

2025	Heteropterus Revista de Entomología Heteropterus Rev. Entomol.	25(1): 43-50
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ISSN: 1579-0681

A new species of the orthotyline plant bug genus *Malacocorisella* Yasunaga, 1999 (Hemiptera: Heteroptera: Miridae: Orthotylinae) from Thailand

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Abstract

The third species of the Asian plant bug genus *Malacocorisella* Yasunaga, 1999 (Orthotylini) is described as new to science from central Thailand. The present discovery of the new species, *M. siamica* Yasunaga, Oh & Duwal **sp. nov.**, also represents the first distributional record of the genus group from the tropical climatic zone. Habitus images of live individuals and scanning electron micrographs are also provided.

Key words: *Malacocorisella*, new species, Orthotylinae, Thailand, SEM documentation.

Resumen

Una nueva especie del género *Malacocorisella* Yasunaga, 1999 de miridos ortotilinos (Hemiptera: Heteroptera: Miridae: Orthotylinae) de Tailandia

Se describe del centro de Tailandia, nueva para la ciencia, la tercera especie del género asiático de miridos *Malacocorisella* Yasunaga, 1999 (Orthotylini). El descubrimiento de esta nueva especie, *M. siamica* Yasunaga, Oh & Duwal **sp. nov.**, también representa el primer registro de distribución del género en la zona climática tropical. Se presentan imágenes de individuos vivos y micrografías electrónicas de barrido.

Palabras clave: *Malacocorisella*, nueva especie, Orthotylinae, Tailandia, documentación MEB.

Laburpena

Thailandiako espezie berri bat mirido ortotilinoen *Malacocorisella* Yasunaga, 1999 generokoa (Hemiptera: Heteroptera: Miridae: Orthotylinae)

Malacocorisella Yasunaga, 1999 (Orthotylini) zimitz miridoen genero asiarreko hirugarren espeziea deskribatzen da, zientziarako berritatzat, erdialdeko Thailandiakoa. *M. siamica* Yasunaga, Oh & Duwal **sp. nov.** izeneko espezie berri honen aurkikuntza generoaren klima-zona tropikalerako lehenengo banaketa-aipua ere bada. Banako bizien irudiak, bai eta ekorketa-mikrografia elektronikoak ere, aurkezten dira.

Gako-hitzak: *Malacocorisella*, espezie berria, Orthotylinae, Tailandia, EME dokumentazioa.

Introduction

The orthotyline plant bug genus *Malacocorisella* (Orthotylini in broad sense) was proposed by Yasunaga (1999) to accommodate a single Japanese species, *M. endoi* Yasunaga, 1999, known to be associated with a walnut, *Juglans mandshurica* Maxim. (Juglandaceae), in cool temperate deciduous forests. Subsequently, Liu and Zheng (2014) described *M. aureus*,

an additional congener from Yunnan, China, and *M. endoi* was also recorded from the Korean Peninsula (Jung *et al.*, 2017).

During our continuing efforts to elucidate the plant bug fauna of central Thailand, a number of specimens obviously belonging to *Malacocorisella* were collected. After close examination of the structures, these materials were confirmed to represent an undescribed species, which is herein described as new to science. The present discovery of this congener in Thailand expands the known distribution area of *Malacocorisella* to tropical zone.

