.

Pilosity: Whole dorsum except membrane with very conspicuous, appressed, golden pubescence; pubescence condensed between eyes, on pronotum at two anterior spots, on



Figs. 8–17: (8–12) *Hebrus birmensis* sp.n. (holotype male) and (13–17) *Hebrus schillhammeri* sp.n. (holotype male): (8, 13) Head, frontal aspect, pilosity omitted. (9, 14) Head, lateral aspect, pilosity partly omitted. (10, 15) Mesoscutellum and metanotal elevation, dorsal aspect, pilosity omitted. (11, 16) Proctiger, dorsal aspect. (12, 17) Left paramere, lateral aspect.

impressed areas of metanotal elevation, and on veins of forewings. Sides and venter of body with thin, appressed, whitish pubescence. Abdominal sternites without special pilosity.

Structures: Body wide and flat. Head (Figs. 18, 19) short, sides between anterior margin of eyes to small, rounded antennal tubercles straight, divergent. Preocular tubercles absent. Anteclypeus without swelling, not compressed. Buccula (Fig. 19) moderately high, with two large, circular impressions; posteriorly with two short processes: dorsal one acute, triangular and slightly pointing to sides, ventral one stout, dorsally with small angle and ventrally with convex outline. Pronotum wide, sides anteriorly with deep, half-circular emargination; whole surface with deep punctures, with double row at mid-line ending in a large anteriomedial groove. Metanotal elevation (Fig. 20) very short, 2.0 times as wide as long, subtriangular, sides subapically with pair of minute teeth. Forewing (almost) reaching apical margin of abdomen. Legs rather short. Legs and abdomen without special modifications. In dorsal aspect, sides of abdomen anteriorly subparallel, posteriorly ovate, apically evenly rounded.

Genitalia of male subsymmetrical: Pygophore (Fig. 21) small, short, with long setae at hind margin, without processes at level of paramere insertion. Proctiger (Fig. 22) small, posterior part almost circular, with pair of tufts consisting of posterolateral directed setae; ventrally with small knob-like processes. Paramere (Fig. 23) with pointed apex,

dorsal margin with distinct, apically rounded process, ventral margin with row of stout black setae.

Description of macropterous females (paratypes):

Measurements: BL 2.38–2.50 mm, HL 0.53–0.60 mm, HW 0.44–0.47 mm, A_2L 0.20–0.22 mm, PL 0.51–0.55 mm, PW 1.04–1.12 mm, MtL 0.81–0.88 mm, AW 0.94–1.09 mm.

Colour, pilosity, and structures as in males, except for genitalia. Gonocoxa flat, unmodified. Proctiger small, knob-like.

Comparative notes: *Timasius goldmarie* sp.n. is a species of ANDERSEN's (1981) *Timasius livens* group which contains two described species from Pakistan, India, and Thailand and a few undescribed species from India and Southeast Asia. The new species can be recognized by a combination of buccula structure and male genitalia. The two short, angulate posterior buccula teeth (Fig. 19) are unique within the *T. livens* group. The pygophore of the male (Fig. 21) lacks a posterolateral pair of teeth at the level of the paramere insertion, which is more or less strongly developed in other described species of the group. The paramere (Fig. 23) bears a brush of stout setae similar to that of *T. livens* ANDERSEN, 1981 from Thailand. The male's proctiger (Fig. 22) has paired posterolateral tufts of strongly curved setae. The ventral outline of the buccula is more similar to *T. minor* ANDERSEN, 1981 from Pakistan and India, than to *T. livens* and *T. schaeferi* sp.n. See also comparative notes of the following species.

Timasius schaeferi sp.n. (Figs. 4, 24–29)

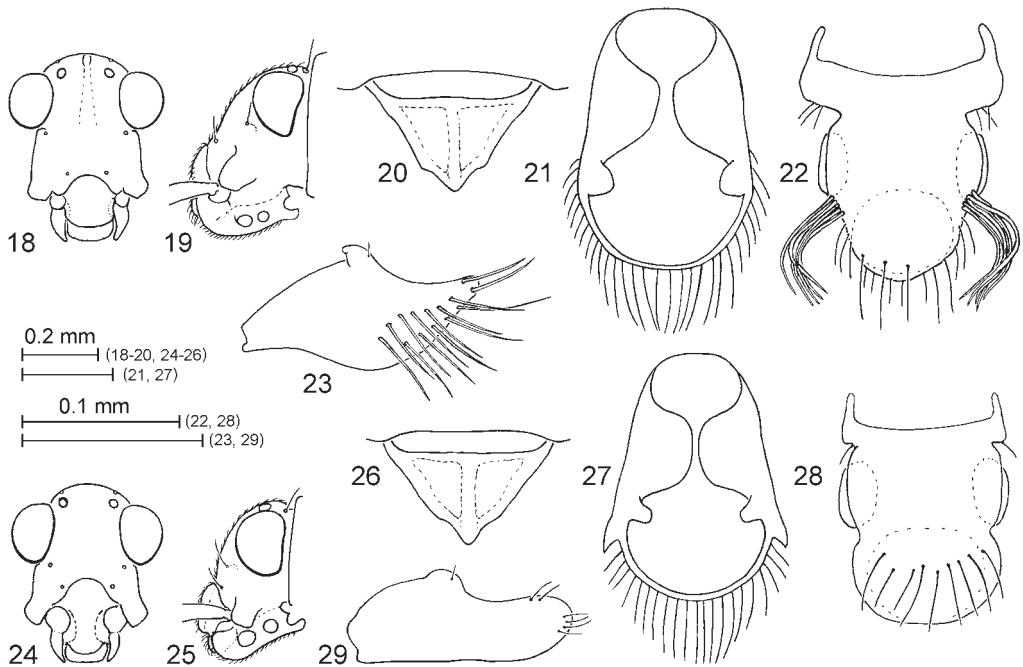
Etymology: Dedicated to my dear friend and always helpful colleague Prof. Dr. Carl W. Schaefer (Storrs).

Type locality: Myanmar, Sagaing Division, Alaungdaw Katthapa National Park, Pagoda Stream, 360 m a.s.l., 22° 19.084' N 94° 28.744' E (GPS).

