

NOTES ON THE MICROVELIINAE OF SINGAPORE AND PENINSULAR MALAYSIA WITH THE DESCRIPTION OF TWO NEW SPECIES OF *MICROVELIA* WESTWOOD (HEMIPTERA-HETEROPTERA: VELIIDAE)

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ABSTRACT. – In this paper we describe two new species of *Microvelia* Westwood, 1834, *Microvelia petraeus*, new species, and *M. cameron*, new species, from Singapore and Peninsular Malaysia. We also offer descriptive notes for *Microvelia genitalis* Lundblad, 1933, and redescribe *Baptista collaris* (Andersen, 1989).

KEY WORDS. – Veliidae, *Microvelia*, Singapore, Peninsular Malaysia, freshwater.

INTRODUCTION

In preparation of the "Guide to the aquatic Heteroptera of Singapore and Peninsular Malaysia" edited by Lanna Cheng, Peter Ng, and Chang Man Yang, we describe two new species of the genus *Microvelia* Westwood, 1834 (Heteroptera, Veliidae, Microveliinae), *Microvelia petraeus* and *M. cameron*, from that region. We also offer descriptive notes for *Microvelia genitalis* Lundblad, 1933, and redescribe *Baptista collaris* (Andersen, 1989). Illustrated keys to all taxa of the family Veliidae known from Singapore and Peninsular Malaysia are given in a forthcoming issue of the "Guide" (Andersen et al., 2002). All measurements are in millimeters. Repositories of material (with abbreviations): B. P. Bishop Museum, Honolulu, U.S.A. (BPBM), Natural History Museum, Vienna, Austria (NHMW), Senckenberg Museum, Frankfurt, Germany (SMF), Zoological Museum, University of Copenhagen, Denmark (ZMUC), and Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore (ZRC).

Microvelia petraeus, new species (Figs. 1, 2)

Material examined. - Holotype - apterous male, Malaysia, Selangor, Templar Park, loc. VI-6, under stones and among roots along small stream in forest, coll. Peter Nielsen, 1 Dec.1979 (ZMUC).

Paratypes - WEST MALAYSIA: 2 females (apt.), same label data as holotype (ZMUC); 5 females (apt.), Pahang, Gua 'Che Yatim, coll. T. C. Maa, 16-17 Dec.1958 (BPBM); 13 males, 5 females(apt.), Pahang, Kuala Lipis, coll. M. Balke, Apr.1997 (ZRC, ZMUC, NHMW) ; 1 male and 1 female (apt.), Selangor, Sungei Gombak, coll. H. K. Lua, 5 May.1996 (ZRC).

Description. - Holotype, apterous male: Length 1.20, width 0.59; body subovate, about 2.0x greatest width across abdomen (Fig. 1). Most of body covered with pilosity of short hairs; abdominal end with longer hairs. Ground color chiefly brownish, head, pronotum, and connexiva brownish yellow; with numerous dark punctures on head, pronotum, meso- metanotum, and basal 4-5 mediotergites (Fig. 1); patches of silvery hairs

laterally on abdominal mediotergites; antennae and legs yellowish. Head width about 1.4x median length (0.38: 0.26). Antennae about 0.6x total length of insect; lengths of antennal segments 1-4: 0.13, 0.14, 0.18, and 0.29; segments 3 and 4 very slender. Pronotum relatively short (0.09), median length distinctly shorter than head length; anterior margin almost straight, posterior margin concave. Meso- and metanotum at least partly exposed behind pronotum, fused with abdominal tergite 1 (Fig. 1). Measurements of leg segments (femur, tibia, and tarsus): fore leg: 0.33, 0.29, and 0.14; middle leg: 0.39, 0.34, and 0.19 (0.06 + 0.13); hind leg 0.41, 0.46, and 0.19 (0.07 + 0.13). Fore femur simple, basal part slightly thickened; fore tibia straight, distally widened, distal grasping comb very short (0.03). Middle and hind femora slightly thickened in middle; middle tibia without grasping comb. Abdominal mediotergites broad, tergites 2-6 relatively short (0.06-0.10), tergite 7 distinctly longer (0.15); connexiva relatively broad, obliquely raised throughout. Abdominal venter tumose, simple; sternum 7 shorter than preceding two sterna together (0.10: 0.14), posterior margin slightly concave. Genital segments relatively small (0.15), slightly protruding beyond abdominal end; segment 8 rectangular, simple; pygophore subovate; proctiger broad, button-shaped; parameres symmetrical, relatively large, slender falciform, basal parts with long bristles (Fig. 2).