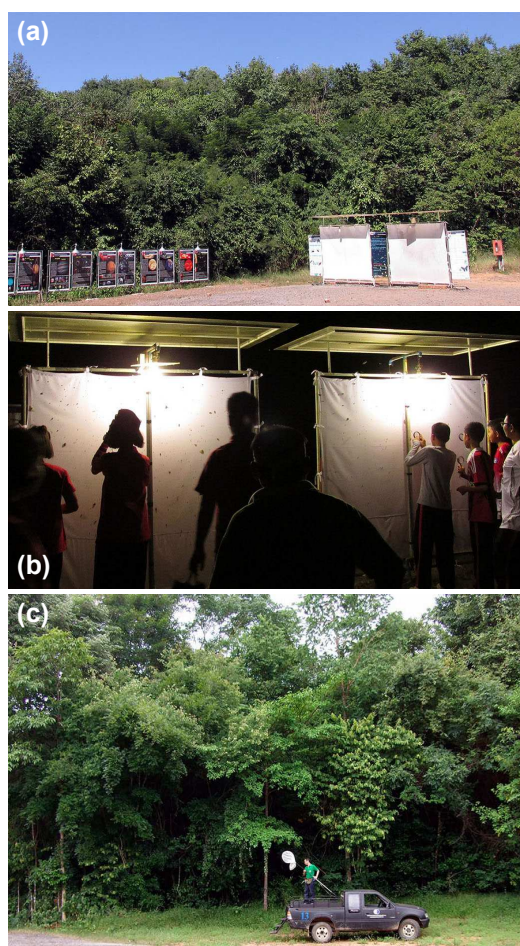


FIGURE 1. Collecting site of *Malacocorisella siamica* sp. nov. at SERS, Thailand: (a) Mercury light traps set at a small open space surrounded by preserved tropical dry-forest; (b) Light traps also utilized for environmental education; (c) Tropical dry-forest in front of light traps.

Material and methods

All specimens of the present new species were collected by a mercury UV light trap device at preserved tropical dry forest zone (14°30'27.5"N 101°55'39.5"E, 410 m alt.) of Sakaerat Environmental Research Station (Fig. 1), Thailand Institute of Scientific and Technological Research, Udom Sap, Wang Nam Khiao, Nakhon Ratchasima (= abbreviated in the text and material examined section as «SERS») between August, 2008 and December, 2015. The type specimens are deposited in: Canadian Nation Collection of Insects, Arachnids and Nematodes, Ottawa Ontario (CNC); Insect Collection, Entomology and Zoology Group, Plant Protection Research and Development Office, Department of Agriculture, Bangkok, Thailand (DOAT); Insect Biosystematics Laboratory, Seoul National University, Korea (SNU); and T. Yasunaga collection, Nagasaki (TYCN). A matrix code label (*e.g.* AMNH_PBI 00380777) uniquely identifying each specimen is attached to the holotype, which is searchable (by species name) on «Heteroptera Species Pages (= HSP)» (<http://research.amnh.org/pbi/heteropteraspecies-page/>). All other materials examined for comparison are kept in the collection of the first author (TYCN).

Terminology of the genitalia principally follows Yasunaga (1999), Schwartz (2011) and Yasunaga and Duwal (2017). Scanning Electron Micrographs were taken with a Hitachi Miniscope® (TM4000 plus II); the genitalic structures were also observed using a Nikon Eclipse Ci upright microscope, with a photo-phase unit. All measurements are given in millimeters; for some of the SEM images, scale bars are shown in micrometers (µm).

