

## RESEARCH PAPER

# Reassessment of characters of the ‘*Orientalmiris*-group’, with descriptions of three new genera and eight new species of the tribe Mirini from the Oriental Region (Hemiptera: Heteroptera: Miridae)

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**Abstract.** Possession of stridulatory devices (serrated forewing edge and metafemoral plectra) is suggested as a useful taxonomic character for classification of the complex group comprising *Creontiades* Distant, 1883, *Megacoelum* Fieber, 1858, *Orientalmiris* Yasunaga, 1997 and an additional superficially similar taxon which is provisionally called the *Orientalmiris*-group. Three new genera, *Muttiocapsus* gen. nov., *Nythomiris* gen. nov. and *Sakaeratiella* gen. nov., are proposed to accommodate two unique undescribed species from the Oriental Region and a known taxon, *Adelphocorisella adelphocoroides* Yasunaga, Shishido & Yamada, 2016 from Thailand, respectively. Accordingly, a new combination, *Sakaeratiella adelphocoroides* comb. nov., is established. Four new species of *Orientalmiris* Yasunaga, 1997 from Peninsular Malaysia, Taiwan and Thailand are also described.

**Key words.** Hemiptera, Heteroptera, Miridae, Mirini, new combination, new taxa, SEM documentation, stridulatory device, Oriental Region

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## Introduction

From the late 19th to the early 20th century, a great number of mirine plant bug species (Mirinae: Mirini) from the Oriental Region were described under a few genera, such as *Adelphocoris* Reuter, 1896, *Calocoris* Fieber, 1858, *Creontiades* Distant, 1883, *Megacoelum* Fieber, 1858 or *Phytocoris* Fallén, 1814 (e.g. DISTANT 1883, 1904, 1909, 1910; POPPIUS 1914, 1915a, b; REUTER 1906). Since these genera were established for European or North American species, the generic placements of many Oriental species were improper, and revised classifications with new genera have been attempted since 1990s (MIYAMOTO & YASUNAGA 1993; YASUNAGA 1997a, 1997b, 1998, 2011; CHÉROT & MAILIPATIL 2016; YASUNAGA et al. 2021; PAGOLA-CARTE et al. 2022, etc.). Nonetheless, quite a few undescribed and undetermined mirine taxa still remain in the region.

Based on the present reassessment of characters (presence of stridulatory devices in particular), a novel classification system is suggested for the taxa accommodated

in *Creontiades*, *Megacoelum*, *Orientalmiris* Yasunaga, 1997 and some superficially similar genera which were previously referred to as the *Adelphocoris*-*Creontiades*-*Megacoelum* (ACM) complex (CHÉROT & MAILIPATIL 2016). As a result of continuing trials by the author to provide a more suitable classification system for the complex group, the stridulatory device is now considered to be a useful character and the ‘*Orientalmiris*-group’ is herein proposed.

Recently, DAVRANOGLU et al. (2023) comprehensively reviewed stridulatory devices in Heteroptera including Miridae, and possession of the wing edge-metafemur stridulatory mechanism was confirmed in four subfamilies, Cylapinae, Deraeocorinae, Orthotylinae, and Phylinae. However, the device has not been reported for Mirinae (the tribe Mirini) so far.

This paper documents that nine mirine genera (including two new genera proposed herein) are equipped with the distinct stridulatory device (serrate forewing edge and metafemoral plectra) and describes three new genera and



eight new species: *Muttiocapsus* gen. nov., *Nythomiris* gen. nov., and *Sakaeratiella* gen. nov.; *Muttiocapsus cruciger* sp. nov., *M. teradai* sp. nov., *Nythomiris nagamasai* sp. nov., *N. nepalicus* sp. nov., *Orientomiris andrzeji* sp. nov., *O. chiangmai* sp. nov., *O. norioi* sp. nov., and *O. shoheii* sp. nov. In addition, *Adelphocorisella adelphocoroides* Yasunaga, Shishido & Yamada, 2016 is transferred to *Sakaeratiella*. A teratological antennomeres found in one of the new species, *Orientomiris norioi*, are additionally reported.

## Material and methods

Specimens examined are deposited in the following collections:

AMNH	American Museum of Natural History, New York, USA;
CNC	Canadian National Collection of Insects, Ottawa, Ontario, Canada;
DOAT	Entomology & Zoology Group, Plant Protection Research & Development Office, Department of Agriculture, Bangkok, Thailand;
NMNS	National Museum of Natural Science, Taichung, Taiwan;
NMTU	Natural History Museum, Tribhuvan University, Kathmandu, Nepal;
NWHS	Nagasaki West High School, SSH Biology Section, Nagasaki, Japan;
SNUC	Seoul National University Collection, Korea;
TYCN	Tomohide Yasunaga Collection, Nagasaki, Japan;
ZRC	Zoological Reference Collection, Natural History Museum, National University of Singapore.

Matrix code labels, which uniquely identify each specimen and are referred to as 'unique specimen identifier (USI)', are attached to the holotype specimens (e.g., AMNH\_PBI 0012345). These specimens are searchable (by species name) on 'Heteroptera Species Pages' (<http://research.amnh.org/pbi/heteropterasespeciespage/>).

The synonymic lists for known taxa are omitted, or selected references are provided if necessary, as comprehensive catalogues are now available (e.g. KERZHNER & JOSIFOV 1999; SCHUH 1995, 2002–2013; AUKEMA et al. 2013; AUKEMA 2018). Terminology of the genitalia mainly follows works which comprehensively treated relevant taxa, such as DAVIS (1955), YASUNAGA (1997a, b, 2019, 2023), YASUNAGA & SCHWARTZ (2007) and CHÉROT & MALIPATIL (2016); the terms for stridulatory devices follow SCHUH & WEIRAUCH (2020) and DAVRANOGLU et al. (2023).

Scanning Electron Micrographs were taken with Hitachi Miniscope®, TM4000 plus II; the genitalic structures were also observed using a Nikon Eclipse Ci upright microscope, with a Photophase-Unit. For SEM documentation of the male and female genitalic structures, the delicate minute organs were dipped and washed in 60–70% ethyl alcohol after dissection under an Olympus SZX-12 binocular stereoscopic microscope, placed on filter paper until dry, carefully attached to cards (ca. 5 × 15 mm) using water soluble wood glue, and finally placed in the Tabletop SEM chamber for examination (without vapor deposition of metals). Measurements are in millimeters; for most of the SEM images (Figs 12–20), scale bars are shown in micrometers (µm).

Additional taxa examined [taxa with stridulatory device are marked with an asterisk (\*)]:

- Adelphocoris demissus* (Horváth, 1905) (Japan)  
*Adelphocoris suturalis* (Jakovlev, 1882) (Japan)  
*Adelphocoris triannulatus* (Stål, 1858) (Japan)  
*Adelphocorisella insulana* Miyamoto & Yasunaga, 1993 (Japan)  
*Adelphocorisella lepedezae* Miyamoto & Yasunaga, 1993 (Japan) (Figs 20O–P)  
 \**Cheilocapsidea pura* (Yasunaga, 1995) (Taiwan) (Fig. 10G)  
 \**Cheilocapsidea rufescens* (Yasunaga, 1995) (Taiwan) (Fig. 12R)  
*Cheilocapsus miyamotoi* Yasunaga, 1997 (Japan)  
 \**Creontiades bipunctatus* Poppius, 1915 (Japan) (Figs 11A, 12S, 14J)  
 \**Creontiades coloripes* Hsiao & Meng, 1963 (Japan)  
 \**Creontiades debilis* Van Duzee, 1915 (Mexico)  
 \**Creontiades pallidifer* (Walker, 1860) (Nepal)  
 \**Creontiades rubrinervis* (Stål, 1862) (USA) (Fig. 10F)  
*Malayamiridius nigrotenuis* (Yasunaga, Schwartz & Chérot, 2021) (Malaysia)  
 \**Megacoelum brevirostre* Reuter, 1879 (Turkmenistan)  
 \**Megacoelum formosanum* (Poppius, 1915) (Taiwan)  
 \**Megacoelum infusum* (Herrich-Schaeffer, 1837) (Bulgaria) (Figs 12B, 14M)  
 \**Muttiocapsus* sp. (Taiwan)  
 \**Neomegacoelum vitreum* (Kerzhner, 1988) (Japan) (Figs 11B, 12S, 14L)  
 \**Orientomiris erythromelas* Yasunaga, 1997 (Japan)  
 \**Orientomiris eurytus* (Yasunaga, 1988) (Japan) (Figs 12I, 19G–I)  
 \**Orientomiris flavicollaris* Yasunaga, 1997 (Japan) (Fig. 12K)  
 \**Orientomiris nigripennis* Yasunaga, 1997 (Japan)  
 \**Orientomiris nigripes* Yasunaga, 1997 (Japan) (Figs 12L, 14O)  
 \**Orientomiris straminipes* (Distant, 1909) (Nepal) (Figs 11D, 12N)  
 \**Orientomiris tricolor* (Scott, 1880) (Japan) (Figs 11C, 12J)  
 \**Orientomiris yaeyamanus* Yasunaga, 1997 (Japan) (Figs 12M, 14N)  
 \**Orientomiris* sp. 1 (near *O. ater* (Poppius, 1915); Nepal) (Fig. 12O)  
 \**Orientomiris* sp. 2 (near *O. sumatranus* (Poppius, 1915); Malaysia)  
 \**Orientomiris* sp. 3 (near *Megacoelum picturatum* Distant, 1904; Malaysia)  
*Pantilius hayashii* Miyamoto & Yasunaga, 1989 (Japan)  
*Pantilius tunicatus* (Fabricius, 1781) (Japan)  
*Phytocoris longipennis* Flor, 1861 (Japan)  
*Phytocoris nowickiyi* Fieber, 1870 (Japan)  
*Phytocoris ohataensis* (Linnavuori, 1961) (Japan)  
*Phytocoris yetiellus* Pagola-Carte, Yasunaga & Duwal, 2023 (Nepal)  
*Poppiocapsidea biseratensis* (Distant, 1903) (Thailand) (Figs 15N–P, 19M–O)  
*Poppiocapsidea* sp. 1 (Philippines)  
*Poppiocapsidea* sp. 2 (Singapore) (Fig. 11E)  
 \**Pseudomegacoelum beckeri* (Fieber, 1870) (Bulgaria) (Fig. 12A)  
*Todomiris puguis* Yasunaga, Chérot & Schwartz, 2021 (Philippines)  
 \**Vairocanamiris jordiribesi* Yasunaga, 2011 (India) (Figs 12T, 14O)

## Taxonomy

### Definition of the *Orientomiris*-group

**Diagnosis.** Based on possession of stridulatory devices, nine genera shown below are now presumed to be closely related to each other and included in the new group of genera. These taxa are primarily defined by the following external characters: body elongate, large-sized (usually over 7 mm in total length), parallel-sided, with long antennae and legs (e.g., Figs 1A, 3F, 11A–D); dorsum more or less shining, with pale, simple setae, almost impunctate, often densely covered with reticular microstructures (mainly on hemelytron); head vertical or subvertical, with longitudinal, mesal sulcation on vertex; antenna long, usually longer than body; lateral margin of forewing (exocorium) minutely notched or serrate (Figs 10C–D, F, 13D, 14D,

Table 1. Measurements of the species treated. Abbreviations: F – female. FM – femur. HEM – hemelytron. HT – holotype. L – length. LBM – labium. M – male. PT – paratype. PRN – pronotum. TB – tibia. VTX – vertex (interocular space). W – width. New taxa in bold.