Type material (all macropterous): Holotype (male, NHMW, Fig. 4) labelled "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 360 m\ 22° 19.084' N 94° 28.744' E\ 4.5.2003, lg. Boukal & al. (102)". Paratypes (14 males, 7 females, NHMW, MBMY, ZRCS), all from the surrounding of the type locality: 2 males, same label data as holotype; 3 males, 1 female "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 5.5.2003, lg. Boukal & al. (107)"; 1 male "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 360 m\ 22° 19.084' N 94° 28.744' E\ 7.5.2003, lg. Boukal & al. (113)"; 1 male, 5 females "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 9.5.2003, lg. Boukal & al. (118)"; 1 male "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.113' N 94° 28.518' E\ 13.5.2003, l. Boukal & al. (122)"; 6 males, 1 female "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Wakya Stream, 400 m\ 22° 19.173' N 94° 29.654' E\ 8.5.2003, lg. Boukal & al. (115)".

Description of macropterous males (holotype and paratypes):

Measurements of holotype: BL 2.25 mm, HL 0.52 mm, HW 0.44 mm, A_2L 0.18 mm, PL 0.46 mm, PW 0.95 mm, MtL 0.82 mm, AW 0.97 mm. Indices: HI 117, AtI 75, EI 70, AnI 50, PHI 216, PnI 207, MMI 72, MtI 87, AbI 237. Relative lengths of antennomeres 1–4 (in % of antennomere 2): 141 : 100 : 128 : 253. Relative lengths of leg segments (in % of metatibia): profemur 52, protibia 54, protarsus 22, mesofemur 60, mesotibia 63, mesotarsus 24, metafemur 78, metatibia 100, metatarsus 29.



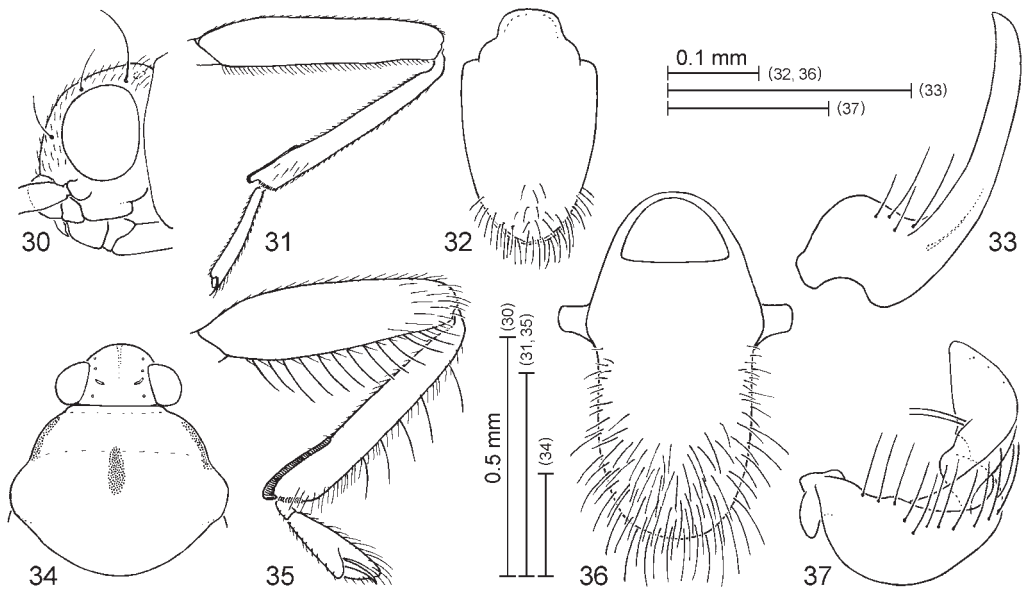
Figs. 18–29: (18–23) *Timasius goldmarie* sp.n. (paratype males) and (24–29) *Timasius schaeferi* sp.n. (paratype males): (18, 24) Head, frontal aspect, pilosity omitted. (19, 25) Head, lateral aspect, pilosity partly omitted. (20, 26) Mesoscutellum and metanotal elevation, dorsal aspect, pilosity omitted. (21, 27) Pygophore, dorsal aspect. (22, 28) Proctiger, dorsal aspect. (23, 29) Left paramere, lateral aspect.

Measurements of paratypes: BL 2.20–2.36 mm, HL 0.49–0.54 mm, HW 0.43–0.46 mm, A_2L 0.18–0.20 mm, PL 0.46–0.53 mm, PW 0.95–1.02 mm, MtL 0.78–0.87 mm, AW 0.92–1.02 mm.

Colour: Black; buccula yellow. Each forewing at base with two large frosted areas; membrane with variably distinct whitish marks. Antennomere 1 yellow, 2–4 brown. Legs yellowish, extreme apices of femora and complete tibiae and tarsi variably infuscated.

Pilosity: Dorsum with appressed, golden pubescence; pubescence condensed on pronotum at two anterior spots, on impressed areas of metanotal elevation, and on veins of forewings; pubescence absent on membrane, lacking or very scattered on cells of forewings. Sides and venter of body with thin, appressed, whitish pubescence. Abdominal sternites without special pilosity.

Structures: Body wide and flat. Head (Figs. 24, 25) very short, sides between anterior margin of eyes to small, rounded antennal tubercles straight, divergent. Preocular tubercles absent. Anteclypeus compressed, midline almost keeled and somewhat shiny. Buccula (Fig. 25) moderately high, with two large, circular impressions; posteriorly with two processes: dorsal one short, acute, triangular and slightly pointing to sides, ventral one slender and apically narrowly rounded. Pronotum wide, sides anteriorly with deep,



Figs. 30–37: (30–33) *Geovelia orientalis* sp.n. (holotype male) and (34–37) *Perittopus zimmermannae* sp.n. (paratype males). (30) Head, lateral aspect, pilosity partly omitted. (31, 35) Foreleg, pilosity partly omitted. (32, 36) Proctiger, dorsal aspect, pilosity partly omitted. (33, 37) Left paramere, lateral aspect. (34) Head and pronotum of apterous morph, dorsal aspect, pilosity omitted.

half-circular emargination; whole surface with deep punctures, with double row at mid-line ending in a large anteriomedial groove. Metanotal elevation (Fig. 26) short, 1.8 times as wide as long, subtriangular, sides subapically with pair of indistinct teeth. Forewing (almost) reaching apical margin of abdomen. Legs rather short. Legs and abdomen without special modifications. In dorsal aspect, sides of abdomen anteriorly subparallel, posteriorly ovate, apically evenly rounded.