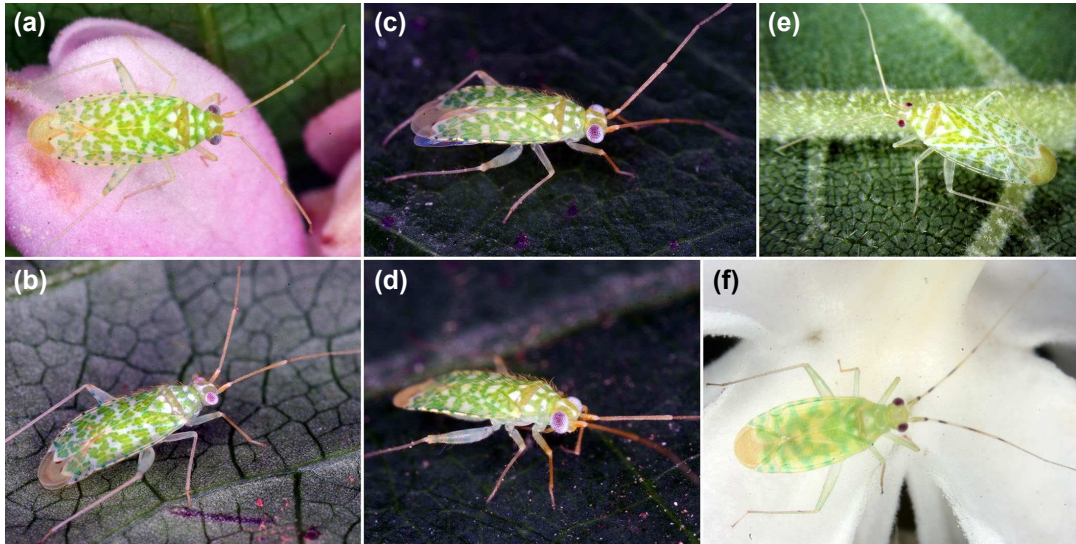


FIGURE 2. Live adult individuals of: (a)-(d) *Malacocorisella siamica* sp. nov.; (e) *M. endoi* (from Hokkaido, Japan); (f) *Zanchius* (near *marmoratus* Zou 1987 (from SERS) / (a)-(b), (e)-(f) Female; (c)-(d) Male.

Results

Malacocorisella siamica Yasunaga, Oh & Duwal sp. nov. (Figs. 2a-d, 3-5)

Type material:

HOLOTYPE: ♂, THAILAND: SERS, UV lighting, 21–24.III.2014, T. Yasunaga (DOAT) (AMNH_PBI 00380777).

PARATYPES: 34 ♂♂, 21 ♀♀: THAILAND:

15 ♂♂, 12 ♀♀: Same data as for holotype (DOAT, SNU, TYCN).

1 ♀: Same data except for date, 20.VIII.2008 (TYCN).

2 ♀♀: Same data except for date, 21.VIII.2008 (CNC).

1 ♂: Same data except for date, 28.X.2008 (CNC).

1 ♀: Same data except for date, 23.I.2009 (CNC).

3 ♂♂: Same data except for date, 24.I.2009 (CNC).

1 ♂, 2 ♀♀: Same data except for date, 12–14.VI.2009 (TYCN).

1 ♂: Same data except for date, 17.III.2010 (TYCN).

2 ♂♂, 1 ♀: Same data except for date, 31.V.2012 (CNC).

2 ♂♂: Same data except for date, 3.VI.2012 (CNC).

1 ♂: Same data except for date, 9.XII.2015 (CNC).

4 ♂♂: Same data except for date, 10.XII.2015 (CNC).

3 ♂♂, 2 ♀♀: Same data except for date, 12.XII.2015 (CNC).

1 ♂: Same data except for date, 13.XII.2015 (CNC).

Diagnosis:

Recognized by its small size, less than 2.9 mm in total length; elongate oval body shape; generally pale green basic coloration (easily fading to pale stramineous brown in dry-preserved specimens); dorsum speckled with white-green spots or maculae (Fig. 2a-d); a small, dark, ovoid spot at distal margin of large areolar cell; left paramere with broadened sensory lobe and triangular hypophysis (Fig. 4a-b); and two slender, elongate spiculi on endosoma (Fig. 4d). The combination of these characters enables this new species to be distinguished from the known congeners *Malacocorisella endoi* (known from Japan and S. Korea; Figs. 2e, 6) and *M. aureus* (from China; cf. Liu and Zheng, 2014).

Description:

Body small in size (2.6–2.9 mm in total length), elongate ovoid, generally composed of thin, delicate integument; basic coloration pale green speckled with white spots (Fig. 2a-d), but vivid green tint (and sometimes whitish mottled pattern) rapidly fading to pale stramineous brown in dry-preserved specimens as in Fig. 3; dorsal surface weakly shining, smooth, with rather sparsely distributed, simple, pale, semierect setae. **Head:** Tinged with olive, with a white, longitudinal, mesal stripe from vertex to frons (Fig. 2d),