		Body	Head	VTX	PRN	HEM	Antennomere L				LBM	Hind leg L	
		L	W	W	W	W	I	II	III	IV	L	FM	TB
<b><i>Muttiocapsus</i></b>													
<b><i>M. cruciger</i></b>	HT M	5.99	1.15	0.27	1.79	1.79	1.03	2.77	1.62	0.81	1.59	2.43	3.55
<b><i>M. teradai</i></b>	HT F	6.48	1.15	0.34	1.98	2.21	1.18	3.09	—	—	2.06	2.35	3.87
<b><i>Nythomiris</i></b>													
<b><i>N. nagamasai</i></b>	HT M	5.34	1.20	0.22	1.69	1.74	0.81	2.50	1.94	1.00	2.33	2.70	4.19
	PT F	5.03	1.18	0.25	1.69	1.79	0.78	2.43	1.76	0.96	2.45	2.67	4.14
	PT F	5.38	1.18	0.29	1.76	1.84	0.86	2.33	2.13	1.03	2.57	2.70	4.31
	PT F	5.43	1.15	0.29	1.74	2.01	0.88	2.28	2.40	1.03	2.45	2.70	3.99
<b><i>N. nepalicus</i></b>	HT M	5.38	1.13	0.32	1.86	1.94	0.86	2.70	2.01	1.10	2.57	2.70	4.17
	PT F	5.25	1.15	0.34	1.86	1.89	0.88	2.65	2.21	1.15	2.52	2.74	4.21
	PT F	5.99	1.15	0.37	1.94	2.21	0.98	3.16	—	—	2.70	2.89	4.24
	PT F	5.69	1.15	0.39	1.96	2.47	0.88	2.25	1.74	0.88	2.67	2.70	4.21
<b><i>Orientomiris</i></b>													
<b><i>O. andrzeji</i></b>	HT M	7.09	1.30	0.42	2.18	2.38	1.47	3.68	3.50	1.40	3.43	3.68	5.54
	PT M	6.96	1.30	0.42	2.21	2.40	1.52	3.94	3.70	1.35	3.48	3.85	5.83
	PT M	7.57	1.23	0.42	2.18	2.40	1.42	3.36	2.94	1.25	3.48	3.60	5.88
	PT F	6.61	1.25	0.39	2.23	2.52	1.57	3.68	3.43	1.27	3.43	3.68	5.88
	PT F	7.39	1.27	0.39	2.18	2.45	1.47	3.68	3.50	1.37	3.36	3.50	5.66
	PT F	7.09	1.27	0.39	2.13	2.45	1.47	3.43	3.43	1.32	3.50	3.58	5.46
<b><i>O. chiangmai</i></b>	HT M	8.31	1.27	0.42	2.38	2.50	1.42	3.68	3.19	1.27	3.45	3.68	5.93
	PT M	7.26	1.25	0.37	2.08	2.33	1.35	3.33	2.99	1.40	3.48	3.43	5.54
	PT M	7.88	1.30	0.39	2.25	2.45	1.32	3.50	3.19	1.32	3.58	3.55	6.13
	PT F	8.75	1.30	0.49	2.50	2.89	1.54	3.68	3.19	—	3.72	3.92	6.42
	PT F	8.88	1.32	0.47	2.47	2.79	1.42	3.58	3.21	—	3.85	3.87	6.52
<b><i>O. norioi</i></b>	HT M	8.40	1.35	0.39	2.28	2.50	1.52	3.72	3.41	1.32	3.68	3.90	6.13
	PT M	8.58	1.38	0.39	2.28	2.47	1.59	3.92	3.45	1.30	3.77	3.94	6.42
	PT M	8.58	1.32	0.34	2.28	2.47	1.49	3.85	—	—	3.80	3.80	6.15
					Left antenna		1.52	4.34	4.17				
	PT M	8.05	1.41	0.37	2.30	2.47	1.57	3.94	3.75	1.47	3.72	4.09	6.59
					Left antenna		1.62	4.29	4.31				
<b><i>O. shoheii</i></b>	HT M	10.2	1.40	0.54	2.79	3.01	1.27	3.92	2.82	1.32	3.92	3.85	6.37
<b><i>Sakaeratiella</i></b>													
<b><i>S. adelphocoroides</i></b>	HT M	6.00	1.10	0.44	1.84	2.16	0.86	2.84	2.23	1.10	3.71	2.70	4.26

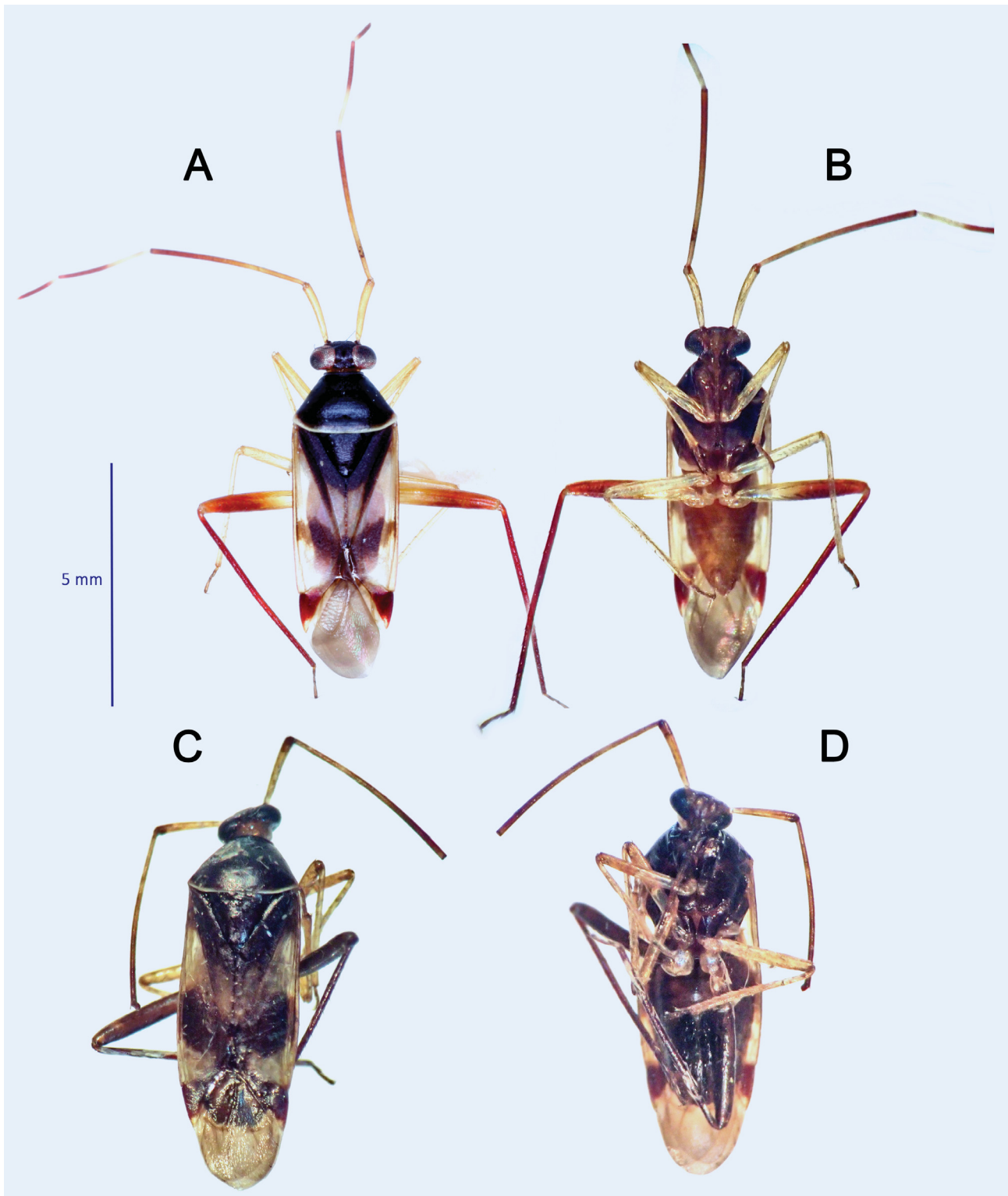


Fig. 1. Habitus images of *Muttiocapsus cruciger* sp. nov., holotype male (A–B), and *M. teradai* sp. nov., holotype female (C–D). A, C – dorsal view. B, D – ventral view.

J–N); and dorsal surface of metafemora with a field of minute granulate bumps, or plectra (Figs 10E, 12A–T).

**Genera included.** *Creontiades* Distant, 1883, *Cheilocapsidea* Poppius, 1915, *Megacoelum* Fieber, 1858, *Muttiocapsus* gen. nov., *Neomegacoelum* Yasunaga, 1998, *Orientomiris* Yasunaga, 1997, *Pseudomegacoelum* Chérot & Malipatil, 2016, *Sakaeratiella* gen. nov., and *Vairocanamiris* Yasunaga, 2011.

### *Muttiocapsus* gen. nov.

**Type species:** *Muttiocapsus cruciger* sp. nov., here designated.

**Diagnosis.** This new genus can be distinguished from other mirines and those included in the *Orientomiris*-group by the following characters: almost glabrous dorsum (Figs 1A, 13A); vertical head with flattened frons and clypeus (Fig. 13C); relatively large eyes; grayish white

