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The genus *Metrocoris* Mayr, 1865 (Gerromorpha: Gerridae) in Vietnam, with descriptions of five new species

Tran A.D.[1] & D.A. Polhemus[2]

Abstract. The taxonomy of *Metrocoris* Mayr, 1865 in Vietnam is revised. Five new species, all from the northern area of Vietnam, are described: *Metrocoris sapa*, new species, *Metrocoris monticola*, new species, *Metrocoris nigriventris*, new species (these three belonging to the *M. compar* species group), *Metrocoris johnpolhemi*, new species (belonging to the *M. bilobatus* species group), and *Metrocoris sicilis*, new species (belonging to the *M. ciliatus* species group). Two species are recorded from Vietnam for the first time: *Metrocoris ciliatus* den Boer, 1965 and *Metrocoris obscurus* Chen & Nieser, 1993. A lectotype for *Metrocoris tenuicornis* Esaki, 1926 is designated in the present paper. Additional descriptions of *M. tenuicornis* Esaki, 1926 and *M. triangulatus* Zettel & Chen, 1996 are also given. Keys to the 16 species of *Metrocoris* occurring in Vietnam are provided. In addition, this paper also confirms the occurrence of *M. tenuicornis* from Laos, provides first records of *M. stranguloides* Chen & Nieser, 1993 and *M. nigrofascioides* Chen & Nieser, 1993 from Laos, and the first records of *M. nigrofascioides* and *M. tenuicornis* from Cambodia.

Keywords. Gerridae, *Metrocoris*, Vietnam, new species, first record

INTRODUCTION

The genus *Metrocoris* Mayr, 1865 is a speciose group of freshwater halobatine water striders occurring from the Middle East eastward through Asia to Korea, Japan, the Philippines, and the Malay Archipelago. *Metrocoris* species are commonly found on streams, from lowland to montane areas. They usually prefer slower sections of streams when active (Fig. 1) and sometimes rest on wet banks a few centimeters above the water margin (Fig. 2). The genus was proposed by Mayr (1865) to hold his new species *M. brevis* from Sri Lanka; this type species was later shown by Meinert (1888) to be a synonym of *M. stali* (Dohrn, 1860). Scattered descriptions of additional species were provided by various authors over the next 100 years, and this body of taxonomic knowledge was eventually compiled into the first comprehensive revision of the genus by den Boer (1965). A subsequent regional treatment for the Malay Archipelago and the Philippines by Polhemus (1990) added five additional species. Soon after that, a second comprehensive revision by Chen & Nieser (1993) was published, recognising a further 25 new species and segregating the genus into 15 species groups based on morphology. Following the revision of Chen & Nieser (1993), additional 34 species were described in a number of publications (Chen, 1994; Chen & Nieser, 1996; Zettel & Chen, 1996; Polhemus, 1998; Chen & Zettel, 1999; Tran & Zettel, 2005; Zettel, 2011; Jehalamar & Chandra, 2013; Basu et al., 2016; Ye et al., 2016). Among these, *M. bui* Chen & Zettel, 1999 is now recognised as junior synonym of *M. sichuanensis* Chen & Nieser, 1993 (see Ye et al., 2016). As a result, an updated revision of *Metrocoris* with a newly revised key to species is needed.

The present paper focuses on the *Metrocoris* fauna of Vietnam, which is speciose and rich in representatives of different species groups in relation to the overall size of the country. Of the 15 species groups recognised by Chen & Nieser (1993), eight have been found in Vietnam to date: the *M. strangulator* group, *M. bilobatus* group, *M. anderseni* group, *M. obscurus* group, *M. nigrofasciatus* group, *M. ciliatus* group, *M. compar* group, and *M. tenuicornis* group, with 16 species found in Vietnam in total. Five of the species in the Vietnam biota are new to science, and are described herein. Two other species, *M. obscurus* Chen & Nieser, 1993 and *M. ciliatus* den Boer, 1965, are recorded from Vietnam for the first time. In addition, the present paper also provides the first records of *M. nigrofascioides* Chen & Nieser, 1993 and *M. tenuicornis* Esaki, 1926 from Cambodia; the first records of *M. stranguloides* Chen & Nieser, 1993 and *M. nigrofascioides* Chen & Nieser from Laos; and confirms the occurrence of *M. tenuicornis* in Laos. The present paper also discusses the taxonomy of *Metrocoris tenuicornis* Esaki, 1926, a widespread species with a certain degree of intraspecific variability, with a lectotype for this taxon now formally designated.

[1]Department of Invertebrate Zoology, Faculty of Biology, Hanoi University of Science (Vietnam National University, Hanoi), 334 Nguyen Trai, Thanh Xuan, Hanoi, Vietnam; Email: tran.anhduc@hus.edu.vn

[2]Department of Natural Sciences, Bishop Museum, 1525 Bernice St., Honolulu, HI 96817 USA; Email: bugman@bishopmuseum.org

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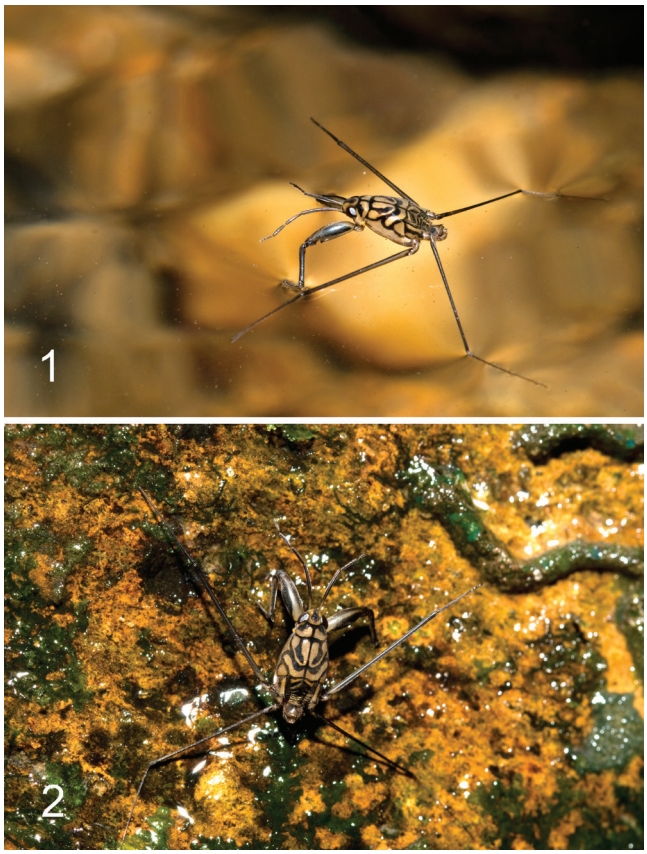


Figs. 1, 2. In situ photographs of *Metrocoris bilotatoides*, from Vietnam, Vinh Phuc Prov., Tam Dao (photographed by TAD).

MATERIAL & METHODS

Materials used in this study have been deposited in the following museums or collections:

BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii (USA).
DAPC	Dan A. Polhemus Collection, Englewood, Colorado (USA).
MHNW	Museum of Natural History, Vienna (Austria).
MTMB	Magyar Természettudományi Múzeum (Hungarian Natural History Museum), Budapest (Hungary).
USNM	United States National Museum of Natural History, Smithsonian Institution, Washington, DC (now including the former John T. Polhemus Collection) (USA).
ZMHU	Zoological Collection of Biological Museum, Hanoi University of Science (Vietnam).
ZRC	Zoological Reference Collection, Lee Kong Chian Natural History Museum, National University of Singapore (Singapore).

The external morphology of specimens was studied using binocular microscopes; male parameres and endosomal sclerites of the insects were examined using compound microscopes. Measurements were mainly made using stage micrometers attached to the eye-pieces of these microscopes, with 0.01 mm accuracy. Illustrations were made with the help of a Camera Lucida fixed to the microscopes. Most colour pictures were taken with an Auto Montage computerised imaging system linked to a Leica M165-C dissecting stereomicroscope, with post-processing using Photoshop software; in-situ colour pictures were taken with a DSLR camera. In order to save text space, the following abbreviations are applied in the **Material examined** section for each species: apt = apterous, asl = above sea level, mpt = macropterous, Prov. = Province, N'Park = National Park.

Metrocoris species, and insects in general, exhibit various kinds of hairs on the body surface. To avoid confusion, the following terminology is used in this paper: 1) setae (plural of seta) refers to stiff or bristle-like hairs; 2) pubescence refers to soft, closely appressed, down hairs; and 3) hairs in general refers to soft, simple, unmodified hairs.

All measurements are given in millimetres. The length of the body in the apterous form, is measured from the apex of the head to the tip of the proctiger (or tip of the connexival processes if these connexival processes exceed tip of proctiger); in the macropterous form, it is measured from the apex of the head to the tips of the wings, if the tips of the wings exceed the tip of the proctiger (unless otherwise specified, i.e., in de-alated macropterous specimens the measurement is from the apex of the head to the tip of the proctiger). The length of the wing (fore wing) is measured from its outer base at the posterior margin of the humeral angle of the pronotum to the apex of the wing. The width of the body is measured across the broadest part of the body, usually across the pair of metacetabula. Head width is measured at the widest part across the eyes. Interocular width is the smallest distance between the two compound eyes on the dorsal surface of the head. Eye size is measured in dorsal view, from the anterior to the posterior margin of eye. Lengths of body segments (thoracic or abdominal segments: e.g., pronotum, mesonotum, mesosternum, etc.) are measured along the longitudinal mid-line of each segment; pregenital length in males is measured along the longitudinal mid-line of sterna 2–7. If no range of variation is given, measurements refer to a single, randomly selected specimen, unless otherwise stated.

For locality data used for GIS analysis, the majority of localities have latitude and longitude coordinates obtained using hand-held Garmin GIS units; certain localities for which the data were not available have been retroactively geo-referenced as degrees/minutes/seconds coordinates in WGS 84 datum using Web-based geospatial browsers such as Google Earth, and the data are included in the locality records in order to facilitate future relocation of these collecting sites. Where the geo-reference data could not be precisely constrained, due to tree cover or other interference, the notation "vic. " is provided preceding the coordinates, indicating the locality lies in the vicinity of the site given, but not necessarily at the exact spot indicated. The maps of species distribution records were produced using ArcMap 10.2.2 GIS software.

TAXONOMY

Metrocoris Mayr, 1865

Metrocoris Mayr, 1865: 445 (type species: *Metrocoris brevis* Mayr, 1865, currently *Metrocoris stali* (Dohrn, 1860), by monotypy); Esaki, 1926: 122–130; den Boer, 1965: 1–38 (revision); Polhemus, 1990: 1–28 (regional revision: Malay Archipelago & Philippines); Chen & Nieser, 1993: 1–43, 45–82 (revision); Chen, 1994: 124–134 (regional revision: China).

Halobatodes White, 1883: 23, 58 (type species: *Halobatodes histrio* White, 1883, by monotypy); (synonymised by Meinert, 1888: 140).

Gerastratus Distant, 1910: 148 (type species: *Gerastratus foveatus* Distant, 1910, by monotypy); (synonymised by Esaki, 1929: 417–418).

Euodos Distant, 1910: 150 (type species: *Euodos communis* Distant, 1910, by monotypy); (synonymised by Esaki, 1929: 418–419).

Metrocoropsis Paiva, 1919: 365 (type species: *Metrocoropsis femorata* Paiva, 1919, by monotypy); (synonymised by Esaki, 1926: 122).

Remarks. The genus *Metrocoris* Mayr is recognised by the following characteristics (after Chen & Nieser, 1993): They are medium sized gerrids (length of males 4.3–8.3, females 3.8–8.3), with body usually not dorso-ventrally depressed, having both apterous and macropterous forms. Dorsum of body is usually yellowish with distinct dark markings; venter of body is usually pale (with the exception of some species in the *M. compar* species group). Eyes are large, but not reaching antero-lateral corners of mesonotum. Fore tarsal segment 1 is much shorter than segment 2. Fore femur of the male is usually incrassate and modified ventrally; fore femur of the female is more slender than that of the male, usually not modified. Male genitalia are usually prominent, with abdominal segment 8 large, pygophore boat-shaped, and parameres well-developed. Endosomal sclerites are variable but characteristic for each species. Sternum 7 of the female is large, usually modified posteriorly, and characteristic for different species groups.

Chen & Nieser (1993: 6) indicated that Kemp (1925) synonymised *Metrocoropsis* Paiva with *Metrocoris* Mayr. However, this is not accurate. Kemp (1925: 93–94) only expressed concerns about the resemblances of *Metrocoropsis femorata* Paiva, 1919 to *Metrocoris nigrofasciatus* Distant, 1903, but did not formally synonymise *Metrocoropsis* Paiva with *Metrocoris* Mayr. The first person who included *Metrocoropsis* Paiva into the synonymy list for *Metrocoris* Mayr was actually Esaki (1926) (see Esaki, 1926: 122).

KEY TO SPECIES OF *METROCORIS* OCCURING IN VIETNAM

1. Sternum 7 shorter than and not covering genital segments ventrally. Abdominal segment 8 cylindrical, not divided along the midline on the ventral side. ..... 2 (males)
– Sternum 7 large and broad, usually covering all abdominal segment 8 ventrally. Abdominal semment 8 divided along the midline on the ventral side (Fig. 90). ..... 17 (females)

Key to males of *Metrocoris*

2. Fore femur incrassate, ventrally with at least one sub-apical tooth. 3
– Fore femur slender, without sub-apical tooth or only with small sub-apical tooth-like elevation. 10
3. Ventral margin of fore femur sinuate on distal half, appearing bi-concave (Fig. 71); paramere sharply bent on distal one-third, with broadly rounded tumescence subapically on outer margin (Figs. 36, 72). ..... *M. obscurus*
– Ventral margin of fore femur with at most a single subapical constriction, not sinuate or biconcave as above; male paramere more evenly curving throughout its length, not sharply bent on distal one-third, without a subapical tumescence on outer margin. 4
4. Fore femur with a median tooth and two sub-apical teeth (Figs. 44, 45). ..... *M. stranguloides*
– Fore femur without a median tooth. 5
5. Fore femur with a sub-apical indentation, sub-apical edge of indentation marked with a large single tooth (Figs. 47, 48, 52, 53, 56, 57, 77). 6
– Fore femur more or less constricted sub-apically, but without distinct indentation, apically with a bifid or bipartite sub-apical tooth. 9
6. Sub-apical indentation with a distinct small tooth on proximal edge (Figs. 47, 48, 52, 53, 77). Shaft of paramere not expanded on distal half. 7
– Sub-apical indentation without distinct tooth on proximal edge (Figs. 56, 57). Shaft of paramere expanded on distal half (Figs. 34, 61). ..... *M. johnpolhemi*, new species
7. Paramere with apex blunt, expanded to form a small head (Fig. 38). ..... *M. nigrofascioides*
– Paramere with apex pointed or narrowly rounded, not expanded to form a small head. 8
8. Paramere strongly curved on distal half, apically strongly narrowed (Fig. 54). ..... *M. vietnamensis*
– Paramere curved on distal two-thirds, gradually tapering apically (Fig. 33). ..... *M. bilobatoides*
9. Slightly smaller species (male length 4.6–6.3 mm). Pygophore sub-ovate, with apical margin rounded. Paramere as in Fig. 37. ..... *M. acutus*
– Larger species (male length 6.3–7.0 mm). Pygophore prolonged, with apical margin straight. Paramere as in Figs. 35, 69. ..... *M. quynhi*
10. Thorax (nota and pleura) with numerous black setae. 11
– Thorax without black setae. 15
11. Larger species (length 5.4–6.3 mm), body broad, roughly triangular. 12
– Smaller species (length 4.7–5.4 mm), body sub-ovate. 13
12. Fore femur constricted sub-apically, with a small tooth-like elevation (Fig. 95). Paramere long, curved dorsad on distal one-third, proximal part narrower than distal part, apex broadly rounded (Figs. 39, 96). ..... *M. sicilis*, new species
– Fore femur simple, without sub-apical elevation. Paramere short, curved dorsad on distal half, proximal part broader than distal part, apex narrowly rounded (Figs. 40, 87). ..... *M. triangulatus*
13. Abdominal segment 8 with a median notch on postero-dorsal margin. Paramere larger and gradually thicker distally (Figs. 91–93). ..... *M. inthanon*
– Abdominal segment 8 without median notch on posterior margin. Paramere smaller, sickle-shaped, tapering evenly along its length to a slender apex (Figs. 41, 81, 82). ..... *M. ciliatus*

14. Ventral surface of fore femur not notched in the middle, usually with a small sub-apical tooth-like elevation (Fig. 123). Paramere with a sub-apical indentation, apex slightly expanded (Figs. 124, 125, 127, 128, 131–136). Middle and hind legs often extremely long, length of middle femur usually equal to or exceeding 10 mm. ..... *M. tenuicornis*
– Ventral surface of fore femur with a notch in the middle; without sub-apical elevation (Figs. 100, 108, 117). Paramere without sub-apical indentation. Middle and hind legs usually shorter, length of middle femur less than 8 mm. 15
15. Male genital segment long bearing dark hairs; colour marks on dorsum dark and distinct, ventral body surface broadly dark (or at least broadly embrowned) throughout its length. 16
– Male genital segment lacking long dark hairs; dorsal markings less distinct; ventral body surface mostly pale. .... *M. sapa*, new species
16. Paramere curved dorsad on distal half, apex broadened and rounded, curved outwards and posteriorly (Figs. 110–112) .... *M. monticola*, new species
– Paramere hook-shaped, curved up on distal one-third, apex projecting outward and anteriorly (Figs. 101–103)..... ..... *M. nigriventris*, new species

Key to females of *Metrocoris*

(Note: Females can be identified with higher certainty if associated males available)

17. Hind margin of sternum 7 simple, not modified (Figs. 85, 90, 99, 130)..... 18
– Hind margin of sternum 7 modified (with 1–2 distal lobes or with a notch)..... 22
18. Dorsum and lateral side of thorax covered with black setae. Dark markings on dorsum of body extensive. ..... *M. inthanon*
– Thorax without black setae. Dark markings on dorsum less extensive. 19
19. Body of triangular appearance, ratio of body length/maximum width ca. 1.5–1.6/1.0. 20
– Body more ovate, ratio of body length/maximum width ca. 1.7–1.9/1.0. 21
20. Fore femur sub-apically constricted, ventral surface with sub-apical elevation..... *M. sicilis*, new species
– Ventral surface of fore femur without sub-apical elevation. ... . *M. triangulatus*
21. Antennal segment 2 shorter than segment 3. ... *M. tenuicornis*
– Antennal segment 2 longer than segment 3. ..... *M. ciliatus*
22. Median lobe of sternum 7 bearing 4 lobes on posterior margin, with two large lateral lobes flanking a medially incised bilobate process (Fig. 70)..... *M. quynhi*
– Sternum 7 not as above, with a most 2 lobes flanking a medial incision..... 23
23. Posterior part of sternum 7 modified into a single lobe (Figs. 46, 76, 79, 107, 116, 122). 24
– Posterior part of sternum 7 modified into two lobes (Figs. 51, 55, 65, 73). 29
24. Hind coxa and trochanter elongated. 25
– Hind coxa and trochanter not modified as above. 27
25. Venter mostly pale. Hind coxa and trochanter covered with long hairs (Fig. 121) ..... *M. sapa,* new species
– Venter with dark marks. Hind coxa and trochanter without distinct long hairs. 26
26. Hind trochanter produced apically into a small process (Fig. 106). Apex of abdomen barely surpassing apex of hind coxa. Distal lobe of sternum 7 with almost straight posterior margin (Fig. 107). ..... *M. nigriventris*, new species
– Hind trochanter not produced apically (Fig. 115). Apex of abdomen clearly surpassing apex of hind coxa, but not surpassing apex of hind trochanter. Distal lobe of sternum 7 with round posterior margin (Fig. 116). ..... *M. monticola*, new species
27. Distal lobe of sternum 7 broad, with long dark hairs on lateral margin (Fig. 46). ..... *M. stranguloides*
– Distal lobe of sternum 7 narrow, without long dark hairs. 28
28. Sternum 7 with a median lobe of sub-rectangular shape directed apically. Pilosity on hind trochanter long and dense (Fig. 79). ..... *M. nigrofascoides*
– Sternum 7 with a tongue-like median lobe produced apically with rounded apex. Pilosity on hind trochanter short (Fig. 76). ..... *M. acutus*
29. Lobes of sternum 7 small and finger-like, separated by a wide, shallow, transverse notch (Fig. 73)..... *M. obscurus*
– Lobes of sternum 7 large and angular, separated by a deep, longitudinal incision. 30
30. Sternum 7 with notch between the distal lobes narrow and angular (Fig. 51)..... *M. bilobatoides*
– Sternum 7 with notch between the distal lobes wider..... 31
31. Notch between two distal lobes with rounded margin (Fig. 55). ..... *M. vietnamensis*
– Notch between two distal lobes with angular margin (Fig. 65). ..... *M. johnpolhemi*, new species

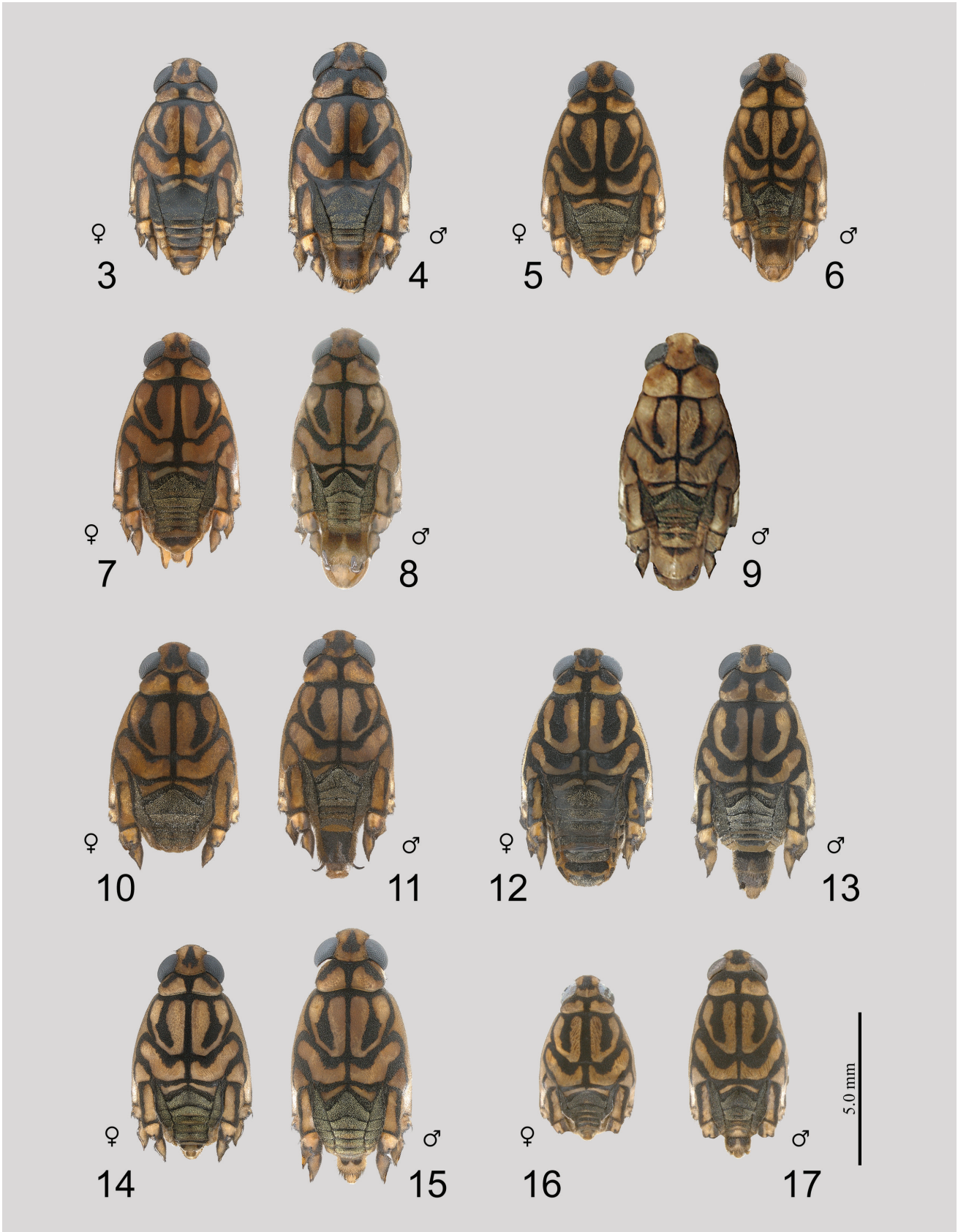
***Metrocoris strangulator* species group**

***Metrocoris stranguloides* Chen & Nieser, 1993**

(Figs. 3, 4, 32, 44–46)

Metrocoris stranguloides Chen & Nieser, 1993: 16–18, Figs, 29, 38, 44–45 (type locality: Hainan Island, China); Zettel & Chen, 1996: 152, 176 (faunistic notes).

Material examined. VIETNAM: **Quang Binh Prov.:** 1 female (apt), 1 male (mpt), Phong Nha, upstream of Thac Xoi waterfall, coll. Tran A.D., 15 July 2004, DY0407 (ZRC). **Da Nang Prov.:** 6 males, 3 females (apt), 1 male, 3 females (mpt), Ba Na - Nui Chua, Suoi Cat Lon, 700 m asl, coll. Tran A.D. & Tan H.H., 28 February 2005, THH05-19 (ZRC); 1 male, 1 female (apt), Ba Na - Nui Chua, rocky cascade along road to summit, coll. Tran A.D. & Tan H.H., 28 February 2005, THH05-20 (ZRC); 1 male, 1 female (mpt), Ba Na-Nui Chua, Suoi Nai - Thac Cau Vong, coll. Tran A.D. & Tan H.H., 01 March 2005, THH05-23 (ZRC); 2 males, 1 female (apt), 3 males (mpt), Ba Na - Nui Chua foothills, Suoi Lanh, coll. Tran A.D. & Tan H.H., 01 March 2005, THH05-25 (ZMHU). **Quang Ngai Prov.:** 18 males, 27 females (apt), 4 males, 1 female (mpt), rocky stream crossing road on E. side of Via Lac Pass, 109 km NE. of Kontum on Hwy. 24, 305 m asl, 14°46′27″N, 108°32′18″E, water temp. 26.5°C, 17 March 2001, CL 4297, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Kon Tum Prov.:** 2 males, 5 females (apt.), stream 77 km NE. of Kontum on Hwy. 24, 1195 m asl, 14°38′23″N, 108°23′38″E, water temp. 19°C, 6 March 2001, CL 4283, coll. J.T. Polhemus and P. Nguyen (USNM); 3 males, 6 females (apt), 3 females (mpt), small stream 97 km NE. of Kontum on Hwy. 24, 1065 m asl, 14°42′28″N, 108°27′46″E, water temp. 21°C, 20 March 2001, CL 4303, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 4 males, 12 females (apt),1 male, 2 females (mpt), stream 96 km NE. of Kontum on Hwy. 24, 1020 m asl, 14°41′58″N, 108°27′33″E, water temp.



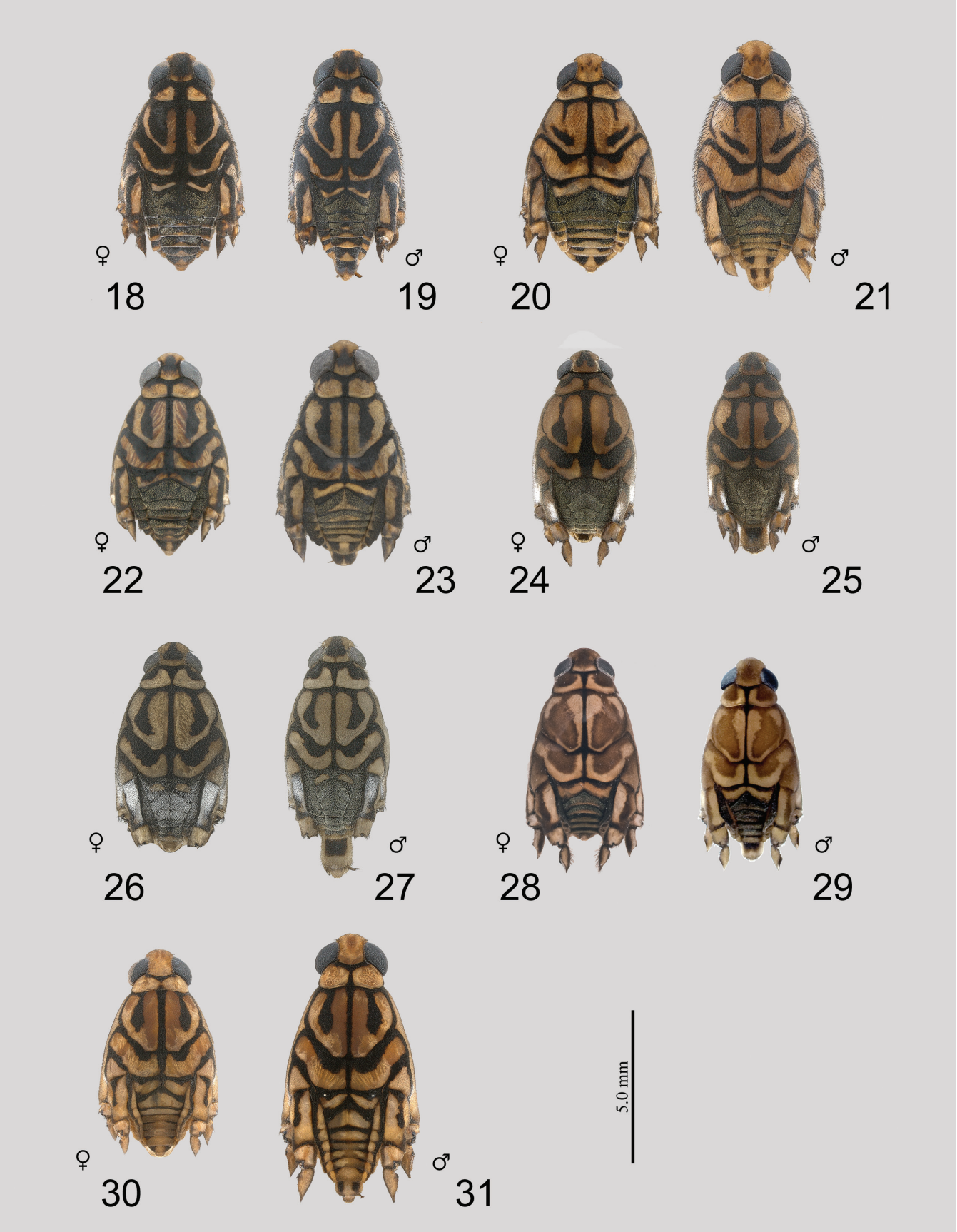
Figs. 3–17. Dorsal colour patterns of *Metrocoris* species, all apterous morph. 3, 4: *M. stranguloides*, specimens from Vietnam, Gia Lai Prov., 60 km N. of An Khe (CL 4309). 5, 6: *M. bilobatoides*, specimens from Vietnam, Lao Cai Prov., 12 km NW. of Sa Pa (CL 4404). 7, 8: *M. johnpolhemi*, new species, specimens from Vietnam, Lai Chau Prov.; male from 12 km N. of Lai Chau (CL 4410), female from Nam Ceung stream (CL 4409). 9: *M. vietnamensis*, paratype, from Vietnam, Da Nang Prov., Ba Na - Nui Chua (TAD0334) (9 reproduced and modified from Tran & Zettel, 2005). 10, 11: *M. quynhi*, specimens from Vietnam, Lao Cai Prov., 18 km NW. of Sa Pa (CL 4400). 12, 13: *M. obscurus*, specimens from Vietnam, Lao Cai Prov., 4 km NE. of Sa Pa (CL 4407). 14, 15: *M. acutus*, specimens from Vietnam, Hai Hung Prov., 22 km N. of Chi Linh (CL 4375). 16, 17: *M. nigrofascioides*, specimens from Vietnam, Binh Dinh Prov., An Khe Pass (CL 4291).