Genitalia of male subsymmetrical: Pygophore (Fig. 27) small, short, with long setae at hind margin, with pair of pointed processes at level of paramere insertion. Proctiger (Fig. 28) small, posterior part almost circular, without conspicuous hair tufts, but with scattered long setae; ventrally with very small knob-like processes. Paramere (Fig. 29) finger-shaped, with rounded apex, dorsal margin with small rounded process, ventral margin without prominent pilosity.

Description of macropterous females (paratypes):

Measurements: BL 2.32–2.45 mm, HL 0.51–0.54 mm, HW 0.45–0.46 mm, A_2L 0.18–0.21 mm, PL 0.47–0.52 mm, PW 1.02–1.10 mm, MtL 0.82–0.89 mm, \overline{AW} 0.96–1.07 mm.

Colour, pilosity, and structures as in males, except for genitalia. Gonocoxa flat, unmodified. Proctiger small, knob-like.

Comparative notes: *Timasius schaeferi* sp.n. also belongs to the *T. livens* group (see ANDERSEN 1981) and was syntopic with *T. goldmarie* sp.n. in several places. The thin

golden pilosity on the forewing cells (comp. Figs. 3 and 4) and the posterior processes of the buccula (comp. Figs. 19 and 25) are helpful for distinguishing both sexes of *T. schaeferi* sp.n. from *T. goldmarie* sp.n., which has prominent golden pilosity consisting of thicker setae. Moreover, the metanotal elevation of *T. schaeferi* sp.n. is slightly longer than that of *T. goldmarie* sp.n. (comp. Figs. 20 and 26), and the anteclypeus of *T. schaeferi* sp.n. is distinctly compressed, so that the yellow and transparent area anteromedially of the antennal insertion is much larger than in *T. goldmarie* sp.n. (comp. Figs. 18 and 24). Important and very clear differences are found in the males' genitalia: In *T. schaeferi* sp.n. the pygophore (Fig. 27) has a pair of acute posterolateral processes (absent in *T. goldmarie* sp.n., Fig. 21) and the pilosity on the parameres (Fig. 29) and proctiger (Fig. 28) is inconspicuous (distinct and modified in *T. goldmarie* sp.n., see Figs. 22, 23). The pygophore processes and parameres are similar as in *T. minor* from Pakistan and India, but in this species the male's proctiger is beset with long stout setae (see ANDERSEN 1981: fig. 43).

Family Veliidae

Geovelia orientalis sp.n. (Figs. 5, 30–33)

Etymology: Latin adjective, meaning "eastern" and referring to the fact that the species represents the genus' most eastern record.

Type locality: Myanmar, Sagaing Division, Alaungdaw Katthapa National Park, sifted from dry and moist leaf litter along Khaung Din Stream and in nearby forest, 450 m a.s.l., 22° 18.360' N 94° 25.937' E (GPS).

Type material (all macropterous): Holotype (male, NHMW) labelled "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Khaung Din Stream, 450 m\ 22° 18.360' N 94° 25.937' E\ 11.5.2003, lg. Boukal & al. (120)", "sifting of dry and moist\ leaf litter along stream\ and in nearby forest". Paratypes: 6 females (NHMW, MBMY, ZRCS) same label data as holotype; 1 female (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.113' N 94° 28.518' E\ 13.5.2003, l. Boukal & al (122)", "sifting of large heaps of\ accumulated plant debris\ after heavy rain fall".

Description of macropterous male (holotype):

Measurements: BL 2.07 mm, BW = PW 0.92 mm, HL 0.34 mm, HW 0.59 mm, A₂L 0.18 mm, PL 0.74 mm, MtL 0.96 mm. Indices: EI 50, AnI 73, PnI 125, MtI 106. Relative lengths of antennomeres 1–4 (in % of antennomere 2): 119 : 100 : 318 : 301. Relative lengths of leg segments (in % of metatibia): profemur 68, protibia 66, protarsus 33, mesofemur 75, mesotibia 75, mesotarsus 17+19, metafemur 86, metatibia 100, metatarsus 30+24.

Colour (Fig. 5): Body mainly dark brown, anterior and ventral areas on head, anterior and lateral margins of pronotum, lateral areas of sternites and laterotergites lighter, rather orange brown, but without distinct marking. Antennae, rostrum and legs chiefly yellowish, only apices of femora distinctly infuscated. Forewing (Fig. 5) dark brown with pale veins and distinct pattern of whitish and creamy spots.

Pilosity: Almost entire body beset with short, whitish, silverish or golden, appressed pilosity. Basal areas of forewings with relatively scattered and slightly longer setae,

those on costal margin obliquely standing. Antennomeres 1–2 with a few black setae at leading edge, antennomere 3 with numerous black setae, mostly at leading edge, antennomere 4 with numerous black setae all over surface.

Structures: Body relatively stout, with long antennae. Head (Figs. 5, 30) short, apically pointed in dorsal aspect, with large, bulging eyes. Rostrum long, clearly surpassing hind margin of prosternum. Pronotum (Fig. 5) stout, at concave anterior margin slightly narrower than across eyes; humeri prominent; surface with numerous scattered punctures (grooves), mostly irregular, but in a distinct, medially interrupted row close to anterior margin and a second row marking the line between pronotum and pronotal lobe; both rows continued at sides below lateral edges. Dorsum of head between eyes and disk of pronotum distinctly convex. Legs long, femora slightly thickened. Foreleg (Fig. 31): profemur slightly incrassate, thicker than meso- and metafemur; protibia with apical grasping comb occupying exactly one fourth of tibia length. Forewings (Fig. 5) posteriorly reaching apical margin of abdomen, but laterally distant from connexiva (sides of laterotergites visible). Forewing with well developed, but not conspicuously thickened veins forming four closed cells plus one distally open apical cell. In dorsal aspect (Fig. 5), sides of abdomen slightly dilated, largest width at suture between segments 4 and 5.

Genitalia: Pygophore very small, subovate. Proctiger (Fig. 32) small, slender shield-shaped, ca. 1.7 times as long as wide. Paramere (Fig. 33) slender, falciform, ca. 0.13 mm long, with a few relatively long setae.