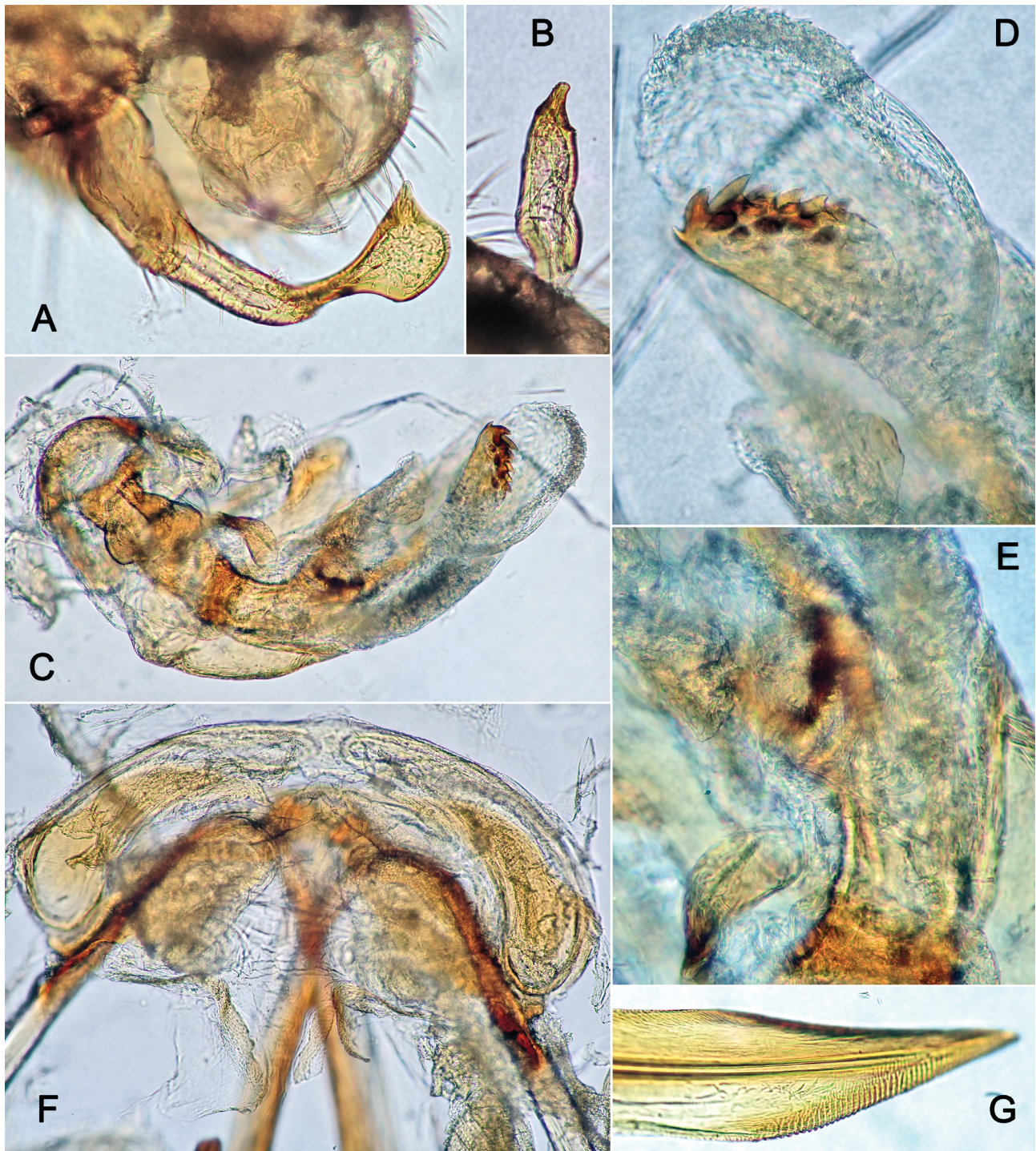


Fig. 2. Genitalia of *Muttiocapsus cruciger* sp. nov., holotype male (A–E), and *M. teradai* sp. nov., holotype female (F–G). A – left paramere. B – right paramere. C – vesica. D – apical comb-like sclerite. E – secondary gonopore. F – genital chamber. G – apex of ovipositor (gonapophysis I).

hemelytra with dark, X-shaped macula posteriad (Figs 1A, C); short labium not exceeding mesocoxa; broadened hypophysis of left paramere (Fig. 13L); reduced, tiny right paramere (Fig. 2B); and developed, wide, mesally overlapped interramal lobes (Fig. 14H).

**Description.** Body elongate, parallel-sided, rather small-sized in *Orientomiris*-group, with total length 6.0–6.5 mm; basic coloration dark brown to fuscous; dorsal surface rather weakly shining, impunctate, smooth, with

sparsely distributed, short, simple setae (Fig. 13A). **Head** vertical, slightly rounded in front, glabrous, minutely wrinkled or roughened (Figs 13C, 14A); eyes relatively large; vertex with shallow, longitudinal sulcation mesally (Fig. 13B); frons and clypeus flat. **Antenna** long, almost linear; segment I about as long as head width across eyes; segment II about as thick as segment I, much longer than metafemur; segment III shorter than basal width of pronotum; segment IV shorter than I. **Labium** short,

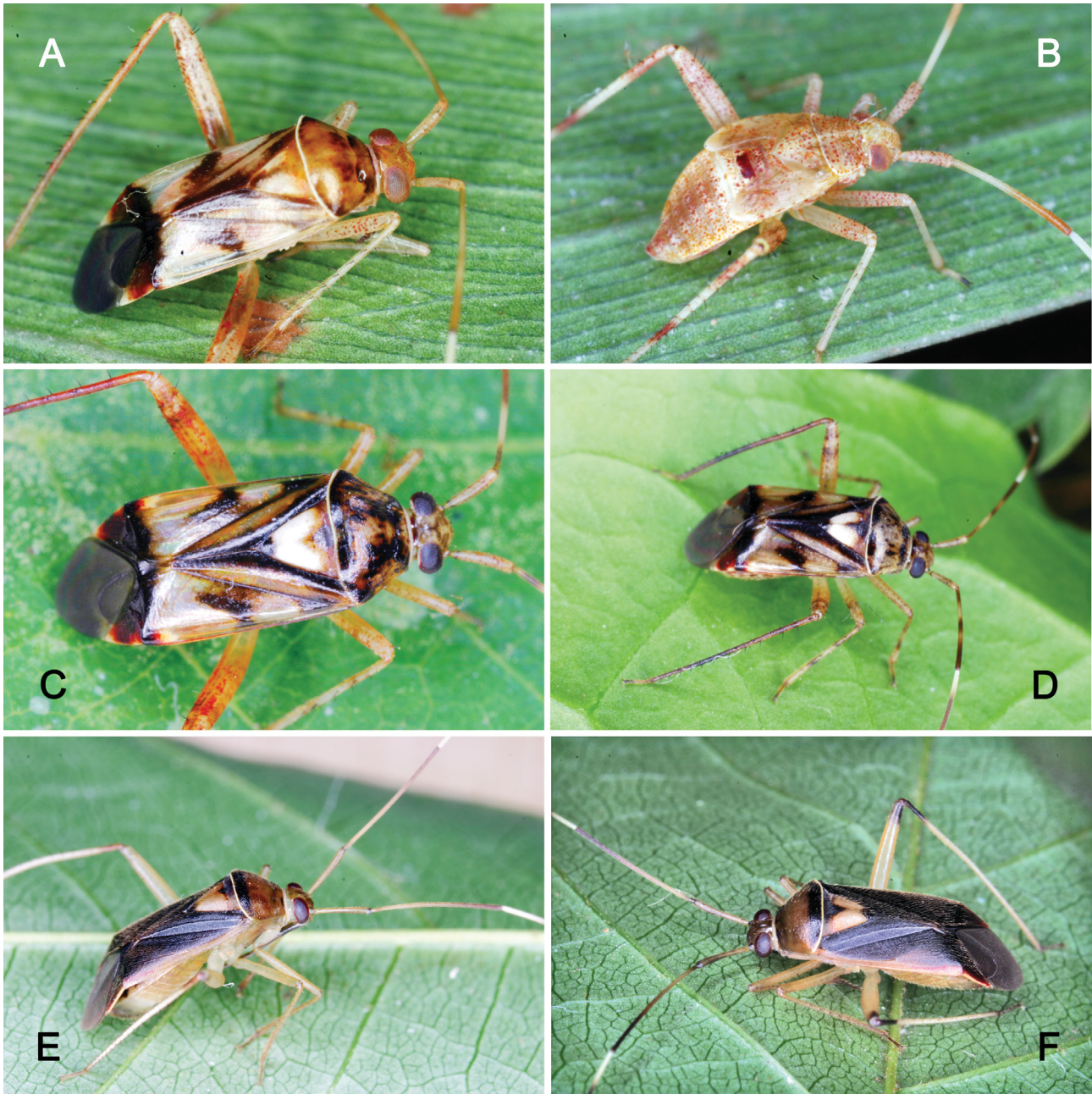


Fig. 3. Habitus images of Oriental mirine plant bugs, live individuals. A – *Nythomiris nagamasai* sp. nov., male. B – same, final (5th) instar nymph. C – *N. nepalicus* sp. nov., female from Makawanpur. D – same, from Kathmandu. E–F – *Orientomiris andrzeji* sp. nov., female.

reaching procoxa but not exceeding apex of mesocoxa.

**Thorax.** Pronotum fuscous, smooth, impunctate, nearly glabrous, with creamy yellow posterior margin; calli indistinct, not clearly demarcated; mesoscutum fuscous, densely covered with minute, velvety pilosity (Fig. 13F); scutellum uniformly shiny fuscous, somewhat roundly inflated, with shallow wrinkles and serrate lateral margin (Fig. 13F); thoracic pleura dark reddish brown, with yellowish brown scent efferent system. **Hemelytron** grayish white, somewhat matte, with X-shaped dark macula across posterior half of corium and cuneus (Figs 1A, C), almost glabrous, densely covered with reticular

microstructures (Fig. 13F); lateral margin of exocorium (embolium) serrate as in Figs 13D–E and 14C–D. **Legs** long, generally slender; metafemur with field of plectra (Figs 12C–D, 13G–H, 14E); tarsi relatively short (Fig. 105); pretarsal structure as in Fig. 106. **Male genitalia** (Figs 2A–E, 6A–C, 13K–O). Pygophore with small, triangular process at base of left paramere (Fig. 6B); parameres small-sized; left paramere C-shaped, with broad, spoon-shaped hypophysis (Figs 2A, 6B, 13K–L); right paramere reduced, tiny, much smaller than left paramere, with small hypophysis (Figs 2B, 6A, 13M); vesica composed of two membranous lobes (Fig. 2C),

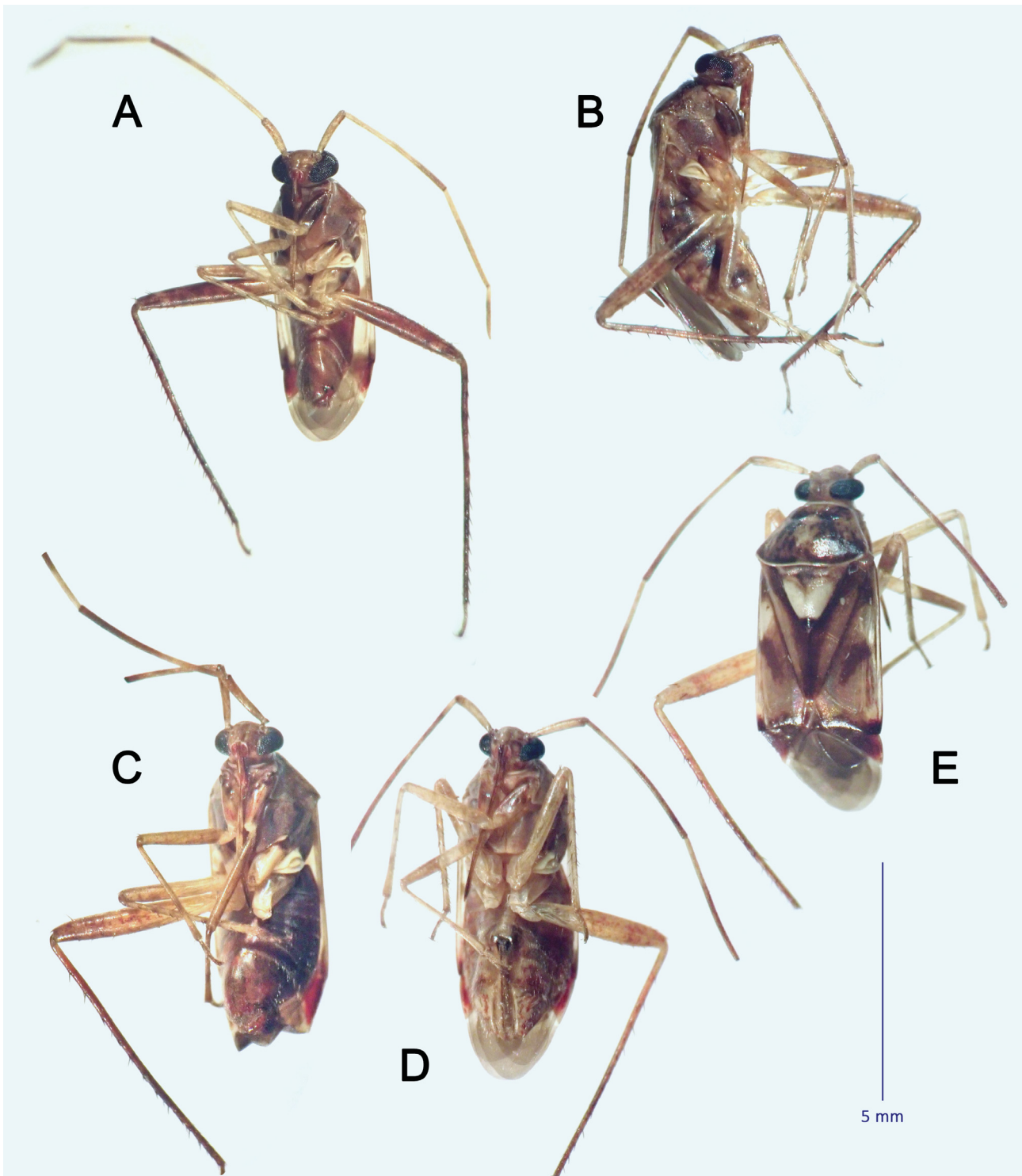


Fig. 4. Habitus images of *Nythomiris nagamasai* sp. nov. (A–B) and *N. nepalicus* sp. nov. (C–E). A, C – male, ventral view. B, D – female, ventral view. E – female, dorsal view.

with small, apical, serrate sclerite (Figs 2D–E), short spicule in middle (Figs 2C, 6C) and basal spinulate lobes (Fig 13K–L); secondary gonopore relatively small and rounded. **Female genitalia** (Figs 2F–G, 14G–I). Sclerotized rings elongate ovoid, relatively contiguous to each other (Fig. 2F); ovipositor (gonapophysis I) sword-like apical part (Figs 2G, 14I); posterior wall with developed, uniformly spinulate interramal lobes that overlap each

other in middle (Figs 14G–H).