22°C, 20 March 2001, CL 4304, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Gia Lai Prov.:** 12 males, 11 females (apt), 2 males, 3 females (mpt), 40 km NW. An Khe, Buon Luoi, 14°10′N, 108°30′E, 620–750 m asl, coll. Pacholátko & Dembicky, 28 March–12 April 1995 (NHMW, 5 males, 5 females in ZRC); 12 males, 16 females (apt), 1 female (mpt), Tral Stream, 60 km N. of An Khe, 700 m asl, 14°20′28″N, 108°34′49″E, water temp. 23.5°C, 22 March 2001, CL 4309, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 4 males, 7 females (apt), 1 male, 1 female (mpt), small hill stream in primary forest, 68 km N. of An Khe, 840 m asl, 14°20′52″N, 108°32′57″E, water temp. 21°C, 22 March 2001, CL 4311, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 1 female, 1 male (apt), Nuoc Stream, 47 km N. of An Khe, 580 m asl, 14°14′17″N, 108°36′17″E, water temp. 24°C, 23 March 2001, CL 4312, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Binh Dinh Prov.:** 9 males, 4 females (apt), stream in boulders on E. side of An Khe Pass, 16 km E. of An Khe on Hwy. 19, 365 m asl, 13°57′43″N, 108°45′48″E, water temp. 19.5°C, 21 March 2001, CL 4307, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Phu Yen Prov.:** 1 male, 5 females (apt), seeps and streamlets on S. side of Ca Pass, 33 km S. of Tuy Hoa on Hwy. 1, 105 m asl, 12°51′47″N, 109°23′53″E, water temp. 25°C, 25 March 2001, CL 4315, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Lam Dong Prov.:** 19 males, 10 females (apt), Suoi Vang, 18 km NW. of Da Lat, coll. Vásárhelyi, 17 October 1988, No.308 (MTMB, NHMW); 69 males, 115 females (apt), 7 males, 13 females (mpt), 12 km N Dalat-LangBian, coll. P. Pacholátko & L. Dembicky, 28–30 April 1994 (NHMW, ZRC); 5 males, 3 females (apt), 2 females (mpt), 12 km N Dalat-Langbian, 12°03′N 108°27′E, 1680–1750 m asl, coll. Pacholátko & Dembicky, 17–21 April 1995 (NHMW, 4 males, 4 females in ZRC); 1 male, 3 females (apt), 1 female (mpt), 16 km N Da Lat-Ankreot, 12°05′N, 108°24′E, 1400 m asl, coll. Pacholátko & Dembicky, 15 April 1995 (NHMW); 5 females (apt), Duc Me, 15 km S. of Bao Loc, 700 m asl, coll. Vásárhelyi, 23 October 1988, No.371 (MTMB); 1 male, 1 female (apt), Suoi Baco, 12 km S. of Bao Loc, 800 m asl, coll. Vásárhelyi, 25 October 1988, No.386 (MTMB); 1 male, 1 female (apt), 1 male, 4 females (mpt), Da Lat, a stream running into Dankia lake, coll. Tran A.D., 21 May 2003, TAD0330 (ZRC); 4 males, 3 females (apt), 1 female (mpt), Da Lat, Datanla waterfall, coll. Tran A.D., 22 May 2003, TAD0333a (ZRC); 3 males, 3 females (apt), 1 female (mpt), Dambri Waterfall, N. of Bao Lac, 850 m asl, 11°38′14″N, 107°44′54″E, water temp. 24°C, 7 May 1998, CL 3075, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 7 males, 12 females (apt), small steeply dropping stream at Mother Mary Shrine, along Hwy. 20 on S. side of Bao Lac Pass, 18 km W. of Bao Lac, 800 m asl, 11°27′09″N, 107°43′21″E, water temp. 24.5°C, 7 May 1998, CL 3076, coll. J.T. Polhemus & P. Nguyen (DAPC); 3 males, 3 females (apt), stream below Suoi Vàng hydro project (= Gold Stream), 16 km N. of Dalat, 1430 m asl, 11°59′26″N, 108°22′06″E, water temp. 24.5°C, 9 May 1998, CL 3078, coll. J.T. Polhemus & P. Nguyen (DAPC); 10 males, 9 females (apt), 1 female (mpt), small tribs. to stream below Suoi Vàng hydro project (= Gold Stream), 16 km N. of Dalat, 1430 m asl, 11°59′26″N, 108°22′06″E, water temp. 19.5°C, 9 May 1998, CL 3079, coll. J.T. Polhemus & P. Nguyen (DAPC); 1 male (apt), spring fed trib. to stream below Suoi Vàng hydro project (= Gold Stream), 16 km N. of Dalat, 1430 m asl, 11°59′26″N, 108°22′06″E, 9 May 1998, CL 3080, coll. J.T. Polhemus & P. Nguyen (DAPC); 6 males, 8 females (apt), 2 males, 1 female (mpt), Prenn Falls, 13 km S. of Dalat on Hwy. 20, 1160 m asl, 11°52′43″N, 108°28′19″E, water temp. 25.5°C, 10 May 1998, CL 3083, coll. J.T. Polhemus & P. Nguyen (DAPC); 3 males, 1 female (apt), 4 males, 5 females (mpt), small rocky stream at Lang Biang Mtn., 12 km N. of Dalat, 1465 m asl, 12°01′12″N, 108°25′27″E, water temp. 20°C, 11 May 1998, CL 3084, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 35 males, 27 females (apt), 3 males, 7 females (mpt), tributary stream to main river at Suoi Vang, 1430 m asl, 11°59′26″N, 108°22′06″E, water temp. 21°C, 11 and 18 May 1998, CL 3085, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 3 females (apt), 2 males (mpt), stream and cascade 6 km S. of Dalat on Hwy. 20, 1390 m asl, 11°54′10″N, 108°26′46″E, 20 May 1998, CL 3095, coll. J.T. Polhemus & P. Nguyen (DAPC); 15 males, 24 females (apt), 4 males, 5 females (mpt), stream in pine forest 13 km N. of Dalat on Suoi Vang road, 1495 m asl, 11°59′26″N, 108°23′19″E , water temp. 21.5°C, 28 March 2001, CL 4317, D.A. Polhemus, J.T. Polhemus and P. Nguyen (USNM, BPBM). **Ninh Thuan Prov.:** 1 male (apt), Nui Chua N'Park, suoi Lo O, coll. Quang N.V., 26 June 2004, NC-03 (ZRC); 19 males, 40 females (apt), 2 males (mpt), first small stream on E. side of Belleview Pass (Ngoan Muc Pass), 66 km NW. of Phan Rang, pools and cascades, 915 m asl, 11°50′25″N, 108°39′21″E, water temp. 24°C, 12 May 1998 and 26 March 2001, CL 3087, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (DAPC, USNM, BPBM); 3 males, 1 female (apt), 1 male (mpt), spring fed stream in granite at shrine on E. side of Belleview Pass (Ngoan Muc Pass), 58 km NW. of Phan Rang, 700 m asl, 11°50′41″N, 108°39′57″E, water temp. 724°C, 12 May 1998, CL 3089, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (DAPC).

CHINA: **Hainan Prov.:** 1 female (apt), Hainan (193), 30 km E. Maoyang, 600 m asl, Wuzhi Shan Resort, coll. Jäch, 17–18 January 1996 (NHMW); 1 female (mpt), Wuzhishan, hill stream near Fanxiang, before Shuiman, coll. I-S. Chen et al., 9 September 2005, THH05-67 (ZRC); 13 males, 7 females (apt), 1 female (mpt), Qiongzhong, Baihua waterfall, near Qiongzhong town, coll. I-S. Chen et al., 11 September 2005, THH05-73 (ZRC); 1 male (apt), Qiongzhong, Linmushan forest park, ca. 15 km into track from road, coll. I-S. Chen et al., 11 September 2005, THH05-77 (ZRC); 1 male, 4 females (apt), 1 female (mpt), Baisha, river along road near Yuanmen, to Wuzhishan, coll. I-S. Chen et al., 12 September 2005, THH05-82 (ZRC).

LAOS: **Luang Nam Tha Prov.:** 3 males, 1 female (apt), 2 females (mpt), 20 km SE. Muang Sing, 950 m asl, coll. Schillhammer (25), 12 June 1996 (NHMW).

Diagnosis. Male: fore femur strongly incrassate with two sub-apical teeth and a median tooth (Figs. 44, 45). Male



Figs. 18–31. Dorsal colour patterns of *Metrocoris* species. 18, 19: *M. inthanon*, specimens from Vietnam, Nghe An Prov., Pu Mat Nature Reserve (CL 4385). 20, 21: *M. sicilis*, new species, paratypes, from Vietnam, Hanoi, Ba Vi N'Park (CL 4393). 22, 23: *M. triangulatus*, specimens from Vietnam, Kontum Prov., 60 km NW. of Kontum (CL 4280). 24, 25: *M. nigriventris*, new species, paratypes, from Vietnam, Lai Chau Prov., 12 km N. of Lai Chau (CL 4410). 26, 27: *M. monticola*, new species, paratypes, from Vietnam, Lao Cai Prov., Sa Pa, Sin Chai (TAD1363). 28, 29: *M. sapa*, new species, paratypes, from Vietnam, Lao Cai Prov., Sa Pa, Nui Xe (TAD0416). 30, 31: *M. tenuicornis*, specimens from Vietnam, Gia Lai Prov., 60 km N. of An Khe (CL 4309).

genitalia large: pygophore sub-ovate (ventral view), slightly raised posteriorly (lateral view); proctiger elongate; paramere long and slender, curved at distal part, but not twisted (Fig. 32); endosoma as in Chen & Nieser (1993: Figs. 44, 45). Female: sternum 7 with broad median lobe, posterior margin of median lobe almost straight (Fig. 46).

Size: apterous males: length 5.5–6.5, width 2.81–3.23, macropterous males: length 7.2–8.3, width 2.71–3.14; apterous females: length 4.8–5.4, width 2.57–3.05, macropterous females: length 6.2–7.4, width 2.67–3.20.

Remarks. *Metrocoris stranguloides* is the only species of the *M. strangulator* group known from Vietnam. As defined by Chen & Nieser (1993), the following are characteristics of this group: strongly incrassate fore femur (males), with two sub-apical teeth and a median tooth; large male genitalia with prominent paramere; sternum 7 of female with broad medial lobe. This group contains five species: *M. stragulator* Breddin (from Java and Sumatra), *M. armatus* Chen & Nieser (from Thailand), *M. malayensis* Chen & Nieser (from Thailand and Peninsular Malaysia), *M. nieseri* Chen & Zettel (from Thailand), and *M. stranguloides* Chen & Nieser (initially described from Hainan Island and S. Vietnam). *Metrocoris stranguloides* can be easily distinguished from the other four species in this group by having a long and slender paramere, simply curved on the distal part but not twisted (Chen & Nieser, 1993). Females of this species are also rather different from those of the other four taxa in having a straight hind margin of the median lobe on sternum 7 (females of the other four species have a clearly notched posterior margin on sternum 7).

Distribution. Vietnam: Quang Binh (first record), Da Nang (first record), Ninh Thuan (first record), Gia Lai, Lam Dong, Kon Tum (first record), Quang Ngai (first record) (Fig. 138). Extralimital records: Hainan Island (China), Laos (first record).

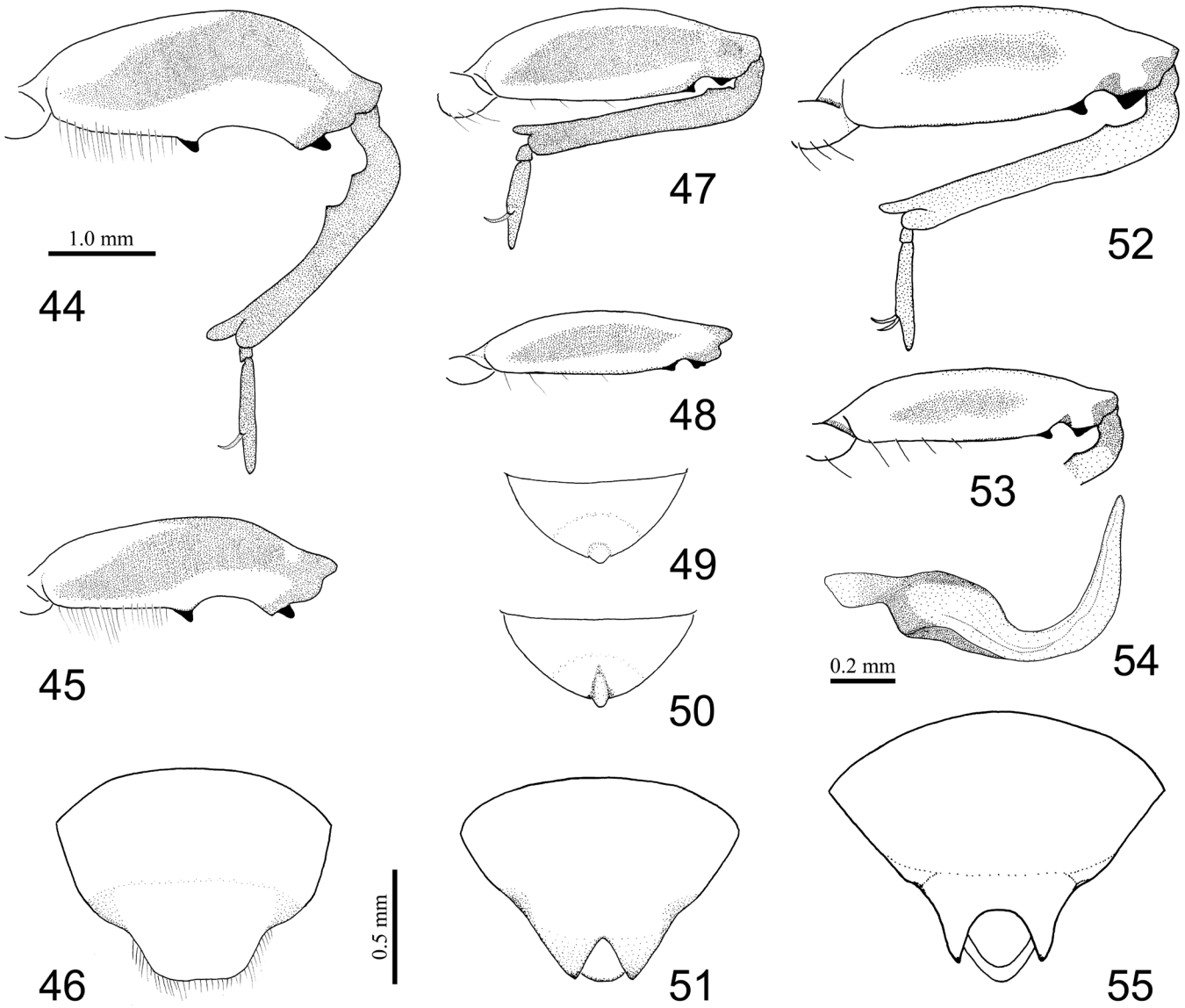
Metrocoris bilobatus species group

Metrocoris bilobatoides Chen & Nieser, 1993
(Figs. 1, 2, 5, 6, 33, 47–51)

Metrocoris bilobatoides Chen & Nieser, 1993: 20–21, Figs. 48, 52–53, 60–62 (type locality: Tam Dao, Vinh Phuc, Vietnam).

Material examined. VIETNAM: **Ha Giang Prov.:** 2 males, 1 female (apt), 1 male (mpt), Vi Xuyen, Xin Chai commune, Da stream by the road from Thanh Thuy to Lao Chai, coll. Tran A.D. et al., 09 May 2014, TAD1405 (ZMHU); 3 males, 1 female (mpt), Bac Quang, km 13 road 177, Tan Lap commune, waterfall & stream, ca. 86 km to Coc Pai town, coll. Tran A.D. et al., 10 May 2014, TAD1410 (ZMHU); 1 male (apt), 1 male, 1 female (mpt), Hoang Su Phi, Nam Ty commune, bridge at km 34 road 177, waterfall & stream, ca. 65 km to Coc Pai, coll. Tran A.D. et al., 10 May 2014, TAD1411 (ZMHU); 3 males, 3 females (apt), 4 males, 1 female (mpt), Xin Man, Nam Dan commune, Thac Tien - Deo Gio, stream 100 m below waterfall, coll. Tran A.D. et al., 11 May 2014, TAD1413 (ZMHU); 1 female (apt), Xin Man, Nam Dan commune, Thac Tien - Deo Gio, waterfall & stream, coll. Tran A.D. et al., 11 May 2014, TAD1414 (ZMHU). **Lao Cai Prov.:** 1 female (apt), Sa Pa, Nui Xe, small waterflow near the Forest Ranger Station, coll. Tran A.D., 2 June 2003, TAD0339 (ZRC); 1 male (mpt), Sa Pa, Hoang Lien N'Park, Sin Chai, coll. Tran A.D., 1 June 2003, TAD0337 (ZRC); 3 males, 2 females (apt), Sa Pa, Hoang Lien N'Park, Sin Chai, coll. Tran A.D., 3 July 2004, TAD0415 (ZRC); 4 males, 5 females (apt), Cat Cat, 1200 m asl, 5 km SW. of Sa Pa, 22°19.720′N 103°50.023′E, coll. L. Peregovits & T. Vásárhelyi, 12 March 1998, No.1 (MTMB); 22 males, 32 females (apt), 2 males, 3 females (mpt), rocky river and tributary 7 km NE. of Sa Pa on Lào Cai road, 1220 m asl, 22°22′19″N, 103°52′16″E, water temp. 17°C, 7 April 2000, 0830–1000 hrs., CL 4395, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 2 females (apt), rocky streamlet with cascades, 16 km NW. of Sa Pa on Lai Chau road, 1890 m asl, 22°21′28″N, 103°46′37″E, water temp. 17°C, 8 April 2000, 1315–1330 hrs., CL 4402, D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 26 males, 20 females (apt), 1 female (mpt), rocky stream 12 km NW. of Sa Pa on Lai Chau road, 1815 m asl, 22°22′22″N, 103°47′35″E, water temp. 18.5°C, 8 April 2000, 1530–1645 hrs., CL 4404, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 1 male (apt), cascading stream 20 km NE. of Sa Pa on Lào Cai road, 565 m asl, 22°26′20″N, 103°55′36″E, water temp. 19°C, 9 April 2000, 1215–1430 hrs., CL 4406, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 2 males, 1 female (apt), Sapa area, small stream crossing road from Quy Hô to Ta Giang Phinh, 9 May 1995, coll. D. Currie, B. Hubley & J. Swann, ROM 956023, hemock forest, second growth (USNM); 1 male (apt), Sa Pa, Cat Cat, Muong Hoa stream, coll. Dinh N.H. et al., 22 April 2011, DNH11.01 (ZMHU); 1 male, 1 female (apt), 1 male, 1 female (mpt), Sa Pa, Sin Chai, Muong Hoa stream, coll. Dinh N.H. et al., 22 April 2011, DNH11.03 (ZMHU); 1 male (apt), Sa Pa, Sin Chai, feeder stream of Muong Hoa stream, coll. Dinh N.H. et al., 22 April 2011, DNH11.04 (ZMHU); 1 male (apt), Sa Pa, O Quy Ho pass, stream and waterfall, ca. 9 km from Sa Pa town, coll. Dinh N.H. et al., 23 April 2011, DNH11.11 (ZMHU); 1 male, 1 female (mpt), Sa Pa, Ban Den, Ta Van, Muong Hoa stream, coll. Dinh N.H. et al., 24 April 2011, DNH11.13 (ZMHU); 1 male, 2 females (apt), Sa Pa, Ban Ho, Nam Pu stream 2, coll. Dinh N.H. et al., 22 October 2012, DNH12.02 (ZMHU); 1 male, 1 female (apt), Sa Pa, Seo Trung Ho stream, coll. Dinh N.H. et al., 22 October 2012, DNH12.05 (ZMHU); 1 male, 2 females (apt), Sa Pa, Thanh Phu, near junction of Nam Cang and Muong Hoa streams, coll. Dinh N.H. et al., 23 October 2012, DNH12.06 (ZMHU); 1 female (apt), Sa Pa, Nam Sai, Seo Nam Sai stream 1, coll. Dinh N.H. et al., 24 October 2012, DNH12.09 (ZMHU); 3 females (apt), Sa Pa, Ban Ho, Nam Pu stream (feeder stream of Muong Hoa stream), site 1, at lower section, coll. Tran A.D. et al., 26 October 2013, TAD1361 (ZMHU); 7 males, 7 females (apt), Sa Pa, Sin Chai, Sin Chai stream, site 1, coll. Tran A.D. et al., 27 October 2013, TAD1363 (ZMHU); 2 males, 4 females (apt), Sa Pa, Sin Chai, Sin Chai stream, site 2, feeder stream, coll. Tran A.D. et al., 27 October 2013, TAD1364 (ZMHU);

Figs. 32–43. Parameres of *Metrocoris* species. 32: *M. stranguloides*, specimen from Vietnam, Gia Lai Prov., 60 km N. of An Khe (CL 4309). 33: *M. bilobatoides*, specimen from Vietnam, Lao Cai Prov., 12 km NW. of Sa Pa (CL 4404). 34: *M. johnpolhemi*, new species, specimen from Vietnam, Lai Chau Prov., Nam Ceung stream (CL 4409). 35: *M. quynhi*, specimen from Vietnam, Lao Cai Prov., 18 km NW. of Sa Pa (CL 4400). 36: *M. obscurus*, specimen from Vietnam, Lao Cai Prov., 4 km NE. of Sa Pa (CL 4407). 37: *M. acutus*, specimen from Vietnam, Hai Hung Prov., 22 km N. of Chi Linh (CL 4375). 38: *M. nigrofascioides*, specimen from Vietnam, Binh Dinh Prov., An Khe Pass (CL 4291). 39: *M. sicilis*, new species, specimen from Vietnam, Hanoi, Ba Vi N'Park (CL 4393). 40: *M. triangulatus*, specimen from Vietnam, Gia Lai Prov., N. of Tram Lap (ROM-961066). 41: *M. ciliatus*, paratype, from Vietnam, Lai Chau Prov., Muong Te (TAD1329). 42: *M. nigriventris*, new species, paratype, from Vietnam, Lao Cai Prov., 20 km NE. of Sa Pa (CL 4406). 43: *M. monticola*, new species, paratype, from Vietnam, Lao Cai Prov., Sa Pa, Sin Chai (TAD1363).



Figs. 44–55. Morphological features of *Metrocoris* species. 44–46: *M. stranguloides*. 44, 45: right fore legs of male. 46: sternum 7 of female, ventral view. 47–51: *M. bilobatoides*. 47, 48: right fore leg of male, same scale. 49, 50: tergum 7 of female, dorsal view (49: specimen from Tam Dao; 50: specimen from Lao Cai). 51: sternum 7 of female, ventral view. 52–55: *M. vietnamensis* (52–55 reproduced and modified from Tran & Zettel, 2005). 52, 53: right fore legs of male. 54: left paramere. 55: sternum 7 of female, in situ (44, 45, 47, 48, 52, 53 same scale; 46, 49–51, 55 same scale).

1 female (apt), 1 male (mpt), Sa Pa, Sin Chai, Muong Hoa stream (Cát stream), coll. Tran A.D. et al., 27 October 2013, TAD1365 (ZMHU); 2 females (apt), Sa Pa, Cat Cat, Ho stream (feeder stream of Muong Hoa stream), coll. Tran A.D. et al., 27 October 2013, TAD1366 (ZMHU); 2 males, 4 females (apt), Sa Pa, Cat Cat, Muong Hoa stream (Cát stream), coll. Ngo Q.H. et al., 27 October 2013, TAD1367 (ZMHU); 2 males (apt), 1 female (mpt), Sa Pa, Trung Chai, km119 Nat. Road #4D, coll. Ngo Q.H. et al., 28 October 2013, TAD1370 (ZMHU). **Vinh Phuc Prov.:** 5 males, 2 females (apt), Tam Dao, 1200 m asl, coll. Vásárhelyi, 14 October 1986, No. 50 (MTMB, NHMW); 2 males (mpt), Vinh Phu, Tam Dao, 1200 m asl, coll. M. Josifov, 8 April 1978 (NHMW); 1 male (apt), Tam Dao, forest stream, 1000–1100 m asl, coll. Papácek, 17 May 1995 (NHMW); 12 males, 10 females (apt), 13 males, 10 females (mpt), Vinh Phu, Tam Dao, coll. L. Dembicky, 9–18 May 1996 (NHMW); 1 female (apt), 2 females (mpt), 21°27′N 105°39′E, 70 km NW. Hanoi, Tam Dao, 900–1200 m asl, coll. Pacholátko & Dembicky, 9–19 May 1996 (NHMW); 2 males, 1 female (apt), Tam Dao, 1200 m asl, coll. Vásárhelyi, 12 October 1986, No.26 (MTMB); 3 males (apt), Tam Dao, 1200 m asl, on light, coll. Vásárhelyi, 13 October 1986, No.37 (MTMB); 7 males, 11 females (apt), 3 males (mpt), Tam Dao N'Park, Suoi Mo (upstream of Thac Bac waterfall), coll. Tran A.D., 16 June 2003, TAD0350 (ZRC); 8 males, 7 females (apt), 2 females (mpt), Tam Dao N'Park, Thac Bac stream (near Doi Che), coll. Tran A.D., 17 June 2003, TAD0351 (ZRC); 7 males, 6 females (apt), 3 males, 4 females (mpt), Tam Dao N'Park, Suoi Bua Lon (Bua Lon stream), coll. Tran A.D., 19 June 2003, TAD0356 (ZRC); 2 males, 3 females (apt), 1 male (mpt), stream at Tam Dao, NW. of Hanoi, 940 m asl, vic. 21°27′53″N, 105°38′45″E,water temp. 17°C, 18 March 2000, CL 4359, coll. J.T. Polhemus & P. Nguyen (USNM); 1 male, 1 female (apt), waterfall below Tam Dao, NW. of Hanoi, 870 m asl, 21°27′11″N, 105°38′35″E, water

temp. 17°C, 18 March 2000, CL 4360, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM). **Ninh Binh Prov.:** 1 male, 1 female (apt), Cuc Phuong, 400 m asl, coll. Vásárhelyi, 17 October 1986, No.68 (MTMB).

Diagnosis. Male: fore femur moderately incrassate (variations existed, ratio length/width about 3.60–4.75), indentation on ventral surface with small tooth on proximal edge, and a stout sub-apical tooth (in more slender fore femur, indentation usually smaller, Figs. 47, 48). Male genitalia large: segment 8, pygophore and proctiger elongate; paramere prominent, falciform with pointed apex (Fig. 33), endosoma as in Chen & Nieser (1993: Fig. 62). Female: tergum 7 sub-triangular, sometimes apex medially produced (Figs. 49, 50); sternum 7 large, posterior part constricted and produced two separate lobes, sometimes curved dorsad, completely enclosing genitalia, the notch between two lobes narrow, angular (Fig. 51).

Size: apterous males: length 5.3–5.8, width 2.38–2.81, macropterous males: length 6.6–7.6, width 2.29–2.64 (mpt); apterous females: length 4.8–5.6, width 2.57–2.87, macropterous females: length 6.3–6.8, width 2.62–2.77.

Remarks. The specimens from Lao Cai Prov. present some structural variations in regard to tergum 7 of the female. In the female specimens from this locality, tergum 7 has its apex distinctly produced (Fig. 50), while female specimens from the type locality have the apex only slightly produced (Fig. 49). Other characters (endosoma, fore leg, parameres of the male, sternum 7 of the female) indicate that these populations are conspecific, with the variations in tergum 7 representing intra-specific variation. For further notes, see Remarks for *M. johnpolhemi*, new species.

Distribution. Vietnam: Lao Cai, Ha Giang (first record), Vinh Phuc, Ninh Binh (Fig. 138).

Metrocoris vietnamensis Tran & Zettel, 2005
(Figs. 9, 52–55)

Metrocoris vietnamensis Tran & Zettel, 2005: 42–45, Figs. 1–9, 24, 26, 27 (type locality: Ba Na - Nui Chua, Da Nang, Vietnam).

Material examined. Holotype and **paratypes**: see Tran & Zettel (2005).

Others: VIETNAM: **Da Nang Prov.:** 1 male, 1 female (apt), Ba Na - Nui Chua, Suoi Nai - Thac Cau Vong, coll. Tran A.D. & Tan H.H., 01 March 2005, THH05-23 (ZRC); 3 males, 5 females (apt), Ba Na - Nui Chua, Suoi Vong Nguyet, coll. Tran A.D. & Tan H.H., 01 March 2005, THH05-24 (ZRC).

Diagnosis. Male: fore femur variably incrassate (ratio length/width: 3.03–4.36), ventral surface of fore femur in distal one-fourth with black indentation which proximally marked by distinct tooth, and with single stout sub-apical tooth; inner surface of fore tibia subbasally with tooth-like elevation (indistinct in males with small fore leg) (Figs. 52, 53). Male genitalia: pygophore not raised posteriorly, caudal margin broadly rounded, caudal face with paired, shallow impressions, dorso-lateral process curved and apically blunt (see Tran & Zettel, 2005: Figs. 4, 5); proctiger elongate (see Tran & Zettel, 2005: Fig. 5); paramere prominent, falciform, strongly curved and apically strongly narrowed (Fig. 54); endosoma: dorsal sclerite long and recurved proximally, apical accessory sclerite distinct, lateral sclerite very large, slightly curved, ventral sclerite short, thin accessory lateral sclerite present (see Tran & Zettel, 2005: Figs. 7, 8). Sternum 7 of female (Fig. 55): large, slightly longer than preceding abdominal sterna together, posterior one-third constricted, bifid forming two widely separated lobes, slightly slanting but not curved dorsad; notch between lobes as wide as each lobe; apices of lobes pointed, reaching apex of abdomen in ventral view.

Size: apterous males: length 6.0–6.8 (holotype 6.7), width 2.67–3.06 (holotype 2.96), macropterous males: length 6.2, width 2.73; apterous females: length 5.1–5.5 (allotype 5.4), width 2.81–3.10 (allotype 3.01).