Description of macropterous females (paratypes):

Measurements: BL 2.12–2.28 mm, BW = PW 0.89–0.97 mm, HL 0.31–0.33 mm, HW 0.58–0.62 mm, A₂L 0.17–0.18 mm, PL 0.71–0.78 mm, MtL 0.95–1.01 mm.

Colour, pilosity, and structures very similar to male. Profemur not incrassate. Protibia without grasping comb. Gonocoxa rather small and flat. Proctiger small, knob-shaped, with slightly pointed apex, directed posteriad.

Comparative notes: *Geovelina* ZIMMERMANN, 1984 is a poorly known genus of Microveliinae; only three species from Nepal (collected at elevation of 2100–3200 m a.s.l.) were described in their apterous morph and only for one species the female was described (ZIMMERMANN 1984). *Geovelina* is remarkable, because it lives terrestrially, but its pretarsal structures are not strictly apical (ZIMMERMANN 1984) as in some other terrestrial Gerromorpha. In Nepal specimens were found in places distant from any aquatic habitat (ZIMMERMANN 1984), but *G. orientalis* sp.n. was sifted in the vicinity of a stream (collectors' notes). ANDERSEN (1989) compared the genera of Microveliinae known at that time in a character matrix, and for the generic characteristics of *Geovelina* I refer to that paper. However, two diagnostic characters of the winged form of *Geovelina orientalis* sp.n. are added here: (1) The forewing is basally neither thickened nor covered by a conspicuous, dense hair pile; and (2) it has four closed cells plus an apical cell which is distally open.

Comparison of *G. orientalis* sp.n. with the Nepalese species is complicated by different wing morphs and the generally simple genital structures of *Geovelina* males (Figs. 32, 33). However, in the three Nepalese species antennomere 4 is longest (ZIMMERMANN

1984), whereas in *G. orientalis* sp.n. antennomere 3 is slightly longer than antennomere 4. Another morphometric difference is found in the metatarsus: Whereas in *G. orientalis* sp.n. the tarsomere 1 is distinctly longer than tarsomere 2, it is shorter or of equal length in species from Nepal (ZIMMERMANN 1984). The male of *G. orientalis* sp.n. has a relatively long grasping comb (Fig. 31) occupying one-fourth of protibia length, similar to that of *G. martensi* ZIMMERMANN, 1984, but conspicuously longer than those of *G. ilamica* ZIMMERMANN, 1984 and *G. parbatika* ZIMMERMANN, 1984 (in these species the comb hardly exceeds the apical tibia width; see ZIMMERMANN 1984: figs. 4, 13). The male of *G. martensi* differs from *G. orientalis* sp.n. in larger body length (2.3 mm), slender body, and long antennomere 1 (much longer than antennomere 2 and eye length; see ZIMMERMANN 1984: fig. 15).

***Perittopus zimmermannae* sp.n.** (Figs. 6, 34–37)

Etymology: Dedicated to my colleague Mag. Dominique Zimmermann, who collected a part of the type series.

Type locality: Myanmar, Chin State, between Kanpetlet and Saw, in residual rock pools in dry stream bed, 940 m a.s.l., 21°10'35.6"N 94°06'05.8"E (GPS).

Type material: Holotype (macropterous male, NHMW, Fig. 6) labelled "MYANMAR: Chin State\ Kanpetlet – Saw, 940 m\ 21°10'35.6"N\ 94°06'05.8"E\ res. rock pools in stream bed", "9.6.2010, leg. D.\ Zimmermann, A.Z. Lin & H. Schillhammer (190)". Paratypes: 1 macropterous male, 2 macropterous females (NHMW) same label data as holotype; 2 macropterous females (NHMW, MBMY) labelled "MYANMAR: Chin State\ Kanpetlet – Saw\ 21°10'56.3"N\ 94°06'54.3"E\ 730 m, res. pools in stream", "7./9.6.2010, leg. D.\ Zimmermann, A.Z. Lin & H. Schillhammer (186)". 2 macropterous males, 2 apterous males (NHMW, MBMY) labelled "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Khaung Din Stream, 450 m\ 22°18.360' N 94° 25.937' E\ 11.5.2003, I. Boukal & al (119)".

Description of macropterous male (holotype and paratypes):

Measurements of holotype: BL 3.22 mm, BW = PW 1.46 mm, HL 0.31 mm, HW 0.68 mm, A₂L 0.30 mm, PL 1.31 mm, MtL 1.35 mm. Indices: EI 70, AnI 40, PnI 111, MtI 93. Relative lengths of antennomeres 1–4 (in % of antennomere 2): 106 : 100 : 101 : 125. Relative lengths of leg segments (in % of metatibia): profemur 53, protibia 51, protarsus 3+20, mesofemur 71, mesotibia 77, mesotarsus 22+24+26, metafemur 80, metatibia 100, metatarsus 7+15+25.

Measurements of paratypes: BL 2.88–3.14 mm, BW = PW 1.36–1.46 mm, HL 0.28–0.31 mm, HW 0.64–0.68 mm, A₂L 0.28–0.32 mm, PL 1.30–1.35 mm, MtL 1.27–1.36 mm.

Colour (Fig. 6): Dorsum of head and pronotum bright red. In specimens from the type locality, pronotum with pair of large, elongate, black marks at sides from anterior margin to humeri and with one elongate black mark on disk. In paratypes from Alaungdaw Katthapa NP, all black marks narrower, in one specimen lateral marks not reaching anterior margin and in another one lateral marks obsolete. Wings dark brown to black. Sides and venter of body orange or brownish yellow, except metapleuron with black or dark brown mark of varying size. Antenna blackish. Legs yellowish; distal parts of femora and tibiae infuscated (weakly so on profemur), or meso- and metatibia totally black; all tarsi black.

Pilosity: Dorsum of head, anterolateral parts of pronotum, apex of pronotal lobe, sides of thorax and abdominal sternites, antennae, femora and tibia beset with long, black, oblique to erect setae. Disk of pronotum with rather short, oblique, black setae. Forewing on all veins with numerous oblique, black setae of varying length. Venter with short, whitish pilosity; pro- and mesosternum with some long, white setae in addition.