**Etymology.** From Latin, *muttio* (= mutter, mumble, murmur) combined with mirid generic name *Capsus* F., 1803, referring to possession of stridulatory device; masculine.

**Biology.** Unknown.

**Distribution.** Indonesia (Sumatra), Malaysia (Perak); this new genus is considered to comprise typical Sundaland elements.

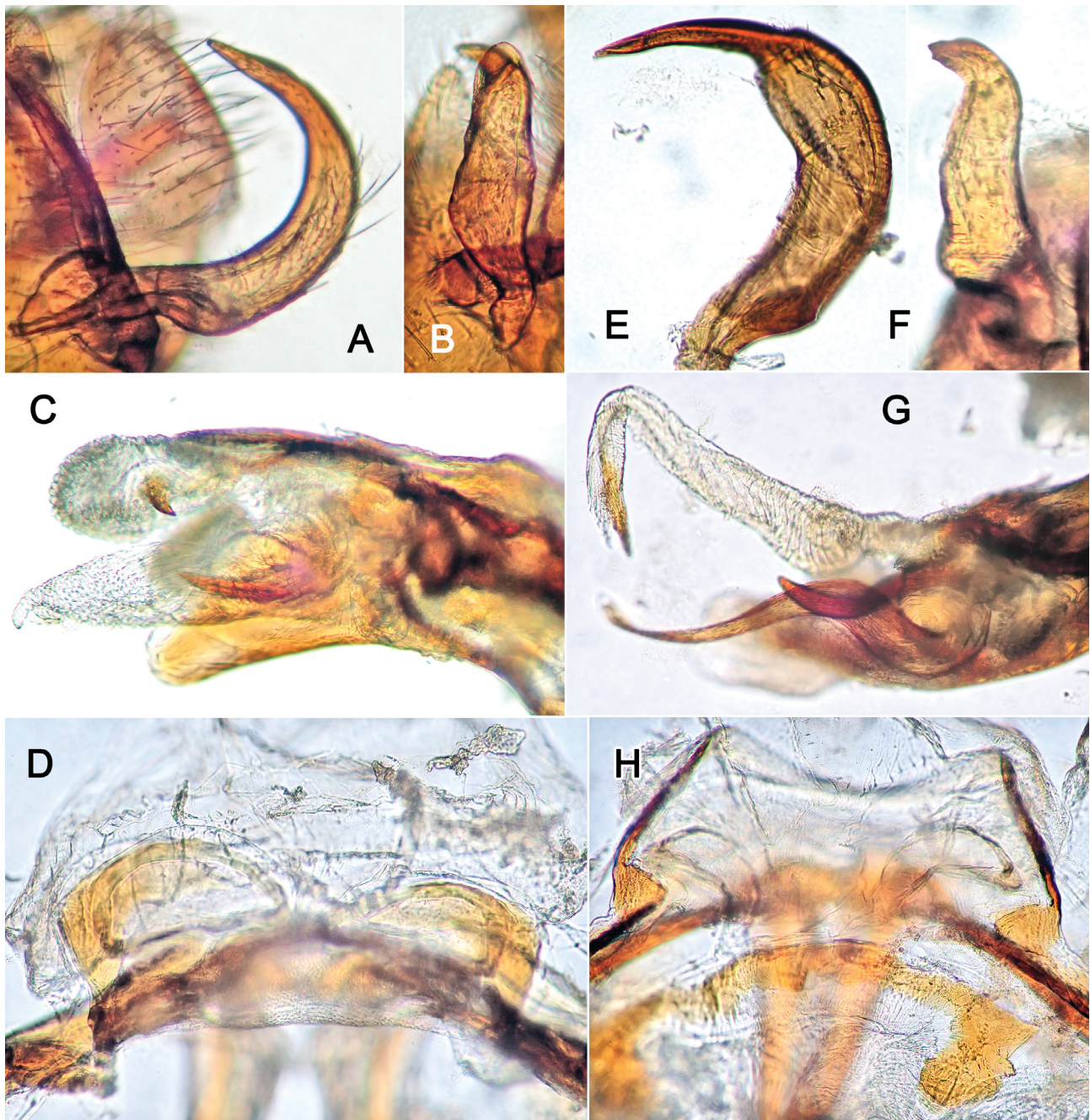


Fig. 5. Male (A–C, E–G) and female (D, H) genitalia of *Nythomiris nagamasai* sp. nov. (A–D) and *N. nepalicus* sp. nov. (E–H). A, E – left paramere. B, F – right paramere. C, G – vesica. D, H – genital chamber.

***Mutiocapsus cruciger* sp. nov.**

(Figs 1A–B, 2A–E, 6A–C, 12C, 13A–O)

**Type material.** HOLOTYPE: ♂, MALAYSIA: Perak, Bukit Larut [= Maxwell Hill], 1,100 m alt., 4.8624°N, 100.7999°E, UV (mercury bulb) light trap, 14.vii.1989, T. Yasunaga (AMNH\_PBI 00378798) (ZRC).

**Diagnosis.** Currently known only from the holotype male. Recognized by characters mentioned in the generic diagnosis above and distinguished from the other congener, *M. teradai* sp. nov., by its uniformly pale antennomere I; narrower reddish fascia on corium (Fig. 1A); pale basal 1/3 of metafemur; and almost uniformly reddish brown abdomen (Fig. 1B).

**Description.** *Male* (holotype). As in generic description.

Head velvety fuscous brown, weakly shining, glabrous; vertex narrow, less than quarter as wide as head across eyes. Antenna reddish brown; segment I creamy yellow, shorter than head width across eyes, with slightly dark apex; basal 1/3 of segment II, basal half of segment III and base of segment IV creamy yellow; segment III longer than labium. Labium shiny chocolate brown, reaching but not exceeding base of procoxa. Pronotum fuscous, weakly shining, with creamy yellow posterior margin; thoracic pleura coffee brown, with creamy yellow scent efferent system; mesoscutum and scutellum fuscous. Hemelytra grayish white, with dark brown, X-shaped macula across corium and cuneus (Fig. 1A);



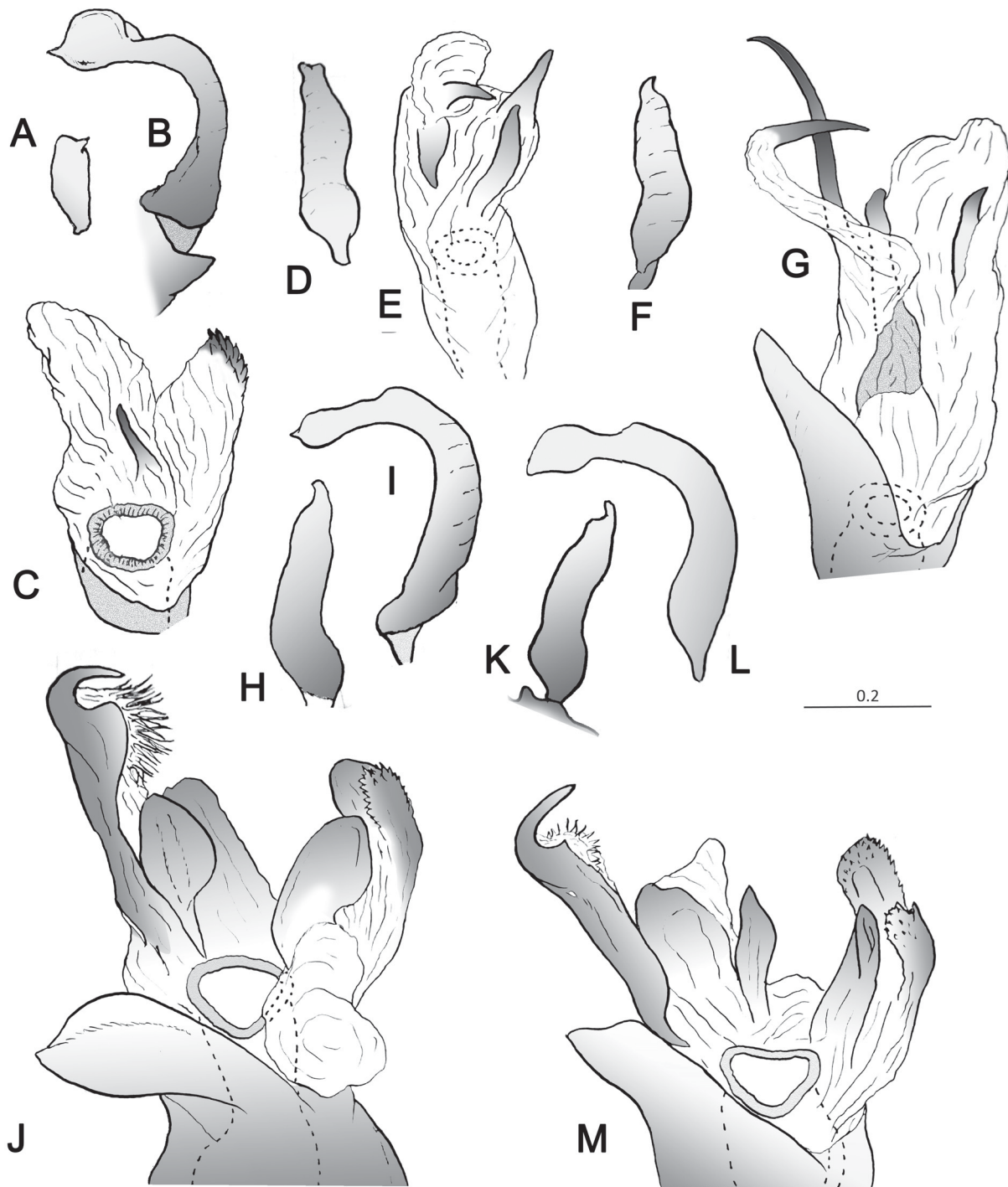


Fig. 6. Male genitalia of *Muttiocapsus cruciger* sp. nov. (A–C), *Nythomiris nagamasai* sp. nov. (D–E), *N. nepalicus* sp. nov. (F–G), *Orientomiris andrzeji* sp. nov. (H–J) and *O. chiangmai* sp. nov. (K–M). A, D, F, H, K – right paramere. B, I, L – left paramere. C, E, G, J, M – vesica.

clavus with dark brown lateral margin and claval commissure; apex of cuneus creamy yellow; membrane pale grayish brown. All coxae shiny chocolate brown; legs and trochanters pale brown; apical 2/3 of metafemur, entire metatibia and all tarsi dark brown; metatarsomere II as long as III (Fig. 13I); pretarsal structure as in Fig. 13J. Abdomen shiny castaneous brown. Male genitalia (Figs 2A–E, 6A–C, 13K–O) as mentioned in generic description.