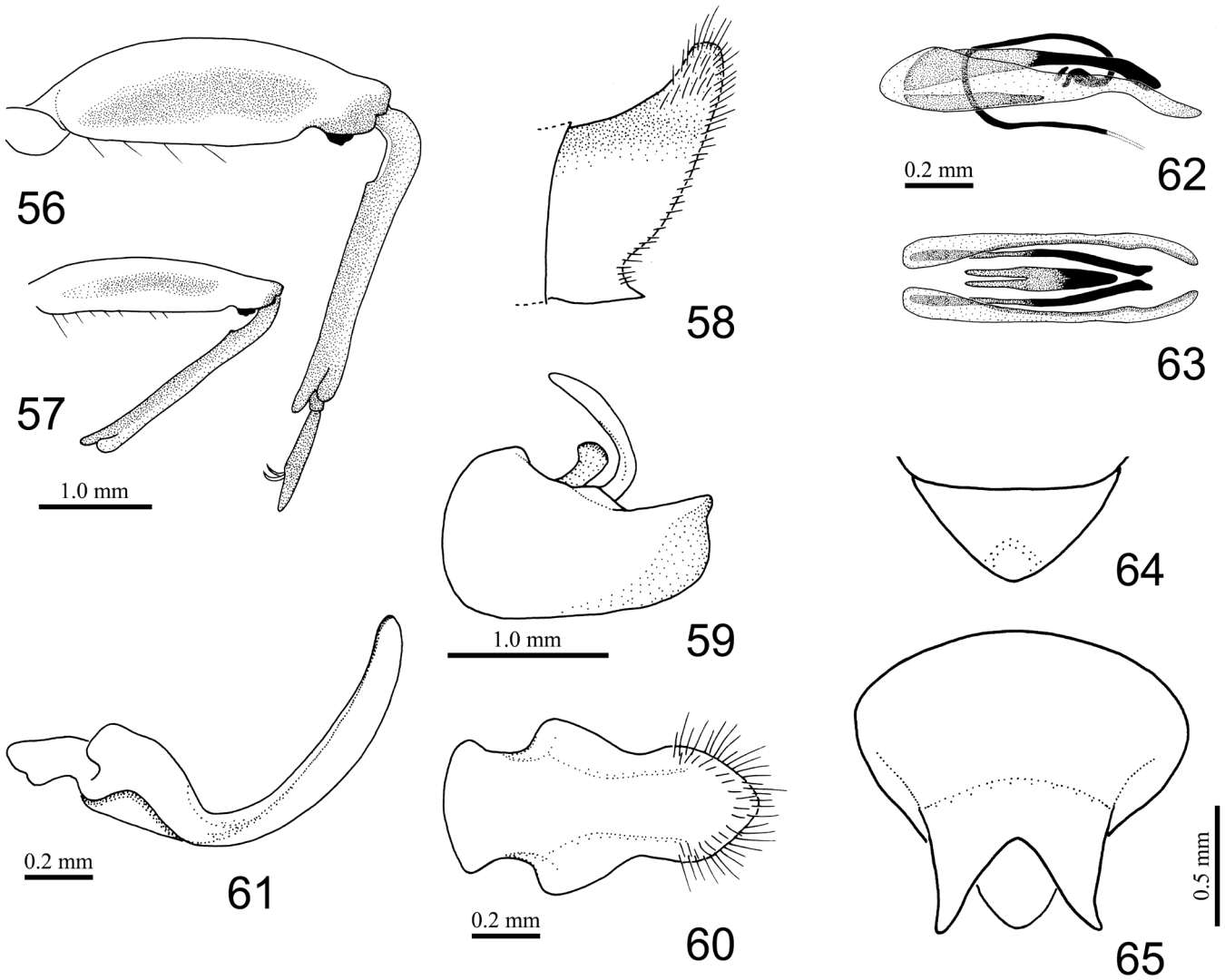
Remarks. *Metrocoris vietnamensis* belongs to the *Metrocoris bilobatus* species group (sensu Chen & Nieser, 1993), and is the second species of this group found in Vietnam, the first being *M. bilobatoides* (see Chen & Nieser, 1993). A detailed comparison of *Metrocoris vietnamensis* with its congeners in the *M. bilobatus* group has already been provided by Tran & Zettel (2005: 44–45). For further comparisons with other members of *M. bilobatus* group which occur in Vietnam, see subsequent Remarks under *M. johnpolhemi*, new species.

Distribution. Vietnam: Da Nang (Fig. 138).

Metrocoris johnpolhemi, new species
(Figs. 7, 8, 34, 56–65)

Material examined. Holotype (apterous male) & allotype (apterous female): VIETNAM: Hanoi, Ba Vi N'Park, stream near Coste 400, ca. 550 m asl, coll. Ngo Q.H. & Tran A.D., 27 April 2012, TAD1210 (ZMHU).

Paratypes: VIETNAM: **Hanoi:** 11 males, 7 females (apt), 2 males, 2 females (mpt), same locality data as holotype (ZMHU, ZRC, NHMW); 3 males, 6 females (apt), Ba Vi N'Park, stream near Coste 400, ca. 550 m asl, coll. Ngo Q.H. et al., 16 December 2011, TAD1120 (ZMHU); 1 female (apt), Ba Vi N'Park, Minh Quang, stream near by Tan Vien Pagoda, 340 m asl, coll. Ngo Q.H. et al., 17 December 2011, TAD1125 (ZMHU); 1 female (apt), Ba Vi N'Park, nr. Son Tay, W. of Hanoi, first small stream on lower road, 575 m asl, 21°03′32″N, 105°21′12″E, water temp. 18°C, 4 April 2000, CL 4391, coll. J.T. Polhemus & P. Nguyen (USNM). **Phu Tho Prov.:** 1 male (mpt), Xuan Son N'Park, Lap stream, site 1, at Ngoc waterfall, coll. Tran A.D. et al., 5 June 2013, TAD1331 (ZMHU); 1 male (apt), 1 male (mpt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 1, at Chin Tang waterfall, coll. Tran A.D. et al., 6 June 2013, TAD1334 (ZMHU); 1 male, 1 female (apt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 1, at Chin Tang waterfall, coll. Nguyen T.S. et al., 26 August



Figs. 56–65. Morphological features of *Metrocoris johnpolhemi*, new species. 56, 57: right fore legs of male. 58: abdominal segment 8 of male, in situ, lateral view. 59: pygophore, lateral view. 60: proctiger of male. 61: left paramere. 62, 63: endosomal sclerites, lateral and dorsal views. 64: tergum 7 of female, dorsal view. 65: sternum 7 of female, ventral view (56, 57 same scale; 58, 59 same scale; 64, 65 same scale).

2014, TS1401 (ZMHU); 1 male, 2 females (mpt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 1, at Chin Tang waterfall, coll. Nguyen T.S. et al., 22 May 2015, TS1503 (ZMHU); 2 males, 2 females (mpt), Xuan Son N'Park, Lap stream, site 1, at Ngoc waterfall, coll. Tran A.D. et al., 23 May 2015, TS1511 (ZMHU). **Lai Chau Prov.:** 2 females (apt), 2 males, 4 females (mpt), Nam Ceung stream, trib. to Nam Na River, 15.5 km N. of Lai Chau, 200 m asl, 22°08′52″N, 103°11′33″E, water temp. 21.5°C, 11 April 2000, 10:00–13:00 hrs., CL 4409, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 1 male, 2 females (apt), 3 females (mpt), cascading stream 12 km N. of Lai Chau, 290 m asl, 22°07′19″N, 103°11′30″E, water temp. 22°C, 11 April 2000, 13:45–16:00 hrs., CL 4410, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 1 male, 1 female (mpt), Tam Duong, Ho Thau, stream at Su Thang brigde, km 9 Nat. Road #4D, coll. Tran A.D. et al., 31 May 2013, TAD1324 (ZMHU).

Diagnosis. Male: fore femur variably incrassate (ratio length/width: 3.32–4.25, holotype: 3.32), ventral surface of fore femur in distal one-fourth with indentation and with single large sub-apical tooth; inner surface of fore tibia subbasally with tooth-like elevation (Figs. 56, 57). Male genitalia large: pygophore not raised posteriorly, caudal margin broadly rounded, dorso-lateral process curved and apically blunt (Fig. 59); proctiger elongate (Fig. 60); paramere prominent, falciform, strongly curved, slightly expanded on distal part, apex rounded (Figs. 34, 61); endosoma (Figs. 62, 63): dorsal sclerite long and recurved proximally, apical accessory sclerite small and weakly sclerotised, lateral sclerite broad and long, accessory lateral sclerite present. Female: tergum 7 sub-triangular, not produced posteriorly (Fig. 64); sternum 7 (Fig. 65) large, distinctly longer than preceding abdominal sterna together, posterior one-third constricted and forming two widely separated lobes, apices of lobes angular, surpassing apex of proctiger in ventral view, the notch between lobes as wide as each lobe and with angular margin.

Description. Size: apterous males: length 6.32–6.72 (holotype: 6.65), width 2.85–3.05 (holotype: 3.02); macropterous males: wings 8.10–8.20, width 2.97–3.07;

apterous females: length 5.19–5.70 (allotype: 5.70), width 2.93–3.17 (allotype: 3.09); macropterous females: 7.20, width 2.94–2.97.

Colour (Figs. 7, 8): Apterous morph: Dorsal dark markings prominent. Interocular area with light brown mark or without dark mark. Antenna: segment 1 almost entirely yellowish or with distal part brown, segments 2–4 light brown to dark brown. Pronotum with median black T-shaped mark at anterior margin and with two dark brown or black marks near anterolateral margin. Mesonotum with black marks: lateral stripes and median longitudinal stripe slender, running toward posterior margin and connected with anterior mark; sublateral stripes slender; each side of mesopleura with a longitudinal slender brown mark, usually variable. Metanotum with black marks running along anterior and lateral margins and with a medial longitudinal mark, bordering two broad, hook-shaped yellowish marks; metacetabula with black stripe, running throughout its length. Fore femur: (a) of the male with apical dark ring and four longitudinal marks of which ventral mark dark brown and connected with ring, and lateral marks dark brown, not confluent with ring, dorsal mark light brown and not confluent with ring; (b) of the female with three slender, usually light brown, longitudinal mark, one on dorsal, one on ventral and the other one on external side of femur, all not confluent with dark ring. Fore tibia yellowish at basal one-fifth or basal one-fourth, distal part dark brown; fore tarsus dark brown. Middle and hind legs: femora yellow or sometimes brownish, tibiae and tarsi dark brownish. Abdomen mainly blackish dorsally, tergum 1 with one yellowish mark posteriorly, terga 2–7: anterior halves blackish, posterior halves yellowish. Venter bright yellowish. Macropterous morph: Pronotum with black mark on anterior margin, confluent with anterolateral marks and the median longitudinal stripe; two light brown sublateral marks confluent with the median stripe; lateral margin between anterior corner and humeri dark brown; posterior margin between humeri and apex yellowish. Fore wings mainly dark brown, anterior margin yellowish.

Apterous male (holotype): Head width 1.72; interocular width 0.63; eye size 0.82. Lengths of antennal segments 1–4: 2.50: 1.05: 0.99: 0.84. Pronotum length 0.69. Mesonotum length 1.57. Lengths of leg segments: fore leg: 3.15: 2.70: 0.16: 0.93; middle leg: 7.70: 5.70: 2.60: 0.34; hind leg: 7.60: 4.53: 0.35: 0.41. Fore femur incrassate, width of femur: 0.95, ratio length/width: 3.32, black granules scattered along ventral surface; other characteristics of fore femur as in Diagnosis above (Figs. 56, 57). Abdomen length on ventral view: 2.69, pregenital length 0.65; sternum 7 slightly longer than sterna 5 and 6 combined, length 0.25. Genitalia of male: Abdominal segment 8 (Fig. 58): large, with posterodorsal margin strongly upcurved; posterior dorsum and lateral sides of segment bearing long hairs; postero-ventral margin bearing short, but wide lobe, ventral length 0.85, width 1.37. Characteristics of pygophore, proctiger, paramere, and endosoma as in Diagnosis above.

Apterous female (allotype): Head width 1.64; interocular width 0.61; eye size 0.77. Lengths of antennal segments 1–4: 1.83: 0.85: 0.93: 0.79. Pronotum length 0.52. Mesonotum length 1.50. Lengths of leg segments: fore leg: 2.33: 2.13: 0.15: 0.77; middle leg: 6.10: 4.50: 2.15: 0.29; hind leg: 5.90: 3.75: 0.27: 0.37. Fore femur slender, without teeth, width 0.36, ratio length/width: 6.47. Abdominal venter length 1.63, length of tergum 7: 0.43, length of sternum 7: 0.88. Shape of sternum 7: see Diagnosis above.

Macropterous male: Head width 1.71, interocular width 0.68, eye size 0.79. Lengths of antennal segments 1–4: 2.63: 1.08: 0.97: 0.90. Pronotum: apex of pronotal lobe pointed, median length 3.60, humeral width 2.75. Fore wing length 6.0. Lengths of leg segments: fore leg: 3.17: 2.69: 0.13: 0.94; middle leg: 7.60: 5.50: 2.63: 0.32; hind leg: 7.60: 4.55: 0.35: 0.39. Fore femur incrassate, ratio length/width: 3.69. Abdomen length on ventral view: 2.47, pregenital length 0.61; sternum 7 slightly longer than sterna 5 and 6 combined, length 0.25. Other characteristics as in apterous males.

Macropterous female: Head width 1.59, interocular width 0.59, eye size 0.75. Lengths of antennal segments 1–4: 1.83: 0.81: 0.90: 0.77. Pronotum: apex of pronotal lobe pointed, median length 3.30, humeral width 2.45. Fore wing length 5.72. Lengths of leg segments: fore leg: 2.35: 2.05: 0.14: 0.76; middle leg: 6.00: 4.50: 2.25: 0.30; hind leg: 6.00: 3.88: 0.31: 0.38. Fore femur as slender as in apterous female, ratio length/width: 6.71. Abdominal venter length 1.53, length of sternum 7: 0.90. Other characteristics as in apterous females.

Remarks. *Metrocoris johnpolhemi*, new species, belongs to the *M. bilobatus* species group (sensu Chen & Nieser, 1993). This new species is similar to *M. bilobatus* den Boer, 1965 and *M. strictus* Chen & Nieser, 1993, in having the sub-apical indentation on the fore femur of the male without a proximal tooth. The shape of sternum 7 of the female in *M. johnpolhemi* is relatively similar to that of *M. bilobatus*, but they can be easily separated because in *M. johnpolhemi* the posterior lobes are clearly slanted outwards with pointed apices, and the notch between these lobes is wider and has a clearly angular median margin (while in the latter, the lobes are pointed posteriorly with rounded apices, and the notch between the lobes is narrower and has a rounded median margin).

In Vietnam, there are currently three known species of the *M. bilobatus* group, namely *M. johpolhemi*, new species, *M. bilobatoides* Chen & Nieser, 1993, a taxon probably restricted to northern Vietnam, and *M. vietnamensis* Tran & Zettel, 2005, a taxon probably restricted to central Vietnam. This new species differs from *M. vietnamensis* and *M. bilobatoides* in regard to the following structures: (1) fore femur of the male: in *M. johnpolhemi* there is no tooth at the proximal edge, and the sub-apical tooth is large, while the latter two species possess a small tooth at the proximal edge present together with a large sub-apical tooth; (2) the shape of paramere: in *M. johnpolhemi* the shaft of the paramere is expanded on the distal half with a rounded apex, while in the latter two species the shaft of the paramere tapers along its length, and has a pointed apex); (3) abdominal sternum 7 of the female: in *M. johnpolhemi* the distal lobes are long,

surpassing the apex of the proctiger in ventral view, and the notch between the two distal lobes is wide and has an angular margin, while in *M. bilobatoides* the distal lobes are shorter and the notch between the lobes is narrow and angular, and in *M. vietnamensis* the distal lobes are also short, and the notch wide, but with a rounded margin.

Etymology. This species is dedicated to the late Dr. John T. Polhemus, in honour of his contribution to our knowledge of water bugs in Southeast Asia.

Distribution. Vietnam: Hanoi (Ba Vi), Lai Chau, Phu Tho (Fig. 138).

Habitats. Specimens of *M. johnpolhemi* were collected from forested hill streams in several localities in northern Vietnam, at elevations ranging ca. 300–600 m above sea level.

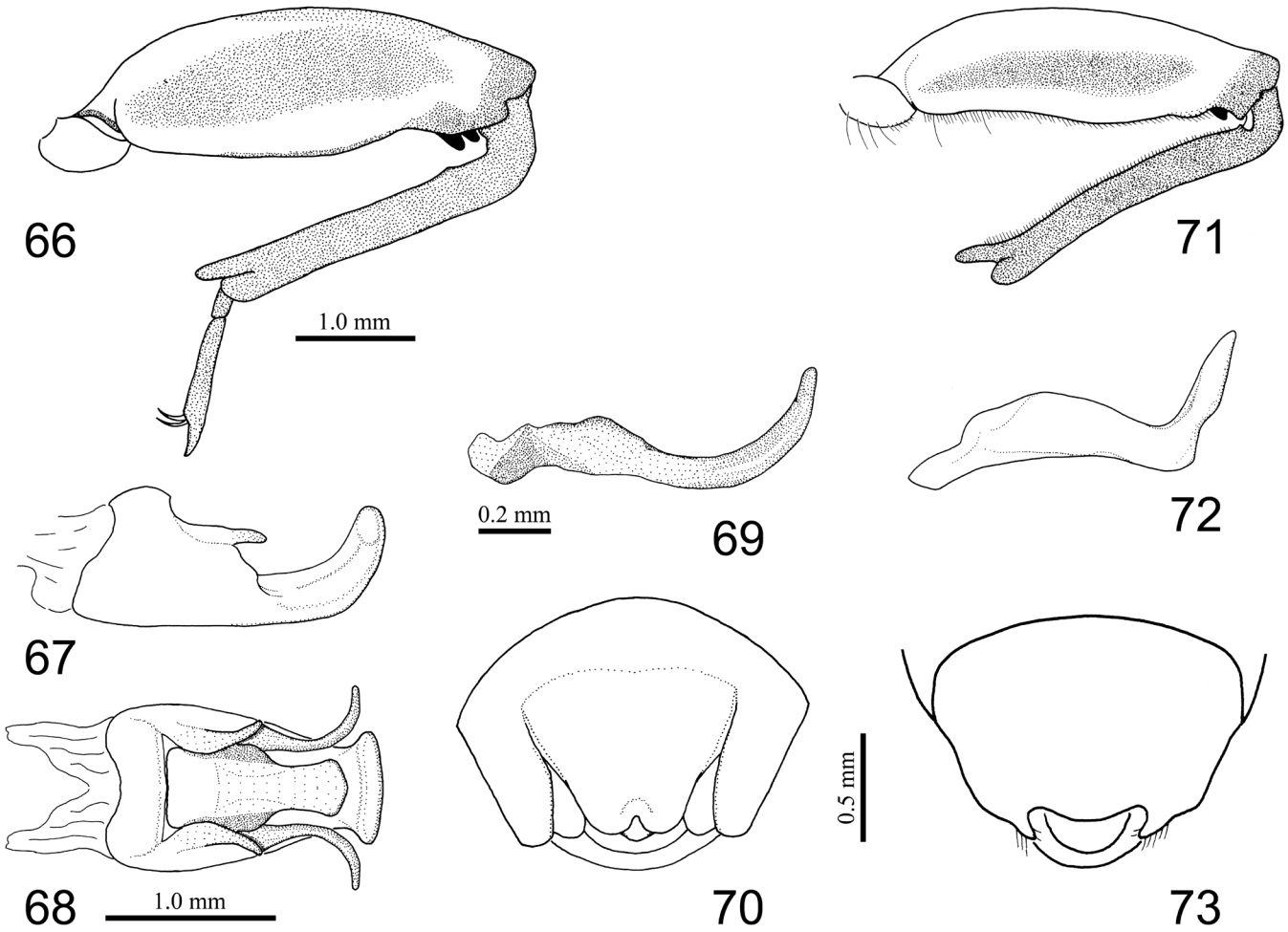
Metrocoris anderseni species group

Metrocoris quynhi Tran & Zettel, 2005
(Figs. 10, 11, 35, 66–70)

Metrocoris quynhi Tran & Zettel, 2005: 45–48, Figs. 10–17, 25, 28, 29 (type locality: Sa Pa, Lao Cai, Vietnam).

Material examined. Holotype and **paratypes**: see Tran & Zettel (2005).

Others – VIETNAM: **Lao Cai Prov.:** 1 female (apt), Sa Pa, Hoang Lien N'Park, Nui Xe, upstream of Suoi Vang, coll. Tran A.D., 4 July 2004, TAD0416 (ZRC); 5 males, 25 females (apt), 4 males, 6 females (mpt), Sa Pa, Hoang Lien N'Park, Nui Xe, Suoi Vang, coll. Tran A.D., 4 July 2004, TAD0417 (ZRC); 2 males, 1 female (apt), 1 immature, crest of pass N. of Mt. Fan Si Pan, 18 km NW. of Sa Pa on Lai Chau road, 1980 m asl, 22°21′10″N, 103°45′57″E, water temp. 16°C, 8 April 2000, 09:00–11:00 hrs., CL 4400, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM); 2 males, 5 females (apt), Sa Pa, Nui Xe, Tram Ton area, small feeder of Vang stream, near waterfall, coll. Dinh N.H. et al., 23 April 2011, DNH11.05 (ZMHU); 1 male, 1 female (apt), Sa Pa, Nui Xe, Tram Ton area, Vang stream, coll. Dinh N.H. et al., 23 April 2011, DNH11.06 (ZMHU); 2 males, 6 females (apt), Sa Pa, Nui Xe, Tram Ton area, feeder stream of Vang stream, coll. Dinh N.H. et al., 23 April 2011, DNH11.07 (ZMHU); 3 males, 1 female (apt), Sa Pa, Nui Xe, Tram Ton area, northward feeder stream of Vang stream, coll. Dinh N.H. et al., 23 April 2011, DNH11.09 (ZMHU); 1 female (apt), Sa Pa, Trung Chai, km 119 Nat. Road #4D, Mong Sen stream, coll. Dinh N.H. et al., 25 April



Figs. 66–73. Morphological features of *Metrocoris* species. 66–70: *M. quynhi* (65–70 reproduced from Tran & Zettel, 2005). 66: right fore leg of male. 67: pygophore, lateral view. 68: male genital capsule, dorsal view. 69: left paramere. 70: female sternum 7, in situ. 71–73: *M. obscurus*. 71: right fore leg of male. 72: left paramere. 73: sternum 7 of female, ventral view (66, 71 same scale; 67, 68 same scale; 69, 72 same scale; 70, 73 same scale).

2011, DNH11.15 (ZMHU); 1 male (apt), Sa Pa, Nam Cang, Nam Cang stream, coll. Dinh N.H. et al., 23 October 2012, DNH12.08 (ZMHU); 5 males, 2 females (apt), 6 males, 5 females (mpt), Sa Pa, Nui Xe, Tram Ton area, Vang stream and its feeders, coll. Tran A.D., 30 May 2013, TAD1319 (ZMHU); 3 males, 3 females (apt), Sa Pa, Nui Xe, Tram Ton area, Vang stream, coll. Tran A.D. et al., 25 October 2013, TAD1356 (ZMHU); 12 males, 17 females (apt), Sa Pa, Nui Xe, Tram Ton area, feeder stream of Vang stream, coll. Tran A.D. et al., 25 October 2013, TAD1357 (ZMHU); 5 males, 5 females (apt), Sa Pa, stream from waterfall by roadside from Nui Xe to Sa Pa town, ca. 13 km from Sa Pa, coll. Tran A.D. et al., 25 October 2013, TAD1358 (ZMHU). **Lai Chau Prov.:** 1 male, 1 female (apt), Tam Duong, stream at San Xa Ho bridge, km 85 Nat. Road #4D, coll. Tran A.D., 31 May 2013, TAD1323 (ZMHU).

Diagnosis. Male: fore femur incrassate (ratio length/width 3.22–3.67), distal one-third constricted, but without distinct ventral indentation, with bipartite apical tooth, of which the distal part is the elevated rim of the ventral surface; inner face of fore tibia with subbasal tooth-like elevation (Fig. 66). Male genitalia: abdominal segment 8 large (see Tran & Zettel, 2005: Fig. 11); pygophore, on dorsal view, prolonged and subapically constricted, with apical margin straight, and with straight, slender dorsolateral process (Figs. 67, 68); proctiger long, with narrow distal part (Fig. 68); paramere hook-shaped, apically pointed (Figs. 35, 69); endosoma: dorsal sclerite long and recurved proximally, apical accessory sclerite indistinct, lateral sclerite straight, ventral sclerite long (see Tran & Zettel, 2005: Figs. 15, 16). Abdomen of female: sternum 7 (Fig. 70) with large medial lobe; lateral parts with longitudinal ridge from anterior end of incision to hind margin, and with small, mediad directed, wing-shaped lobes covering most-lateral parts of medial lobe; medial lobe subtrapezoidal, with distinctly notched hind margin, slanted dorsocaudad; on dorsal view, tergum 7 small, hidden under tergum 6.

Size: apterous males: length 6.3–7.0 (holotype 6.6), width 3.03–3.25 (holotype 3.10), macropterous males: length 6.4–6.5, width 3.00–3.30; apterous females: length 5.4–5.8 (allotype 5.45), width 3.30–3.40 (allotype 3.40), macropterous females: length 5.0–5.5, width 3.01–3.30.

Remarks. *Metrocoris quynhi* belongs to the *M. anderseni* species group (sensu Chen & Nieser, 1993) and is the first species of this group found in Vietnam. The morphological characteristics of the *M. anderseni* group and a detailed comparison of *Metrocoris quynhi* to other members of this group has already been provided by Tran & Zettel (2005: 44–45).

Distribution. Vietnam: Lao Cai, Lai Chau (first record) (Fig. 139).

Metrocoris obscurus species group

Metrocoris obscurus Chen & Nieser, 1993
(Figs. 12, 13, 36, 71–73)

Metrocoris obscurus Chen & Nieser, 1993: 27–29, Figs. 70, 71, 76, 84 (type locality: Bumgahtauang-Hpungan, Myanmar).

Material examined. VIETNAM, **Lao Cai Prov.:** 2 males, 5 females (apt), stream in open valley, 4 km NE. of Sa Pa on Lao Cai road, 1250 m asl, 22°21′10″N, 103°52′12″E, water temp. 24°C, 9 April 2000, 1630–1700 hrs., CL 4407, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM); **Cao Bang Prov.:** 1 male, 3 females (apt), Bao Lac, Dinh Phung commune, near Tung Muu, stream by the Nat' road 34, coll. Tran A.D. et al., 20 December 2013, TAD1378 (ZMHU).

Diagnosis. Male: fore femur incrassate (ratio length/width 3.22–3.67), ventral margin sinuate on distal half (widest at ca. distal half), with a single apical tooth; inner surface of tibia without sub-basal elevation (Fig. 71). Male genitalia: abdominal segment 8 large, ventral side about as long as wide; pygophore long, with apical margin broadly rounded, dorsolateral process of pygophore short and directed dorsad; proctiger long, with narrow distal half; paramere sharply bent on distal one-third, with broadly rounded tumescence subapically on outer margin (Fig. 72); endosoma as in Chen & Nieser (1993: Fig. 84). Female: body dorsoventrally compressed; sternum 7 large, length along midline about same as length of preceding abdominal sterna combined; posterior sternum 7 with two small and finger-like lobes, separated by wide, shallow, transverse notch (Fig. 73).

Size: apterous males: length 6.2–6.9, width 3.05–3.45; apterous females: length 5.9–6.1, width 3.35–3.48.

Remarks. *Metrocoris obscurus* belongs to the *M. obscurus* species group (sensu Chen & Nieser, 1993) and is the only taxon in this species group. The specimens from Vietnam are slightly larger than the type specimens from Myanmar and China (see Chen & Nieser, 1993).

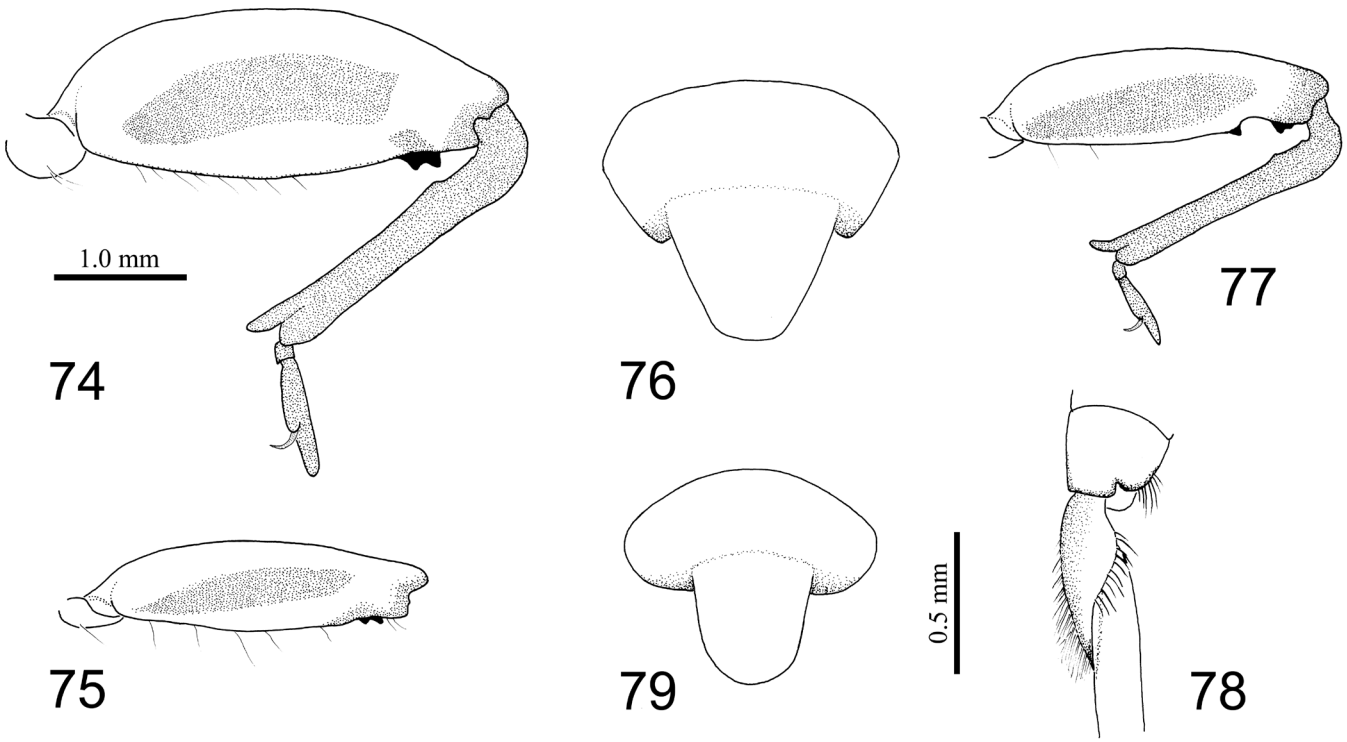
Distribution. Vietnam (first record): Lao Cai, Cao Bang (Fig. 139). Extralimital records: Myanmar: Bumgahtauang-Hpungan; China: Yunnan.

Metrocoris nigrofasciatus species group

Metrocoris acutus Chen & Nieser, 1993
(Figs. 14, 15, 37, 74–76)

Metrocoris acutus Chen & Nieser, 1993: 32–33, Figs, 88, 95–96, 101–102 (type locality: Konthanthan, Chiang Mai, Thailand); Zettel & Chen, 1996: 152, 176–177 (records from Vietnam).

Material examined. VIETNAM: **Dien Bien Prov.:** 1 female (apt), 3 males (mpt), Na Tau, Nam Rom river, coll. Tran A.D., 25 July 2004, DY0412 (ZRC); 2 males, 4 females (apt), 1 male, 2 females (mpt), Muong Phang, Muong Phang stream, coll. Tran A.D., 26 July 2004, DY0415 (ZRC); 5 males, 5 females (apt), 1 male, 2 females (mpt), Dien Bien



Figs. 74–79. Morphological features of *Metrocoris* species. 74–76: *M. acutus*. 74, 75: right fore legs of male, same scale. 76: sternum 7 of female, ventral view. 77–79: *M. nigrofascioides*. 77: right fore leg of male. 78: hind trochanter of female. 79: sternum 7 of female, ventral view (74, 75, 77 same scale; 76, 78, 79 same scale).