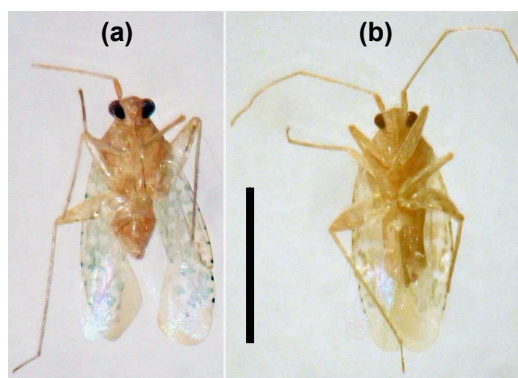


FIGURE 3. *Malacocorisella siamica* sp. nov., ventral view of dry-preserved specimens: (a) Male; (b) Female (Scale bar = 2 mm).

short, vertical in lateral view (Fig. 5b, f); eye removed from anterior margin of pronotum (Fig. 5d). **Antenna:** Pale reddish brown, with whitish apices of antennomeres I and II (Fig. 2a-d) but uniformly pale brown in dried specimens (Fig. 3); antennomere II short, less than 0.9 mm in length. **Labium:** Pale

reddish brown, long, reaching or sometimes slightly exceeding apex of metacoxa. **Thorax:** Pronotum pale green, with white maculae as in Fig. 2a-d (often uniformly pale brown in dried specimens); mesoscutum yellowish green, with a pair of small, white spots; scutellum pale green, with a pair of white maculae and paler posterior half; pleura creamy pale green (entirely pale brown in dried specimens as in Fig. 3); metathoracic scent efferent system white in fresh specimens (Fig. 2d), with narrow peritreme (Fig. 5c). **Hemelytron:** Pale green, partly tinged with yellow or olive, speckled with white maculae and green spots as in Fig. 2a-d; exocorium with a row of small, green spots; cuneus whitish green, with several green spots; membrane pale brown, semitransparent, with a small, brown, ovoid spot at posterior margin of areolar cell; color pattern of areolar cells similar to that of hemelytron. **Legs:** Coxae and legs pale whitish green, partly tinged with green (uniformly pale brown in dried specimens); tibiae and tarsi tinged with red; metatarsus and pretarsal structure of mesoleg as in Fig. 5g-i; pulvillus relatively developed; parempodium ribbon-like, rather narrow and short. **Abdomen:** Pale whitish green but uniformly pale brown in dried specimens (Fig. 3). **Male genitalia** (Figs. 4a-d, 5j): Genital segment (pygophore) widely

		Body	Head	VTX	PRN	HEM	Antennomere L				LBM	Metaleg L	
		L	W	W	W	W	I	II	III	IV	L	FM	TB
<i>M. endoi</i>	PT ♂	3.70	0.60	0.27	0.96	1.38	0.30	1.10	0.60	0.45	1.08	1.08	1.79
	PT ♂	3.11	0.57	0.26	0.78	1.20	0.26	1.05	0.60	0.44	1.05	1.05	1.65
	PT ♀	3.43	0.56	0.29	0.90	1.38	0.29	1.05	0.62	0.53	1.10	1.07	1.80
	PT ♀	3.41	0.57	0.27	0.89	1.35	0.29	1.05	0.71	0.50	1.11	1.07	1.83
<i>M. siamicus</i> sp. nov.	HT ♂	2.67	0.53	0.26	0.69	1.05	0.21	0.90	0.60	0.41	0.95	0.83	1.38
	PT ♂	2.70	0.51	0.26	0.70	1.05	0.21	0.84	0.59	0.48	0.90	0.87	1.43
	PT ♂	2.77	0.48	0.23	0.65	1.07	0.23	0.87	0.57	0.33	0.90	0.81	1.34
	PT ♀	2.77	0.49	0.26	0.71	1.17	0.23	0.90	0.60	0.35	0.93	0.90	1.47
	PT ♀	2.50	0.50	0.26	0.65	1.05	0.21	0.75	0.60	0.44	0.90	0.84	1.34
	PT ♀	2.84	0.48	0.26	0.69	1.08	0.23	0.87	0.59	0.50	0.95	0.89	1.40
* <i>M. aureus</i>	Max.	3.28	0.60	0.29	0.78	1.14	0.26	1.04	0.67	0.71	–	–	–
	Min.	3.13	0.55	0.27	0.76	1.20	0.23	1.02	0.65	0.61	–	–	–