Paratype, apterous female: Length 1.30, width 0.64. Body subovate, total length about 2.0x greatest width across abdomen. Color and pilosity as in male. Antennae about 0.6x total length of insect; lengths of antennal segments 1-4: 0.14, 0.14, 0.18, and 0.30. Measurements of leg segments (femur, tibia, tarsus): fore leg: 0.34, 0.30, and 0.15; middle leg: 0.39, 0.35, and 0.18 (0.06 + 0.12); hind leg: 0.41, 0.48, and 0.23 (0.08 + 0.15). Connexiva obliquely raised throughout. Sternum 7 slightly longer than preceding two sterna together (0.18: 0.16), posterior margin slightly produced in middle. Genital segments relatively large, exposed behind abdominal end, proctiger button-shaped, protruding.

Other paratypes examined: Apterous males, length 1.19-1.33, width 0.59-0.63; apterous females, length 1.30-1.40, width 0.64-0.65. Coloration, pilosity, and structural characters as in apterous female paratype described above. Macropterous forms unknown.

Distribution. - Peninsular Malaysia (Pahang, Selangor).

Remarks. - Named both for the habitat (living under stones) and the first name of the collector of the type-

series, Mr. Peter Nielsen, Nuuk, Greenland. This is one of the smallest species of *Microvelia* found in the area. It is further distinguished by the presence of dark punctures on the dorsal head surface (in other species of *Microvelia* such punctures are normally confined to thorax and abdomen), ovate body shape of both sexes, and relatively large male parameres.

Microvelia cameron, new species

(Figs. 3-5)

Material examined. - Holotype - apterous male, Malaysia, Pahang, Cameron Highlands, 200 m, loc. IV-2, pools along stream, coll. Peter Nielsen, 27 Nov.1979 (ZMUC).

Paratypes - WEST MALAYSIA: 7 males, 7 females (apt.) and several nymphs, same data as holotype (ZMUC); 1 male (apt.), 1 female (macr.), Pahang. Pulau Tioman, Sungei Bahara, pool nr Juara Trail, coll. H. K. Lua, 25 Jun.1996 (ZRC); 2 males, 3 females (apt.), 1 male, 2 females (macr.), Pulau Tioman, pool along Sungei Keliling, coll. H. K. Lua, 26 Jun.1997 (ZRC); 1 male, 2 females (apt.), Johore, Skudi, pool nr stream, palm Estate, coll. B. Tan, 6 Dec.1995 (ZRC); 1 male, 1 female (macr.), Johore, Endau, near Sungei Mewar, coll. S. L. Goh & G. T. Sumita, 8 May.1995 (ZRC). EAST MALAYSIA: 22 males, 12 females (apt.), 42 males, 26 females (macr.), Sabah, pool along stream off Sungei Kinabatangan, coll. H. K. Lua, 11 Apr.1994 (SMF, ZMUC, ZRC). SINGAPORE: 5 males, 9 females (apt.), 2 females (macr.), Chestnut Forest, puddle, coll. D. Kovac & C. M. Yang, 31 Oct.1996 (SMF, ZRC); 8 males, 13 females (apt.), 2 males (macr.), Lower Peirce forest, pool, coll. C. M. Yang, 30 Jan.1995 (NHMW, ZRC); 2 males, 6 females (apt.), Seletar Forest, pool, coll. Y. H. Lim, 31 May.1994 (ZRC); 2 males, 3 females (apt.), 4 males, 5 females (macr.), 9 nymphs, MacRitchie Forest, pool in swamp, coll. K. L. Yeo, 20 Apr.1994 (ZRC); 3 males, 3 females (apt.), 1 female (macr.), MacRitchie Forest, coll. K. L. Yeo, 21 Apr.1994 (ZRC); 2 males, 2 females (apt.), 1 male, 2 females (macr.), Bukit Timah Nature Reserves, coll. H. K. Lua, 14 Dec.1995 (ZRC); 2 females (apt.), 1 male (macr.), Mandai, pool near mangroves, coll. C. M. Yang, 7 Jun.1996 (ZRC). 1 male, 8 females (apt.), 3 nymphs, pool, Nee Soon Swamp, coll. C. M. Yang, 7 Apr.1999 (ZRC).