Dong, Keo Lom, Huoi stream, coll. Tran A.D., 27 July 2004, DY0417 (ZRC). **Lai Chau Prov.:** 2 males (mpt), Tam Duong, Ho Thau, stream at Su Thang brigde, km 9 Nat. Road #4D, coll. Tran A.D. et al., 31 May 2013, TAD1324 (ZMHU); 1 female (apt), Muong Te, Nam Khao, Nam Puc, stream by the road from Muong Te town to Pac Ma, ca. 17 km from Muong Te town, coll. Tran A.D. et al., 2 June 2013, TAD1325 (ZMHU); 1 male, 1 female (mpt), Muong Te, Nam Khao, Huoi Dang stream, by the road from Muong Te town to Pac Ma, ca. 21 km from Muong Te town, coll. Tran A.D. et al., 2 June 2013, TAD1326 (ZMHU); 1 male, 5 females (apt), 1 male, 1 female (mpt), Muong Te, Bum Nua, Huoi Hon stream, by the road from Muong Te town to Pa Tan, ca. 10 km from Muong Te town, coll. Tran A.D. et al., 2 June 2013, TAD1327 (ZMHU); 1 male (apt), 2 males, 1 female (mpt), Muong Te, Bum Nua, a stream by the road from Muong Te town to Pa Tan, ca. 13 km from Muong Te town, coll. Tran A.D. et al., 2 June 2013, TAD1328 (ZMHU); 2 males, 3 females (apt), 3 males (mpt), Muong Te, Muong Mo stream, by the road from Muong Te town to Lai Ha, ca. 33 km from Muong Te town, coll. Tran A.D. et al., 3 June 2013, TAD1329 (ZMHU); 2 males (mpt), Muong Te, Muong Mo, Ban 41 stream, by the road from Muong Te town to Lai Ha, ca. 45 km from Muong Te town, coll. Tran A.D. et al., 3 June 2013, TAD1330 (ZMHU); 3 males, 3 females (apt), Nam Na River and Nam Ceung stream trib., 15.5 km N. of Lai Chau, 200 m asl, 22°08′52″N, 103°11′33″E, water temp. 21.5°C (trib.), 11 April 2000, 1000–1300 hrs., CL 4409, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 5 females (apt), 1 male, 1 female (mpt), cascading stream 12 km N. of Lai Chau, 290 m asl, 22°07′19″N, 103°11′30″E, water temp. 22°C, 11 April 2000, 1345–1600 hrs., CL 4410, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Lao Cai Prov.:** 2 males, 5 females (apt), 1 female (mpt), Sa Pa, Trung Chai, km 119 Nat. Road #4D, Mong Sen stream, coll. Dinh N.H. et al., 25 April 2011, DNH11.15 (ZMHU); 2 males, 6 females (mpt), Sa Pa, Nam Cang, Nam Cang stream, coll. Dinh N.H. et al., 23 October 2012, DNH12.08 (ZMHU); 1 male, 1 female (apt), Sa Pa, Nam Sai, Seo Nam Sai stream 1, coll. Dinh N.H. et al., 24 October 2012, DNH12.09 (ZMHU); 1 male, 1 female (mpt), Sa Pa, Nam Sai, Seo Nam Sai stream 2, coll. Dinh N.H. et al., 24 October 2012, DNH12.10 (ZMHU); 2 males (apt), 1 female (mpt), Sa Pa, Thanh Phu, Nam Cang stream, coll. Tran A.D. et al., 26 October 2013, TAD1359 (ZMHU); 2 males (apt), Sa Pa, Thanh Phu, near junction of Nam Cang and Muong Hoa streams, coll. Ngo Q.H., 26 October 2013, TAD1360 (ZMHU); 1 male (apt), 1 female (mpt), Sa Pa, Ban Ho, Nam Pu stream (feeder stream of Muong Hoa stream), site 1, at lower section, coll. Tran A.D. et al., 26 October 2013, TAD1361 (ZMHU); 3 males, 4 females (apt), 1 female (mpt), Sa Pa, Trung Chai, km 119 Nat. Road #4D, coll. Ngo Q.H. et al., 28 October 2013, TAD1370 (ZMHU); 7 males, 7 females (apt), 4 females (mpt), rocky river and small trib., 16 km NE. of Sa Pa on Lao Cai road, 850 m asl, 22°24′52″N, 103°53′51″E, water temp. 19°C (main river), 7 April 2000, 1115–1400 hrs.; 9 April 2000, 1500–1600 hrs., CL 4397, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 12 males, 12 females (apt), 1 female (mpt), small rocky stream 19 km NE. of Sa Pa on Lao Cai road, 595 m asl, 22°25′39″N, 103°55′00″E, water temp. 20°C, 7 April 2000, 1515–1600 hrs., CL 4399, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 4 males, 6 females (apt), 1 male (mpt), cascading stream 20 km NE. of Sa Pa on Lao Cai road, 565 m asl [1850 ft], 22°26′20″N,

103°55′36″E, water temp. 19°C, 9 April 2000, 1215–1430 hrs., CL 4406, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Ha Giang Prov.:** 1 female (apt), Bac Me, Minh Ngoc commune, small stream by Nat' road 34 ca. 20 km to Bac Me town, coll. Tran A.D. et al., 07 May 2014, TAD1401 (ZMHU); 3 males, 5 females (apt), 1 male, 2 females (mpt), Bac Me, road 176, Minh Son commune, stream at Ban Van bridge, coll. Tran A.D. et al., 07 May 2014, TAD1403 (ZMHU); 1 female (apt), 2 males, 2 females (mpt), Vi Xuyen, Nat' road 4C, Minh Tan commune, Nam Dieng stream, near bridge, ca. 17.5 km to Ha Giang city, coll. Tran A.D. et al., 09 May 2014, TAD1408 (ZMHU); 2 males, 5 females (apt), 2 males, 3 females (mpt), Bac Quang, km 13 road 177, Tan Lap commune, waterfall & stream, ca. 86 km to Coc Pai town, coll. Tran A.D. et al., 10 May 2014, TAD1410 (ZMHU); 1 female (apt), Hoang Su Phi, Nam Ty commune, bridge at km 34 road 177, waterfall & stream, ca. 65 km to Coc Pai, coll. Tran A.D. et al., 10 May 2014, TAD1411 (ZMHU); 1 female (apt), 3 females (mpt), Xin Man, road 178, feeder stream of Nam Yen river, near bridge ca. 2 km from Coc Pai town, coll. Tran A.D. et al., 11 May 2014, TAD1412 (ZMHU). **Cao Bang Prov.:** 3 males, 6 females (apt), Le Nin stream at Pac Bo cave, 370 m asl, 22°58′36″N, 106°03′02″E, water temp. 18°C, 22 March 2000, CL 4371, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 2 females (apt), Bao Lac, Dinh Phung commune, near Tung Muu, stream by the Nat' road 34, coll. Tran A.D. et al., 20 December 2013, TAD1378 (ZMHU); 3 males, 3 females (apt), Bao Lac, Bao Toan commune, Na Roa village, Khuoi Rong stream, feeder of Gam river, coll. Tran A.D. et al., 20 December 2013, TAD1381 (ZMHU); 1 male, 10 females (apt), 1 male (mpt), Bao Lac, near Bao Lam district town, Ban Chim steram, feeder of Gam river, coll. Tran A.D. et al., 20 December 2013, TAD1382 (ZMHU). **Bac Kan Prov.:** 1 female (apt), Ba Be, Hoang Tri commune, Hoang Tri waterfall, coll. Tran, A.D. et al., 22 August 2012, TAD1218 (ZMHU); 6 males, 6 females (apt), Ba Be N'Park, streams and pools in lower Ba Be Falls area, 140 m asl, 22°27′00″N, 105°33′48″E , water temp. 20.5°C, 20 March 2000, CL 4363, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 2 males, 5 females (apt), Ba Be Nat. Park, spring fed stream nr. Ba Be Falls, 180 m asl, 22°27′07″N, 105°34′28″E, water temp. 19°C, 20 March 2000, CL 4365, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 3 males, 7 females (apt), 1 female (mpt), Ba Be Nat. Park, Na Phon river emerging from Pac Ngoi cave on W. side of Ba Be Lake, 175 m asl, 22°25′08″N, 105°46′06″E, water temp. 20.5°C, 21 March 2000, CL 4369, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM). **Vinh Phuc Prov.:** 8 males, 8 females (apt), small stream nr. entrance to Tam Dao N'Park, NW. of Hanoi, 225 m asl, 21°25′53″N, 105°36′55″E, water temp. 19°C, 19 March 2000,CL 4361, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM). **Quang Ninh Prov.:** 4 males, 2 females (apt), 1 male (mpt), Van Don, Cai Bau island, Van Yen, Cau Cao stream, coll. Tran A.D., 14 June 2003, TAD0349 (ZRC); 5 females (apt), Dong Trieu Range, tributary stream nr. Yen Tú pagoda, 165 m asl, 21°07′44″N, 106°43′39″E, water temp. 17°C, 26 March 2000, CL 4378, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM). **Son La Prov.:** 1 female (mpt), Moc Chau, 800 m asl, coll. Vásárhelyi, 25–27 May 1986, No.96 (NHMW); 1 male (apt), Moc Chau, 850 m asl, coll. Vásárhelyi, 26 October 1986, No.112 (NHMW). **Phu Tho Prov.:** 3 males, 5 females (apt), 2 females (mpt), Xuan Son N'Park, Lap stream, site 1, at Ngoc waterfall, coll. Tran A.D. et al., 5 June 2013, TAD1331 (ZMHU); 2 males, 1 female (apt), 1 female (mpt), Xuan Son N'Park, Lap stream, site 2, first concrete bridge from Ngoc waterfall, coll. Tran A.D. et al., 5 June 2013, TAD1332 (ZMHU); 1 male, 2 females (apt), 1 female (mpt), Xuan Son N'Park, Lap stream, site 3, second concrete bridge from Ngoc waterfall, coll. Tran A.D. et al., 5 June 2013, TAD1333 (ZMHU); 2 females (apt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 1, at Chin Tang waterfall, coll. Tran A.D. et al., 6 June 2013, TAD1334 (ZMHU); 1 male, 2 females (apt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 2, ca. 2 km from Chin Tang waterfall, coll. Tran A.D. et al., 6 June 2013, TAD1335 (ZMHU); 1 male (apt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 3, ca. 4 km from Chin Tang waterfall, coll. Tran A.D. et al., 6 June 2013, TAD1336 (ZMHU); 1 male, 1 female (mpt), Xuan Son N'Park, Ban Coi, Coi stream, site 1, water from underground, coll. Tran A.D. et al., 7 June 2013, TAD1337 (ZMHU); 1 male, 5 females (apt), 1 male, 1 female (mpt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 2, ca. 2 km from Chin Tang waterfall, coll. Tran A.D. et al., 28 August 2013, TAD1341 (ZMHU); 1 male, 1 female (apt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 3, ca. 4 km from Chin Tang waterfall, coll. Tran A.D. et al., 28 August 2013, TAD1342 (ZMHU); 5 males, 7 females (apt), Xuan Son N'Park, Dong Son, Than stream, site 1, coll. Tran A.D. et al., 29 August 2013, TAD1346 (ZMHU); 1 female (apt), Xuan Son N'Park, Dong Son, Than stream, site 2, coll. Tran A.D. et al., 29 August 2013, TAD1347 (ZMHU); 1 male, 3 females (apt), Xuan Son N'Park, Lap stream, site 1, at Ngoc waterfall, coll. Tran A.D. et al., 30 August 2013, TAD1352 (ZMHU); 1 male, 1 female (apt), Xuan Son N'Park, Lap stream, site 2, first concrete bridge from Ngoc waterfall, coll. Tran A.D. et al., 30 August 2013, TAD1353 (ZMHU); 2 males (apt), Xuan Son N'Park, Lap stream, site 3, second concrete bridge from Ngoc waterfall, coll. Tran A.D. et al., 30 August 2013, TAD1354 (ZMHU). **Hanoi:** 3 females (apt), 2 males (mpt), Ba Vi N'Park, Khanh Thuong, Bang stream, 83 m asl, coll. Ngo Q.H. et al., 17 December 2011, TAD1122 (ZMHU); 5 males, 10 females (apt), 2 females (mpt), Khanh Thuong, Mit stream, forest area, 80 m asl, coll. Ngo Q.H. et al., 17 December 2011, TAD1124 (ZMHU); 3 males, 5 females (apt), 5 females (mpt), Minh Quang, stream near by Tan Vien Pagoda, 340 m asl, coll. Ngo Q.H. et al., 17 December 2011, TAD1125 (ZMHU); 2 males (apt), Minh Quang, Cái stream, 65 m asl, coll. Ngo Q.H. et al., 17 December 2011, TAD1126 (ZMHU); 8 males, 11 females (apt), Ba Vi N'Park, Khoang Xanh, Tien stream, 95 m asl, coll. Ngo Q.H. et al., 17 December 2011, TAD1127 (ZMHU); 4 males, 2 females (apt), 3 males, 4 females (mpt), Khanh Thuong, Bang stream, 83 m asl, coll. Ngo Q.H. & Tran A.D., 26 April 2012, TAD1201 (ZMHU); 5 males, 6 females (apt), Khanh Thuong, Mit stream, forest area, 80 m asl, coll. Ngo Q.H. & Tran A.D., 26 April 2012, TAD1203 (ZMHU); 5 males, 10 females (apt), 1 female (mpt), Minh

Quang, stream near by Tan Vien Pagoda, 340 m asl, coll. Ngo Q.H. & Tran A.D., 26 April 2012, TAD1206 (ZMHU); 1 male, 1 female (mpt), Minh Quang, Cái stream, 65 m asl, coll. Ngo Q.H. & Tran A.D., 26 April 2012, TAD1207 (ZMHU); 7 males, 1 female (apt), 3 males, 5 females (mpt), Khoang Xanh, Tien stream, 95 m asl, coll. Ngo Q.H. & Tran A.D., 27 April 2012, TAD1208 (ZMHU); 2 males (mpt), Ba Vi N'Park, stream near Coste 400, ca. 550 m asl, coll. Ngo Q.H. & Tran A.D., 27 April 2012, TAD1210 (ZMHU). **Hai Duong Prov.:** 8 males, 27 females (apt), Khe La stream, 22 km N. of Chi Linh, 160 m asl, vic. 21°13′32″N, 105°35′09″E, water temp. 18°C, 25 March 2000, CL 4375, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM). **Hoa Binh Prov.:** 1 female (apt), Hoa Binh, 100 m, coll. Vásárhelyi, 21 October 1986, No.88 (NHMW). **Ninh Binh Prov.:** 2 males, 1 female (apt), 1 male, 1 female (mpt), Cuc Phuong, 400 m asl, coll. Vásárhelyi, 17 October 1986, No.68 (NHMW). **Thanh Hoa Prov.:** 10 males, 17 females (apt), 1 female (mpt), Ben En N'Park, Nhu Xuan, Tan Binh, Xuan Ly ranger station, Khe Lo 4 stream, coll. Pham T.D., 26 February 2013, BE1301 (ZMHU); 2 males, 9 females (apt), Ben En N'Park, Nhu Xuan, Tan Binh, stream 300 m behind Xuan Ly ranger station, coll. Pham T.D., 26 February 2013, BE1302 (ZMHU); 2 males, 3 females (apt), Ben En N'Park, Nhu Xuan, Son Binh, Khe Cay Khe stream, site 1, coll. Pham T.D., 01 March 2013, BE1304 (ZMHU); 1 male, 4 females (apt), Ben En N'Park, Nhu Xuan, Son Binh, Khe Cay Khe stream, site 2, 300 m down-stream from site 1, coll. Pham T.D., 01 March 2013, BE1305 (ZMHU); 11 males, 14 females (apt), 1 female (mpt), Ben En N'Park, Nhu Xuan, Son Binh, Khe Trai Cao stream, coll. Pham T.D., 04 March 2013, BE1308 (ZMHU); 1 male (apt), Pu Hu Nature Reserve, Quan Hoa, Hien Chung, Ban Pheo, Pheo stream, coll. Pham T.D., March 2013, PH1302 (ZMHU); 1 female (apt), Pu Hu Nature Reserve, Quan Hoa, Hien Chung, Ban Pheo, Ham stream, coll. Pham T.D., 09 April 2013, PH1303 (ZMHU); 4 females (apt), 1 female (mpt), Pu Luong Nature Reserve, Ba Thuoc, Co Lung, Ban Khuyn, Khuyn stream, coll. Pham T.D., 18 March 2013, PL1303 (ZMHU). **Nghe An Prov.:** 2 males (apt), Pu Mat Nature Reserve, SW .of Con Cuong, Kem waterfall, 400 m asl, vic. 18°58′13″N, 104°48′03″E, water temp. 22°C, 1 April 2000, CL 4385, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 6 males, 12 females (apt), 1 male, 2 females (mpt), Bac stream, nr. Pu Mat Nature Reserve, 200 m asl, 18°59′18″N, 104°50′33″E, water temp. 24°C, 2 April 2000, CL 4388, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 1 female (mpt), Pu Mat N'Park, Khe Kem waterfall & stream, site #1, coll. Ngo Q.H., 20 December 2012, NQH1203 (ZMHU); 2 males, 3 females (apt), Pu Mat N'Park, Khe Kem stream, site #2, ca. 300 m downstream from waterfall, coll. Ngo Q.H., 20 December 2012, NQH1204 (ZMHU); 6 males, 7 females (apt), Con Cuong, near Tung Huong, Khe Num stream, coll. Ngo Q.H., 21 December 2012, NQH1211 (ZMHU); 1 male, 3 females (apt), 1 male (mpt), Ky Son, Ta Ca, feeder stream of Loi stream, coll. Tran A.D. & Nguyen V.H., 16 April 2013, TAD1302 (ZMHU); 1 female (apt), Ky Son, Muong Xen, Ta Ca, Hoi Giang stream, coll. Tran A.D., 16 April 2013, TAD1303 (ZMHU); 2 males, 2 females (apt), 2 males (mpt), Pu Mat N'Park, Kem stream, site 2, ca. 500 m from waterfall, coll. Tran A.D. et al., 18 April 2013, TAD1311 (ZMHU); 4 females (mpt), Pu Mat N'Park, Kem stream, site 3, near visitors' shelter, coll. Tran A.D. et al., 18 April 2013, TAD1312 (ZMHU). **Ha Tinh Prov.:** 7 males, 13 females (apt), 1 female (mpt), Vu Quang N'Park, Khe Lim waterfall, coll. Tran A.D., 24 April 2003, TAD0304 (ZRC); 5 males, 17 females (apt), 2 females (mpt), Vu Quang N'Park, a small branch of Khe Lim, coll. Tran A.D., 24 April 2003, TAD0305 (ZRC); 1 female (mpt), Vu Quang N'Park, small waterpools near Khe Lim, coll. Tran A.D., 24 April 2003, TAD0306 (ZRC); 6 males, 18 females (apt), 2 males, 4 females (mpt), Vu Quang N'Park, Song Con, old Sao La station, coll. Tran A.D., 25 April 2003, TAD0307a (ZRC); 3 males, 3 females (apt), Vu Quang N'Park, Song Con, old Sao La station, coll. Tran A.D., 25 April 2003, TAD0307b (ZRC).

CHINA: **Yunnan Prov.:** 1 male (apt), Gejiu Pref., 10 km N Gejiu, ca. 1300 m asl, coll. Schönmann & Wang, 22 November 1999, CWBS 398 (NHMW).

THAILAND: **Mae Hong Son Prov.:** 1 male (apt), NW. Thailand, waterfall near Mae Sariang, coll. C.M. Yang & T.B. Lim, 11 September 1998, YCM219 (ZRC); 3 females (apt), NW. Thailand, New waterfall, stream, fast flowing with boulder, coll. C.M. Yang & T.B. Lim, 7 September 1998, YCM203A (ZRC); 1 male, 1 female (apt), Pha Bong, 12 km S. Mae Hong Son, coll. H. Zettel (13a), 12 November 1995 (NHMW). **Chiang Mai Prov.:** 1 male, 1 female (apt), W. Mae Rim, Mae Sa N'Park, Mae Sa Falls, coll. H. Zettel (2), 30–31 October 1995 (NHMW). **Phetchabun Prov.:** 1 male, 1 female (apt), 36 km SE. Sila, N Ban Nam Nao, Ban Pala Yai, coll. H. Zettel (27), 25 November 1995 (NHMW).

Diagnosis. Male: fore femur incrassate (ratio length/width variable, in apterous males about 2.70–4.02), with a bifid sub-apical tooth; fore tibia without indentation on inner surface (Figs. 74, 75). Male genitalia moderate in size: pygophore sub-ovate; proctiger elongate; paramere slender, falciform with pointed apex (Fig. 37); endosoma as in Chen & Nieser (1993: Figs. 101, 102). Female: sternum 7 large, constricted laterally, medially produced tongue-like lobe (with diagonal lateral margins) on posterior margin, sometimes directed dorsad, completely enclosing the genitalia (Fig. 76).

Size: body length about twice as width: apterous males: length 4.60–6.30, width 2.28–3.14, macropterous males: length 6.40–8.20, width 2.34–2.97; apterous females, length 4.40–5.80, width 2.41–3.14, macropterous males: length 6.20–6.90, width 2.52–2.67.

Remarks. *Metrocoris acutus* belongs to the *M. nigrofasciatus* species group, as defined by Chen & Nieser (1993), on the basis of the following character states: male fore femur incrassate, ventral surface of apical part indented with a single or bifid sub-apical tooth; paramere slender and curved; female sternum 7 large, with median lobe produced. Two species belonging to the *M. nigrofasciatus* group are found in Vietnam, *M. acutus* and *M. nigrofascioides*. Males of these two species can be separated from each other by the structures

of the fore leg, parameres and endosoma. By contrast, the females of the two species are very similar to each other, especially in regard to colour pattern. However, they can be separated by size (the females of *M. acutus* are slightly larger), shape of the median lobe of sternum 7 (tongue-like in *M. acutus*, sub-rectangular in *M. nigrofascioides*), and pubescence on the inner surface of the hind trochanter (more distinct and longer in *M. nigrofascioides*).

Distribution. Vietnam: Dien Bien, Son La, Quang Ninh, Hoa Binh, Ninh Binh, Ha Tinh, Cao Bang (first record), Hai Duong (first record), Thanh Hoa (first record), Nghe An (first record), Lao Cai, Lai Chau, Bac Kan, Vinh Phuc (Fig. 139). Extralimital records: China (Yunnan), Laos (Luang Prabang), Thailand (northern).

Metrocoris nigrofascioides Chen & Nieser, 1993
(Figs. 16, 17, 38, 77–79)

Metrocoris nigrofascioides Chen & Nieser, 1993: 34–35, Figs. 90, 97, 105 (type locality: Fang, Chiang Mai, Thailand); Zettel & Chen, 1996: 152, 177 (records from Vietnam).

Material examined. VIETNAM: **Thanh Hoa Prov.:** 1 male (apt), 1 male, 1 female (mpt), Ben En N'Park, Nhu Xuan, Son Binh, Khe Cay Khe stream, site 1, coll. Pham T.D., 01 March 2013, BE1304 (ZMHU). **Quang Binh Prov.:** 1 male (apt), Phong Nha, upstream of Thac Xoi waterfall, coll. Tran A.D., 15 July 2004, DY0407 (ZRC); 4 males, 2 females (apt), Phong Nha, a stream 1 km behind Forest Ranger station 4, coll. Tran A.D., 16 July 2004, DY0409 (ZMHU). **Da Nang Prov.:** 4 males (apt), Ba Na - Nui Chua foothills, Suoi Lanh, coll. Tran A.D. & Tan H.H., 01 March 2005, THH05-25 (ZRC). **Kon Tum Prov.:** 1 male, 3 females (apt.), stream 2 km inside Chu Mom Ray Nature Reserve, 635 m asl, 14°25′55″N, 107°42′46″E, water temp. 21°C, 4 March 2001, CL 4277, coll. J.T. Polhemus & P. Nguyen (USNM); 2 females (apt), stream 63 km NE. of Kontum on Hwy. 24, 1050 m asl, 14°36′14″N, 108°18′22″E, water temp. 20.5°C, 6 March 2001, CL 4281, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 4 males, 6 females (apt), 1 male, 3 females (mpt), stream in dry forest hills 29 km NE. of Kontum on Hwy. 24, 565 m asl, 14°27′01″N, 108°09′12″E, water temp. 20.5°C, 19 March 2001, CL 4284, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM); 1 female (apt), 1–4 m trib. of Ngoc Mi River, ca. 20 km NE. of Ngoc Linh, 980 m asl, 10 Sept. 1998, coll. B. Hubley, D.C. Currie & M. Tseng, ROM 982314, secondary tropical forest, 15°08′23″N, 107°54′40″E (USNM). **Gia Lai Prov.:** 1 male, 3 females (mpt), 40 km NW. An Khe, Buon Luoi, 14°10′N 108°30′E, 620–750 m asl, coll. Pacholátko & Dembicky, 28 March–12 April 1995 (NHMW); 5 males, 1 female (apt), 1 female (mpt), Nuoc Stream, 47 km N. of An Khe, 580 m asl, 14°14′17″N, 108°36′17″E, water temp. 24°C, 23 March 2001, CL 4312, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Binh Dinh Prov.:** 7 males, 8 females (apt), 1 female (mpt), rocky stream on E. side of An Khe Pass, 19 km E. of An Khe on Hwy. 19, 115–200 m asl, 13°58′50″N, 108°47′14″E, water temp. 24°C, 12 March 2001, CL 4291, coll. J.T. Polhemus & P. Nguyen (USNM); 1 male, 3 females (apt), waterfall on E. side of An Khe Pass, 19 km E. of An Khe on Hwy. 19, 170 m asl, 13°58′23″N, 108°46′48″E, water temp. 24°C, 12 March 2001, CL 4292, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM). **Phu Yen Prov.:** 1 male (apt), stream in granite hills on N. side of Ca Pass, 29 km S. of Tuy Hoa on Hwy. 1, 60 m asl, 12°53′05″N, 109°23′38″E, water temp. 24°C, 25 March 2001, CL 4316, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM). **Lam Dong Prov.:** 1 male (apt), Di Linh, 18 km S. of Bao Loc, 600 m asl, coll. Vásárhelyi, 14 October 1988, No.283 (MTMB). **Dong Nai Prov.:** 2 males 1 female (apt), Vinh Cuu, Vinh An, Suoi Rang waterfall, coll. Tran A.D., 10 May 2003, TAD0315b (ZRC). **Kien Giang Prov., Phu Quoc Island:** 1 male (apt), 1 male (mpt), Da Ban stream & waterfall, coll. Tran A.D. & D. Yeo, 29 November 2010, TAD1020 (ZMHU); 2 males, 1 female (apt), 3 males, 3 females (mpt), Tranh stream (middle section & waterfall), coll. Tran A.D., 30 November 2010, TAD1022 (ZMHU).
LAOS: **Khammouan Prov.:** 3 males, 1 female (apt), 1 male, 1 female (mpt), Ban Khoun Ngeun env., N18°07′E104°29′, alt. 250 m asl, coll. E. Jendek & P. Patcholátko, 4–16, 25–30 November 2000 (NHMW). **Saravan Prov.:** 1 male, 1 female (apt), Tat Lo Waterfall & Resort, 370 m asl, coll. Schwendinger, 29 December 1996 (NHMW). **Vientiane Prov.:** 1 male, 6 females (apt), Ban Van Heue, ~20 km E. of Phou Khao Khouay park HQ, 1039 m asl, vic. 18°17′44″N, 102°53′48″E, 31 August 1967, coll. J.L. Gressit et al. (BPBM). **Luang Prabang Prov.:** 2 females (apt), 2 males, 5 females (mpt), Huay La stream, (trib. to Nam Xeuang river), NE. of Ban Pha on road to Pak Xeng, 305 m asl, 20°03′38″N, 102°19′45″E, water temp. 26°C, 6 December 2015, 1000–1200 hrs., CL 6026, coll. D.A. Polhemus (BPBM); 5 males, 5 females (apt), 1 male, 2 females (mpt), Huay Sokor stream, (trib. to Nam Xeuang river), NE. of Ban Pha on road to Pak Xeng, 350 m asl, 20°03′11″N, 102°21′43″E, water temp. 25°C, 6 December 2015, 1330–1500 hrs., CL 6027, coll. D.A. Polhemus (BPBM); 1 male (apt), Nam Bor River, 1.3 km SW. of Ban Phuong Pao village, 365 m asl [1200 ft], 19°57′02″N, 102°28′33″E, water temp. 21°C, 7 December 2015, 0930–1015 hrs., CL 6028, coll. D.A. Polhemus (BPBM); 1 female (apt), 1 male, 1 female (mpt), small forest tributary to Nam Bor River, 1.4 km SW. of Ban Phuong Pao village, 395 m asl, 19°56′59″N, 102°28′29″E, water temp. 21°C, 7 December 2015, 1030–1100 hrs., CL 6029, coll. D.A. Polhemus (BPBM); 3 males, 2 females (apt), 4 males, 1 female (mpt), rocky stream and small clear tributary at Ban Kokvane village, upstream of bridge, 320 m asl [1050 ft], 19°57′07″N, 102°17′36″E, water temp. 23.5°C, 7 December 2015, 1315–1415 hrs., CL 6031, coll. D.A. Polhemus (BPBM); 2 males, 2 females (apt), 1 male (mpt), rocky stream at Tad Thang waterfall area,, 7 km S. of Luang Prabang, 410–440 m asl [1350–1450 ft], 19°50′15″N, 102°07′53″E, water temp. 21°C, 8 December 2015, 0900–1045 hrs., CL 6032, coll. D.A. Polhemus (BPBM).

CAMBODIA: **Koh Kong Prov.:** 4 males, 1 female (apt), 2 females (mpt), Cardamom Mountains, shaded forest streamlet on road to Tatai Dam overlook, 420 m asl, 11°36′02″N, 103°13′02″E, water temp. 26°C, 30 August 2015, CL 6016, coll. D.A. Polhemus (BPBM, USNM); 3 males, 1 female

(mpt), Cardamom Mountains, cascading stream in sandstone bed on road to Tatai Dam overlook, 420 m asl, 11°35′47″N, 103°14′48″E, water temp. 26°C, 30 August 2015, CL 6017, coll. D.A. Polhemus (BPBM, USNM); 2 males, 2 female (apt), Cardamom Mountains, Toeuk Noeng River, 165 m asl, 11°37′33″N, 103°28′51″E, water temp. 26°C, 31 August 2015, CL 6019, coll. D.A. Polhemus (BPBM, USNM); 1 male, 4 female (apt), Cardamom Mountains, outflow from ponded stream on road from Koh Kong to Pursat, 540 m asl, 12°00′58″N, 103°10′47″E, water temp. 24.5°C, 1 September 2015, CL 6023, coll. D.A. Polhemus (BPBM, USNM). THAILAND: **Chiang Mai Prov.:** 1 male (mpt), N. Thailand, 78 km from Chiang Mai, coll. Y.Y. Goh, 12 June 1998, GYY079 (ZRC); 3 males, 4 females (apt), 1 male, 1 female (mpt), NW. Chiang Mai, stream off Pai River, coll. C.M. Yang & T.B. Lim, 08 September 1998, YCM207 (ZRC); 2 males, 2 females (apt), 1 male, 1 female (mpt), W. Mae Rim, Mae Sa N'Park, Mae Sa Falls, coll. H. Zettel (2), 30–31 October 1995 (NHMW). **Kamphaeng Phet Prov.:** 1 male (mpt), central Thailand, Kamphaeng Phet, side stream to waterfall, coll. C.M. Yang & T.B. Lim, 12 September 1998, YCM223 (ZRC); 1 female (apt), central Thailand, rocky stream, coll. C.M. Yang & T.B. Lim, 12 September 1998, YCM222A (ZRC).