Structures: Body very stout. Hind margin of head laterally and ventrally with a few black spiculae. Rostrum long, reaching middle of mesosternum. Pronotum (Fig. 6) stout, with straight anterior margin, pronotal lobe separated from pronotum by shallow transverse impression; humeri prominent; whole surface with numerous scattered punctures (grooves). Legs long, femora slightly thickened. Foreleg (Fig. 35) modified: femur strongly incrassate, 2.9 times as long as broad; tibia with apical grasping comb occupying exactly one third of protibia length. Forewings (Fig. 6) posteriorly reaching apex of body, laterally adjacent to medial edge of raised connexiva. Each forewing with two complete cells forming a corium as typical for the genus. In dorsal aspect (Fig. 6), sides of abdomen posteriorly slightly converging.

Genitalia: Pygophore small, subovate. Proctiger (Fig. 36) small and very slender, with pair of long and narrow basolateral processes. Paramere (Fig. 37) with broad basal part and helicoid, rather narrow distal part, apex forming an acute angle.

Description of macropterous females (paratypes):

Measurements: BL 3.14–3.23 mm, BW = PW 1.46–1.52 mm, HL 0.30–0.36 mm, HW 0.69–0.72 mm, A₂L 0.29–0.31 mm, PL 1.34–1.42 mm, MtL 1.33–1.40 mm.

Colour, pilosity, and structures very similar to male. Black pronotum marks large and distinct (note that no females from Alaungdaw Katthapa NP available). Foreleg not modified: femur not incrassate; tibia without grasping comb. Gonocoxa small and flat; proctiger small, knob-shaped, directed posteriorly; both almost concealed in abdominal segment 7. Posterior part of connexiva, hind margin of tergite 8, and gonocoxae with long, mostly straight, posteriorly directed, black setae.

Description of apterous males (paratypes):

Measurements: BL 2.80–2.84 mm, BW 1.14–1.17 mm, HL 0.31 mm, HW 0.66–0.67 mm, A₂L 0.29–0.30 mm, PW 1.12–1.16 mm, PL 0.96–0.97 mm, MtL 1.30–1.32 mm.

Colour similar to macropterous morph. Medial black mark on pronotum (Fig. 34) comparatively short and narrow, lateral marks distinct. Tergites and laterotergites brownish orange, tergites 3–6 distinctly infuscated. Pilosity similar to macropterous morph. All tergites and laterotergites with long, black posterocaudally directed setae. Structures similar to macropterous male, except pronotum (Fig. 34) of very different shape, much smaller than in macropterous specimens, but strongly developed compared with apterous morphs of other species; with small humeri and posteriorly almost reaching hind margin of tergite 1. Tergite 7 1.3 times as wide as long.

Comparative notes: *Perittopus* is the only genus in Perittopinae. The distally helicoid paramere of the male (Fig. 37) and the small proctiger of the female set *P. zimmermannae* sp.n. in a clade of species, which is widely distributed from northeastern India to Borneo and Bali, and has one additional isolated occurrence in Sri Lanka with *P. cey-*

lanicus ZETTEL, 2001 (ZETTEL 2001a, b). Within this species group, there are two other described species with distinct black marks on their pronota: *P. breddini* KIRKALDY, 1901 from Java and Bali has a black centre mark, and *Perittopus maculatus* PAIVA, 1919 from northeastern India has large paired marks at anterior corners, whereas *P. rufus* DISTANT, 1903, the only species so far recorded from Myanmar (Tenasserim) lacks any black pronotum marks. *Perittopus zimmermannae* sp.n. differs from these species in the combination of black marks (Figs. 6, 34) and in the apical angle of the paramere, from *P. breddini* also in a longer grasping comb on the male's foreleg, and from *P. maculatus* also in conspicuously slender tarsi.

Family Gerridae

Metrocoris atlas sp.n. (Figs. 7, 38–44)

Etymology: Referring to the male's strongly enlarged profemur, this species is named after the mythical Greek figure Atlas, the titan who carries the heaven in the west. Used as a noun in apposition.

Type locality: Myanmar, Sagaing Division, Alaungdaw Katthapa National Park, Khaung Din Stream, 450 m, 22° 18.360' N 94° 25.937' E (GPS).

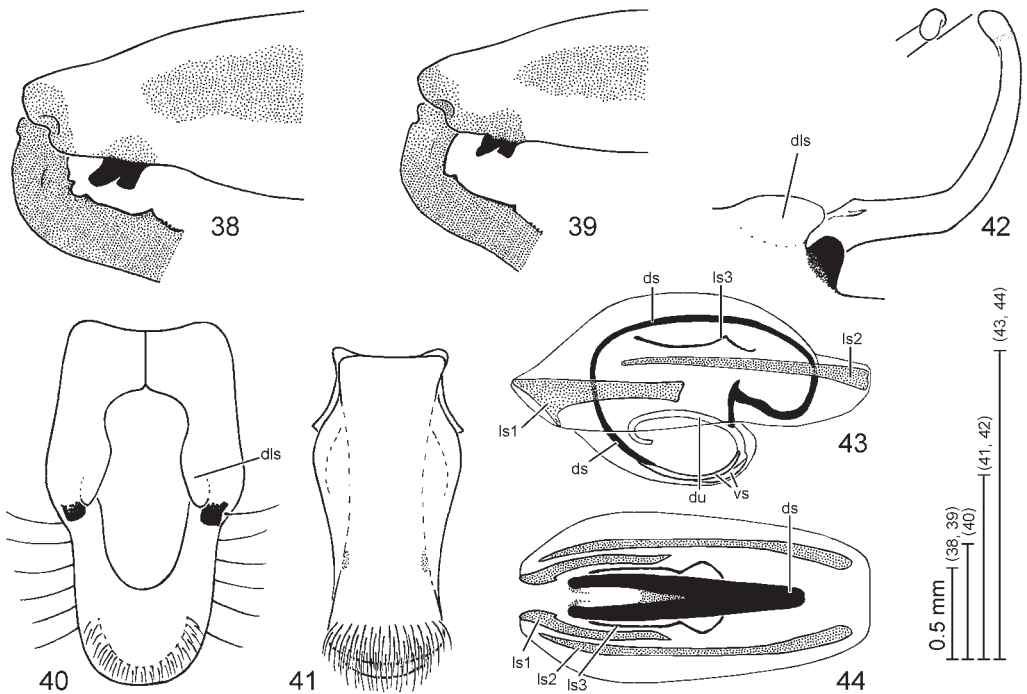
Type material: Holotype (apterous male, NHMW, Fig. 7) and paratype (macropterous male, NHMW) labelled "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Khaung Din Stream, 450 m\ 22° 18.360' N 94° 25.937' E\ 11.5.2003, I. Boukal & al (119)".