**Female.** Unknown.

**Measurements.** See Table 1.

**Etymology.** From Latin, *cruciger* (= having cross, cross-career), referring to the dark X-shaped macula on the hemelytra of this new species; noun in apposition.

**Biology.** A single male specimen was collected using UV (mercury) light trap set in primary tropical rainforest zone. No other information is available.

**Distribution.** Malaysia (Perak).

**Muttiocapsus teradai sp. nov.**

(Figs 3–4, 10–11, 80, 112–120)

**Type material.** HOLOTYPE: ♀, INDONESIA: North Sumatra, Prapat (Parapat), 2°39'N 98°56'E, UV lighting, x.1989, local collector (AMNH\_PBI 00378799) (ZRC).

**Diagnosis.** Distinguished readily from the other congener, *M. cruciger* sp. nov., by its darkened apical 1/5 of antennomere I; longer labium reaching apex of mesocoxa; dark basal half of clavus; broader dark macula on corium; and entirely dark brown metafemur without pale base.

**Description.** *Female* (holotype). As in generic description. Head dark brown, weakly shining, glabrous. Antenna pale brown; segment I longer than head width across eyes, with smoky brown apical 1/5; apical 2/3 of segment II smoky brown; segments III and IV missing. Labium shiny dark brown, reaching but not exceeding apex of mesocoxa; segment III brown. Pronotum fuscous, weakly shining, with creamy yellow posterior margin; thoracic pleura shiny dark brown, with posterior half of scent efferent system creamy yellow; mesoscutum and scutellum fuscous. Hemelytra pale brown, with dark brown, X-shaped macula (broader than *M. cruciger* sp. nov., as in Figs 1A, C) across corium and cuneus; clavus with darkened anterior half and lateral margin; apex of cuneus pale brown; membrane pale grayish brown, with darkened areolar cells. All coxae dark brown; legs and trochanters pale brown; metafemur, metatibia and all tarsi dark brown. Abdomen shiny dark brown. Female genitalia (Figs 2F–G, 14G–I) as mentioned in generic description.

**Male.** Unknown.

**Measurements.** See Table 1.

**Etymology.** Named in honor of the late Mr. Daihei Terada, who worked for Hitachi High Tech and kindly accorded me to utilize Miniscope® for long years but regretfully passed away on August 26, 2024; a noun in the genitive case.

**Biology.** Unknown.

**Distribution.** Indonesia (North Sumatra).

**Orientomiris Yasunaga, 1997**

*Orientomiris* Yasunaga, 1997b: 728–729 (new genus). Type species by original designation: *Calocoris tricolor* Scott, 1880, from Nagasaki, Japan (Fig. 11C)

*Orientomiris*: YASUNAGA (2001): 250 (diagnosis); ZHENG et al. (2004): 210 (diagnosis); CHÉROT & MALIPATIL (2016): 173 (diagnosis, new combinations); YASUNAGA et al. (2021): 153 (new combinations); YASUNAGA (2023): 80 (diagnosis).

**Diagnosis.** Recognized primarily by the following combination of characters: body elongate, parallel-sided, usually more than 8 mm in total length; stridulatory devices always present (serration on forewing edge and metafemoral plectra, cf. Figs 10A–E); basic coloration brown to fuscous (e.g., Figs 3E–F, 11C–D); dorsal surface weakly shining, impunctate, partly or widely covered with reticular microstructures, with sparsely or uniformly distributed, pale, simple setae; head rather vertical, weakly porrect; vertex with a longitudinal mesal sulcus; antenna long, usually longer than body, almost linear; legs long; male genital segment (pygophore) with a conical process at base of each paramere (e.g., Figs 9A–B, 18A, 19F, J); vesica with semi-circular (sometimes triangular) secondary

gonopore (Fig. 18E) and several variable lobal sclerites, lacking stout or elongate spicule (Figs 6J, M, 18D, K); elongate-ovoid sclerotized rings contiguous to each other mesally (Figs 18F, M); and posterior wall with relatively wide interramal lobes and rounded dorsal structure (Figs 18G, N). Further diagnostic characters or descriptions (including male and female genitalic structures) for the genus were provided by YASUNAGA (1997, 2023), ZHENG et al. (2004) and CHÉROT & MALIPATIL (2016). Because of the great similarity in external appearance, unequivocal species identifications of *Orientomiris* species, particularly from the Oriental Region, are difficult (CHÉROT & MALIPATIL 2016). Herein four new species which are evidently separable from the already known taxa are described below.

**Biology.** The majority of *Orientomiris* species are considered to be arboreal, usually propagating on broadleaf host plants (YASUNAGA 2001). Some members are considered to be predators (YASUNAGA 2001) and can be reared with a synthetic diet (fermented milk beverage and blood-worm) (MIYAZAKI et al. 2019).

**Distribution.** Eastern Palearctic and Oriental Region; currently includes 38 species from China, India, Indonesia, Japan, Malaysia, Philippines, Taiwan and Thailand (ZHENG et al. 2004, CHÉROT & MALIPATIL 2016, YASUNAGA et al. 2021, YASUNAGA 2023).

**Checklist of *Orientomiris* species**

<i>O. andrzeji</i> sp. nov.	Thailand
<i>O. ater</i> (Poppius, 1915)	India
<i>O. brunnetii</i> (Distant, 1909)	India
<i>O. brunneus</i> (Poppius, 1914)	Java
<i>O. Chiangmai</i> sp. nov.	Thailand
<i>O. chinensis</i> (Li & Zheng, 1991)	China
<i>O. fruhstorferi</i> (Poppius, 1915)	Lombok
<i>O. erythromelas</i> Yasunaga, 1997	Japan
<i>O. eurytus</i> (Yasunaga, 1988)	Japan
<i>O. flavicollaris</i> Yasunaga, 1997	Japan
<i>O. maculicollis</i> (Poppius, 1915)	India
<i>O. marginandus</i> (Distant, 1909)	Sri Lanka
<i>O. marginatus</i> (Poppius, 1915)	Sumatra
<i>O. montanus</i> (Poppius, 1915)	Sumatra
<i>O. monticola</i> (Poppius, 1914)	Java
<i>O. nigripes</i> Yasunaga, 1997	Japan
<i>O. nigripennis</i> Yasunaga, 1997	Japan
<i>O. norioi</i> sp. nov.	Malaysia
<i>O. orientalis</i> (Poppius, 1915)	India
<i>O. pallidicornis</i> (Poppius, 1915)	Luzon
<i>O. patruus</i> (Distant, 1909)	Sri Lanka
<i>O. pervalidus</i> (Distant, 1909)	India, Nepal
<i>O. piceus</i> (Reuter, 1906)	China
<i>O. pronotalis</i> (Li & Zheng, 1991)	China
<i>O. pseudopronotalis</i> (Li & Zheng, 1991)	China
<i>O. ravana</i> (Kirkaldy, 1909)	Sri Lanka
<i>O. rubripeda</i> (Li & Zheng, 1991)	China
<i>O. shoheii</i> sp. nov.	Taiwan
<i>O. sinicus</i> (Walker, 1873)	China
<i>O. straminipes</i> (Distant, 1909)	India, Nepal
<i>O. sumatranus</i> (Poppius, 1915)	Sumatra
<i>O. tibialis</i> (Distant, 1909)	India
<i>O. tenuicornis</i> (Li & Zheng, 1991)	China
<i>O. tricolor</i> (Scott, 1880)	Japan
<i>O. uzeli</i> (Poppius, 1911)	Sri Lanka
<i>O. yaeyamanus</i> Yasunaga, 1997	Japan
<i>O. yunnananus</i> (Li & Zheng, 1991)	China
<i>O. zoui</i> (Li & Zheng, 1991)	China

***Orientalomiris andrzejki* sp. nov.**

(Figs 3E–F, 6H–K, 7C, 8A, C, 12F, 17A–F, 18A–I)

**Type material.** HOLOTYPE: ♂, **THAILAND:** Nakhon Ratchasima, Wang Nam Khieo, Sakaerat Environmental Research Station, 14°30'27"N, 101°55'39"E, 410 m alt., UV light trap, 12–14.vi.2009, T. Yasunaga & K. Yamada (AMNH\_PBI00378802) (DOAT). PARATYPES: **THAILAND:** Chiang Mai, Baan Khun Chiang Khian, Chiang Mai Univ. Exp. Forest, 18°50'N 98°54'E, sweeping flowers of broadleaf trees, 16–17.xi.1989, T. Yasunaga, 1 ♂ (TYCN); Nakhon Ratchasima, same data as for holotype, 7 ♂♂ 8 ♀♀ (AMNH, CNC, SNUC, TYCN); same data, except for date 16.ix.2008, 1 ♀ and 25–27.ii.2009, 1 ♂ (TYCN).

**Diagnosis.** Recognized by its relatively small size among congeners; grayish brown dorsum with pale brown ventral surface, anterior pronotum, scutellum and lateral margin of hemelytron (Figs 3E–F); uniformly chocolate brown labium; pale legs with narrowly infuscate apex of metafemur and base of metatibia; and unique shape of vesica (Figs 6J, 8C, 18D), in addition to ratio of vertex in female greater than that of male.

**Description.** Body grayish brown, parallel-sided, relatively small (6.6–7.6 mm in total length); dorsal surface weakly shining, with uniformly distributed, pale, simple, semierect setae (Figs 3E–F, 17A). Head chestnut brown, relatively shining; vertex and frons sometimes pale along inner margin of eye; vertex 0.32–0.34 (♂) / 0.30–0.32 (♀) times as wide as head across eyes. Antenna pale brown; extreme apex of segment I dark brown; segment II with dark base and apical 1/4–1/3; basal 2/5 of segment III and basal 1/4 of IV whitish brown. Labium uniformly shiny chocolate brown, slightly exceeding apex of metacoxa (Fig. 17B). Pronotum brown, more or less darkened on calli and posterior disk, with creamy yellow collar and posterior margin; pleura uniformly pale brown; metathoracic scent efferent system as in Fig. 17C; mesoscutum and scutellum yellowish white; mesoscutum darkened medially; scutellum with triangular fuscous macula at base and dark apex. Hemelytron grayish brown, with pale exocorium; exocorial serration as in Figs 10D, 17D; cuneus with narrowly yellowish margin and reddish apex; membrane smoky brown. Coxae and legs pale brown, except for darkened apex of metafemur, base of metatibia and tarsomeres II–III; metafemoral plectra as in Figs 10E, 12F; tibial spines reddish brown; pretarsal structures as in Figs 17E–F. Abdomen pale brown. Male genitalia (Figs 6H–K, 8A, C, 18A–E): pygophore with conical process at base of left paramere (Figs 6I, 18A); left paramere rather L-shaped, with somewhat narrowed hypophysis (Figs 8A, 18C); vesical lobal sclerites as in Figs 6J, 8C, with an elongate, apically hooked sclerite that is accompanied by dense hair-like processes (Figs 8C, 18D). Female genitalia (Figs 18F–I): interramal lobe projected at inner margin, with uniformly and densely distributed spinules (Figs 18G–H); dorsal structure densely spinulate laterally (Fig. 18I).