Diagnosis. Male: fore femur incrassate (ratio length/width variable, about 3.63–4.61), ventral surface indented sub-apically, with pointed proximal edge and a large sub-apical tooth, inner surface of fore tibia with broad indentation basally (not obvious in males with more slender fore femur) (Fig. 77). Male genitalia moderate in size: pygophore sub-ovate; proctiger elongate; paramere falciform, apex blunt (Fig. 38); endosoma as in Chen & Nieser (1993: Fig. 105). Female: inner surface of hind trochanter with long hairs (Fig. 78); sternum 7 large, constricted laterally, posteriorly produced median lobe with parallel lateral margins and round posterior margin, sometimes directed dorsad, completely enclosing genitalia (Fig. 79).

Size: apterous males: length 4.31–4.95, width 2.11–2.51; apterous females: length 4.02–4.75, width 2.23–2.52.

Remarks. See Remarks for *M. acutus*.

Distribution. Vietnam: Thanh Hoa, Quang Binh, Da Nang, Kon Tum, Gia Lai, Binh Dinh, Phu Yen, Lam Dong, Dong Nai, Phu Quoc (Fig. 139). Extralimital records: Myanmar: Hpungan Sadon, Thailand (northern), Laos (first record), Cambodia (first record).

Metrocoris ciliatus species group

Metrocoris ciliatus den Boer, 1965
(Figs. 41, 80–83)

Metrocoris ciliatus den Boer, 1965: 23–26, Figs. 36, 41–43, 45 (type locality: Dawna Hills, Myanmar); Chen & Nieser, 1993: 54–57 (redescription, records from Thailand).

Material examined. VIETNAM: **Lai Chau Prov.:** 1 male (mpt), Muong Te, Muong Mo stream, by the road from Muong Te town to Lai Ha, ca. 33 km from Muong Te town, coll. Tran A.D. et al., 3 June 2013, TAD1329 (ZMHU).

CHINA: **Yunnan Prov.:** 5 males, 5 females (apt), 6 males, 7 females (mpt), Xishuangbanna, Mengyang, Mengang River: forest stream, coll. Cheng L. et al., 18–31 May 2000, LC019 (ZRC); 1 male, 2 females (apt), 1 male (mpt), ZRC.6.22062, Xishuangbanna, Jinghong, Banna N'Park, 850 m asl, small forest stream, coll. Yang C.M. & P. Chew, 28 May–12 June 2002, YCM0327 (ZRC).

Diagnosis. Both sexes: fore femur slender (ratio length/width: males ca. 8.5, females ca. 8.0), sub-apically constricted, ventral surface with sub-apical elevation (Fig. 80). Male: pro-, meso- and metanotum, pleura, and abdominal tergum 1 with scattered black setae; genitalia small, abdominal segment 8 slightly shorter than wide on ventral, pygophore and proctiger simple; paramere falciform, short, with curvature at distal half, apex blunt (Figs. 41, 81, 82); endosoma as in Fig. 83. Female: thoracic segments without black setae; sternum 7 about as long as sterna 4–6 together, posterior margin broadly rounded (modified from Chen & Nieser, 1993).

Size (after Chen & Nieser, 1993): apterous males: length 4.8, width 2.5; apterous females: length 5.0, width 2.7 (specimen from Vietnam, macropterous male: length 6.64, width 2.53).

Remarks. This is the first record of this taxon in Vietnam. For comparative notes, see Remarks under *M. inthanon*.

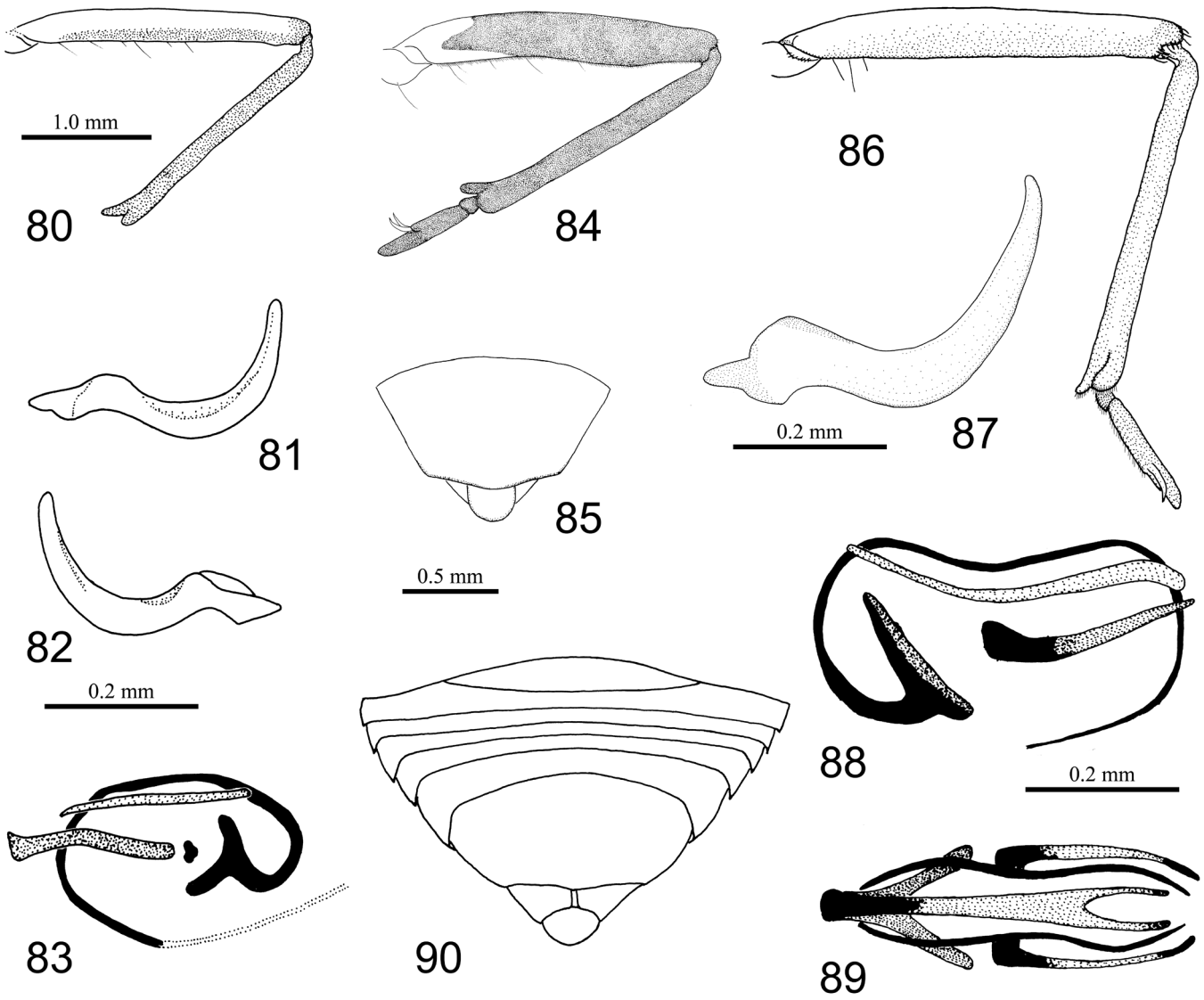
Distribution. Vietnam (first record): Lai Chau (Fig. 140). Extralimital records: Myanmar: Dawna Hills; Thailand: Chiang Mai; China: Yunnan.

Metrocoris inthanon Chen & Nieser, 1993
(Figs. 18, 19, 84, 85, 91–93)

Metrocoris ciliatus den Boer, 1965: 23–26, Figs. 36, 40, 46 (female paratypes from Laos).

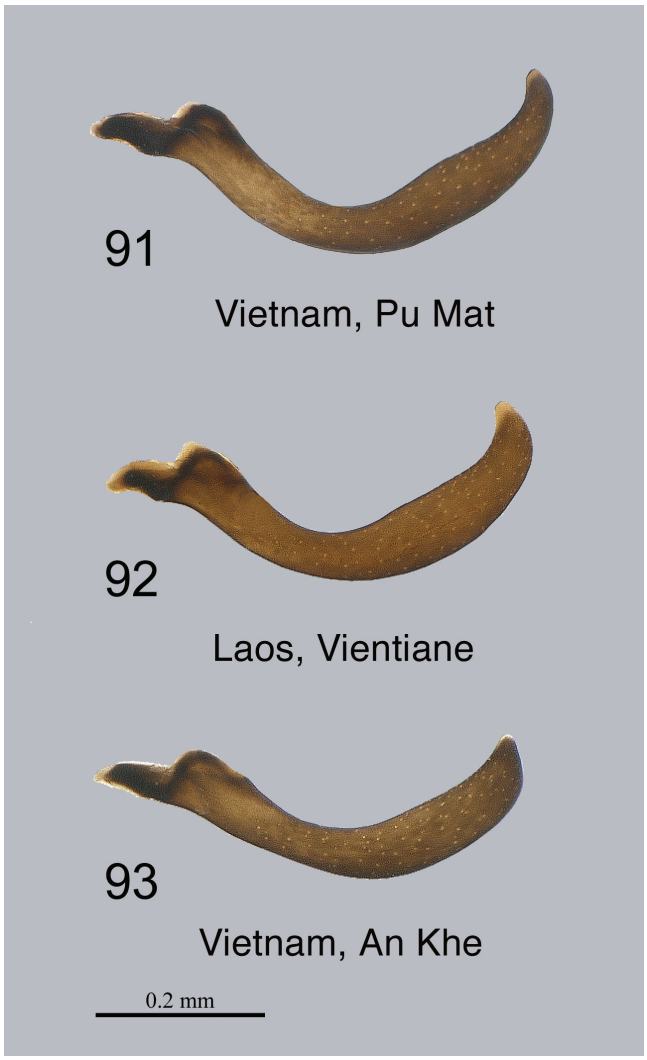
Metrocoris inthanon Chen & Nieser, 1993: 57–59, Figs. 154, 162, 170 (type locality: Doi Inthanon, Chiang Mai, Thailand); Zettel & Chen, 1996: 152, 177 (records from Vietnam).

Material examined. VIETNAM: **Phu Tho Prov.:** 1 male, 3 females (apt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 3, ca. 4 km from Chin Tang waterfall, coll. Tran A.D. et al., 6 June 2013, TAD1336 (ZMHU); 1 male, 1 female (apt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 3, ca. 4 km from Chin Tang waterfall, coll. Tran A.D. et al., 28 August 2013, TAD1342 (ZMHU). **Thanh Hoa Prov.:** 1 female (apt), Pu Luong Nature Reserve, Ba Thuoc, Co Lung, Ban Khuyn, Khuyn stream, coll. Pham T.D., 18 March 2013, PL1303 (ZMHU). **Nghe An Prov.:** 1 male, 3 females (apt), Pu Mat N'Park, Khe Kem waterfall & stream, site #1, coll. Ngo Q.H., 20 December 2012, NQH1203 (ZMHU); 1 male (apt), Pu Mat N'Park, Khe Kem stream, site #2, ca. 300 m downstream from waterfall, coll. Ngo Q.H., 20 December 2012, NQH1204 (ZMHU); 1 male, 1 female, Pu Mat N'Park, Khe Kem stream, site #3,



Figs. 80–90. Morphological features of *Metrocoris* species. 80–83: *M. ciliatus*, macropterous male. 80: right fore leg. 81, 82: left paramere, two different views. 83: endosomal sclerites, lateral view. 84, 85: *M. inthanon*. 84: right fore leg of male. 85: apex of abdomen, female, ventral view. 86–90: *M. triangulatus*. 86–89: male holotype. 86: A, right fore leg. 87: left paramere. 88, 89: endosomal sclerites, lateral and dorsal views. 90: abdomen of female, ventral view (80, 84, 86 same scale; 81–83 same scale; 85, 90 same scale).

coll. Ngo Q.H., 20 December 2012, NQH1205 (ZMHU); 1 male, 1 female (apt), Pu Mat N'Park, Khe Kem stream, site #4, coll. Ngo Q.H., 20 December 2012, NQH1206 (ZMHU); 3 males, 1 female (apt), Pu Mat Nature Reserve, SW. of Con Cuong, Kem waterfall, 400 m asl, vic. 18°58′13″N, 104°48′03″E, water temp. 22°C, 1 April 2000, CL 4385, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 4 males, 6 females (apt), Bac stream, nr. Pu Mat Nature Reserve, 200 m asl, vic. 18°59′18″N, 104°50′33″E, water temp. 24°C, 2 April 2000, CL 4388, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM). **Ha Tinh Prov.:** 1 male, 3 females (apt), 1 female (mpt), Vu Quang N'Park, Song Con, old Sao La station, coll. Tran A.D., 25 April 2003, TAD0307a (ZRC). **Quang Binh Prov.:** 1 male, 2 females (apt), Phong Nha N'Park, Cha Noi, Khe Khai, coll. Hoang Q.K. & Dinh V.K, 5 August 2002, VNQB0201 (ZRC); 1 male (mpt), Phong Nha N'Park, Khe Gat, Cha Noi, coll. Hoang Q.K. & Dinh V.K., 4 April 2003, VNQB0301 (ZRC); 4 males, 2 females (apt), 1 female (mpt), Phong Nha, Cha Noi, Khe Con Khai stream, coll. Tran A.D., 13 July 2004, DY0402 (ZRC); 1 male (apt), Phong Nha, a stream near Forest Ranger station 37, coll. Tran A.D., 15 July 2004, DY0405 (ZRC); 2 males, 3 females (apt), Phong Nha, Chay stream, coll. Tran A.D., 17 July 2004, DY0410 (ZRC). **Gia Lai Prov.:** 15 males, 15 females (apt), 40 km NW. An Khe, Buon Luoi, 14°10′N, 108°30′E, 620–750 m asl, coll. Pacholátko & Dembicky, 28 March–12 April 1995 (NHMW, ZRC); 19 males, 20 females (apt), 3 females (mpt), Tral Stream, 60 km N. of An Khe, 700 m asl, 14°20′28″N, 108°34′49″E, water temp. 23.5°C, 22 March 2001, CL 4309, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 2 females (mpt), small stream 2 km N. of Tram Lap along forest road, 19 June 1996, ROM-961066, 14°26′N, 108°33′E, primary rainforest, 900 m asl, coll. B. Hulbey (USNM). **Ninh Thuan Prov.:** 1 female (apt), Nui Chua N'Park, suoi Lo O, coll. Quang N.V., 26 June 2004, NC-03 (ZRC); 1 female (apt), Nui Chua N'Park, unknown location, coll. Quang N.V., 26 June 2004, NC-15 (ZRC).



Figs. 91–93. *Metrocoris inthanon*, variations of male parameres. 91: specimen from Vietnam, Nghe An Prov., Pu Mat Nature Reserve (CL 4388). 92: specimen from Laos, Vientiane Prov., Ban Van Heue. 93: specimen from Vietnam, Gia Lai Prov., 60 km N. of An Khe (CL 4309).

LAOS: **Champasak Prov.:** 5 females (apt), Bolavens plateau E. Pakse, 50 km E. Muang Paksong, 700 m asl, coll. Schillhammer (9), 27 May 1996 (NHMW). **Vientiane Prov.:** 2 males, 3 females (apt), Ban Van Heue, ~20 km E. of Phou Khao Khouay park HQ, 1039 m asl, vic. 18°17′44″N, 102°53′48″E, 29 March 1966, coll. J.L. Gressit et al. (BPBM). THAILAND: **Mae Hong Son Prov.:** 3 males, 2 females (apt), NW. Thailand, waterfall near Mae Sariang, coll. C.M. Yang & T.B. Lim, 11 September 1998, YCM219 (ZRC).

Diagnosis. Dorsum with extensive dark markings. Both male and female with dense black setae on all thoracic pleura. Male: fore femur slender, not modified (Fig. 84). Male genitalia moderate in size: tergum 8 with median notch on posterior margin; pygophore sub-ovate; proctiger elongate; paramere curved with distal part slightly broad and apex blunt (Figs. 91–93); endosoma as in Chen & Nieser (1993: 170). Female: sternum 7 large, not constricted laterally, posterior margin slightly produced (Fig. 85).

Size: apterous males: length 4.70–5.40, width 2.54–2.84, macropterous males: length 7.10, width 2.81; apterous females: length 4.90–5.60, width 2.64–2.97, macropterous females: length 5.20–5.50 (wings broken halfway), width 2.81–2.90.

Remarks. The *M. ciliatus* species group was defined by Chen & Nieser (1993) based on the following character states: male fore femur slender and not modified; meso- and metapleura with black setae; male genital segments moderate in size, parameres not prominent, ventral sclerite of endosoma shortened; female sternum 7 large with posterior margin round or almost straight. Within the *M. ciliatus* group, *M. inthanon* is closely related to *M. ciliatus* by having a similar endosomal structure and having dense black setae on the meso- and metapleuron (see Chen & Nieser, 1993), but it can be easily separated from the latter by its slightly larger body, extensive dark markings on the dorsum, dense black setae on the meso- and metapleuron present in both males and females, tergum 8 of the male with a median notch on posterior margin, and the shape of the male paramere. Parameres of *M. inthanon* populations from different localities show some variations in the thickness of distal part and the shape of apex (see Figs. 91–93). Because specimens of these populations match all other diagnostic characteristics of *M. inthanon*, we consider these as intra-specific variation in the context of the current work.

Distribution. Vietnam: Phu Tho, Thanh Hoa, Nghe An (first record), Ha Tinh, Quang Binh, Gia Lai, Ninh Thuan, (Fig. 140). Extralimital records: Laos, Thailand.

Metrocoris triangulatus Zettel & Chen, 1996
(Figs. 22, 23, 40, 86–89)

Metrocoris triangulatus Zettel & Chen, 1996: 152, 177–178, Figs. 48–52 (type locality: Vietnam, An Khe – Buon Luoi).

Material examined. Holotype (apterous male), VIETNAM, **Gia Lai Prov.:** "40km NW An Khe, Buon Luoi, 14°10′N, 108°30′E, 620–750 m, 28.3. –12.4.1995, leg. Pacholátko & Dembicky" (NHMW). **Paratype**: VIETNAM: 1 female (apt), same locality label as holotype (NHMW).

Others: VIETNAM: **Thanh Hoa Prov.:** 1 male, 1 female (apt), Ben En N'Park, Nhu Xuan, Xuan Quy, Song Chang ranger station, Khe Khoanh 2 stream, coll. Pham T.D., 11 March 2013, BE1310 (ZMHU); 1 female (mpt), Pu Hu Nature Reserve, Quan Hoa, Hien Chung, Ban Pheo, Ham stream, coll. Pham T.D., 09 April 2013, PH1303 (ZMHU). **Da Nang Prov.:** 12 males, 7 females (apt), 1 male, 3 females (mpt), Ba Na - Nui Chua, Suoi Cat Lon, 700 m asl, coll. Tran A.D. & Tan H.H., 28 February 2005, THH05-19 (NHMW, ZMHU, ZRC). **Kon Tum Prov.:** 11 males, 47 females (apt), small stream 60 km NE. of Kontum on Hwy. 24, 1035 m asl, 14°35′43″N, 108°17′49″E, water temp. 18°C, 6 March 2001, CL 4280, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM). **Gia Lai Prov.:** 2 males, 6 females (apt), 1 male (mpt), Tral Stream, 60 km N. of An Khe, 700 m asl, 14°20′28″N, 108°34′49″E, water temp. 23.5°C, 22 March 2001, CL 4309,

coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 4 males, 17 females (apt), 2 females (mpt), small hill stream in primary forest, 68 km N. of An Khe, 840 m asl, 14°20′52″N, 108°32′57″E, water temp. 21°C, 22 March 2001, CL 4311, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 1 male, 1 wingless female (apt), small stream 2 km N. of Tram Lap along forest road, 19 June 1996, ROM-961066, 14°26′N, 108°33′E, primary rainforest, 900 m asl, coll. B. Hulbey (USNM).

Diagnosis. Body dorso-ventrally compressed. Male: fore femur slender, not modified (Fig. 86); pro-, meso-, metapleuron, meso-, metanotum and abdominal tergum 1 with black setae. Male genitalia small: pygophore short, sub-ovate on ventral view and directed dorsad on lateral view; paramere curved, proximal part broader than distal part, apex narrowly rounded (Figs. 40, 87); endosoma as in Figs. 88, 89. Female: thoracic segments without black setae; sternum 7 large, about as long as previous sterna together, posterior margin broad, slightly arched (Fig. 90).

Size: apterous males: length 5.40–6.30 (holotype 6.30), width 3.38–3.50 (holotype 3.50), macropterous males: length 5.20 (wings broken), width 3.04; apterous females: length 4.80–5.00, width 3.20–3.33, macropterous females: length 6.60–6.90, width 3.04–3.10.

Additional description of macropterous morph. Colour: Dorsal head yellow with two small brown spots on the interocular area (similar to apterous form). Pronotum mainly yellow with brown markings: anterior margin black, a pair of brown sub-lateral stripes slender, confluent with a brown median stripe anteriorly and posteriorly, posterior margin from humeri to apex light yellow. Wings brownish, anterior margin with dense black hairs. Colour of antenna and legs similar to apterous form.

Macropterous male: Head width 1.51, interocular width 0.51, eye size 0.75. Lengths of antennal segments: 2.57: 1.17: 0.89: 0.70. Pronotum length 3.00, width 2.35, apex of pronotal lobe round. Lengths of leg segments (femur: tibia: tarsus 1 + 2): fore leg: 2.35: 2.30: 0.75; middle leg: 6.50: 5.30: 1.98; hind leg: 6.70: 3.82: 0.57. Other structural characteristics as in apterous male.

Macropterous female: Head width 1.49, interocular width 0.57, eye size 0.73. Lengths of antennal segments: 1.76: 0.87: 0.82: 0.67. Pronotum length 2.81, width 2.28, apex of pronotal lobe round. Lengths of leg segments: fore leg: 1.80: 1.94: 0.70; middle leg: 5.60: 4.41: 1.84; hind leg: 5.60: 3.33: 0.56. Other structural characteristics as in apterous female.

Remarks. Zettel & Chen (1996) discussed the similarity of *M. triangulatus* with other species that possess pleural black setae, i.e., species of the *M. ciliatus* group (sensu Chen & Nieser, 1993) and the *M. philippiensis* group (sensu Chen & Nieser, 1993, including *M. sunda* D. Polhemus and *M. tigrinus* D. Polhemus). However, the form of the male parameres (short and only slightly curved) and the structure of endosoma sclerites of *M. sunda* and *M. tigrinus* clearly separate them from the *M. ciliatus* group. Zettel & Chen (1996) also noted that *M. triangulatus* was also relatively similar to *M. tenuicornis* because both species have similar leg structures (fore femur slender, middle and hind legs very long), and small genital segments. However, *M. triangulatus* can be separated from the latter by the black setae on the pleura (in males), the shape of male paramere and the shape of sternum 7 in the female.

Metrocoris triangulatus matches all diagnostic characteristics of the *M. ciliatus* group (see Remarks for *M. inthanon*), particularly the presence of black pleural setae in males and the shape of female sternum 7, thus it can be placed in this species group. *Metrocoris triangulatus* differs from other species in the *M. ciliatus* group by the shape of body, the very small genital segments, and the shape of the male paramere. For further comparisons, see Remarks under *M. sicilis*, new species.

Distribution. Vietnam: Thanh Hoa (first record), Kon Tum (first record), Da Nang (first record), Gia Lai (Fig. 140).

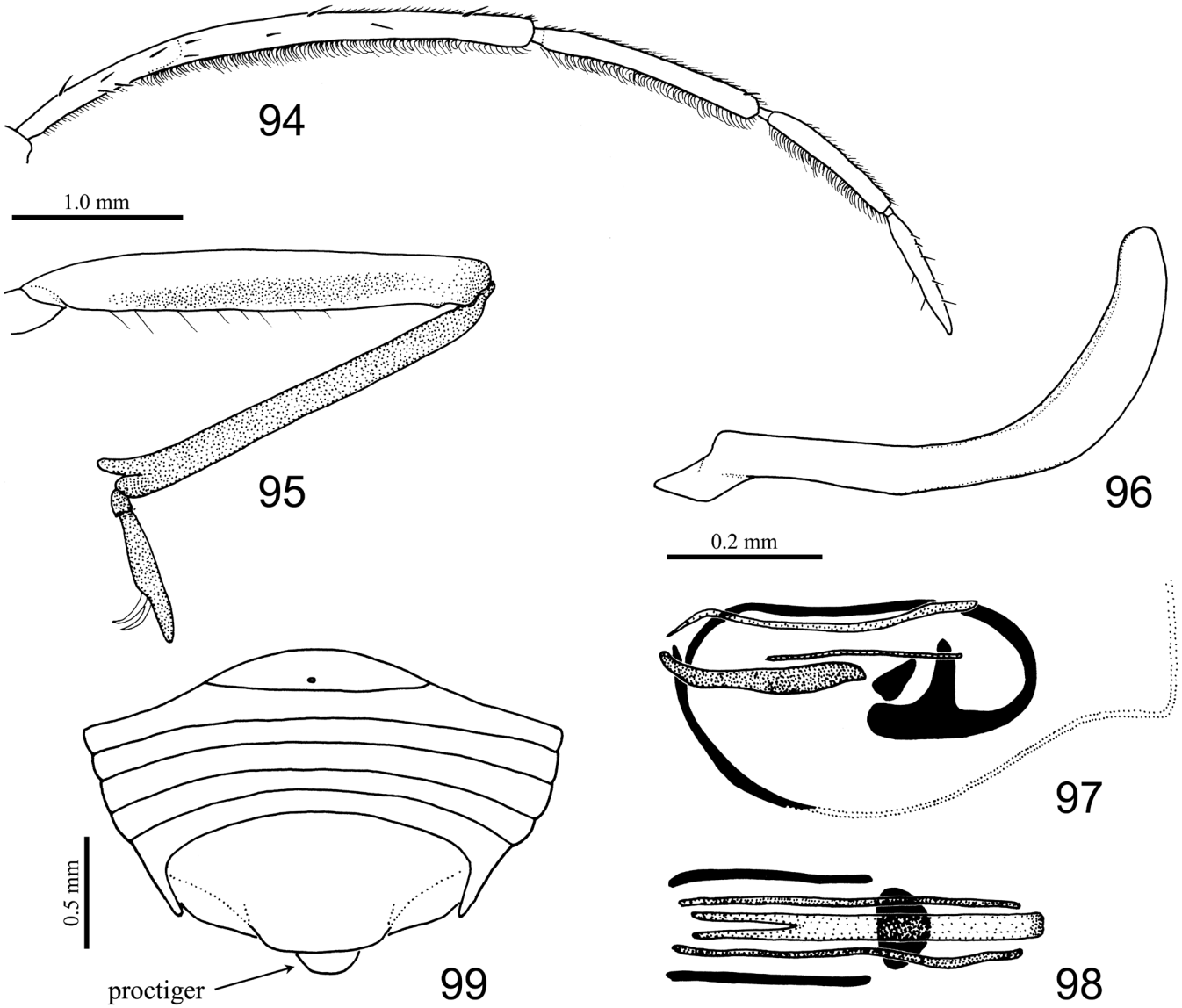
Metrocoris sicilis, new species

(Figs. 20, 21, 39, 94–99)

Material examined. Holotype (apterous male) and **allotype** (apterous female): VIETNAM: Hanoi, Ba Vi N'Park, stream near Coste 400, ca. 550 m asl, coll. Ngo Q.H. et al., 16 December 2011, TAD1120 (ZMHU).

Paratypes: VIETNAM: **Hanoi:** 2 males, 6 females (apt), same locality data as Holotype (ZMHU); 2 males, 2 females (apt), Ba Vi N'Park, small creek by main road to summit, ca. 9.5 km from park head quarter, ca. 600 m asl, coll. Tran A.D., 11 June 2010, TAD1014 (NHMW, ZRC); 1 male, 1 female (apt), 1 male (mpt), Ba Vi N'Park, stream near Coste 400, ca. 550 m asl, coll. Ngo Q.H. & Tran A.D., 27 April 2012, TAD1210 (ZMHU); 3 males, 12 females (apt), Ba Vi N'Park, nr. Son Tay, W. of Ha Noi, third small stream on lower road, 625 m asl, vic. 21°03′32″N, 105°21′16″E, water temp. 18.5°C, 4 April 2000, CL 4393, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM); 3 males, 2 females (apt), Ba Vi N'Park, nr. Son Tay, W. of Hanoi, second small stream on lower road, 615 m asl, 21°03′32″N, 105°21′13″E, water temp. 18°C, 4 April 2000, CL 4392, coll. J.T. Polhemus & P. Nguyen (USNM, BPBM). **Phu Tho Prov.:** 1 male, 1 female (apt), Xuan Son N'Park, Kim Thuong, Tan Ong stream, site 3, ca. 4 km from Chin Tang waterfall, coll. Tran A.D. et al., 28 August 2013, TAD1342 (ZMHU).

Diagnosis. Both sexes: body dorso-ventrally compressed (more conspicuous in females); fore femur slender (ratio length/width: males, 7.43–8.44; females, 6.44–7.42), sub-apically constricted, ventral surface with sub-apical elevation (more prominent in males) (Fig. 95). Male: antennae with dense hairs along segments 1–3 (Fig. 94); pro-, meso- and metanotum, pleura, and abdominal tergum 1 with scattered black setae; genitalia small, abdominal segment 8 short, pygophore and proctiger simple, longer than wide; paramere long, falciform, curved dorsad at distal one-third, apex



Figs. 94–99. Morphological features of *Metrocoris sicilis*, new species. 94: right antenna of male. 95: right fore leg of male. 96: left paramere. 97, 98: endosomal sclerites, lateral and dorsal views. 99: abdomen of female, ventral view (94, 95 same scale; 96–98 same scale).

broadly rounded (Figs. 39, 96); endosoma dorsal sclerite long, recurved and expanded apically, apical accessory sclerite distinctly visible, lateral sclerite slender and short, two pairs of thin accessory lateral sclerites present, ventral sclerite short (Figs. 97, 98). Female: thoracic segments without black setae; sternum 7 large, about as long as previous sterna together, posterior margin narrow, straight (Fig. 99).

Description. Size: apterous males: length 5.43–6.00 (holotype: 5.13), width 3.09–3.52 (holotype: 2.98); macropterous male: length excluding wings 5.13 (including wings 7.28), width 3.09; apterous females: length 4.63–5.25 (allotype: 5.00), width 2.85–3.45(allotype: 3.16).