TABLE 1. Measurements for *Malacocorisella* species (Abbreviations: FM = femur; HT = holotype; L = length; LBM = labium; PRN = pronotum; PT = paratype; TB = tibia; VTX = vertex (interocular space); W = width) (*Based on the original description: Liu and Zheng, 2014).

excavated dorsally (Fig. 5j). Left paramere weakly curved, C-shaped (Fig. 4c); endosoma with two elongate spiculi (Fig. 4d). **Female genitalia** (Fig. 5k-o): Genital chamber widely membranous, uniformly covered with minute spinules (Fig. 5k); ovipositor (gonapophysis I) generally narrow, tapering apically (Fig. 5l); posterior wall (Fig. 5m) with small, spinulate interramal lobe (Fig. 5n) and rather sparsely distributed scaly microstructures on interramal sclerite (Fig. 5o).

Measurements:

See Table 1.

Etymology:

Named for Siam, the old name of Thailand. The name is a variable adjective.

Distribution:

Thailand (forest zones of Nakhon Ratchasima).

Biology:

Unknown; all available specimens were collected by UV light traps. Collection records suggest the present new species has three or more generations per year, as the adult individuals were found in almost all months (except for July and November) throughout dry (October-April) and rainy (May-September) seasons.

Discussion

This compact Asian genus-group has been known by two members, namely *Malacocorisella endoi* Yasunaga, 1999 (type species of the genus, inhabiting cool temperate deciduous forests in Hokkaido, Honshu, Shikoku and Kyushu, Japan and Gangwon-do, South Korea) (Yasunaga *et al.*, 2001; Jung *et al.*, 2017; Ito, 2023) and *M. aureus* Liu & Zheng, 2014 (known only from warm temperate zone at Hutiao Xia, or Tiger-Leaping-Valley area, 27°11'N 100°04'E, Yunnan, China) (the taxon is not listed by Schuh (2002-2013) and Aukema (2018)). We herein describe the first tropical congener that was found from central Thailand. The members of *Malacocorisella* share the following diagnostic characters: generally small size; dorsum with fine and dense green-white mosaic pattern (Fig. 2a-e vs. 2f); basal carina on vertex weak or obliterated (Figs. 5d, f, 6b); antennomeres I and II uniformly pale, without dark or reddish annulation; parempodium relatively small and narrow (Figs. 5h, 6e);

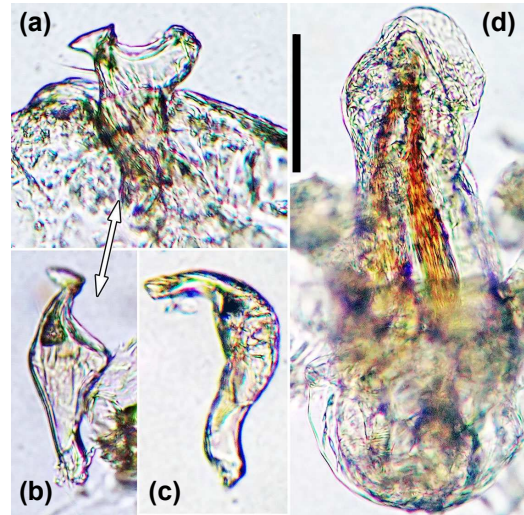


FIGURE 4. Male genitalia of *Malacocorisella siamica* sp. nov.: (a)-(b) Left paramere; (c) Right paramere; (d) Endosoma (Scale bar = 0.1 mm).

dorso-apical male genital segment (pygophore) deeply excavated (Figs. 5j, 6g); tiny-sized parameres (Fig. 4a-c); and endosoma with two spiculi (Fig. 4d) (*cf.*: Yasunaga, 1999; Liu and Zheng, 2014); and interramal lobes reduced (Fig. 5m-n) or rudimental (6j-k).