**Measurements.** See Table 1.

**Etymology.** Named after the Polish heteropterist, Andrzej [Andzhey] Wolski, my long-time friend and colleague, who conducted fieldwork with me in Indochina (including the type locality of this new species) several times but regrettably passed away in May, 2024; a noun in the genitive case.

**Biology.** Unknown. All available specimens were captured by UV light trap set at tropical dry forest zone.

**Distribution.** North and central Thailand.

***Orientalomiris chiangmai* sp. nov.**

(Figs 6K–M, 7A–B, 8B, D, 12E, 17G–L, 18J–O)

**Type material.** HOLOTYPE: ♂, **THAILAND:** Chiang Mai, Baan Khun Chiang Khian, Chiang Mai Univ. Exp. Forest, 18°50'N 98°54'E, UV lighting, 15–16.xi.1989, T. Yasunaga (DOAT) (AMNH\_PBIAMNH\_PBI00378803). PARATYPES: **THAILAND:** Chiang Mai, same data as for holotype, 2 ♂♂ (TYCN); same locality, sweeping flowers of broadleaf trees, 16–17.xi.1989, T. Yasunaga, 1 ♂ 3 ♀♀ (TYCN, ZRC); Chiang Mai, Doi Pui, 18°48'N 98°55'E, 18.xi.1989, T. Yasunaga, 1 ♀ (TYCN).

**Diagnosis.** This new species is most closely related to the preceding *O. andrzejki* sp. nov., from which *O. chiangmai* sp. nov. can be distinguished by its paler general coloration; pale brown head with a pair of brown stripes; wider vertex in female; reddish brown labium; almost uniformly pale brown or brown hemelytron; pale base of metatibia; different pattern of sclerites on vesica (cf. Figs 6J, M); and interramal lobe with sparser and shorter spinules restricted to distal half (Fig. 18O).

**Description.** Body pale brown to brown, parallel-sided, moderate in size; dorsal surface weakly shining, with uniformly distributed, pale, simple, semierect setae (Figs 7A, 17G). Head pale brown, weakly shining, with pair of brown stripes (Fig. 7A); vertex 0.29–0.33 (♂) / 0.35–0.38 (♀) times as wide as head across eyes. Antenna pale brown; segment I ventrally with grayish brown stripe connecting to apical brown ring; apical 1/6–1/7 of segment II darkened; segment III brown, with two faint yellow annulations at base and apical 1/3; segment IV brown, with pale basal 1/3. Labium pale reddish brown, slightly exceeding apex of metacoxa. Pronotum usually uniformly pale brown to brown, slightly darkened along posterior margin, with pale brown collar and posterior margin; pleura uniformly pale brown; metathoracic scent efferent system as in Fig. 17H; mesoscutum and scutellum pale brown; mesoscutum narrowly darkened medially; scutellum with small triangular fuscous macula at base and dark apex. Hemelytron brown to castaneous brown; exocorium slightly paler, with exocorial serration as in Fig. 17I; cuneus uniformly reddish brown; membrane pale smoky brown, with fuscous veins. Coxae and legs pale brown; metafemur with two obscure fasciae subapically; metafemoral plectra as in Figs 12E, 17J; tibial spines pale brown; pretarsal structures as in Figs 17K–L. Abdomen pale brown. Male genitalia (Figs 6K–M, 8B, D, 18J–L): pygophore with stout process at base of left paramere (Fig. 8B); left paramere semi-circularly curved, constricted at base of hypophysis (Figs 6L, 18J); vesical lobal sclerites as in Figs 6M, 8D, with elongate, apically hooked sclerite that is accompanied by short hair-like processes (Fig. 6M). Female genitalia (Figs 18M–O): interramal lobe weakly projected at inner margin, with sparsely distributed spinules on distal half area (Figs 18N–O); dorsal structure sparsely with short spinules (Fig. 18O).

**Measurements.** See Table 1.

**Etymology.** Named after the type locality, Chiang Mai District in northern Thailand; a noun in apposition.

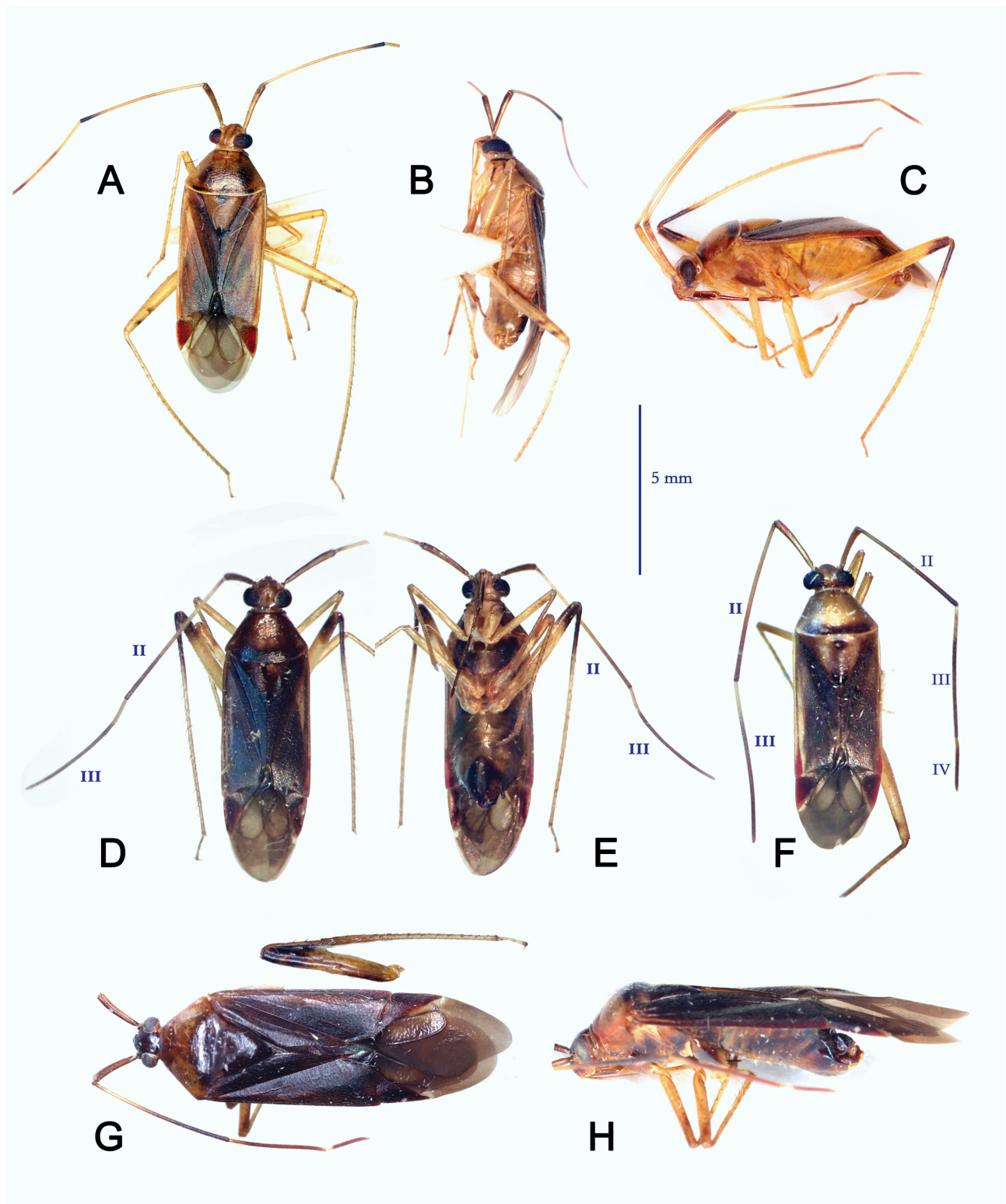


Fig. 7. Habitus images of *Orientomiris chiangmai* sp. nov. (A–B), *O. andrzeji* sp. nov. (C), *O. norioi* sp. nov. (D–F) and *O. shoheii* sp. nov. (G–H). A, D, F, G – male, dorsal view. B, H – male, left lateral view. C – female, left lateral view. E – male, ventral view.

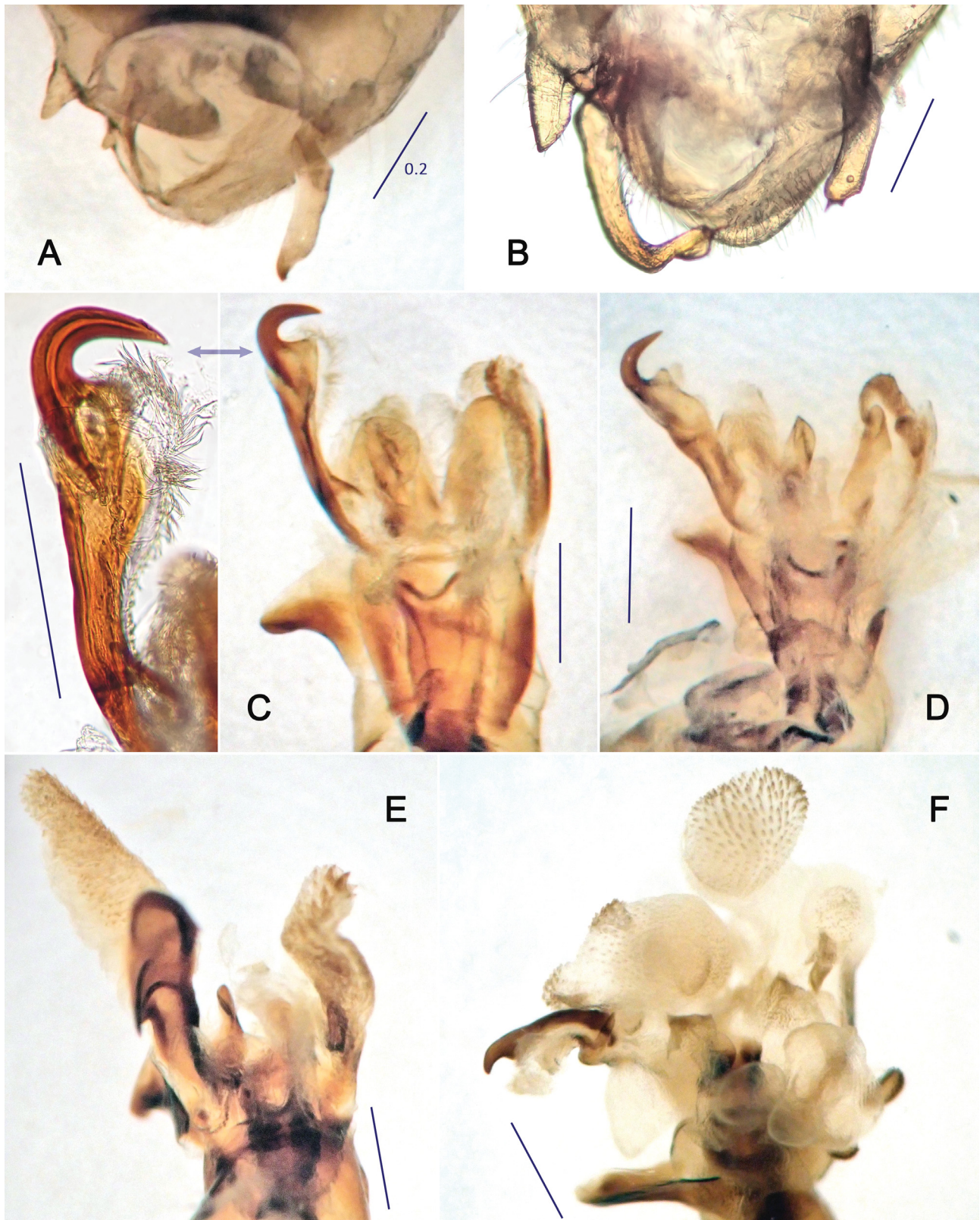


Fig. 8. Male genitalia of *Orientomiris andrzeji* sp. nov. (A, C), *O. chiangmai* sp. nov. (B, D), *O. norioi* sp. nov. (E) and *O. shoheii* sp. nov. (F). A–B – genital segment (pygophore) in dorsal view. C–F – vesica. Scale bars 0.2 mm.