Description. - Holotype, apterous male: Length 1.95, width 0.80; body elongate ovate, about 2.4x greatest width across abdomen. Most of body covered with pilosity of short hairs, abdominal end with longer hairs. Ground color orange brownish; head dark brown; pronotum with broad transverse, pale band along anterior margin; a row of dark punctures along anterior margin of pronotum and numerous dark punctures on pronotal lobe; patches of silvery hairs anterolaterally on pronotum; antennae and legs chiefly pale brownish; abdominal mediotergites dark

brownish laterally; adominal terga 1-3 laterally and whole tergum 7 frosted. Head width about 1.6x median length (0.51: 0.33). Antennae about 0.5x total length of insect; lengths of antennal segments 1-4: 0.18, 0.18, 0.25, and 0.36. Pronotum subrectangular, median length distinctly longer than head length (0.40); anterior margin slightly concave, posterior margin broadly rounded. Meso- and metanotum (except lateral parts) concealed beneath pronotal lobe. Measurements of leg segments (femur, tibia, and tarsus): fore leg: 0.54, 0.41, and 0.24; middle leg: 0.61, 0.54, and 0.31 (0.13 + 0.19); hind leg 0.63, 0.73, and 0.33 (0.15 + 0.18). Fore femur simple (Fig. 3), basal part slightly thickened; fore tibia straight, distally widened, with a slender process on internal margin carrying a minute grasping comb (<0.01). Middle and hind femora thickened in middle; middle tibia with short grasping comb distally (0.04) (Fig. 4). Abdominal mediotergites broad, tergites 1-6 subequal in length (0.12-0.14), tergite 7 about twice as long (0.26); connexiva relatively narrow, obliquely raised throughout. Abdominal venter tumose, sternum 6 in middle with large transverse pad of densely set, dark brownish hairs (Fig. 5); sternum 7 (0.19) subequal in length to preceding two sterna together, posterior margin broadly concave. Genital segments very large (0.34), distinctly protruding from abdominal end; segment 8 rectangular, assymmetrical, with ventral posterior margin thickened and folded; pygophore broad, strongly assymmetrical, with deep incision on right side; proctiger broad, button-shaped; parameres assymmetrical, right paramere large, falciform, with pointed apex (Fig. 5); left paramere small.

Paratype, apterous female. Length 2.11, width 0.96. Body elongate ovate, total length about 2.2x greatest width across abdomen. Color and pilosity as in male. Antennae about half total length of insect; lengths of antennal segments 1-4: 0.18, 0.18, 0.26, and 0.39. Measurements of leg segments (femur, tibia, tarsus): fore leg: 0.51, 0.40, and 0.26; middle leg: 0.58, 0.54, and 0.34 (0.15 + 0.19); hind leg: 0.66, 0.73, and 0.35 (0.16 + 0.19). Connexiva obliquely raised throughout. Sternum 7 slightly longer than preceding two sterna together (0.36: 0.31). Genital segments small, withdrawn into abdominal end, proctiger button-shaped, deflected.

Paratype, macropterous male. Length 1.70-1.83, width 0.76. Head length 0.24, width 0.45. Pronotum with weak constriction in front of humeral corners, length 0.55, width 0.76. Lengths of antennal segments 1-4: 0.17, 0.16, 0.22, 0.33. Wings surpassing end of abdomen. Fore-wings dark with prominent white markings in the cells, and numerous suberect hairs on

external and anterior veins. Wing venation as in *Microvelia douglasi* (Lundblad, 1933: fig 115k). Other characters as in apterous male.

Paratype, macropterous female. Length 1.92-2.07, width 0.80. Head length 0.33, width 0.51. Pronotum length 0.63, width 0.80. Lengths of antennal segments 1-4: 0.16, 0.16, 0.21: 0.32. Wing venation and color as in macropterous male. Other characters as in apterous female.

Other paratypes examined: Apterous males, length 1.60-2.00; apterous females, length 1.70-2.15; macropterous males, length 1.70-1.83; macropterous females, length 1.92-2.07. Color, pilosity, and structural characters as in apterous holotype and paratype and macropterous paratypes.

Distribution. - Peninsular Malaysia (Johore, Pahang, Pulau Tioman), East Malaysia (Sabah), Singapore.