Schuh (1974) suggested a number of recognizable natural groups, including *Zanchius* and its related genera, in the Orthotylini, whereas «*Zanchius*-group» is now considered to require an independent tribe (Cassis and Schuh, 2012; Yasunaga and Duwal, 2017). The taxa included in the *Zanchius*-group have distinctive characters different from those of typical orthotyline members, such as dorsally flattened head with small, anteriorly directed eyes that are removed from pronotum, delicate body with thin integument and semitransparent forewings (Fig. 2) which is possibly correlated with the rapid discoloration (Fig. 3), small male genital segment with tiny parameres (Fig. 4a-c), small membranous endosoma with simple spiculi (Fig. 4d), and reduced interramal lobes on posterior wall (Figs. 5m-o, 6j-l; Murayama *et al.*, 2023). Judging from the current membership, *Zanchius* itself is composed of several different lineages and further comprehensive revision treating all relevant taxa is required (Oh *et al.*, in prep.).

Most species of the *Zanchius*-group are considered to be predators, preying on tiny leafhoppers or psyllids

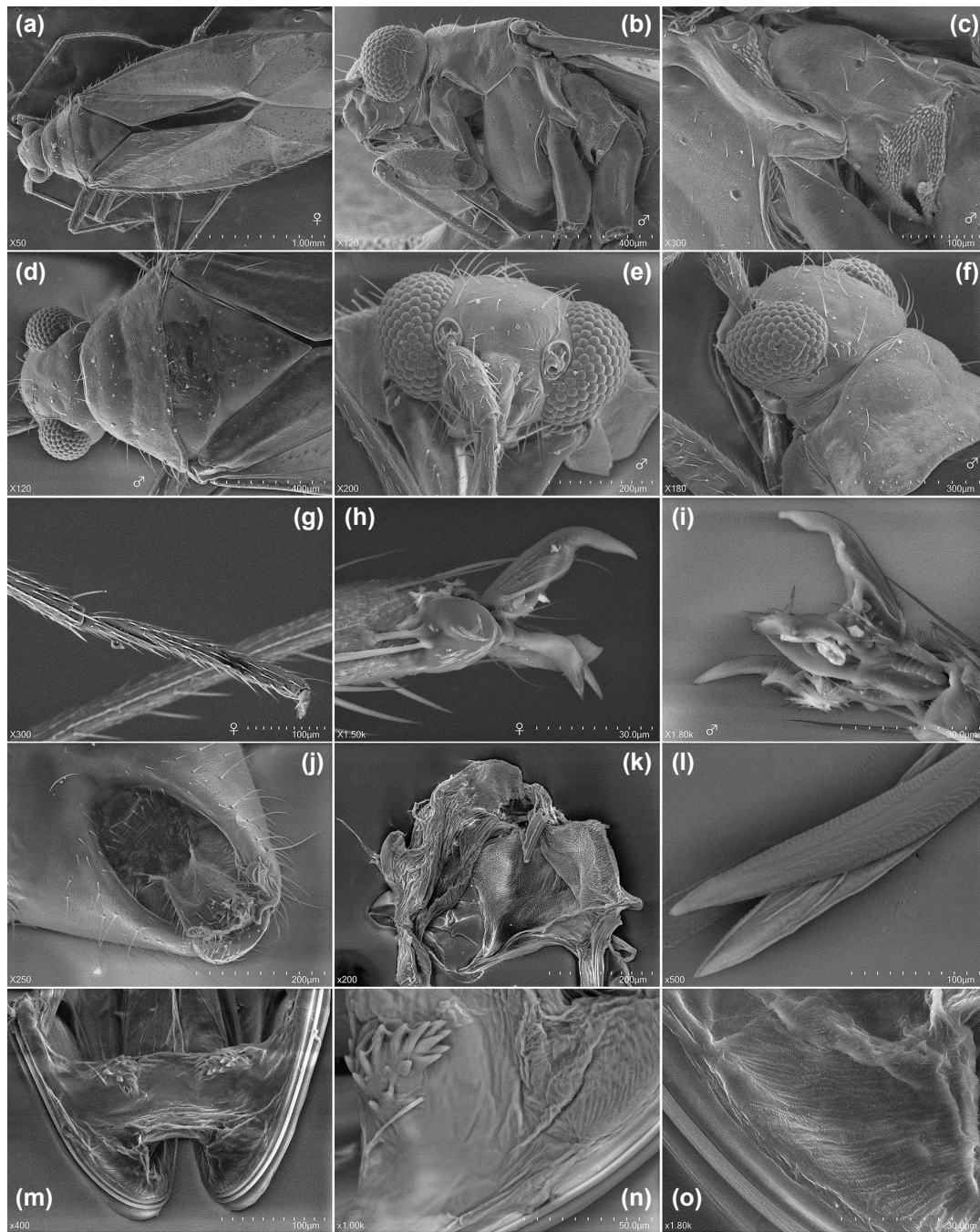


FIGURE 5. Scanning electron micrographs for *Malacocorisella siamica* sp. nov.: (a), (d) Dorsal habitus; (b) Anterior body, left lateral view; (c) Thoracic pleura, left lateral view; (e) Frontal head; (f) Head and pronotum; (g) Metatarsus; (h)-(i) Pretarsal structure of metaleg; (j) Male genital segment (pygophore), dorsal view; (k) Female genital chamber, dorsal view; (l) Ovipositors (gonapophyses I); (m)-(o) Posterior wall.