Description of apterous male (holotype):

Measurements: BL 6.20 mm, BW 2.85 mm, HL 0.74 mm, HW 1.81 mm, A₂L 1.07 mm, PW 1.71 mm, PL 0.64 mm, MtL 4.00 mm. Indices: EI 79, AnI 81, PnI 267, MtI 2.34. Relative lengths of antennomeres 1–4 (in % of antennomere 2): 222 : 100 : 85 : 65. Relative lengths of leg segments (in % of metatibia): profemur 75, protibia 57, protarsus 4+21, mesofemur 178, mesotibia 48, mesotarsus 60+8, metafemur 166, metatibia 100, metatarsus 9+10.

Colour (Fig. 7): Yellow, with distinct and prominent black markings on dorsum. Interocular area with broad black mark medially. Antennomere 1 yellow, antennomeres 2–4 black. Pronotum with black midline and transverse stripes at anterior margin laterally curved towards posterolateral corners. On mesonotum sublateral stripes slightly wider than midline and transverse bands; stripes on mesacetabula thin, running toward anterior marginal mark; medial stripe on mesopleura thin and slightly curved. On metanotum black mark at anterior margin broader than the one at posterior margin. Mesopleura with narrow longitudinal stripe. Profemur with apical dark ring and four longitudinal stripes, only ventral stripe connected with ring, posterior stripe broadest. Protibia and protarsus black. On middle and hind legs, femora yellowish, tibiae and tarsi dark brown. Abdomen dorsally mainly black. Venter pale yellow.

Pilosity: Whole body including appendages with dense, short, black, appressed pubescence, only that on tergites and laterotergites silverish, that on venter whitish; ventral side of antennae with very short, dense, erect pubescence.



Figs. 38–44: *Metrocoris atlas* sp.n. (38, 40–44: holotype, apterous male; 39: paratype, macropterous male), pilosity totally or partly omitted: (38, 39) Junction of profemur and protibia. (40) Pygophore, dorsal aspect. (41) Proctiger, dorsal aspect. (42) Left paramere in situ, lateral aspect; with indistinct dorsolateral sclerite (dls) of pygophore; insert illustrating the paramere's apex in apical (approximately dorsal) aspect. (43, 44) Vesica sclerites: ds = dorsal sclerite, du = ductus seminalis, ls1 = left first lateral sclerite, ls2 = left second lateral sclerite, ls3 = left third lateral sclerite, vs = ventral sclerites.

Structures: Head anteriorly rounded, with large eyes: Pronotum with both anterior and posterior margin strongly sinuate. Foreleg (Figs. 38, 39) strongly modified: femur strongly incrassate, 3.0 times as long as wide, not constricted or indented in apical third, with very large bipartite apical tooth (its distal part being the elevated rim of the ventral surface); inner face of tibia with sub-basal, tooth-like elevation. Segment 8 large (Fig. 7), subrectangular in dorsal aspect, length 1.42 mm, width 1.06 mm.

Genitalia: Pygophore (Fig. 40) prolonged, but section distal of paramere insertion hardly constricted, with rounded apical margin; dorsolateral sclerite not clearly separated (Fig. 42). Proctiger (Fig. 41) long, with narrow distal part. Paramere (Fig. 42) strongly curved, its apex bent laterad and narrowly rounded. Vesicula (Figs. 43, 44): dorsal sclerite long and recurved distally, proximally split into two arms; no apical accessory sclerite; three pairs of lateral sclerites: first lateral sclerite straight, strongly widened at base; second lateral sclerite very long and slender; third lateral sclerite inconspicuous, thin, bisinuate; ventral sclerite long, distally reaching apex of dorsal sclerite.

Description of macropterous male (paratype):

Measurements: BL 5.35 mm (excl. wings), 7.20 mm (incl. wings), BW 2.73 mm, HL 0.83 mm, HW 1.69 mm, A₂L 0.98 mm, PW 2.43 mm, PL 3.44 mm, MtL 3.96 mm.

Colour: On pronotum, anterior and anterolateral margins in front of humeri black; paired dark sublateral stripes wider than transverse band and median stripe, confluent with median stripe anteriorly and subapically; posterior margin from humeri to apex creamy. Mesopleura without longitudinal stripe. Wings mainly blackish brown, costal margin proximally yellowish. Antenna and legs of similar colour as in apterous morph.

Pilosity: Black pilosity on mesopleura slightly longer than in apterous morph. Basal areas of forewings with dense black pilosity along veins.

Structures: Pronotum with pointed apex. Profemur moderately incrassate, 3.6 times as long as wide. Wings clearly surpassing apex of abdomen, length of forewing 5.28 mm.

Comparative notes: *Metrocoris atlas* sp.n. is tentatively placed in the *M. anderseni* group. For the definition of this group see CHEN & NIESER (1993) and TRAN & ZETTEL (2005). In *M. atlas* sp.n. the distal section of the male's pygophore is elongate (Fig. 40), but it lacks the characteristic constriction found in other group members. In addition, the male's profemur lacks a distinct distal constriction proximal of the (sub-)basal tooth. On the other hand, the conspicuous bipartite (sub-)apical tooth on the male's profemur (Figs. 38, 39), the tooth-like sub-basal elevation on the male's protibia, the large, elongated genital segments, especially the long, curved parameres (Fig. 42) and the very slender proctiger (Fig. 41), form a set of characteristics which indicate that *M. atlas* sp.n. takes a basal position in the *M. anderseni* group. This group contains – from west to east – *M. anderseni* CHEN & NIESER, 1993 and *M. falcatus* CHEN & NIESER, 1993, both from Uttar Pradesh, India; *M. femoratus* (PAIVA, 1919) from Meghalaya, India; *M. genitilis* CHEN & NIESER, 1993 from Yunnan, China, and Chiang Mai, Thailand; and *M. quynhi* TRAN & ZETTEL, 2005 from Lao Cai, Vietnam. All species seem to have rather restricted distributions.