Remarks. - Named for the type locality, Cameron Highlands. This species belongs to the *M. pygmaea* (Dufour) group of Old World *Microvelia* species in which the males have grasping combs on both the fore and middle tibiae and strongly asymmetrical parameres (right paramere largest). Here belong also *M. douglasi* and *genitalis* (Lundblad, 1933; Andersen, 1982). The new species is distinguished from these species by the distal process of the male fore tibia, ventral modification of the male abdomen, and detailed structure of the male genital segments.

Microvelia genitalis Lundblad, 1933

Microvelia genitalis Lundblad, 1933: 361-364, Fig. 117.

Material examined. - WEST MALAYSIA: 9 males, 16 females (apt.), 1 female (macr.), Penang Island, Bayan Lepas, coll. Peter Nielsen, 24 Nov.1979 (ZMUC); 1 male (apt.), Trengganu, Pualu Redeng, Pasir Panjang, coll. H. K. Lua, 25 Jun.1992 (ZRC); SINGAPORE: 2 males, 2 females (apt.) Rifle Range Forest, pool near stream, coll. K. L. Yeo, 3 Jun.1993 (ZRC); 4 males, 3 females (apt.), Bukit Timah Nature Reserve, coll. H. K. Lua, 13 Jun. and 13 Dec.1995 (ZRC); 8 females (apt.), Seletar Nature Reserve, coll. H. K. Lua, 16 May.1994 (ZRC)

Descriptive notes. - Apterous males: Length 1.40-1.50, width 0.50. Color of body, antennae, and legs pale brownish, pronotum anteriorly with pale transverse band. Antennae long and slender, length of segments 1-4: 0.14, 0.13, 0.23, and 0.35 mm. Both fore and middle tibiae of male with distal grasping combs; fore tibial comb about 1/5 length of tibia

(0.06: 0.29), middle tibial comb more than 1/4 length of tibia (0.10: 0.36). Male genital segments extremely large, about 1/4 length of body (0.38: 1.44); segment 8 very long and broad, asymmetrical; right paramere very large, falciform, apex blunt; left paramere much smaller (see Lundblad, 1933: Fig. 117).

Apterous females: Length 1.50-1.55, width 0.60-0.65. Color as in male. Female abdomen broad, almost parallel-sided, only slightly tapering in width posteriorly; connexiva obliquely raised throughout. Genital segments of female concealed within pregenital abdomen; proctiger subquadrate, strongly deflected.

Macropterous female: Length 1.75, width 0.70; forewings brownish with pale markings.

Distribution. - Indonesia (Java), Peninsular Malaysia (Penang, Terengganu), Singapore, Taiwan, Thailand.

Remarks. - This species was described from Java, Indonesia (Lundblad, 1933) and later recorded from Singapore (Yang et al., 1997).

***Baptista collaris* (Andersen, 1989)**
(Figs. 6-8)

Lathriovelina collaris Andersen, 1989: 379-380, Figs. 49, 50.
Baptista collaris - Kovac & Yang, 2000: 161.

Material examined. - WEST MALAYSIA: 10 males, 1 female (apt.), 1 female (macr.), Pahang, Cameron Highlands, 200 m, loc. IV-4, small stream in ravine, coll. Peter Nielsen, 27 Nov.1979 (ZMUC); 1 female (apt.), same locality and date, loc. IV-2, pools along stream, coll. Peter Nielsen (ZMUC); 1 female (apt.), Selangor, Templar Park, loc. VI-6, under stones and among roots along small stream in forest, coll. Peter Nielsen, 1 Dec.1979 (ZMUC); 4 males, 3 females (apt.), Pulau Tioman, Sungei Baharu, coll. K. M. Chong, 26 Jun.1996 (ZRC); 5 males, 1 female (apt.), Pulau Tioman, Sungei Salang, coll. K. Lim, 25 Jun.1997 (ZRC).