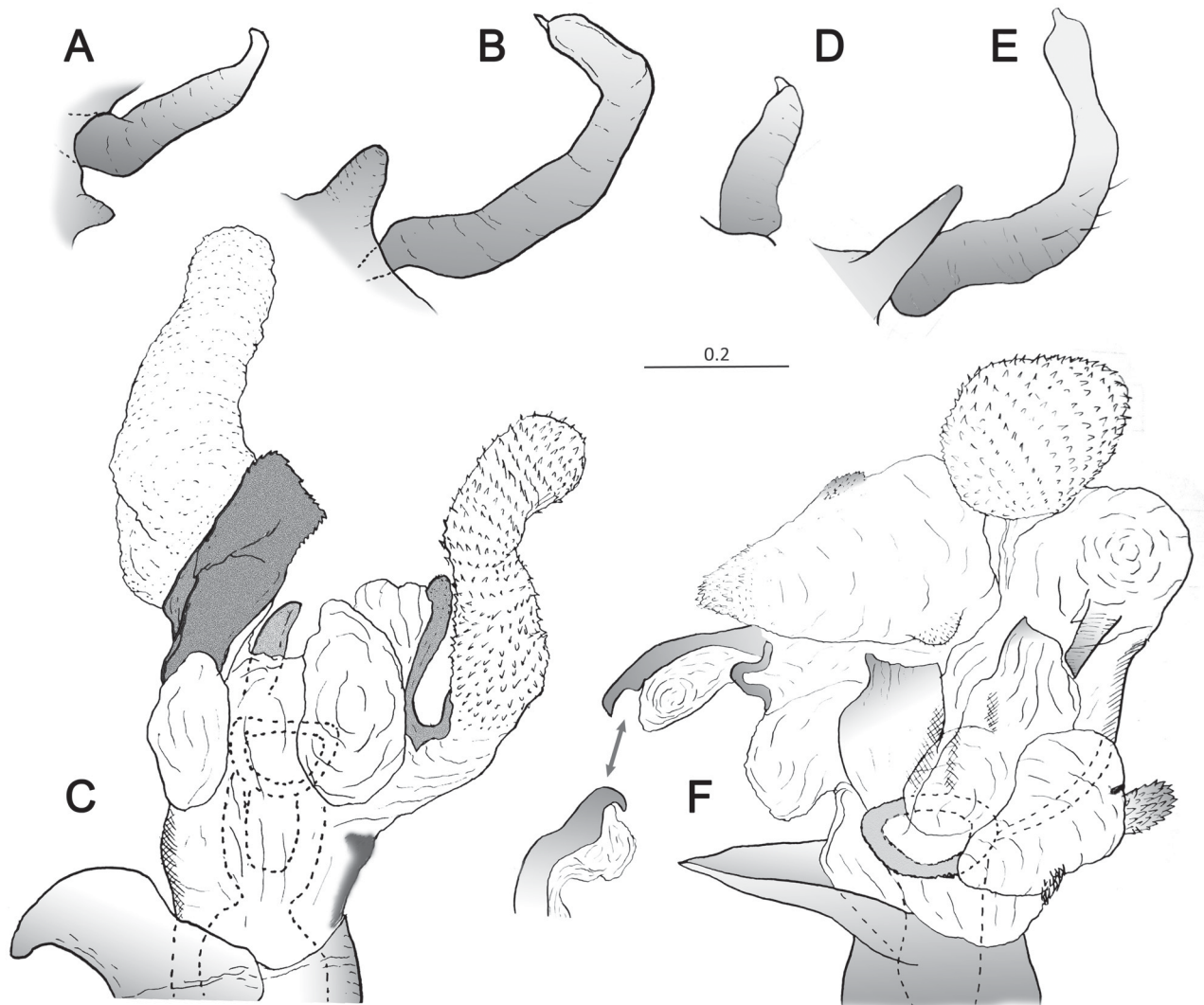


Fig. 9. Male genitalia of *Orientomiris norioi* sp. nov. (A–C) and *O. shoheii* sp. nov. (D–F). A, D – right paramere. B, E – left paramere. C, F – vesica. Scale bars 0.2 mm.

**Biology.** Unknown. Several specimens including teneral adults were found on inflorescence of undetermined broadleaf trees.

**Distribution.** North Thailand (Chiang Mai).

***Orientomiris norioi* sp. nov.**

(Figs 7D–F, 8E, 9A–C, 12G, 17M–O, 19J–M)

**Type material.** HOLOTYPE: ♂, MALAYSIA: Perak, Bukit Larut [= Maxwell Hill], 1,100 m alt., 4.8624°N, 100.7999°E, UV (mercury) light trap, 4.i.1990, T. Yasunaga (ZRC) (AMNH\_PBI 00378804). PARATYPES: MALAYSIA: Pahang, Fraser's Hill [= Bukit Fraser], 3°43'N 101°44'E, 28–29.vi.1987, I. Hattori, 2 ♂♂ (TYCN); same data as for holotype, except for date 7.i.1990, 1 ♂ (TYCN).

**Diagnosis.** Currently known only from male specimens. Recognized by its generally dark brown coloration; uniformly chocolate brown labium; pale legs with darkened apical metafemur and base of metatibia; densely distributed, large metafemoral plectra (Fig. 12G); thumb-like pygophoral projection (Figs 9B, 19J); short, flattened hypophysis of left paramere (Fig. 19K); and elongate

membranous lobes and large median sclerite on vesica (Figs 8E, 9C).

**Description. Male.** Body brown to fuscous, parallel-sided, moderate in size; dorsal surface weakly shining, with uniformly distributed, pale, simple, semierect setae (Figs 7D, F, 17M). Head castaneous brown, weakly shining; vertex 0.25–0.29 times as wide as head across eyes. Antenna dark brown; segment I sometimes pale brown; basal 2/3 of segment II brown or pale brown; base of segment III pale brown (basal 1/5 pale brown in partly fused antenna as in Figs 7D–F). Labium shiny chocolate brown, slightly exceeding apex of metacoxa. Pronotum usually castaneous brown, sometimes pale brown anteriorly except for dark posterior part (Fig. 49), with pale brown collar and narrowly paler posterior margin; pleura dark brown; metathoracic scent efferent system as in Fig. 17N; mesoscutum and scutellum dark brown, but in paler specimen mesoscutum and scutellum pale brown laterally (Fig. 7F). Hemelytron uniformly dark brown (Fig. 7D) or chestnut

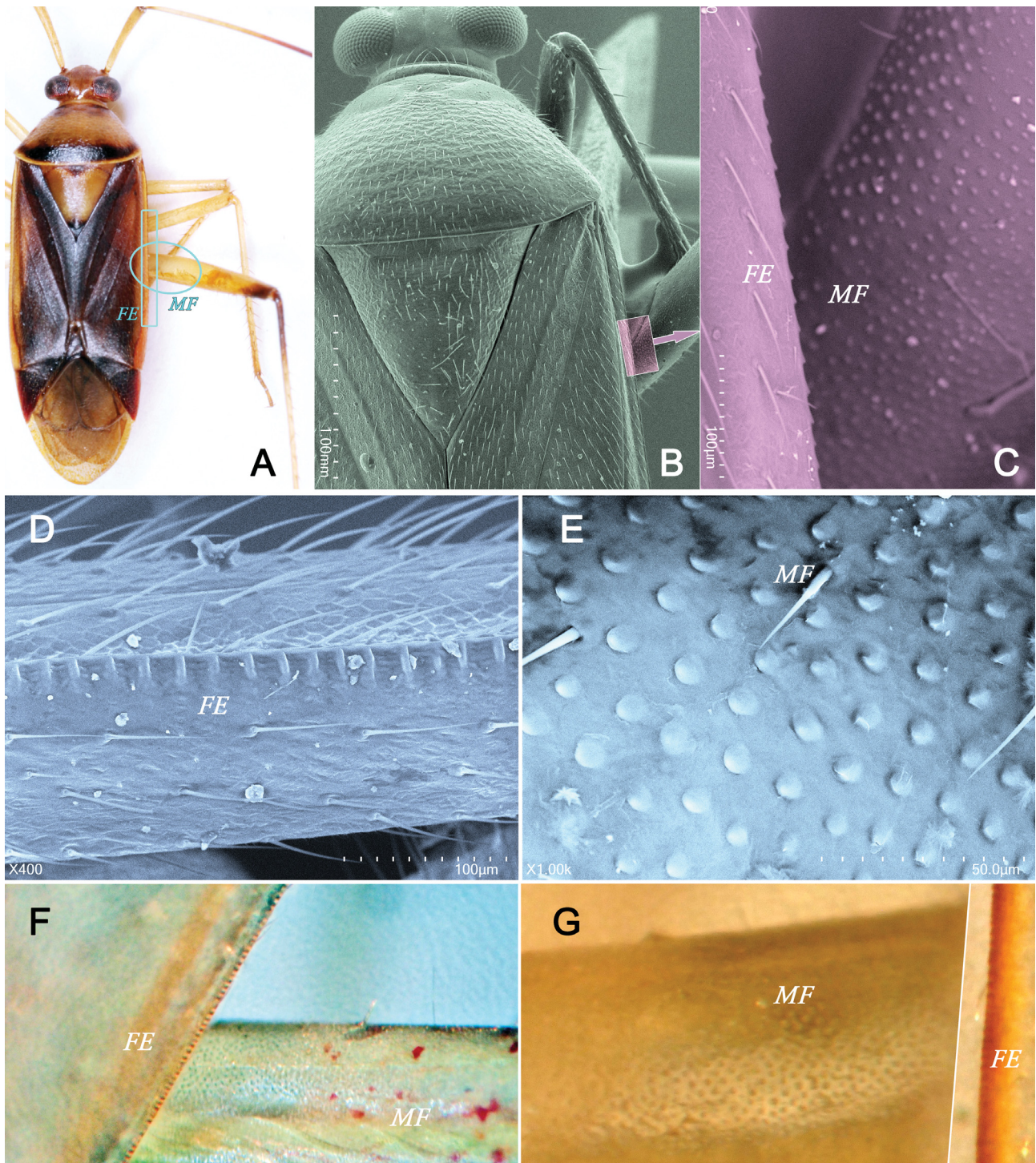


Fig. 10. Stridulatory devices of *Orientomiris andrzeji* sp. nov. (A–E), *Creontiades rubrinervis* (Stål, 1862) (F) and *Cheilocapsidea pura* (Yasunaga, 1995) (G). Abbreviations: FE = forewing (embolial) edge. MF = metafemur (dorsal surface).

brown (Fig. 7F); exocorial serration as in Fig. 17N; cuneus sometimes tinged with red; membrane smoky brown. Coxae and legs pale brown; apical 1/5 of metafemur and basal 1/6 of metatibia darkened; metafemoral plectra large (Fig. 12G); tibial spines pale brown; pretarsal structures as in Fig. 17O. Abdomen dark brown; ventral median part somewhat paler. Male genitalia (Figs 8E, 9A–C, 19J–M): pygophore with thumb-like process at base of left paramere (Figs 9B, 19J) and other smaller process at base of right

paramere (Fig. 9A); left paramere L-shaped, with short, somewhat flattened hypophysis (Figs 9B, 19K); vesical lobal sclerites as in Figs 8E, 9C, 19M.