First country records**Family Mesoveliidae*****Mesovelia horvathi* LUNDBLAD, 1933**

Material examined: 1 apterous male, 1 macropterous female (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Wakya Stream, 400 m\ 22° 19.173' N 94° 29.654' E\ 8.5.2003, lg. Boukal & al. (115)"; 1 macropterous female (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 9.5.2003, lg. Boukal & al. (118)".

General distribution: Widespread in Australasia from southern China to Australia, and in the southeastern Palaearctic (Japan) (POLHEMUS & POLHEMUS 2001).

Family Hebridae***Hyrcanus varicolor* ANDERSEN, 1981**

Material examined (all macropterous): 1 female (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw

Katthapa NP\ Pagoda Stream, 360 m\ 22° 19.084' N 94° 28.744' E\ 4.5.2003, lg. Boukal & al. (102)"; 2 males, 4 females (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP, large\ stream (mouth of Pagoda), 360m\ 22° 19.084' N 94° 28.744' E\ 4.5.2003, lg. Boukal & al. (102a)"; 12 males, 14 females (NHMW, MBMY) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 5.5.2003, lg. Boukal & al. (107)"; 1 male, 2 females (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 400 m\ 22° 18.560' N 94° 27.679' E\ 6.5.2003, lg. Boukal & al. (111)"; 21 males, 7 females (NHMW, MBMY, ZRCS) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 360 m\ 22° 19.09' N 94° 28.82' E\ 7.5.2003, l. Boukal & al. (112)"; 3 males, 2 females (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Wakya Stream, 400 m\ 22° 19.173' N 94° 29.654' E\ 8.5.2003, lg. Boukal & al. (115)"; 3 males, 8 females (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 9.5.2003, lg. Boukal & al (118)"; 1 male (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.113' N 94° 28.518' E\ 13.5.2003, l. Boukal & al (122)".

General distribution: Thailand, Vietnam, Indonesia (Sumatra, Java) (ZETTEL 1998). Records from Myanmar represent the most western distribution of this species.

Family Veliidae

Microvelia douglasi SCOTT, 1874

Material examined: 1 macropterous female (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 5.5.2003, lg. Boukal & al. (107)"; 1 macropterous male (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 9.5.2003, lg. Boukal & al (118)".

General distribution: From India to Japan and Australia (ANDERSEN & WEIR 2004).

Rhagovelia sumatrensis LUNDBLAD, 1933

Material examined: 2 apterous females (NHMW, MBMY) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Wakya Stream, 400 m\ 22° 19.173' N 94° 29.654' E\ 8.5.2003, lg. Boukal & al. (115)"; 2 apterous females (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 9.5.2003, lg. Boukal & al (118)"; 1 apterous male, 1 apterous female (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Khaung Din Stream, 450 m\ 22° 18.360' N 94° 25.937' E\ 11.5.2003, l. Boukal & al (119)"; 1 macropterous female (NHMW) "MYANMAR: Magwe Div.\ Saw, furcation area of\ Saw Chaung, 370 m\ 21° 08' 57.9" N 4° 09' 28.6" E\ leg. H. Schillhammer\ & D. Zimmermann (179)".

General distribution: From India to southeastern China and Lombok in Indonesia (ZETTEL 2000).

Family Gerridae

Amemboa cristata POLHEMUS & ANDERSEN, 1984

Material examined: 1 macropterous female (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Pagoda Stream, 350 m\ 22° 19.094' N 94° 28.823' E\ 9.5.2003, lg. Boukal & al (118)"; 2 macropterous males, 1 apterous female (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Khaung Din Stream, 450 m\ 22° 18.360' N 94° 25.937' E\ 11.5.2003, l. Boukal & al (119)".

General distribution: Thailand, Malaysia (POLHEMUS & ANDERSEN 1984). Records from Myanmar represent the most western distribution of *A. cristata*.

Gerris gracilicornis (HORVÁTH, 1879)

Material examined: 5 macropterous males, 3 macropterous females (NHMW) "MYANMAR: Chin State\ Natmataung NP, WNW\ Kanpetlet, Mt. Victoria\ 21° 14' 00.9" N 3° 54' 16.0" E", "3040 m, 5.6.2010, small\ pond, leg. H. Schillhammer\ & D. Zimmermann (182)".

General distribution: Chiefly East Palearctic Region (Far East of Russia, Japan, China, Taiwan) entering the most northern parts of the Oriental Region (India, Bhutan, Myanmar) (ANDERSEN 1995, ZETTEL & TRAN 2007, and this study).

***Pleciobates pacholatko* ZETTEL & CHEN, 1996**

Material examined: 1 apterous male, 2 apterous females (NHMW) "BURMA: Bago Div.\ Bago Yoma, Sein Yai For.\ Camp, 1700m, 29.10.\ 1998, l. Schillhammer (36)".

General distribution: This species was originally described from northern Thailand and southern Vietnam (ZETTEL & CHEN 1996). The record from Myanmar is the most western one.

***Ptilomera fang* POLHEMUS, 2001**

Material examined: 2 macropterous (dealate) males (NHMW) "MYANMAR: Sagaing Div.\ Alaungdaw Katthapa NP\ Khaung Din Stream, 450 m\ 22° 18.360' N 94° 25.937' E\ 11.5.2003, l. Boukal & al (119)".

General distribution: Hitherto, this species was only known from northern Thailand. It was originally described from a stream near Fang in Chiang Mai Province (POLHEMUS 2001). VITHEEPADIT & SITES (2007) present numerous records from the Doi Inthanon in the same province.

Catalogue of species

Notes: Citations in brackets refer to the first records from Myanmar. Additional records in literature are only referred to if the first record is taxonomically not safe. An asterisk (*) marks those species which are at present knowledge endemic to Myanmar. Synonymy of *Esakia kuiterti* from Myanmar and *E. ventidioides* LUNDBLAD, 1933 from Sumatra by POLHEMUS (1992) is yet to be confirmed until the taxonomy of *Esakia* species is carefully revised.