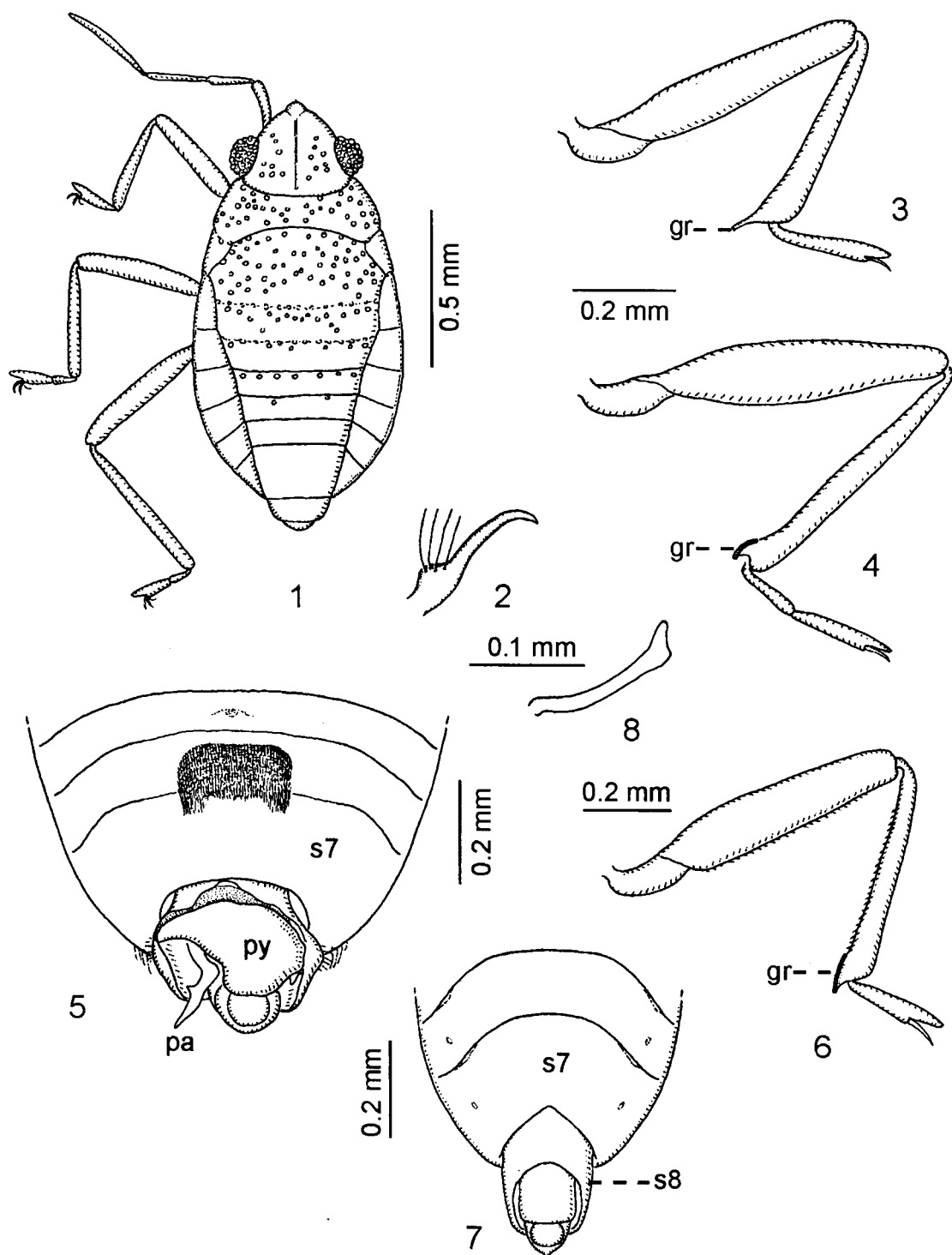
Redescription. - Apterous males: Length 2.35-2.50, width 0.80-0.90; body elongate ovate, length about 3.0x greatest width across thorax. Most of body covered with pilosity of long semierect dark hairs. Ground color orange brownish; pronotum dark brownish with broad transverse, pale band along anterior margin; a row of dark punctures along anterior margin of pronotum and numerous dark punctures on pronotal lobe; antennae and legs chiefly pale brownish; abdominal terga dark brownish laterally and along intersegmental sutures; patches of silvery hairs antero-laterally on pronotum, and

laterally on abdominal terga 1-2 and 5-6. Head width about 1.4x median length (0.63: 0.45). Antennae about 0.55x total length of insect; lengths of antennal segments 1-4: 0.31, 0.21, 0.41, and 0.48. Pronotum subrectangular, median length subequal to head length (0.46); anterior margin concave, posterior margin broadly rounded. Measurements of leg segments (femur, tibia, and tarsus): fore leg: 0.69, 0.61, and 0.24; middle leg: 0.78, 0.69, and 0.34 (0.13 + 0.21); hind leg 0.88, 0.99, and 0.40 (0.16 + 0.24). Fore femur simple, basal part slightly thickened (Fig. 6); fore tibia straight, grasping comb short, about 0.16x tibial length (0.10); both femur and tibia with numerous small dark spines along ventral margin. Middle femur not modified; hind femur slightly thicker than middle femur. Abdominal venter not modified (Fig. 7). Sternum 7 shorter than preceding two sterna together (0.20: 0.31), posterior margin with small V-shaped incision in middle. Genital segments relatively large, distinctly protruding from abdominal end; segment 8 rectangular, but otherwise simple; proctiger elongate, pointed; parameres large, symmetrically developed, falciform, with blunt apices (Fig. 8).