Colour (Figs. 20, 21). Apterous morph: Interocular area with light brown mark or without dark mark. Antenna: segment 1 yellowish at proximal part and brown at distal part, segments 2–4 light brown to dark brown. Dorsum of thorax yellowish with usually slender blackish markings. Pronotum with median black T-shaped mark at anterior margin and confluent with two dark brown or black marks near anterolateral margin. Mesonotum: black mark on anterior margin connected with lateral stripes and median longitudinal stripe; lateral stripes running towards but not reaching posterior margin; sublateral stripes usually confluent with posterolateral marks; mesopleura with a longitudinal light brown stripe on each side. Metanotum with black mark running along anterior and lateral margins, confluent with medial longitudinal mark and metacetabular stripes, bordering broad yellowish background; metacetabular stripes black, running throughout its length. Fore femur with apical dark ring and a longitudinal mark on external side connected with ring; fore tibia and tarsus brown or dark brown. Middle and hind legs: femora mostly yellow, usually with distal part brown; tibiae and tarsi dark brown. Abdomen mainly blackish dorsally, tergum 1 with one broad yellowish mark running across width of tergum; terga 3–7: posterior part with yellow marks medially. Venter bright yellowish. Macropterous morph: Pronotum with dark mark on anterior margin, confluent with the median longitudinal stripe, but not connected with dark mark on lateral margin between anterior corner and humeri; two light brown sublateral marks running toward apex of protonal lobe

but not confluent with the median stripe; posterior margin between humeri and apex light yellowish. Fore wings mainly dark brown, anterior margin yellowish, posterior part of wings light brown.

Apterous male (holotype): Head width 1.58; interocular width 0.59; eye size 0.81. Lengths of antennal segments 1–4: 3.13: 1.35: 0.99: 0.76. Pronotum length 0.38. Mesonotum length 1.53. Lengths of leg segments: fore leg: 2.60: 2.35: 0.14: 0.76; middle leg: 7.15: 5.75: 2.13: 032; hind leg: 7.15: 4.28: 0.32: 0.38. Fore femur slender, width of femur: 0.35, ratio length/width: 7.43; other characteristics of fore femur as in Diagnosis above. Abdomen length on ventral view: 1.12, pregenital length 0.54; sternum 7 slightly longer than sterna 5 and 6 combined, length 0.16. Genitalia of male: segment 8 short, length 0.27, width 0.63; characteristics of pygophore, proctiger, paramere, and endosoma as in Diagnosis above.

Apterous female (allotype): Head width 1.52; interocular width 0.54; eye size 0.77. Lengths of antennal segments 1–4: 2.05: 0.97: 0.88: 0.73. Pronotum length 0.38. Mesonotum length 1.44. Lengths of leg segments: fore leg: 2.19: 1.95: 0.13: 0.63; middle leg: 6.15: 4.50: 1.86: 0.27; hind leg: 6.15: 3.48: 0.27: 0.35. Fore femur slender, width 0.34, ratio length/width: 6.44. Abdominal venter length 1.23, length of tergum 7: 0.23, length of sternum 7: 0.63. Shape of sternum 7: see Diagnosis above. Connexival margin with long hairs.

Macropterous male: Head width 1.62, interocular width 0.63, eye size 0.77. Lengths of antennal segments 1–4: 2.97: 1.37: 0.99: 0.82. Pronotum: apex of pronotal lobe rounded, median length 2.91, humeral width 2.50. Fore wing length 5.5. Lengths of leg segments: fore leg: 2.72: 2.44: 0.17: 0.81; middle leg: 7.10: 5.56: 2.20: 0.34; hind leg: 6.90: 4.30: 0.33: 0.40. Fore femur slender, width 0.38, ratio length/width: 7.16. Abdomen length on ventral view: 1.14, pregenital length 0.50; sternum 7 slightly longer than sterna 5 and 6 combined, length 0.17. Other characteristics as in apterous males.

Macropterous female unknown.

Remarks. *Metrocoris sicilis*, new species, clearly belongs to the *M. ciliatus* group (sensu Chen & Nieser, 1993). It differs from other species in this group by the combination of following characteristics: dense hairs on antennal segments 1–3 of the male; both males and females with the fore femur sub-apically constricted, and its ventral surface with a sub-apical elevation; longer, sickle-shaped parameres; and the shape of sternum 7 of females. It is most similar to *M. triangulatus* due to triangular shape of body, but can be separated from the latter by the characteristics above.

To date, four species belonging to the *M. ciliatus* species group have been found in Vietnam: *M. ciliatus*, *M. inthanon, M. triangulatus,* and *M. sicilis* new species. Among these, two species, *M. sicilis* and *M. triangulatus*, are most closely related to each other, due to the triangular appearance of the body, the dorso-ventrally compressed body, the structure of the endosoma, and the general shape of sternum 7 in the female. *Metrocoris sicilis* can be easily separated from *M. triangulatus* by having the fore femur of both sexes with a sub-apical elevation on the ventral surface, antennal segments 1–3 of the male with dense and long hairs, the genitalia relatively larger, and the male paramere longer, with a broadly rounded apex. In *M. triangulatus,* the fore femur of both sexes is simple, without a sub-apical elevation on the ventral surface, the antenna of the male has only a dense pilosity of shorter hairs on segments 2 and 3, the genitalia are small, and the paramere is short, tapering towards a narrow apex.

Etymology. The word "*sicilis*" in Latin means sickle (see Brown, 1956). The species epithet refers to the sickle-shaped paramere, and is used as a noun in apposition.

Distribution. Vietnam: Hanoi (Ba Vi), Phu Tho (Xuan Son) (Fig. 140).

Habitats. This new species was found on forest streams.

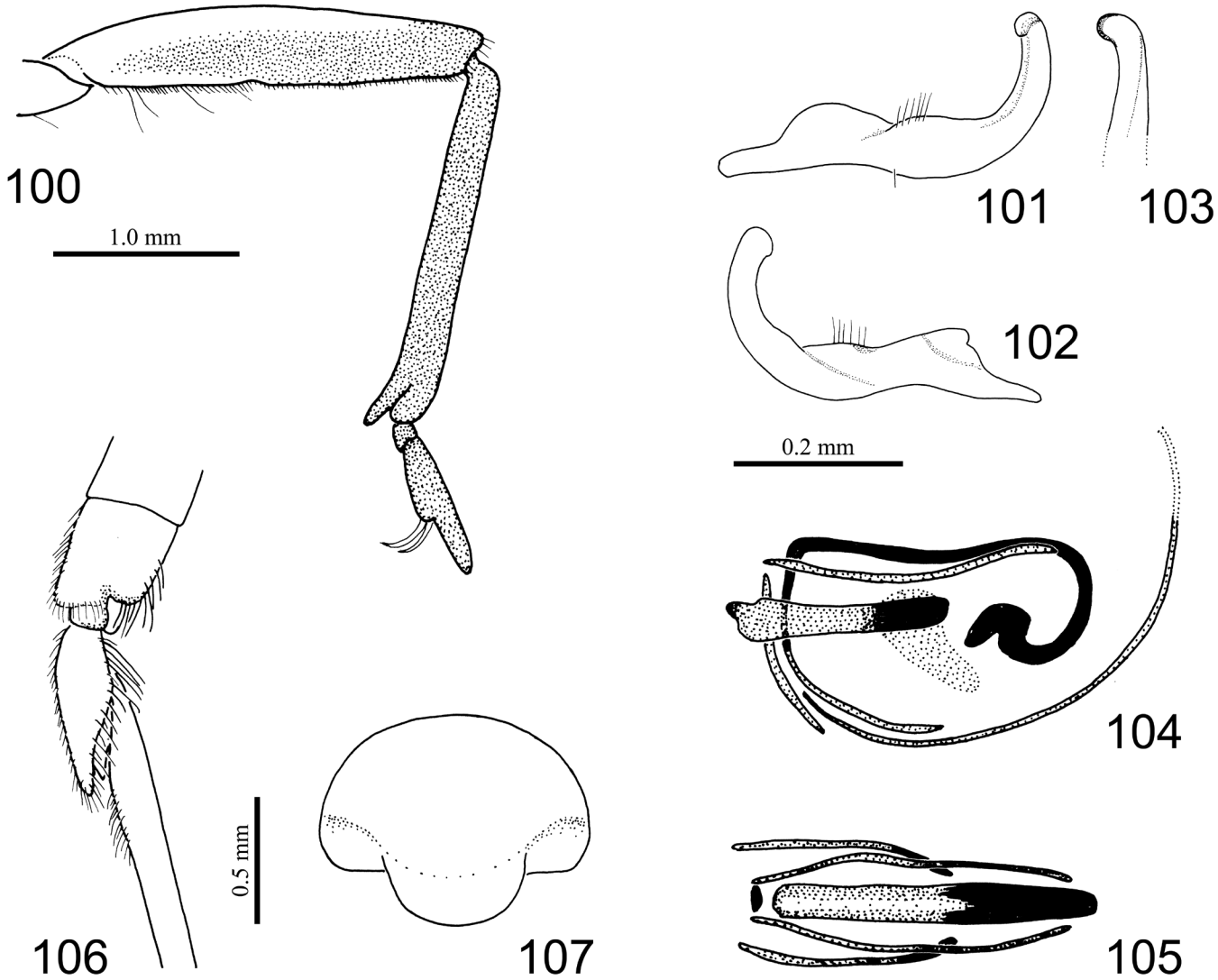
Metrocoris compar species group

Metrocoris nigriventris, new species

(Figs. 24, 25, 42, 100–107)

Material examined. Holotype (apterous male) and **allotype** (apterous female): VIETNAM, Lao Cai Prov., Sa Pa, Thanh Phu, near junction of Nam Cang and Muong Hoa streams, coll. Dinh N.H. et al., 23 October 2012, DNH12.06 (ZMHU).

Paratypes: VIETNAM: **Lao Cai Prov.:** 1 male, 3 females (apt), same locality data as holotype (ZMHU); 1 male (apt), Sa Pa, Ban Ho, Nam Pu stream 2, coll. Dinh N.H. et al., 22 October 2012, DNH12.02 (ZRC); 1 female (apt), Sa Pa, Seo Trung Ho stream, coll. Dinh N.H. et al., 22 October 2012, DNH12.05 (ZRC); 1 male (apt), Sa Pa, Nam Cang, Nam Cang stream, coll. Dinh N.H. et al., 23 October 2012, DNH12.08 (ZMHU); 1 female (apt), Sa Pa, Nam Sai, Seo Nam Sai stream 1, coll. Dinh N.H. et al., 24 October 2012, DNH12.09 (ZMHU); 3 males, 2 females (apt), rocky river and tributary 7 km NE. of Sa Pa on Lao Cai road, 1220 m asl, 22°22′19″N, 103°52′16″E, water temp. 17°C, 7 April 2000, 0830–1000 hrs., CL 4395, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 5 males, 1 females (apt), 1 male (mpt), rocky river and small trib., 16 km NE. of Sa Pa on Lao Cai road, 850 m asl, 22°24′52″N, 103°53′51″E, water temp. 19°C (main river), 7 April 2000, 1115–1400 hrs.; 9 April 2000, 1500–1600 hrs., CL 4397, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 4 males, 2 females (apt), 1 female (mpt), small rocky stream 19 km NE. of Sa Pa on Lao Cai road, 595 m asl, 22°25′39″N, 103°55′00″E, water temp. 20°C, 7 April 2000, 1515–1600 hrs., CL 4399, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM); 5 males, 3 females (apt), cascading stream 20 km NE. of Sa Pa on Lao Cai road, 565 m asl, 22°26′20″N, 103°55′36″E, water temp. 19°C, 9 April 2000, 1215–1430 hrs., CL 4406, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Lai Chau Prov.:** 2 males, 3 females (apt), 3 males (mpt), cascading stream 12 km N. of Lai Chau, 290 m asl, 22°07′19″N, 103°11′30″E,



Figs. 100–107. Morphological features of *Metrocoris nigriventris*, new species. 100: right fore leg of male. 101–103: left paramere, three different views. 104, 105: endosomal sclerites, lateral and dorsal views. 106: hind coxa and trochanter of female. 107: sternum 7 of female, ventral view (101–105 same scale; 106, 107 same scale).

water temp. 22°C, 11 April 2000, 1345–1600 hrs., CL 4410, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Phu Tho Prov.:** 1 male (apt), Xuan Son N'Park, Lap stream, site 1, at Ngoc waterfall, coll. Nguyen T.S. et al., 27 August 2014, TS1409 (ZMHU); 1 male (mpt), Xuan Son N'Park, Lap stream, site 1, at Ngoc waterfall, coll. Nguyen T.S. et al., 23 May 2015, TS1511 (ZMHU).

Diagnosis. Both sexes: body sub-ovate, ventral surface with distinct dark marks; fore femur relatively short, about subequal to length of mesosternum) slender (ratio length/width: males, 5.12–6.40; females, 6.34–6.98); in males, proximal half of fore femur about as wide as distal half, ventral surface slightly notched near the middle (Fig. 100), pilosity denser and longer at proximal half (in females, fore femur simple). Male: genitalia of medium size, abdominal segment 8 longer than wide and clearly longer than sternum 7; pygophore simple, on ventral view apex of pygophore straight, postero-lateral surface covered with long yellowish hairs; proctiger simple, lateral margins almost parallel, with long hairs on lateral margins; paramere not extending beyond genital segment, hook-shaped, curved dorsad at distal one-third, with apex projected outwards and anteriorly (Figs. 101–103); endosoma (Figs. 104, 105): dorsal sclerite long and recurved proximally, apical accessory sclerite large but weakly sclerotised, lateral sclerite broad and short, thin accessory lateral sclerite present. Female: hind trochanter produced posteriorly, forming a small process with some long hairs (Fig. 106); abdomen shortened, tip of abdomen barely surpassing apex of hind coxa; sternum 7 large, clearly longer than previous sterna together, constricted laterally, posterior part producing a median lobe with rounded apical margin, directed dorsad, and completely enclosing genitalia on ventral view (Fig. 107).

Description. Size: apterous males: length 4.75–5.31 (holotype 5.13), width 2.25–2.63 (holotype 2.41), macropterous males: length 6.00–6.45, width 2.22–2.45; apterous females: length 4.34–5.19 (allotype 4.70), width 2.36–2.66 (allotype 2.45), macropterous females: length 6.80, width 2.50.

Colour (Figs. 24, 25): Apterous morph: Interocular area with dark brown mark medially. Antenna: segment 1 yellowish at proximal half and brown at distal half; segments 2–4

brown. Dorsum of thorax yellowish with black markings. Pronotum with median black T-shaped mark at anterior margin and confluent with two lateral black marks which run to propleura. Mesonotum: black mark on anterior margin slender and connected with lateral stripes and median longitudinal stripe; lateral stripes slender, reaching posterior margin of mesonotum; sublateral marks slender anteriorly and broadened posteriorly, confluent with black mark on anterior margin (sublateral marks sometimes variable, indistinct); mesopleura with a longitudinal brown stripe. Metanotum with broad black mark running along anterior and lateral margins, confluent with medial longitudinal mark and metacetabular stripes, bordering yellowish background; metacetabular stripes black, slender and short, about half of metacetabular length; yellow areas on meso- and metacetabula covered with silvery pubescence. Fore femur with apical dark ring and a distinct longitudinal mark on external side usually connected with ring, inner and ventral side chiefly brown; fore tibia and tarsus dark brown. Middle and hind legs: coxae and trochanters chiefly yellowish; middle femur mostly yellow, dorsal and ventral surface each with a longitudinal slender brown mark; hind femur only yellowish proximally; tibiae and tarsi dark brown. Abdomen mostly black dorsally. Venter of body with distinct dark marks: pro-, meso-, and metasternum with broad longitudinal black mark medially; mesosternum with additional broad black or dark brown marks on antero-lateral and postero-lateral areas; abdominal sterna chiefly brown, genital segment usually yellowish. Macropterous morph: Pronotum with dark mark on anterior margin, confluent with the median longitudinal stripe, and connected with dark mark on lateral area between anterior corner and humeri; two brown sublateral marks running toward apex of protonal lobe usually confluent with the median stripe posteriorly; posterior margin between humeri and apex light yellowish. Fore wings chiefly dark brown, posterior part of wings light brown.

Apterous male (holotype): Head width 1.32, interocular width 0.67, eye size 0.56. Lengths of antennal segments 1–4: 2.06: 0.90: 0.85: 0.70. Pronotum length 0.55, mesonotum length 1.32. Lengths of leg segments (femur: tibia: tarsus 1: tarsus 2): fore leg: 2.05: 1.80: 0.09: 0.67; middle leg: 5.19: 3.50: 1.90: 0.34; hind leg: 5.00: 2.78: 0.30: 0.38. Fore femur: width 0.32, other characteristics as in Diagnosis above. Abdomen length on ventral view: 1.71, pregenital length 0.68; sternum 7 about as long as sterna 3–6 combined, length 0.28. Genital segments medium size: segment 8 broadened posteriorly, length 0.49, width 0.61; characteristics of pygophore, proctiger, paramere, and endosoma as in Diagnosis above.

Apterous female (allotype): Head width 1.33; interocular width 0.59; eye size 0.58. Lengths of antennal segments 1–4: 1.90: 0.81: 0.86: 0.71. Pronotum length 0.45, mesonotum length 1.57. Lengths of leg segments: fore leg: 2.03: 1.75: 0.11: 0.67; middle leg: 5.06: 3.43: 2.00: 0.34; hind leg: 4.90: 2.66: 0.29: 0.40. Fore femur slender, width 0.32. Hind coxae simple, without apical projection, hind trochanter produced posteriorly, forming a small process with some long hairs, length of hind trochanter 0.70. Abdominal venter length 1.32, length of tergum 7: 0.20, length of sternum 7 (caudal view): 0.72. Shape of sternum 7: see Diagnosis above. Connexival margin with scattered long hairs.

Macropterous male: Head width 1.35, interocular width 0.63, eye size 0.60. Lengths of antennal segments 1–4: 2.05: 0.92: 0.87: 0.72. Pronotum: apex of pronotal lobe rounded, median length 3.03, humeral width 2.25. Fore wing length 4.9. Lengths of leg segments: fore leg: 2.18: 1.75: 0.11: 0.72; middle leg: 5.19: 3.75: 2.13: 0.38; hind leg: 5.19: 2.97: 0.30: 0.42. Fore femur: width 0.38. Abdomen length on ventral view: 1.95, pregenital length 0.72; sternum 7 about as long as sterna 3–6 combined, length 0.27. Abdominal segment 8: length 0.63, width 0.65. Other characteristics as in apterous males.

Macropterous female: Head width 1.35, interocular width 0.63, eye size 0.58. Lengths of antennal segments 1–4: 1.83: 0.83: 0.90: 0.72. Pronotum: apex of pronotal lobe rounded, median length 3.20, humeral width 2.35. Fore wing length 5.25. Lengths of leg segments: fore leg: 2.15: 1.95: 0.11: 0.72; middle leg: 5.38: 3.60: 2.18: 0.37; hind leg: 5.25: 2.78: 0.32: 0.42. Fore femur as slender as in apterous female, width: 0.32. Abdominal venter length 1.08, length of sternum 7: 0.76. Other characteristics as in apterous females.

Remarks. See Remarks under *Metrocoris monticola*, new species.

Etymology. This species epithet refers to the extensive black marks on ventral surface of the body, a character state usually present in members of the *M. compar* species group.

Distribution. Vietnam: Lao Cai, Lai Chau, Phu Tho (Fig. 141).

Habitats. *Metrocoris nigriventris*, new species has been collected from montane streams, at elevations ranging from 290 to 1220 m.

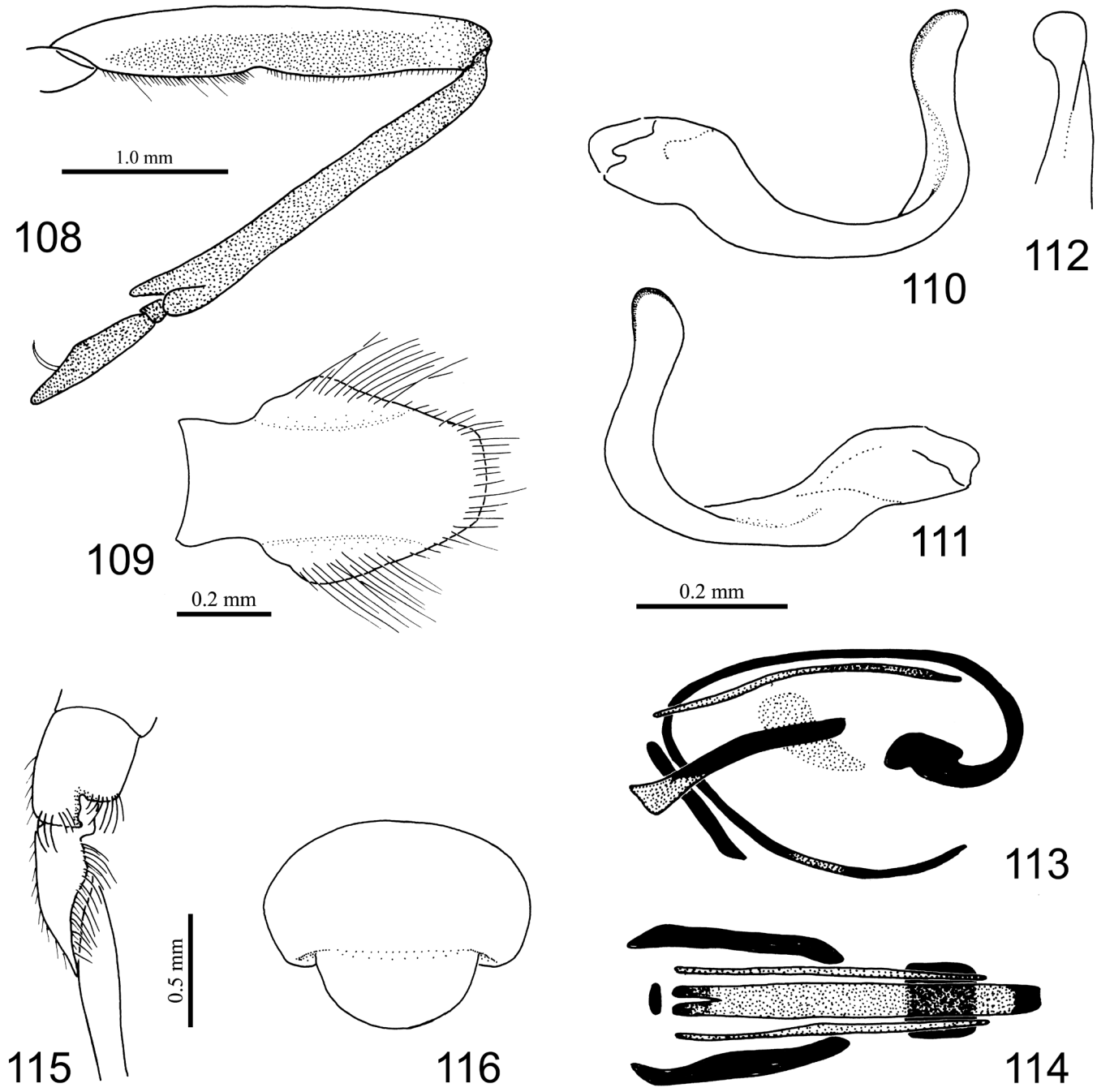
Metrocoris monticola, **new species**

(Figs. 26, 27, 43, 108–116)

Material examined. Holotype (apterous male) & **allotype** (apterous female): VIETNAM, Lao Cai Prov., Sa Pa, Sin Chai, Sin Chai stream, site 1, coll. Tran A.D. et al., 27 October 2013, TAD1363 (ZMHU).

Paratypes: VIETNAM: 6 males, 5 females (apt), same locality data as holotype (ZMHU, BPBM, NHMW, ZRC).

Diagnosis. Both sexes: body sub-ovate, ventral surface with distinct dark marks; fore femur clearly longer than mesosternum. Male: fore femur moderately slender (ratio length/width: 5.66–6.49), proximal half about as wide as distal half, ventral surface with a distinct notch near the middle, pilosity denser and longer at proximal half (Fig. 108); genitalia of medium size, abdominal segment 8 clearly longer than sternum 7; pygophore simple, on ventral view apex of pygophore broadly rounded, postero-lateral surface with sparse long yellowish hairs; proctiger simple,



Figs. 108–116. Morphological features of *Metrocoris monticola*, new species. 108: right fore leg of male. 109: proctiger of male. 110–112: left paramere, three different views. 113, 114: endosomal sclerites, lateral and dorsal views. 115: hind coxa and trochanter of female. 116: sternum 7 of female, ventral view (110–114 same scale; 115, 116 same scale).

slightly broadened at basal two-fifths, with long hairs on lateral margins (Fig. 109); paramere not extending beyond genital segment but prominent, curved dorsad at distal half, apex broadened and rounded, curved outwards and posteriorly (Figs. 110–112); endosoma: dorsal sclerite long and recurved proximally, apical accessory sclerite large but weakly sclerotised, lateral sclerite slender and short, thin accessory lateral sclerite present (Figs. 113, 114). Female: fore femur simple and slender (ratio length/width 6.94–7.53); hind trochanter elongated, without long hairs (Fig. 115); abdomen shortened, tip of abdomen not surpassing apex of hind trochanter; sternum 7 large, clearly longer than previous sterna together, constricted laterally, posterior part producing a median lobe with broadly rounded apical margin, directed dorsad, and completely enclosing genitalia on ventral view (Fig. 116).

Description. Size: apterous males: length 5.80–6.00 (holotype 5.88), width 2.53–2.75 (holotype 2.66); apterous females, length 5.13–5.44 (allotype 5.13), width 2.75–2.84 (allotype 2.75).

Colour (Figs. 26, 27): Apterous morph: Interocular area with dark brown mark medially. Antenna: segment 1 yellowish at proximal part and brown at distal part; segments 2–4 brown or lightly brown. Dorsum of thorax yellowish with black markings. Pronotum with median black T-shaped mark at anterior margin and confluent with two black marks on antero-

lateral areas, which run to propleura. Mesonotum: black mark on anterior margin connected with lateral stripes and median longitudinal stripe; lateral stripes slender, reaching posterior margin of mesonotum; sublateral marks slender broadened posteriorly, confluent with black mark on anterior margin; mesopleura with a longitudinal brown stripe. Metanotum with broad black mark running along anterior and lateral margins, confluent with medial longitudinal mark and metacetabular black marks, bordering yellowish background; metacetabula with broad black marks usually reaching posterior margin of metacetabula; yellow areas on meso- and metacetabula covered with silvery pubescence. Fore femur with apical dark ring and a distinct longitudinal mark on external side usually connected with ring, inner and ventral surface either dark brown or light brown; fore tibia and tarsus brown or dark brown. Middle and hind legs: coxae and trochanters chiefly yellowish; middle femur mostly yellow, dorsal surface with a longitudinal slender brown mark, ventral surface sometimes with indistinct longitudinal brown mark; hind femur only yellowish proximally; tibiae and tarsi dark brown. Abdomen mostly black dorsally. Venter of body with distinct dark marks: pro-, meso-, and metasternum with broad longitudinal black mark medially; mesosternum with addtional broad black or dark brown marks on antero-lateral and postero-lateral areas; abdominal sterna chiefly brown, terminal segments usually yellowish.

Apterous male (holotype): Head width 1.49, interocular width 0.67, eye size 0.64. Lengths of antennal segments 1–4: 2.81: 1.15: 0.95: 0.80. Pronotum length 0.55, mesonotum length 1.55. Lengths of leg segments (femur: tibia: tarsus 1: tarsus 2): fore leg: 2.72: 2.43: 0.14: 0.90; middle leg: 6.90: 4.85: 2.50: 0.41; hind leg: 7.00: 4.15: 0.35: 0.40. Fore femur: width 0.44, other characteristics as in Diagnosis above. Abdomen length on ventral view: 2.00, pregenital length 0.74; sternum 7 about as long as sterna 4–6 combined, length 0.27. Genital segments medium size: segment 8 not distinctly broadened posteriorly, length 0.58, width 0.81; characteristics of pygophore, proctiger, paramere, and endosoma as in Diagnosis above.

Apterous female (allotype): Head width 1.42; interocular width 0.64; eye size 0.63. Lengths of antennal segments 1–4: 2.30: 1.05: 0.95: 0.79. Pronotum length 0.49, mesonotum length 1.59. Lengths of leg segments: fore leg: 2.56: 2.28: 0.09: 0.86; middle leg: 6.40: 4.45: 2.45: 0.40; hind leg: 6.40: 3.75: 0.39: 0.44. Fore femur simple and slender, width 0.34. Hind coxae simple, without apical projection, hind coxa and trochanter without long hairs, length of hind trochanter 0.68. Abdominal venter length 1.53, length of tergum 7: 0.09, length of sternum 7 (caudal view): 0.92; shape of sternum 7: see Diagnosis above.

Macropterous morph unknown.

Remarks. Chen & Nieser (1993) defined the *M. compar* species group on the basis of the following character states: usually darkened ventral surface of the body; male fore femur slender and simple; male paramere hook-shaped or falciform; male endosoma with a long ventral sclerite; hind coxa and trochanter of female usually modified (e.g., elongated and covered with very long hairs); sternum 7 of female constricted, with a median lobe on posterior margin. Both *M. monticola*, new species and *M. nigriventris*, new species clearly belong to the *M. compar* species group. This new species is similar in many respects to *M. nigriventris*, new species, but differs from the latter by the combination of the following characteristics: longer fore femur (in *M. monticola* clearly longer than the mesosternum in both sexes, while in *M. nigriventris* only subequal to the length of the mesoternum); shape of the fore femur of the male (in *M. monticola* with the notch in the middle of the ventral surface more distinct); relatively larger genitalia; the shape of the male paramere; the shape of pygophore on ventral view; the pilosity of pygophore (in *M. monticola* with sparse hairs, in *M. nigriventris* with longer and denser hairs); slightly longer abdomen in the female (in *M. monticola* clearly surpassing the apex of hind coxae); and the median lobe of sternum 7 of female (broader in *M. monticola*).

The shape of paramere of *M. monticola* is relatively similar to that of *Metrocoris compar* (White, 1883) from India and Myanmar, and *M. pardus* Zettel, 2011 from Peninsular Malaysia, but other characters show significant differences between the these species: *M. monticola* and *M. pardus* are distinctly different in the colour pattern of dorsum; and the female of *M. pardus* has a distinctly shortened abdomen, with the apex of the abdomen only reaching the base of the hind coxa, while in the female of *M. monticola* the apex of the abdomen reaches the apex of the hind coxa. Comparing *M. monticola* and *M. compar*, the paramere of *M. monticola* has no long hairs as seen in that of the latter; *M. monticola* has a longer sternum 7 (about 1.5 times as long as the preceeding abdominal sterna, versus only about 1.1 times in *M. compar*, see Chen & Nieser, 1993). It is notable that, among taxa in the *M. compar* species group, *M. monticola* has probably the simplest hind coxa and trochanter in the female, being elongated but without significant modification and no long hairs.

Etymology. The name *monticola*, treated as a noun in apposition, meaning inhabiting (-*cola*) mountain area (*monti*-), is given to this species, as it was found in a montane stream.