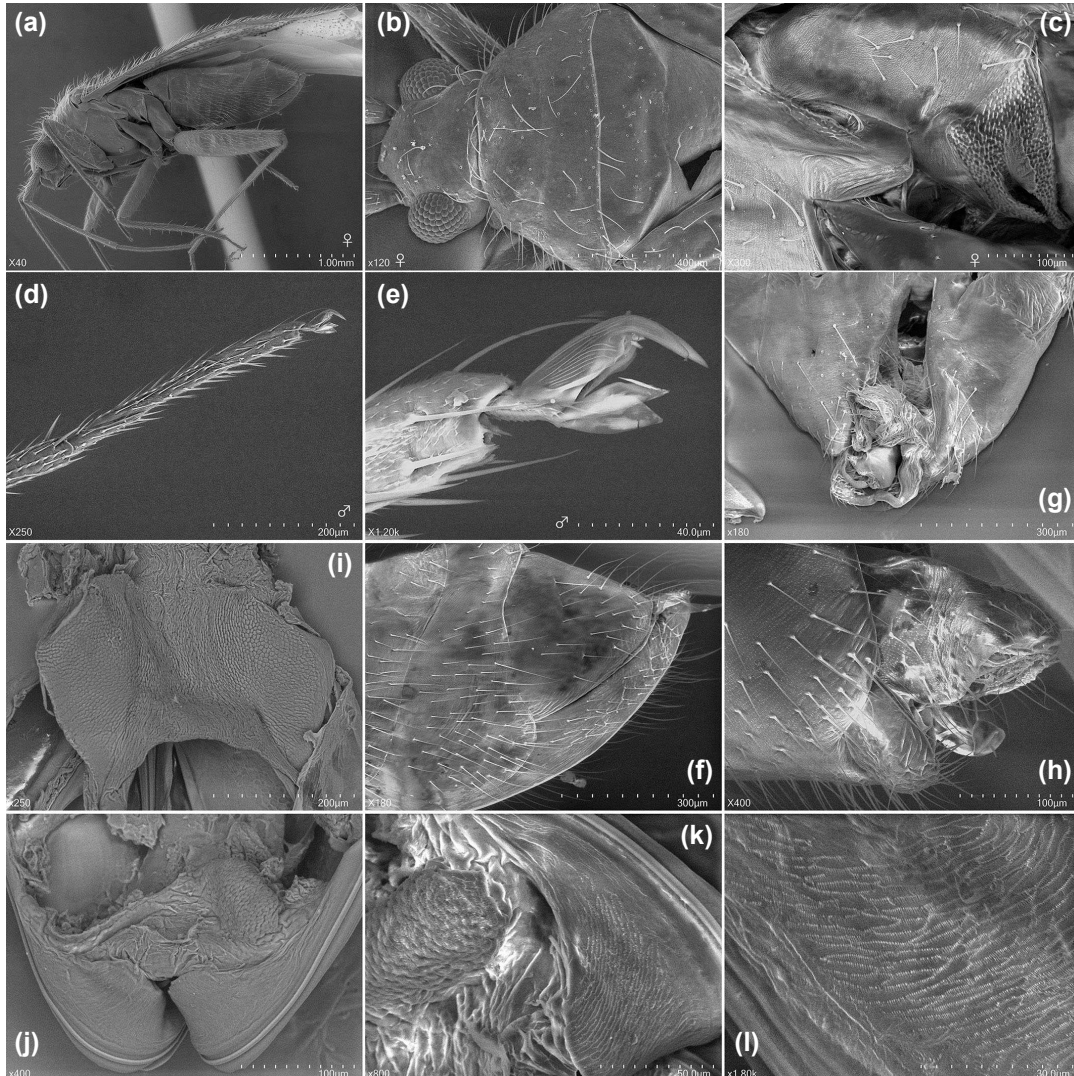


FIGURE 6. Scanning electron micrographs for *Malacocorisella endoi* (paratypes from Hokkaido, Japan): (a) Left lateral habitus; (b) Anterior body, dorsal view; (c) Thoracic pleura, left lateral view; (d) Metatarsus; (e) Pretarsal structure of metaleg; (f) Female abdomen, left lateral view; (g) Male genital segment (pygophore), dorsal view; (h) Same, left lateral view; (i) Female genital chamber, dorsal view; (j)-(l) Posterior wall.

(Yasunaga, 1999; Yasunaga *et al.*, 2001; Liu and Zheng, 2014). The Japanese species, *Malacocorisella endoi*, is known to be monophagous and associated with a walnut, *Juglans mandshurica*. Although this cryophilic univoltine mirid was often found together with an unidentified psyllid species, predatory behavior is yet to be observed (Yasunaga *et al.*, 2001). On the other

hand, all known specimens of the present new species and the Chinese *M. aureus* were attracted to UV light at night. At the collecting site in Thailand (Fig. 1), sweep-netting or beating method in daytime has never yielded specimen of *M. siamica* **sp. nov.** (Fig. 1c). Presumably, this tropical congener is nocturnal and prefers to inhabit canopy areas of the forests.

Acknowledgements

Special thanks are due to the following individuals or institutions for supporting field investigations, providing invaluable materials and/or sharing essential information: the former director Dr. Taksin Artchawakom, Dr. Phuvasa Chanonmuang and local staff members (SERS); Dr. Charuwat Taekul (DOAT); Dr. Kazutaka Yamada (Museum of Nature and Human Activities Hyogo, Sanda, Japan); Benyapha N. Rungrueang (Surin, Thailand); the late Dr. Andrzej Wolski (Opole University, Poland) and his wife Tamara; Mr. Reo Ito (Oita, Japan); and Mr. Takayuki Shishido (Himeji, Japan). The first author is also grateful to Ms. Amiko Nihei, Mr. Atsushi Hama and the late Mr. Daihei Terada (Hitachi High-Tech, Tokyo, Japan) for allowing to use a tabletop scanning electron microscope. Thanks are extended to reviewer and Dr. Santiago Pagola-Carte (editor of *Heteropterus Rev. Entomol.*) for reviewing or editing the manuscript.

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Received / Recibido / Hartua: 21/03/2025

Accepted / Aceptado / Onartua: 17/04/2025

Published / Publicado / Argitaratua: 30/06/2025