MESOVERELIIDAE

Mesoveliinae:

Mesovelia horvathi LUNDBLAD, 1933 **first record**

Mesovelia vittigera HORVÁTH, 1895 (BUZZETTI & al. 2006)

HEBRIDAE

Hyrceaninae:

Hyrceanus varicolor ANDERSEN, 1981 **first record**

Hebrinae:

Hebrus birmensis* **new species

**Hebrus orientalis* DISTANT, 1903 (DISTANT 1903)

Hebrus schillhammeri* **new species

Timasius goldmarie* **new species

Timasius schaeferi* **new species

HYDROMETRIDAE**Hydrometrinae:**

Hydrometra annamana HUNGERFORD & EVANS, 1934 (ZETTEL 2006a)

Hydrometra greeni KIRKALDY, 1898 (YANG & ZETTEL 2005)

Hydrometra jaczewskii LUNDBLAD, 1933 (POLHEMUS & POLHEMUS 1995)

Hydrometra longicapitis TORRE-BUENO, 1927 (ZETTEL 2006a)

Hydrometra orientalis LUNDBLAD, 1933 (POLHEMUS & POLHEMUS 1995)

Hydrometra ripicola ANDERSEN, 1992 (ZETTEL 2006a)

VELIIDAE**Microveliinae:**

Baptista gestroi DISTANT, 1903 (DISTANT 1903)

Geovelia orientalis* **new species

**Microvelia burmanica* PAIVA, 1918 (PAIVA 1918)

Microvelia douglasi SCOTT, 1874 **first record**

Perittopinae:

**Perittopus rufus* DISTANT, 1903 (DISTANT 1903)

Perittopus zimmermannae* **new species

Rhagoveliinae:

Rhagovelia sumatrensis LUNDBLAD, 1933 **first record**

**Tetraripis chinthe* POLHEMUS & POLHEMUS, 1998 (POLHEMUS & POLHEMUS 1998)

Veliinae:

Angilia bispinosa ANDERSEN, 1981 (POLHEMUS & POLHEMUS 1998)

Angilia orientalis ANDERSEN, 1981 (POLHEMUS & POLHEMUS 1998)

Angilovelia y-alba (PAIVA, 1918) (PAIVA 1918)

GERRIDAE**Rhagadotarsinae:**

Rhagadotarsus kraepelini BREDDIN, 1905 (DISTANT 1910, as *Nacebus dux* DISTANT, 1910)

Trepobatinae:

Gnomobates kuiterti (HUNGERFORD & MATSUDA, 1958) (HUNGERFORD & MATSUDA 1958a, as *Cryptobates kuiterti*)

Gerrinae:

Aquarius adelaidis (DOHRN, 1860) (DISTANT 1903 as *Gerris spinolae* LETHIERRY & SEVERIN, 1896; confirmed by ANDERSEN 1990)

Aquarius paludum paludum (FABRICIUS, 1794) (DISTANT 1903 as *Gerris paludum*; confirmed by ANDERSEN 1990)

Gerris gracilicornis (HORVÁTH, 1879) **first record**

Gerris tigrinus BROWN, 1949 (BROWN 1949)

Limnogonus fossarum fossarum (FABRICIUS, 1775) (ANDERSEN 1975)

Limnogonus nitidus (MAYR, 1865) (DISTANT 1903 as *Gerris nitida*; confirmed by ANDERSEN 1975)

Limnogonus pectoralis (MAYR, 1865) (BUZZETTI & al. 2006)

Neogerris parvulus (STÅL, 1859) (ANDERSEN 1975)

Tenagogonus kuiterti HUNGERFORD & MATSUDA, 1958 (HUNGERFORD & MATSUDA 1958b)

Eotrechinae:

**Amemboa burmensis* POLHEMUS & ANDERSEN, 1984 (POLHEMUS & ANDERSEN 1984)

Amemboa cristata POLHEMUS & ANDERSEN, 1984 **first record**

Amemboa lyra (PAIVA, 1918) (PAIVA 1918)

**Amemboides setosus* (POLHEMUS & ANDERSEN, 1984) (POLHEMUS & ANDERSEN 1984 as *Amemboa* (*Amemboides*) *setosa*)

Eotrechus kalidasa KIRKALDY, 1902 (KIRKALDY 1902)

Onychotrechus esakii ANDERSEN, 1980 (DISTANT 1903: as *O. sakuntala* (KIRKALDY, 1901); see ANDERSEN 1980)

Cylindrostethinae:

Cylindrostethus costalis SCHMIDT, 1915 (POLHEMUS 1994)

Cylindrostethus scrutator KIRKALDY, 1899 (DISTANT 1903)

Ptilomerinae:

Pleciobates pacholatkoii ZETTEL & CHEN, 1996 **first record**

Ptilomera assamensis HUNGERFORD & MATSUDA, 1965 (POLHEMUS 2001)

**Ptilomera burmana* POLHEMUS, 2001 (POLHEMUS 2001)

Ptilomera fang POLHEMUS, 2001 **first record**

Ptilomera tigrina UHLER, 1860 (DISTANT 1903, under *P. laticaudata* (HARDWICKE, 1925); *P. tigrina* confirmed by POLHEMUS 2001)

**Ptilomerella anderseni* ZETTEL, 2009 (ZETTEL 2009)

Rhyacobates malaisei ANDERSEN & CHEN, 1995 (ANDERSEN & CHEN 1995)

Halobatinae:

**Esakia kuiteri* HUNGERFORD & MATSUDA, 1958 (HUNGERFORD & MATSUDA 1958c)

Halobates sp. (cf. *H. flaviventris* ESCHSCHOLTZ, 1822) (BUZZETTI & al. 2006)

**Metrocoris angustus* CHEN & NIESER, 1993 (CHEN & NIESER 1993)

Metrocoris atlas* **new species

Metrocoris ciliatus DEN BOER, 1965 (DEN BOER 1965)

Metrocoris compar (WHITE, 1883) (CHEN & NIESER 1993)

**Metrocoris coxalis* CHEN & NIESER, 1993 (CHEN & NIESER 1993)

Metrocoris hungerfordi DEN BOER, 1965 (DEN BOER 1965)

Metrocoris nigrofascioides CHEN & NIESER, 1993 (CHEN & NIESER 1993)

Metrocoris obscurus CHEN & NIESER, 1993 (CHEN & NIESER 1993)

**Metrocoris pilosus* CHEN & NIESER, 1993 (CHEN & NIESER 1993)

**Ventidius (Ventidioides) kuiterti* HUNGERFORD & MATSUDA, 1960 (HUNGERFORD & MATSUDA 1960)

Ventidius (Ventidius) distanti PAIVA, 1918 (PAIVA 1918)

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