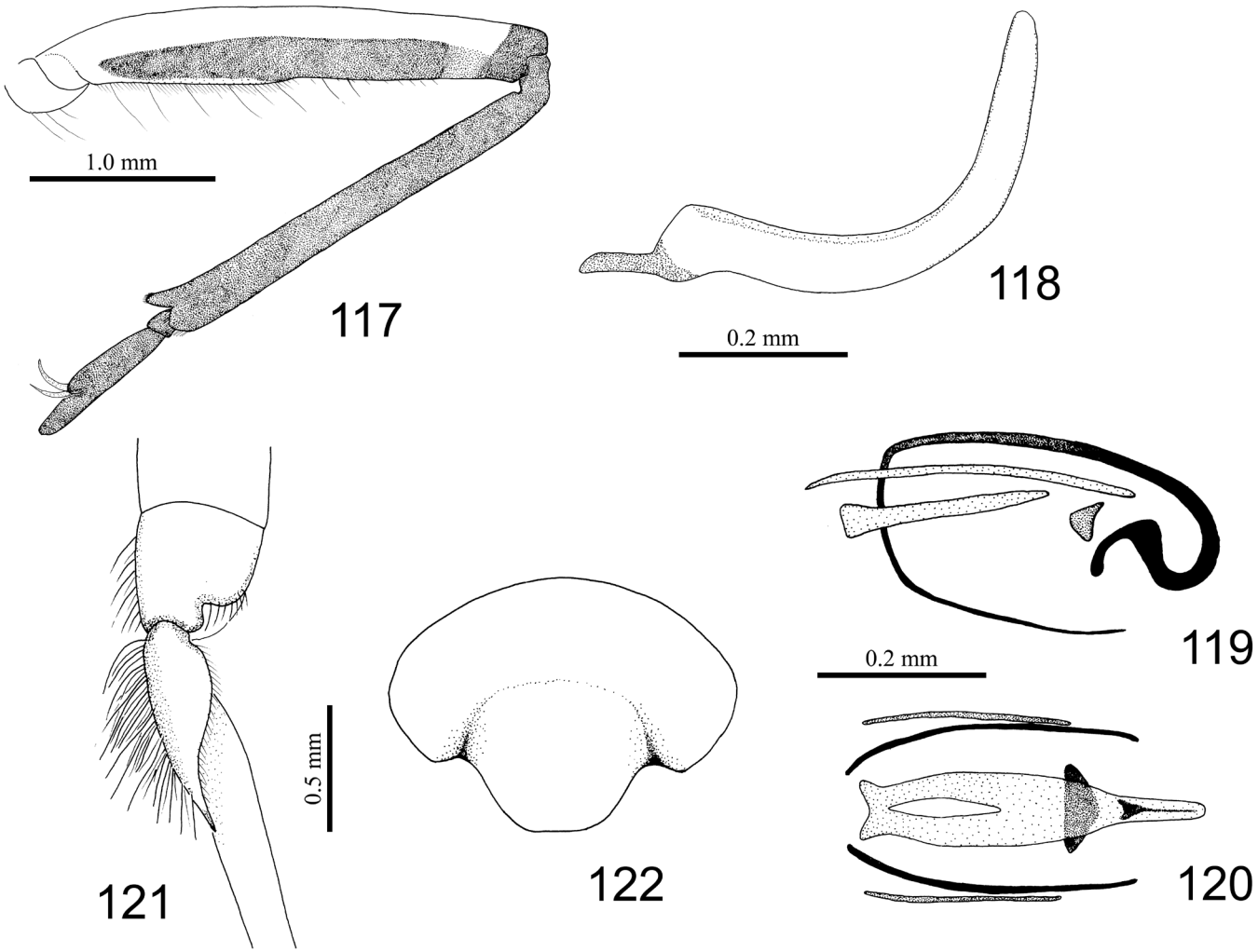
Distribution. Vietnam: Lao Cai (Fig. 141).

Habitats. *Metrocoris monticola* has been collected from a small montane stream, at elevation ca. 1400 m.

***Metrocoris sapa*, new species**
(Figs. 28, 29, 117–122)

Material examined. Holotype (apterous male) & **allotype** (apterous female): VIETNAM, Lao Cai Prov., Sa Pa, Hoang Lien N'Park, Nui Xe, upstream of Suoi Vang, coll. Tran A.D., 4 July 2004, TAD0416 (ZMHU).

Paratypes: VIETNAM, **Lao Cai Prov.:** 1 male, 1 female (apt), 1 male, 4 females (mpt), same locality data as holotype



Figs. 117–122. Morphological features of *Metrocoris sapa*, new species. 117: right fore leg of male. 118: left paramere. 119, 120: endosomal sclerites, lateral and dorsal views. 121: hind coxa and trochanter of female. 122: sternum 7 of female, ventral view (121, 122 same scale).

(ZRC); 1 male (mpt), Sa Pa, Hoang Lien N'Park, Nui Xe, Suoi Vang, coll. Tran A.D., 4 July 2004, TAD0417 (ZRC).

Diagnosis. Both sexes: body sub-ovate, ventral surface light coloured ventral surface, without any dark mark; fore femur clearly longer than mesosternum. Male: fore femur moderately slender (ratio length/width: 6.60), proximal half, broader than distal half, constricted near near the middle, pilosity denser and longer at proximal half (Fig. 117); genitalia small: abdominal segment 8 clearly longer than sternum 7; proctiger simple, elongated and slender; pygophore ovate on ventral view; paramere falciform, simple, curved at middle part, apex rounded and not modified (Fig. 118); endosoma (Figs. 119, 120): dorsal sclerite long and recurved on apical, apical accessory sclerite distinct, ventral sclerite shorter than dorsal sclerite, lateral sclerite straight, rather broad, partially sclerotised. Female: fore femur simple, not modified as in male, and slender (ratio length/width: 7.94); hind coxa and trochanter enlongated, without apical projection, interior side of hind coxa and trochanter with long hairs (Fig. 121); abdominal sternum 7 broader than long, clearly longer than previous sterna together, constricted laterally, posterior part producing a median lobe with nearly straight apical margin, directed dorsad, and completely enclosing genitalia on ventral view (Fig. 122).

Description. Size: apterous males: length 4.80–5.60 (holotype 5.60), width 2.48–2.97 (holotype 2.97), macropterous males: length 8.00–8.10, width 2.87; apterous females: length 4.80–5.10 (allotype 5.10), width 2.90–2.94 (allotype 2.94), macropterous females: length 8.00–8.30, width 3.00–3.04.

Colour (Figs. 28, 29). Dorsal body mainly pale, light brown markings expanded and yellow markings reduced. Antennae dark brown or black, proximal part of antennal segment 1 yellowish brown. Interocular region of head mainly dark, with yellow mark on posterior margin of head. Pronotum with black anterior margin confluent with a slender median black marking, forming a T-shaped marking; antero-lateral corners with a large light brown marking, leaving the yellow markings slender along the median black marking and on posterior margin. Mesonotum with a slender median black marking, two large light brown markings along each side of median black marking, and a light brown marking on each antero-lateral corner. Metanotum with a slender median black marking, two yellow markings on each side of the median marking running along posterior margin. Abdominal terga 1–7: each tergum dark brown or black on anterior part, and yellow on posterior part. Metacetabula, inner half yellow, outer half brown to dark brown. All coxae and trochanters mainly yellow with small brown markings. Fore femur

yellow with 1 brown stripe on outer side and 1 on inner side, confluent with brown apical part. Middle and hind femora mainly yellowish brown. Tibia and tarsus dark brown or black. Venter of body mainly light yellow. In macropterous form, pronotum with median T-shaped black marking on anterior margin, pronotal lobe mainly yellowish brown with lateral margin light yellow from humeri to tip of pronotal lobe, wings mainly brown.

Apterous male (holotype): Head width 1.59, interocular width 0.67, eye size 0.75. Lengths of antennal segments 1–4: 2.54: 1.17: 1.03: 0.71, antennal segment 2 with scattered spines. Pronotum length 0.49, mesonotum length 1.58. Lengths of leg segments (femur: tibia: tarsus 1: tarsus 2): fore leg: 2.64: 2.51: 0.08: 0.86; middle leg: 7.30: 5.45: 2.51: 0.35; hind leg: 7.80: 4.61: 0.35: 0.44. Fore femur: width 0.40, other characteristics as in Diagnosis above. Abdomen length on ventral view: 1.71, pregenital length 0.83; sternum 7 slightly longer than sterna 5 and 6 combined, length 0.27. Genital segments small: segment 8 sub-rectangular on dorsal view, length 0.44, width 0.56; characteristics of pygophore, proctiger, paramere, and endosoma as in Diagnosis above.

Apterous female (allotype): Head width 1.64, interocular width 0.65, eye size 0.78. Lengths of antennal segments 1–4: 2.23: 1.06: 1.03: 0.71, antennal segment 1 with scattered spines. Pronotum length 0.44, mesonotum length 1.70. Lengths of leg segments: fore leg: 2.54: 2.38: 0.08: 0.83; middle leg: 7.00: 5.10: 2.35: 0.33; hind leg: 7.30: 4.56: 0.32: 0.42. Fore femur: width 0.32, other characteristics as in Diagnosis above. Hind coxae without apical projection, length of hind trochanter 0.76, interior side of hind coxa and trochanter with long hairs (Fig. 121). Abdominal venter length 1.08. Abdominal sternum 7 broader than long, length ca. 0.98 (caudal view), shape of sternum 7: see Diagnosis above.

Macropterous male: head width 1.56, interocular width 0.63, eye size 0.70. Lengths of antennal segments: 2.48: 1.17: 0.98: 0.71. Pronotum length 3.30, humeral width 2.48. Fore wing length 6.40. Lengths of leg segments: fore leg: 2.48: 2.44: 0.10: 0.79; middle leg: 7.10: 5.15: 2.33: 0.35; hind leg: 7.30: 4.26: 0.32: 0.40. Margin of connexivum with long hairs. Other characteristics similar to apterous male.

Macropterous female: head with 1.52, interocular width 0.63, eye size 0.71. Lengths of antennal segments: 2.08: 0.90: 0.95: 0.68. Pronotum length 3.45, humeral width 2.48. Fore wing length 6.30. Lengths of leg segments: fore leg: 2.48: 2.31: 0.08: 0.76; middle leg: 6.30: 4.70: 2.38: 0.35; hind leg: 6.80: 4.17: 0.35: 0.44. Margin of connexivum with long hairs. Other characteristics similar to apterous female.

Remarks. Based on the definition of *M. compar* species group (sensu Chen & Nieser, 1993, see Remarks under *M. monticola*, new species), we can assign also *M. sapa*, new species to the *M. compar* species group. However, *M. sapa* does not totally fit the diagnostic characteristics of this group because it has a light coloured ventral surface, without any dark markings.

Metrocoris sapa, new species is most similar to *M. hirtus* Chen & Nieser, 1993 (from Sichuan, China) in having a similar general shape of the male parameres, endosomal structures and female hind coxa. The dorsal colour pattern of *M. sapa* is similar to that of *M. pardus* Zettel, 2011 (from Peninsular Malaysia). However, the apex of the paramere in *M. sapa* is rounded, simple and not modified like those of *M. hirtus* or *M. pardus* (see Chen & Nieser, 1993: Fig. 195; Zettel, 2011: Fig. 8). This species can also be distinguished from all other species of the *M. compar* group by the combination of following characters: apex of paramere rounded and not modified; endosoma with the apical sclerite more developed, lateral sclerite indistinct, ventral sclerite shorter; median lobe of sternum 7 of female with rounded apex; hind coxa of female with less dense pilosity and with the apex not produced.

The discoveries of *M. nigriventris*, *M. monticola*, and *M. sapa* have raised the total number of species in the *M. compar* group to nine, and they are also the first records of this group in Vietnam. Other previously known species have been found in India, Nepal, Myanmar, China, and Peninsular Malaysia (Chen & Nieser, 1993; Chen, 1994; Zettel, 2011).

Etymology. This species is named after its type locality, Sa Pa. The word "*sapa*" is used here specifically as a noun in apposition.

Distribution. Vietnam: Lao Cai (Fig. 141).

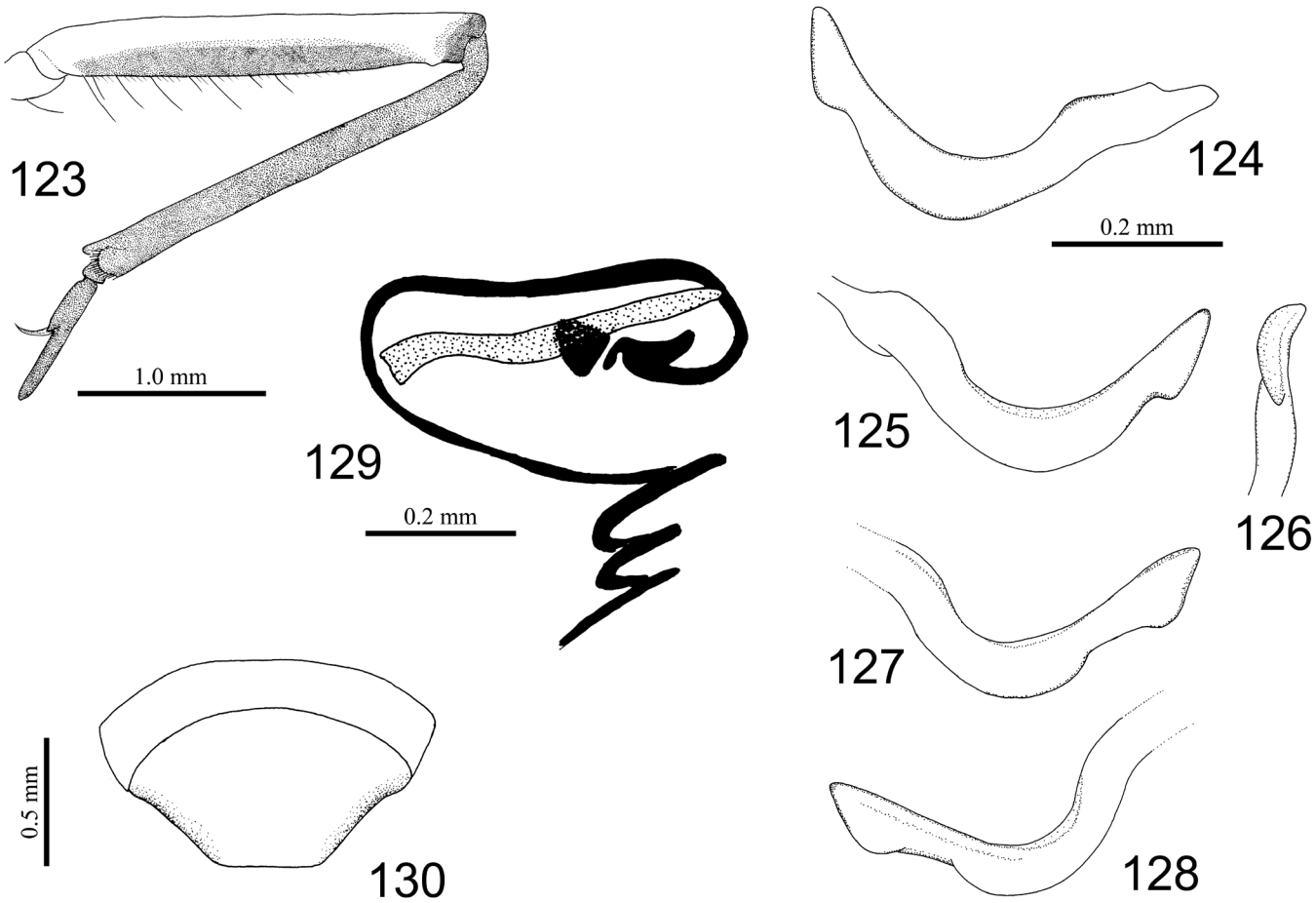
Habitats. *Metrocoris sapa* was collected from a montane stream, at elevations between 1800 and 1900 m. It was found in association with *M. quynhi* and *M. acutus*, both of which are much larger species. Due to the small size and pale dorsal colour of living specimens in this new species, it may superficially resemble nymphs of other *Metrocoris* species.

***Metrocoris tenuicornis* species group**

***Metrocoris tenuicornis* Esaki, 1926**
(Figs. 30, 31, 123–136)

Metrocoris tenuicornis Esaki, 1926: 125, Figs. 3c–e (type locality: Annam, Vietnam); den Boer, 1965: 28–29, Figs. 36, 48, 63–64 (additional notes); Cheng, 1966: 273–282, Figs. 1–25 (life history); Polhemus, 1990: 18–19, Figs. 14, 34–35, 49 (redescription); Chen & Nieser, 1993: 70–72, Figs. 183–184, 196, 202 (redescription); Zettel & Chen, 1996: 152, 178 (faunistic notes).

Material examined. Syntypes: 1 macropterous male, 1 apterous female, "Annam, Laos" / "det. T. Esaki" (MTMB) (hereby, the macropterous male is designated as **lectotype** and the apterous female is desginated as **paralectotype**). Others: VIETNAM: **Dien Bien Prov.:** 1 male (mpt), Na Tau, Nam Rom river, coll. Tran A.D., 25 July 2004, DY0412 (ZRC). **Hai Duong Prov.:** 3 males, 3 females (apt), Kheao stream, 23 km N. of Chi Linh, 125 m asl, water temp. 17°C, 25 March 2000, CL 4376, coll. J.T. Polhemus & P. Nguyen (USNM). **Thanh Hoa Prov.:** 1 female (apt), Ben En N'Park, Ngòn stream, near Bang ranger station, coll. Pham T.D.,



Figs. 123–130. Morphological features of *Metrocoris tenuicornis*. 123: right fore leg of male. 124–126: right paramere of lectotype. 127, 128: left paramere of specimen from Vietnam, Quang Binh Prov. (124, 127: outer view; 126, 128: inner view; 125: apex of paramere, caudal view). 129: endosomal sclerites of lectotype, lateral view. 130: sternum 7 of female, ventral view.

03 August 2012, BE1205 (ZMHU); 3 females (apt), Ben En N'Park, Nhu Xuan, Khe May stream, coll. Pham T.D., December 2012, BE1206 (ZMHU); 1 female (apt), Ben En N'Park, Nhu Xuan, Tan Binh, Xuan Ly ranger station, Khe Lo 4 stream, coll. Pham T.D., 26 February 2013, BE1301 (ZMHU); 2 males, 1 female (apt), Ben En N'Park, Nhu Xuan, Son Binh, Khe Cay Khe stream, at junction with road, coll. Pham T.D., 01 March 2013, BE1307 (ZMHU); 2 females (apt), Ben En N'Park, Nhu Xuan, Duc Luong, Khe Cau Da stream, coll. Pham T.D., 08 March 2013, BE1309 (ZMHU); 3 males, 13 females (apt), 1 female (mpt), Ben En N'Park, Nhu Xuan, Xuan Quy, Song Chang ranger station, Khe Khoanh 2 stream, coll. Pham T.D., 11 March 2013, BE1310 (ZMHU). **Quang Binh Prov.:** 4 males, 2 females (apt), Phong Nha, a stream 1 km behind Forest Ranger station 4, coll. Tran A.D., 16 July 2004, DY0409 (ZRC). **Kon Tum Prov.:** 7 males, 8 females (apt), shallow trib. to stream 2 km inside Chu Mom Ray Nature Reserve, 635 m asl, 14°25′55″N, 107°42′50″E, water temp. 21.5°C, 4 March 2001, CL 4278, J.T. Polhemus and P. Nguyen (USNM, BPBM); 1 male, 1 female (apt), stream 63 km NE. of Kontum on Hwy. 24, 1050 m asl, 14°36′14″N, 108°18′22″E, water temp. 20.5°C, 6 March 2001, CL 4281, coll. J.T. Polhemus & P. Nguyen (USNM). **Gia Lai Prov.:** 1 male (apt), 40 km, NW. An Khe, Buon Luoi, 14°10′N, 108°30′E, 620–750 m asl, 28 March–12 April 1995, coll. Pacholátko & Dembicky (NHMW); 11 males, 18 females (apt), Tral Stream, 60 km N. of An Khe, 700 m asl, 14°20′28″N, 108°34′49″E, water temp. 23.5°C, 22 March 2001, CL 4309, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Lam Dong Prov.:** 7 males, 8 females (apt), lake at Valley of Love, 5 km N. of Dalat, 1495 m asl, 11°58′39″N, 108°27′00″E, 11 May 1998, CL 3086, coll. J.T. Polhemus (USNM); 10 males, 6 females (apt), stream in pine forest 13 km N. of Dalat on Suoi Vang road, 1495 m asl, 11°59′26″N, 108°23′19″E, water temp. 21.5°C, 28 March 2001, CL 4317, coll. D.A. Polhemus, J.T. Polhemus & P. Nguyen (USNM, BPBM). **Dong Nai Prov.:** 1 male, 3 females (apt), Nam Cat Tien, Lan stream B, coll. Tan H.H. et al., 10 May 2001, THH0128 (ZRC); 1 male (apt), Vinh Cuu, Vinh An, Suoi Rang, coll. Tran A.D., 10 May 2003, TAD0315a (ZRC); 1 female (apt), Vinh Cuu, Ma Da, Suoi Sai (Sai stream), up-stream from bridge, coll. Tran A.D., 31 October 2009, TAD0918 (ZMHU); 1 male (mpt), Cat Tien N'Park, feeder stream of Bau Chim (Bird lake), coll. Tran A.D., 7 November 2009, TAD0930 (ZMHU); 7 males, 3 females (apt), Cat Tien N'Park, Cay Si stream, coll. Tran A.D. & Pham T.D., 09 April 2010, PTD1002 (ZMHU). **Kien Giang Prov., Phu Quoc island:** 5 males, 6 females (mpt), Tranh stream (at lower section), coll. Tran A.D. et al., 30 November 2010, TAD1021 (ZMHU); 4 males (mpt), Tranh stream (middle section & waterfall), coll. Tran A.D., 30 November 2010, TAD1022 (ZMHU).

LAOS: **Vientiane Prov.:** 7 males, 6 females (apt), 1 male (mpt), Ban Van Heue, ~20 km E. of Phou Khao Khouay park HQ, 1039 m asl, vic. 18°17′44″N, 102°53′48″E, 31 August 1967, coll. J.L. Gressit et al. (BPBM).

CAMBODIA: **Koh Kong Prov.:** 2 males, 3 females (apt), Cardamom Mountains, stream approx. 31 km NE. of Koh Kong on road to Pursat, 310 m asl, 11°41′03″N, 103°06′56″E, water temp. 26°C, 30 August 2015, CL 6021, coll. D.A. Polhemus (BPBM, USNM).

THAILAND: **Chiang Mai Prov.:** 1 male (apt), N. Thailand, 55 km to Chiang Mai, coll. Y.Y. Goh, 13 June 1998, GYY86 (ZRC).

MALAYSIA: **Perak:** 1 male, 1 female (apt), ZRC.6.19655, stream about 195 km to Ipoh (40 km to Gerik) from Baling, coll. H.K. Lua, 20 February 1997, LHK0331 (ZRC); 1 male, 1 female (apt), ZRC.6.19656, Carut Bt. Sebelah, rocky stream, about 2 km before Baling on Gerik, Sg. Pentani Rd, coll. H.K. Lua, 18 February 1997, LHK0327 (ZRC). **Sabah:** 3 males (apt), Maliau Basin, Sungei Maliau, upstream, coll. K.L. Yeo, 15 May 1996, MB13 (ZRC); 1 male, 3 females (apt), Maliau Basin, Sungei Maliau, upstream, coll. K.L. Yeo, 15 May 1996, MB15 (ZRC); 1 female (apt), Maliau Basin, Heath forest stream, coll. T.B. Lim & K.L. Yeo, 22 May 1996, MB25 (ZRC); 2 males, 1 female (apt), Maliau Basin, Sungei Maliau, upstream, coll. T.B. Lim, 21 May 1996, MB24 (ZRC); 2 females (apt), Maliau Basin, Sungei Maliau, upstream, near Camp 96, coll. T.B. Lim & K.L. Yeo, 14 May 1996, MB4 (ZRC); 1 male, 2 females (apt), Maliau Basin, tributary of Sungei Maliau, upstream, coll. T.B. Lim & K.L. Yeo, 23 May 1996, MB26A (ZRC); 1 male, 3 females (apt), Maliau Basin, Sungei Maliau, near to base camp, coll. G. Gunsalam, 15 May 1996, MB28 (ZRC); 1 male, 2 females (apt), Maliau Basin, Sungei Maliau, upstream, near Camp 96, coll. T.B. Lim & K.L. Yeo, 14 May 1996, MB2 (ZRC); 2 males, 3 females (apt), Maliau Basin, Sungei Maliau, near to base camp (Heliped), coll. G. Gunsalam, 17 May 1996, MB36 (ZRC); 3 males, 3 females (apt), Maliau Basin, coll. G. Gunsalam, 14 May 1996, MB4A (ZRC); 1 female (apt), Maliau Basin, coll. G. Gunsalam, 14 May 1996, MB1A (ZRC); 1 female (apt), Maliau Basin, Sungei Maliau, upstream near Camp 96, coll. T.B. Lim, 13 May 1996, MB1 (ZRC); 1 female (apt), 1 female (mpt), Maliau Basin, near Heliped, coll. G. Gunsalam, 15 May 1996, MB30 (ZRC); 1 female (mpt), Maliau Basin, Sungei Maliau tributary, Camp 88II, coll. K.L. Yeo, 16 May 1996, MB17 (ZRC); 1 female (apt), Maliau Basin, Sungei Maliau, upstream, near Camp 96, coll. T.B. Lim & K.L. Yeo, 14 May 1996, MB2 (ZRC). **Sarawak:** 1 male, 1 female (apt), Sarawak, Semengoh NSG, 30 km S. Kuching, coll. H. Zettel (2), 17 February 1993 (NHMW).

SINGAPORE: 1 female (apt), MacRitchie, Sime Rd, coll. H.K. Lua et al., 2 June 1994, NS148I (ZRC); 9 males, 14 females (apt), MacRitchie, Sime Rd, coll. H.K. Lua et al., 2 June 1994, NS148H (ZRC); 6 males, 17 females (apt), MacRitchie, Sime Rd, coll. H.K. Lua et al., 2 June 1994, NS148E (ZRC); 9 males, 19 females (apt), MacRitchie, Sime

Figs. 131–136. *Metrocoris tenuicornis*, variations of male parameres. 131: specimen from Myanmar, Maymyo (CL 4012). 132: specimen from Vietnam, Hai Hung Prov., 23 km N. of Chi Linh (CL 4375). 133: specimen from Vietnam, Lam Dong Prov., 5 km N. of Dalat (CL 3086). 134: specimen from Laos, Vientiane Prov., Ban Van Heue. 135: specimen from Vietnam, CL 4309, Gia Lai, 60 km N. of An Khe (CL 4309). 136: specimen from Cambodia, Koh Kong Prov., 31 km NE. of Koh Kong (CL 6021).

Rd, coll. H.K. Lua et al., 2 June 1994, NS148G (ZRC); 2 males, 4 females (apt), 1 male (mpt), ZRC.6.5079–5087, Bukit Timah, coll. C.F. Lim, [date unknown] (ZRC); 1 male (apt), 1 male, 1 female (mpt), Rifle Range Rd, stream, coll. D.H. Murphy, March 1986 (ZRC); 2 males, 12 females (apt), Rifle Range Rd, coll. D.H. Murphy, March 1986 (ZRC); 8 males, 7 females (apt), Nee Soon, swamp forest stream, coll. D.H. Murphy, 3 January 1986 (ZRC); 5 males, 8 females (apt), Rifle Range Rd, secondary stream, coll. Y.H. Lim et al., 3 June 1993, NS109 (ZRC); 13 males, 4 females (apt), stream leading to MacRitchie Reservoir from Thomson ridge, plot 3, coll. Del Sim, 29 April 1993, NS64 (ZRC); 9 males, 26 females (apt), Nee Soon swamp forest, Plot 25, coll. H.K. Lua et al., 21 April 1993, NS51 (ZRC); 8 males, 18 females (apt), SICC, Upper Peirce stream near Plot 8 & 9, coll. C.Y. Chang, 25 May 1993, NS95 (ZRC); 4 females (apt), 1 male (mpt), Rifle Range Rd, coll. H.K. Lua et al., 28 April 1993, NS61 (ZRC); 1 male, 6 females (apt), Chestnut Drive forest swamp, Plot 56-57, coll. H.K. Lua, 22 April 1993, NS55 (ZRC); 1 male, 3 females (apt), Sime Rd, small stream near Plot 6, coll. C.M. Yang et al., 7 April 1993, NS29 (ZRC); 1 male (apt), Upper Peirce Reservoir, Plot No.31, coll. K.L. Yeo et al., 26 May 1993, NS60 (ZRC); 1 male, 1 female (apt), SICC, Upper Peirce stream, coll. C.Y. Chang, 24 May 1993, NS93 (ZRC); 11 females (apt), Sime Road forest, NW. of SICC Golf Course, Plot 22, coll. K.K.P. Lim et al., 26 April 1993, NS57 (ZRC); 6 males, 15 females (apt), Upper Peirce Reservoir stream, Plot 23, coll. Y.H. Lim et al., 17 May 1993, NS84 (ZRC); 1 male (apt), Nee Soon swamp forest, Central Catchmen survey, coll. K.K.P. Lim et al., 15 April 1993 (ZRC); 6 females (apt), MacRichie Reservoir, near Plot 17, pond, coll. C.M. Yang et al., 13 April 1993, NS34 (ZRC); 1 female (apt), MacRitchie Reservoir, SICC near Plot 4, [collector unknown], 28 May 1993, NS104 (ZRC); 4 males, 14 females (apt), Seletar Reservoir inlet, along Mandai Rd, coll. H.K. Lua et al., 14 April 1993, NS41 (ZRC); 4 males, 4 females (apt), Bukit Timah Nature Reserve, coll. C.M. Yang et al., 1 October 1991, YCM30 (ZRC).

INDONESIA: 2 males (apt), Riau, Pulau Bintan, [collector unknown], 20 November 1996 (ZRC); 1 male, 1 female (apt), East Java, 60 km SW. Banyuwangi, Meru Betiri N'Park, W. Sumber Sari, 80 m asl, coll. Schillhammer (12), 4 October 1995 (NHMW).

PHILIPPINES: 1 male, 1 female (apt), Palawan, 9 km W. P. Princesa Iwahig, Balsahan river, coll. Zettel (48), 24 March 1994 (NHMW); 2 males, 1 female (apt), Palawan, W. Sabang, 0–30 m, coll. H. Zettel (52e), 29 March 1994 (NHMW); 2 males, 1 female (apt), Mindoro, Mindoro Beach, 10 km W. Puerto Galera, coll. H. Zettel (31a), 23 November 1993 (NHMW).

Diagnosis. Basic dorsal pattern as in Figs. 30, 31, the darkness of brown markings variable (from dark brown to yellowish brown). Sexual dimorphism distinct, males are larger and with longer legs than females. Male: fore femur (Fig. 123) slender (ratio of length/width around 8.2) constricted sub-apically, with small, blunt sub-apical elevation on ventral (variable in some populations: indentation not distinct); middle and hind legs usually very long (lengths variable). Male genitalia moderate size; paramere short, distally curved, constricted then widened before apex, tip of paramere pointed, slightly curved outwards (on posterior view, in-situ) (Figs. 124–128, 131–136); endosoma structure as in Fig. 129. Female: sternum 7 large, slightly shorter than all preceding abdominal sterna combined, usually directed dorsad, posterior margin almost straight (Fig. 130).

Size: apterous males: length 4.60–6.70, width 2.44–3.30, macropterous males: length 5.70–7.10, width 2.38–3.17; apterous females: length 3.75–5.40, width 2.18–2.90, macropterous females: length 6.80, width 2.81–2.85.

Additional description of lectotype. Macropterous male: Size: length 6.40, width 3.20. Head width 1.70, interocular width 0.60, eye size 0.85. Antennae broken. Pronotum/length 3.23, width 2.54. Lengths of leg segments (incomplete, some segments broken off): fore leg: 2.71: 2.64: 0.11: 0.90; middle femur: 10.6; hind leg: 10.5: 6.50: 0.48: 0.27. Fore femur slender, ratio of length/width = 8.2 (width 0.33), ventral surface with a small indentation near apex.