Apterous female: Length 2.48, width 1.00. Body subovate, total length about 2.5x greatest width across abdomen. Color and pilosity as in male. Antennae about half total length of insect; lengths of antennal segments 1-4: 0.29, 0.20, 0.39, and 0.49. Measurements of leg segments (femur, tibia, tarsus): fore leg: 0.66, 0.55, and 0.28; middle leg: 0.74, 0.70, and 0.34 (0.11 + 0.23); hind leg: 0.90, 0.98, and 0.41 (0.16 + 0.25). Connexiva obliquely raised throughout, posterior corners of laterotergites 7 produced. Sternum 7 shorter than preceding two sterna together (0.31: 0.38). Genital segments distinctly protruding from abdominal end, proctiger cone-shaped, pointed.

Macropterous female: Length 2.75, width 1.09. Forewings brownish with whitish streaks and spots, two streaks basally and three ovate spots in distal part. Pronotum pentagonal in outline, shorter than wide across humeral angles (0.85: 1.06). Other characters as in apterous female.

Remarks. - This species was described in the genus *Lathriovelina* Andersen on account of the presence of a ventral "collar" in the female holotype (Andersen, 1989: 379), a character shared with the type species of this genus, *L. capitata* Andersen. As pointed out by Kovac & Yang (2000), this "collar" is an artefact, being the posterior part of the head (postocciput) which appears when the head is raised (as often



Figs. 1-8. 1. *Microvelia petraeus*: apterous male, dorsal view antenna and legs of right side omitted. 2. *Microvelia petraeus*: left paramere of male. 3. *Microvelia cameron*: male fore leg (gr, grasping comb). 4. *Microvelia cameron*: male middle leg (gr, grasping comb). 5. *Microvelia cameron*: male abdominal end, ventral view (pa, paramere; py, pygophore; s7, sternum 7). 6. *Baptista collaris*, male fore leg (gr, grasping comb). 7. *Baptista collaris*, male abdominal end, ventral view (s7, sternum 7; s8, segment 8). 8. *Baptista collaris*, left paramere of male.

happens when specimens are killed and preserved). Consequently, Kovac & Yang (2000) redefined *Lathriovelina* and transferred *collaris* to the genus *Baptista* Distant, sensu Andersen (1989).

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LITERATURE CITED

Andersen, N. M., 1982. The Semiaquatic Bugs (Hemiptera, Gerromorpha). Phylogeny, adaptations, biogeography, and classification. *Entomonograph*, 3: 1-455.

Andersen, N. M., 1989. The Old World Microveliinae (Hemiptera: Veliidae). II. Three new species of *Baptista* Distant and a new genus from the Oriental region. *Entomologica Scandinavica*, 19 [1988]: 363-380.

Andersen, N. M., C. M. Yang & H. Zettel, 2002. Guide to the Aquatic Heteroptera of Singapore and Peninsular Malaysia. – 2. Veliidae. *Raffles Bulletin Zoology*, 50(1): 231-250.

Kovac, D. & C. M. Yang, 2000. Revision of the Oriental bamboo-inhabiting semiaquatic bugs genus *Lathriovelina* Andersen, 1989 (Heteroptera: Veliidae) with description of *L. rickmersi*, new species, and notes on the genus *Baptista* Distant, 1903. *Raffles Bulletin Zoology*, 48(1): 153-165.

Lundblad, O.M., 1933. Zur Kenntniss der aquatilen und semiaquatilen Hemipteren von Sumatra, Java und Bali. *Archiv für Hydrobiologie*, Supplement 12: 1-195, 263-489.

Yang, C. M., H. K. Lua & K. L. Yeo, 1997. Semi-aquatic bug (Heteroptera: Gerromorpha) fauna in the Nature Reserves of Singapore. Proceedings of the Nature Reserves Survey Seminar. *Gardens Bulletin (Singapore)*, 49: 313-319.