Remarks. Esaki (1926) described *M. tenuicornis* without providing detailed descriptions of the male genitalia (parameres, endosoma). The type locality is "Annam, Laos". The particular location is doubtful, but probably somewhere in the central part of Vietnam (despite the word "Laos" in the label, Annam was a popular name referring to the central part of Vietnam in the early 19th Century, which shared a border with Laos, see Sterling et al., 2006). Den Boer (1965) gave additional notes on the endosomal structure, but he did not describe the parameres of the insect. He also examined the syntypes at the Hungarian Museum, Budapest but did not designate a lectotype. Polhemus (1990) gave a detailed description of this species, based on series of specimens from Peninsular Malaysia, Borneo, Sumatra, the Philippines, Myanmar, India, and Hong Kong, but did not have any material available from Vietnam. Chen & Nieser (1993), when revising the genus *Metrocoris*, gave some descriptive notes and illustrations of this species. However, the types were not physically examined during either of these two studies. The illustrations of the male paramere in the works of Polhemus (1990: Fig. 34) and of Chen & Nieser (1993: Fig. 196), do not match the paramere of the type specimen. During the course of this study, the syntypes were examined by the first author, and the macropterous male is hereby designated as lectotype to fix the taxonomy of this species (paralectotype: apterous female, in poor condition).

Chen & Nieser (1993) placed *M. tenuicornis* in its own monotypic species group, the *M. tenuicornis* group, but provided no diagnosis or defining character states for this group (although their comparative notes regarding *M. tenuicornis* could presumably be taken as the diagnosis for this species group). Recently, Basu et al. (2016) described *M. lavitra* from West Bengal, India, but indicated that it did not fall into any currently defined species group within the genus. We consider *M. lavitra* to be a member of the *M.*

tenuicornis group, based on the following characters: (1) fore femur of the male slender, bearing at most a single very small tooth distally near the ventral apex, or unarmed altogether; (2) male paramere crescent-shaped and apically expanded to form an oblique head of variable size (Figs. 131–136); (3) male endosoma with dorsal sclerite long and recurved proximally, ventral sclerite with a tightly coiled extension projecting beyond margin of endsomal capsule (Fig. 129); (4) middle and hind legs of the male usually extremely long, with the length of the middle femur exceeding 10 mm in some specimens, and the length of the hind femur exceeding 8 mm (this character is subject to a degree of intrasexual variability, such that not all individuals exhibit the extreme femoral prolongation, as also noted by Chen & Nieser, 1993).

By examining "*Metrocoris tenuicornis*" populations from different areas in Southeast Asia, we observed that there are variations in the structure of the male fore femur (sub-apical indentation sometimes not distinct) and parameres (the constriction before apex is variable, see Figs. 124, 125, 127, 128, 131–136), but that the male endosomal structures are uniform throughout. Overall, the male paramere shapes in "*Metrocoris tenuicornis*" and *M. lavitra* seem to form a morphocline (Figs. 131–136), although this progression of shapes does align with any clear east-west geographic trend across Indochina and into India. The male paramere shape in *M. lavitra* is most similar to that seen in the specimen of *M. tenuicornis* that we have illustrated from Burma (Fig. 131), and represents a more extremely modified example at one end of this character state series. It is possible that the *M. tenuicornis* group as we have defined it herein contains a set of cryptic sibling species, but such a conclusion is premature, and would be most effectively investigated using molecular techniques. As such, all Vietnamese populations that currently key to *M. tenuicornis* are treated as conspecific in the context of the present work, until further evidence can be found to justify taxonomically subdividing this assemblage.

Distribution. Vietnam: Dien Bien, Hai Duong, Thanh Hoa, Quang Binh, Kon Tum, Gia Lai, Lam Dong, Dong Nai, Phu Quoc (Fig. 141). Extralimital records: China, Hong Kong, Southeast Asia from mainland, including Cambodia (first record), Laos (confirmed record), to the Malay Archipelago and the Philippines (see Chen & Nieser, 1993).

Habitats. *Metrocoris tenuicornis* is often found skating on moderate or slow flowing forest streams. Except for some populations found in mountane areas of Vietnam at the elevations of 620–760 m, this species is mostly found in lowland areas. This habitat preference may contribute to the wide distribution of *M. tenuicornis*.

DISCUSSION

The *Metrocoris* biota of Vietnam shows a distinct segregation of species north and south of a zone falling roughly along the Ma River valley (Thanh Hoa Prov.), at approximately 20° north latitude (based on the coverage of our collecting sites, Fig. 137). Species occurring exclusively south of this boundary zone in Vietnam include *M. triangulatus*, *M. vietnamensis*, *M. stranguloides*, *M. nigrofascioides*, and *M. inthanon* (Figs. 138–140). The first two species have ranges entirely restricted to central and southern Vietnam east of the Annamite Mountains (also known as Truong Son mountain range), whereas the latter three species have broader ranges in the region, with *M. stranguloides* also occurring on Hainan Island, *M. inthanon* occurring westward into Laos and northern Thailand, and *M. nigrofascioides* ranging widely across Cambodia, Laos and Thailand, and into eastern-northeastern Myanmar.

In contrast to the *Metrocoris* biota inhabiting the southern two-thirds of Vietnam, the species assemblage north of the Ma River consists of a larger number of taxa, including many localised endemics. Species occurring exclusively north of the Ma River in Vietnam include *M. bilobatoides*, *M. johnpolhemi*, *M. quynhi*, *M. sapa*, *M. sicilis*, *M. nigriventris*, *M. monticola*, *M. obscurus*, *M. ciliatus*, and *M. acutus* (Figs. 138–141). The first six species are currently known only from northern Vietnam, while *M. obscurus* and *M. ciliatus* are also known from adjacent southern China, and *M. acutus* ranges westward through Laos and Yunnan to northeastern Myanmar. Of particular note in this northern assemblage is the concentration of apparently endemic species in the Hoang Lien Son mountain range near the hill station of Sa Pa, including *M. quynhi*, *M. sapa*, *M. nigriventris*, and *M. monticola* (Figs. 139, 141). Certain other species in northern Vietnam, particularly *M. obscurus* and *M. ciliatus*, appear to represent southern outlying populations of species whose core ranges are centered further north, in China.

One therefore sees a marked segregation of Vietnamese *Metrocoris* species north and south of the Ma River valley, with five species occurring only to the south of this area, and 10 species occurring only to the north. In addition to the above, one widespread lowland species, *M. tenuicornis*, occurs in both northern and southern Vietnam, as well as being widely distributed throughout Southeast Asia as a whole (Fig. 141). The reasons for the marked faunal discontinuity between northern and southern Vietnam are not clear. In some cases this faunal division even occurs within putatively monophyletic species groups. For instance, in the *M. nigrofasciatus* group, *M. acutus* occurs only to the north of the Ma River, and *M. nigrofascioides* only to the south. Both of these species have broader distributions beyond Vietnam, as noted above, and it may be that the faunal disjunction apparent in Vietnam is reflective of a more extensive north-to-south faunal segregation within Indochina as a whole.

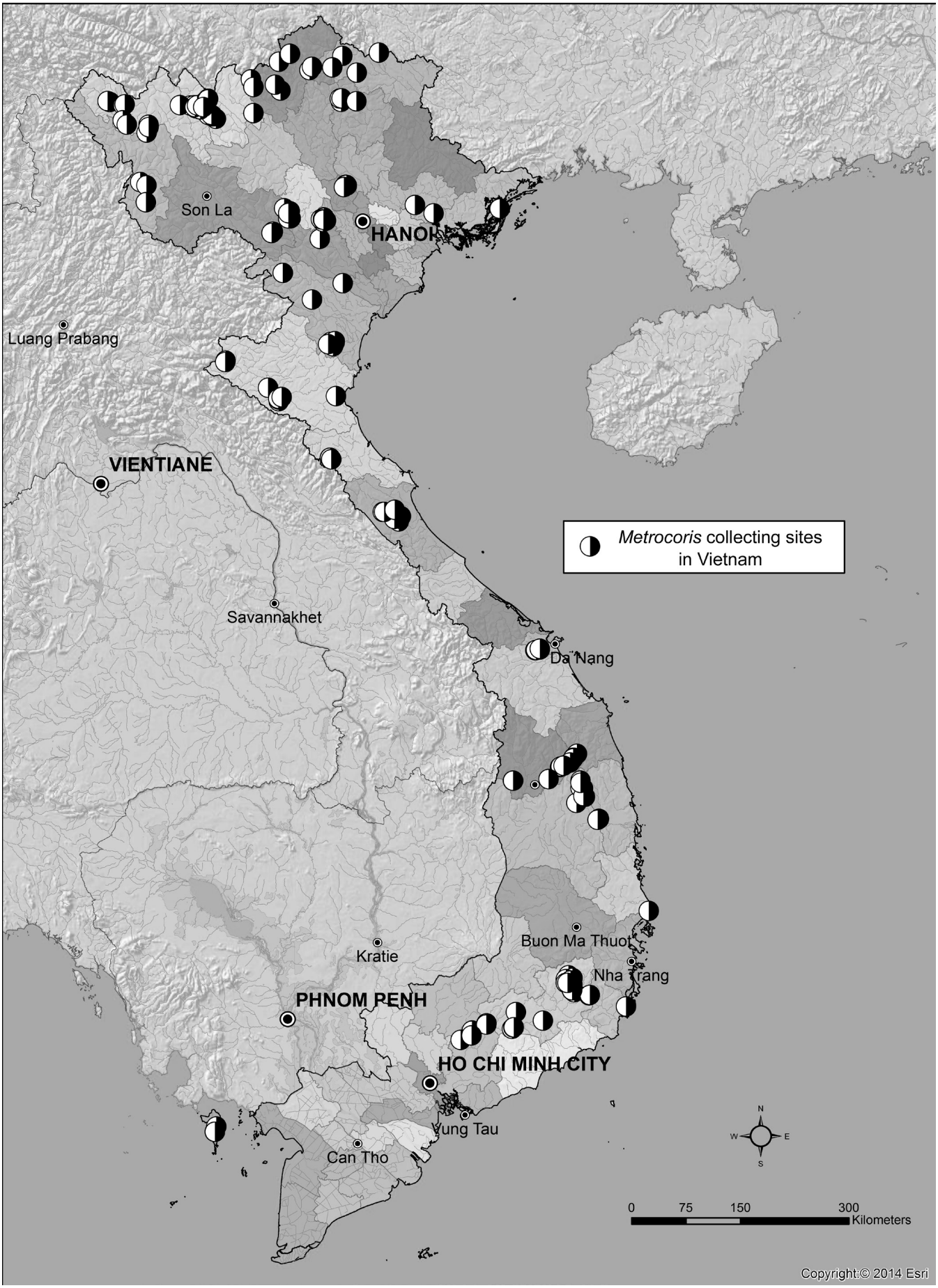


Fig. 137. *Metrocoris* collecting sites in Vietnam.

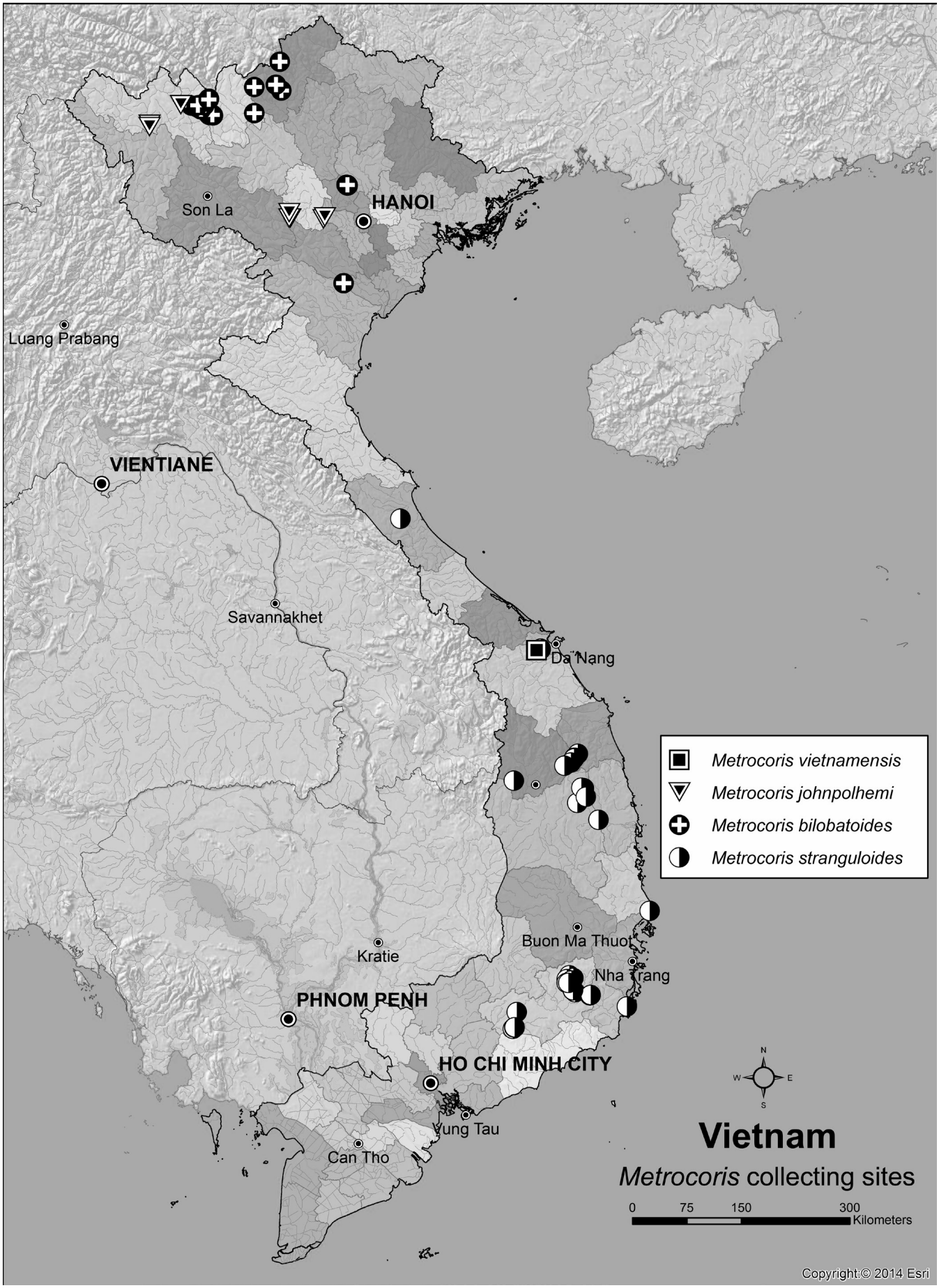


Fig. 138. Distribution records in Vietnam of *Metrocoris stranguloides*, *M. bilobatoides*, *M. johnpolhemi,* new species, and *M. vietnamensis*.

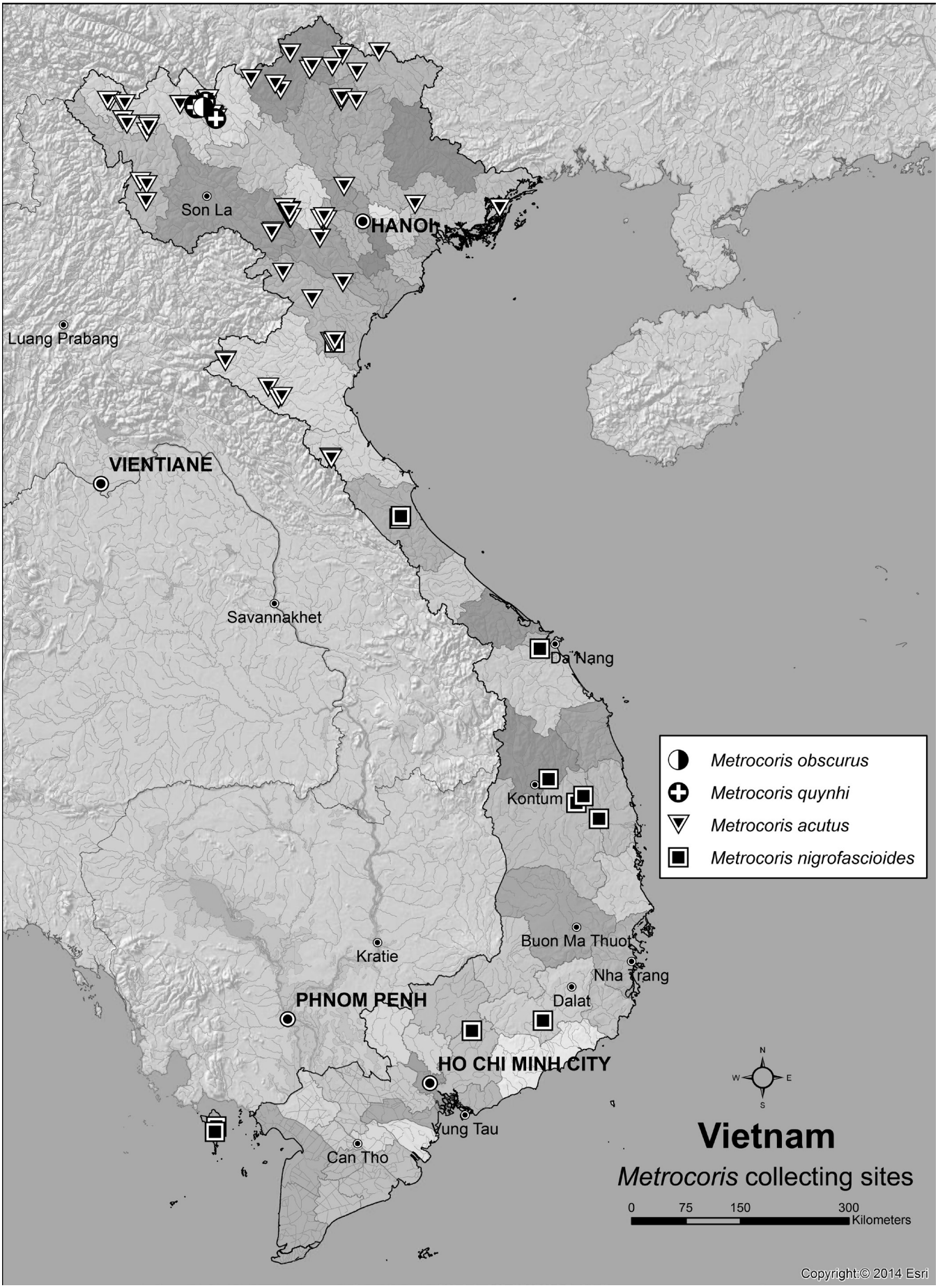


Fig. 139. Distribution records in Vietnam of *Metrocoris obscurus*, *M. quynhi*, *M. acutus*, and *M. nigrofascioides*.

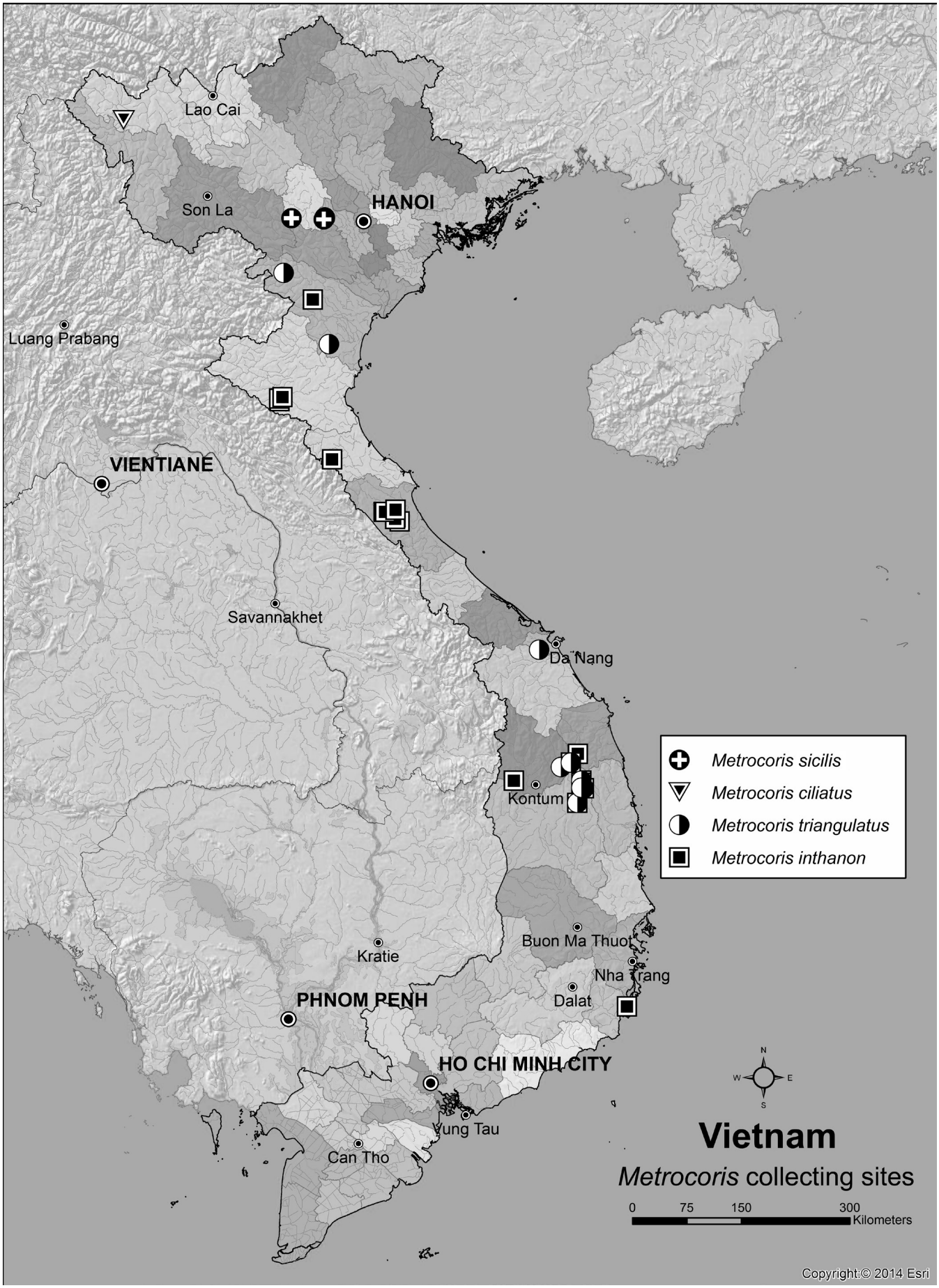


Fig. 140. Distribution records in Vietnam of *Metrocoris ciliatus*, *M. inthanon*, *Metrocoris sicilis*, new species, and *M. triangulatus*.

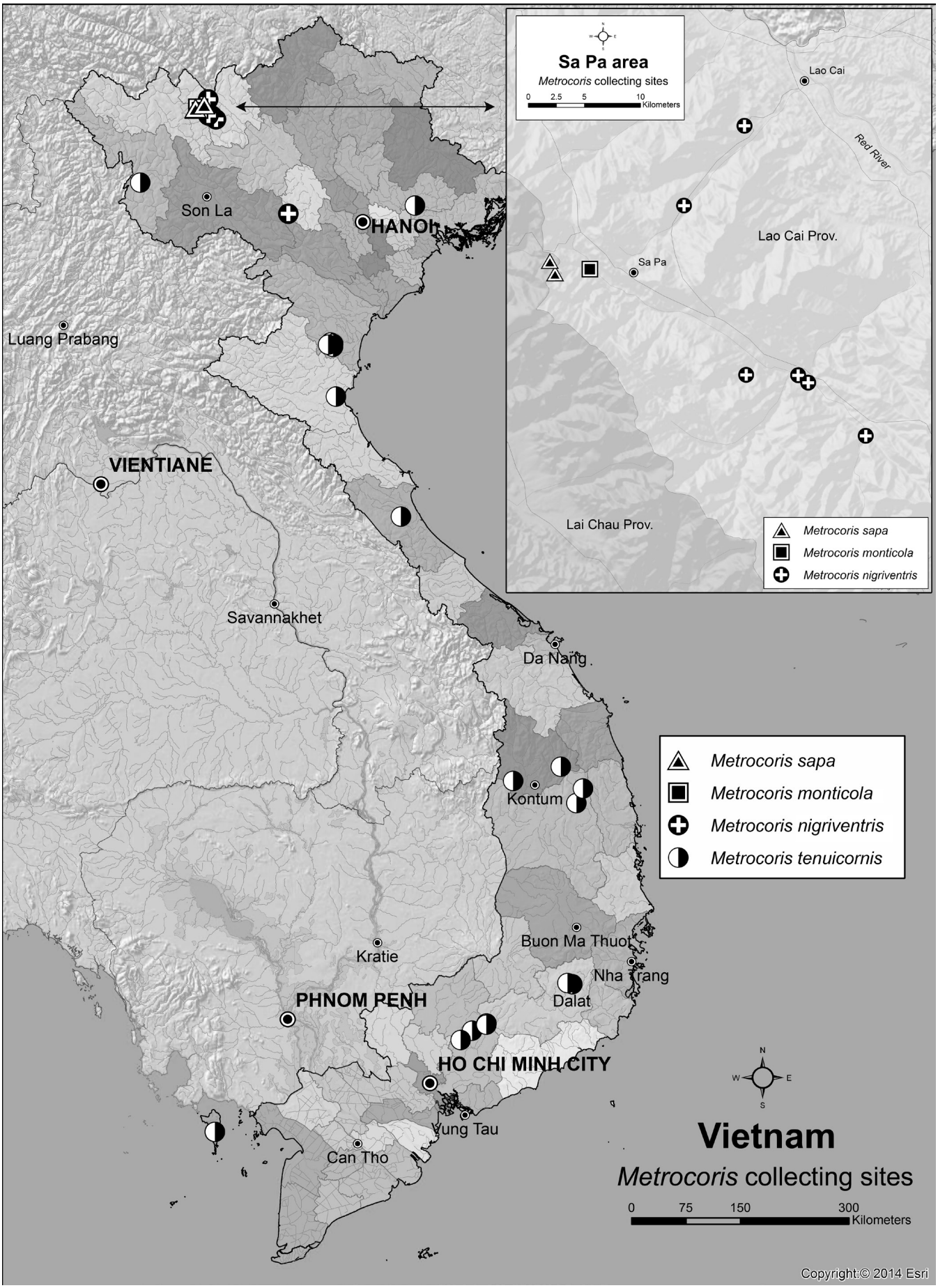


Fig. 141. Distribution records in Vietnam of *Metrocoris nigriventris*, new species, *M. monticola*, new species, *M. sapa*, new species, and *M. tenuicornis*.

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LITERATURE CITED

Basu S, Polhemus DA, Subramanian KA, Saha GK & Venkatesan T (2016) *Metrocoris* Mayr (Insecta: Hemiptera: Gerridae) of India with descriptions of five new species. Zootaxa, 4178(2): 257–277.

Brown RW (1956) Composition of Scientific Words, Revised Edition. Smithsonian Institution Press, Washington, DC, 882 pp.

den Boer MH (1965) Revisionary notes on the genus *Metrocoris* Mayr (Heteroptera, Gerridae), with descriptions of four new species. Zoologische Verhandelingen Leiden, 74: 1–38.

Chen PP & Nieser N (1993) A taxonomic revision of the Oriental water strider genus *Metrocoris* Mayr (Hemiptera, Gerridae). Part I and Part II. Steenstrupia, 19(1–2): 1–43, 45–82.

Chen PP (1994) An overview of Chinese *Metrocoris* Mayr with description of three new species (Hemiptera: Gerridae). Entomologia Sinica, 1(2): 124–134.

Chen PP & Nieser N (1996) A new species of *Metrocoris* Mayr (Heteroptera: Gerridae) from Sangihe island (Indonesia). Entomologische Berichten, 56(4): 72–75.

Chen PP & Zettel H (1999) Five new species of the Halobatinae genus *Metrocoris* Mayr, 1865 (Insecta: Hemiptera: Gerridae) from continental Asia. Annalen des Naturhistorischen Museums in Wien, Serie B, 101: 13–32.

Cheng L (1966) Studies on the biology of the Gerridae (Hem., Heteroptera) II: The life history of *Metrocoris tenuicornis* Esaki. The Entomologist's Monthly Magazine, 102: 273–282.

Distant WL (1910) Some undescribed Gerrinae. Annals and Magazine of Natural History, 8(5): 140–153.

Dohrn A (1860) Zur Heteropteren-Fauna Ceylon's. Stettiner Entomologische Zeitung, 21: 399–409.

Esaki T (1926) The water-striders of the subfamily Halobatinae in the Hungarian National Museum. Annales Historico-Naturales Musei Nationalis Hungarici, 23: 117–164.

Esaki T (1929) New or little-known Gerridae. II. Indian species. Annals and Magazine of Natural History, 10(4): 412–419.

Jehalamar EE & Chandra K (2013) Two new species of *Metrocoris* Mayr (Hemiptera: Heteroptera: Gerridae) from India. Zootaxa, 3734(1): 63–71.

Kemp S (1925) Rhynchota of the Siju Cave, Garo Hills, Assam. Records of the Indian Museum, 26: 93–97.

Mayr GL (1865) Diagnosen neuer Hemipteren II. Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien, 15: 429–446.

Meinert F (1888) Slaegten *Metrocoris* Mayr og dens "forma praematura" Halobatodes Buchanan White. Entomologiske Meddelelser, 1: 140–144.

Paiva CA (1919) Rhynchota from the Garo Hills, Assam. Records of the Indian Museum, 16: 349–377.

Polhemus DA (1990) A revision of the genus *Metrocoris* Mayr (Heteroptera: Gerridae) in the Malay Archipelago and the Philippines. Entomologica Scandinavica, 21: 1–28.

Polhemus DA (1998) Two new species of water striders (Heteroptera: Gerridae) from the Philippines. Proceedings of the Entomological Society of Washington, 100(2): 261–268.

Sterling EJ, Hurley MM & Le DM (2006) Vietnam: A Natural History. Yale University Press, New Haven, 423 pp.

Tran AD & Zettel H (2005) Two new species of the water strider genus *Metrocoris* Mayr, 1865 (Insecta: Heteroptera: Gerridae) from Vietnam, and redescription of *M. femoratus* (Paiva, 1919) from Meghalaya, India. Annalen des Naturhistorischen Museums in Wein, Serie B, 106: 41–54.

White FB (1883) Report on the pelagic Hemiptera procured during the voyage of H.M.S. Challenger during the years 1873–1876. Report on the Scientific Results of the Voyage of H.M.S. Challenger in the years 1873–1876, 7(19): 1–82.

Ye Z, Chen PP & Bu WJ (2016) Notes on the *Metrocoris lituratus* group (Heteroptera: Gerridae: Metrocoris) with descriptions of four new species in Sichuan Basin from China. Zootaxa, 4117(3): 359–374.

Zettel H (2011) *Metrocoris pardus* sp.n. (Heteroptera: Gerridae) aus Westmalaysien. Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen, 63(2): 109–114.

Zettel H & Chen PP (1996) Beitrag zur Taxonomie und Faunistik der Gerridae Vietnams mit Neubeschreibungen der Gattung *Andersenius* gen.nov. aus der Unterfamilie Ptilomerinae und weiterer Arten (Insecta: Heteroptera: Gerridae). Entomologische Abhandlungen, 57(6): 149–182.