**Female.** Unknown.

**Measurements.** See Table 1.

**Etymology.** Named in memory of my father, Dr. Norio Yasunaga (1930–2013), who was a fish pathologist and supported my field surveys in SE Asia in 1980s; a noun in the genitive case.

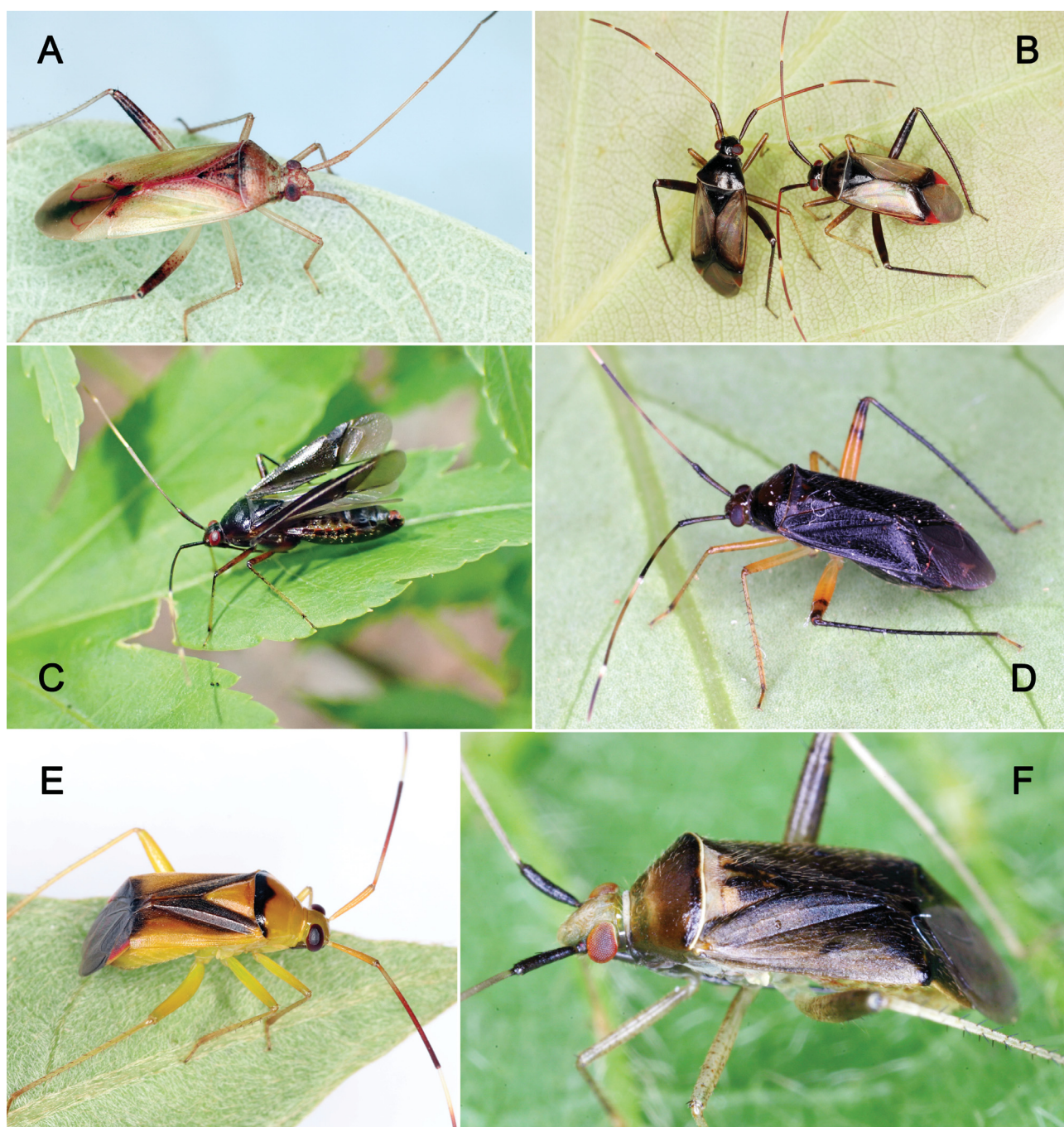


Fig. 11. Habitus images of various mirine plant bugs examined in this study. A – *Creontiades bipunctatus* Poppius, 1915, female. B – *Neomegacoelum vitreum* (Kerzhner, 1988), male (left) and female. C – *Orientomiris tricolor* (Scott, 1880), female. D – *O. straminipes* (Distant, 1909), female. E – *Poppiocapsidea* sp., undetermined female specimen from Singapore. F – *Sakaeratiella adelphocoroides* (Yasunaga, Shishido & Yamada, 2016), holotype male.

**Biology.** Unknown. Collection records suggest this new species has two generations per year.

**Distribution.** Malaysia (Pahang and Perak).

**Remarks.** Two paratype male specimens were found to have teratological left antennomeres (cf. Figs 7D–F). The segments II, III and IV appear to have been accidentally fused and separated into two segments, judging from the measurements (Table 1). Several works documented similar antennal oligomery in some plant bug species (WHEELER 2001, YASUNAGA 2018b, YASUNAGA et al. 2019).

***Orientomiris shoheii* sp. nov.**

(Figs 7G–H, 8F, 9D–F, 12H, 19A–F)

**Type material.** HOLOTYPE: ♂, TAIWAN: Kaohsiung Hsien, Meishan-Tinchi, 800–2,300 m alt., 23°17'N 120°52'E, 29.vi.1986, K. Baba (NMNS) (AMNH\_PBI 00378805).

**Diagnosis.** This is one of the largest species among known congeners and most similar in size and external features to *O. eurytus* (Yasunaga, 1988) (Figs 12I, 17G–I), from which the present new species can be readily distinguished by even shorter antennae, labium and legs; short anten-



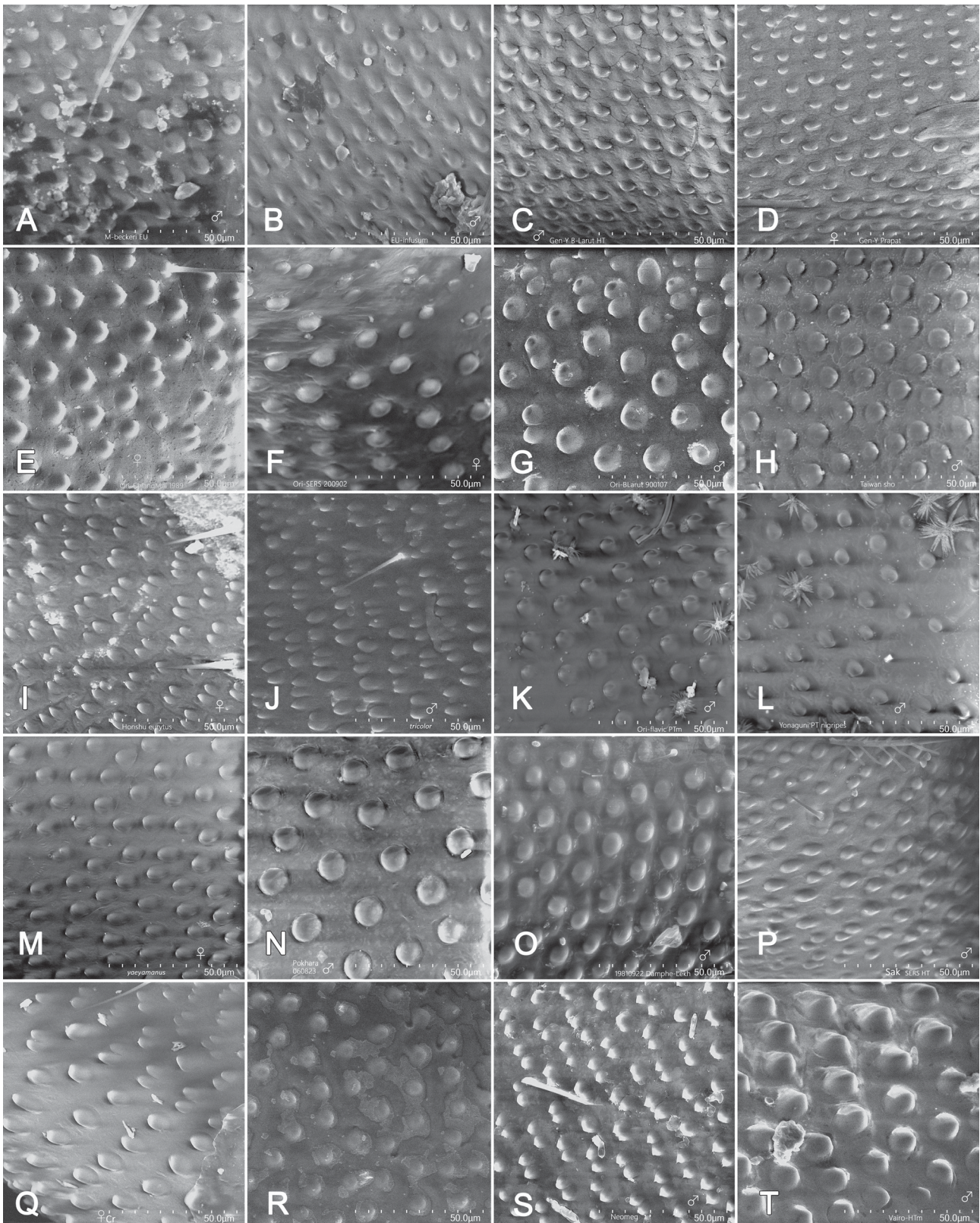


Fig. 12. Scanning electron micrographs of metamorphosing plectra (all at 1000 $\times$ ). A – *Pseudomegacoelum beckeri* (Fieber, 1870). B – *Megacoelum infusum* (Herrich-Schaeffer, 1837). C – *Muttiocapsus cruciger* sp. nov. D – *M. teradai* sp. nov. E – *Orientomiris chiangmai* sp. nov. F – *O. andrzeji* sp. nov. G – *O. norioi* sp. nov. H – *O. shoheii* sp. nov. I – *O. eurytus* (Yasunaga, 1988). J – *O. tricolor* (Scott, 1880). K – *O. flavicollaris* Yasunaga, 1997. L – *O. nigripes* Yasunaga, 1997. M – *O. yaeyamanus* Yasunaga, 1997. N – *O. straminipes* (Distant, 1909). O – *O.* sp. 1. P – *Sakaeratiella adelphocoroides* (Yasunaga, Shishido & Yamada, 2017). Q – *Creontiades bipunctatus* Poppius, 1915. R – *Cheilocapsidea rufescens* (Yasunaga, 1995). S – *Neomegacoelum vitreum* (Kerzhner, 1988). T – *Vairocanamiris jordiribesi* Yasunaga, 2011.

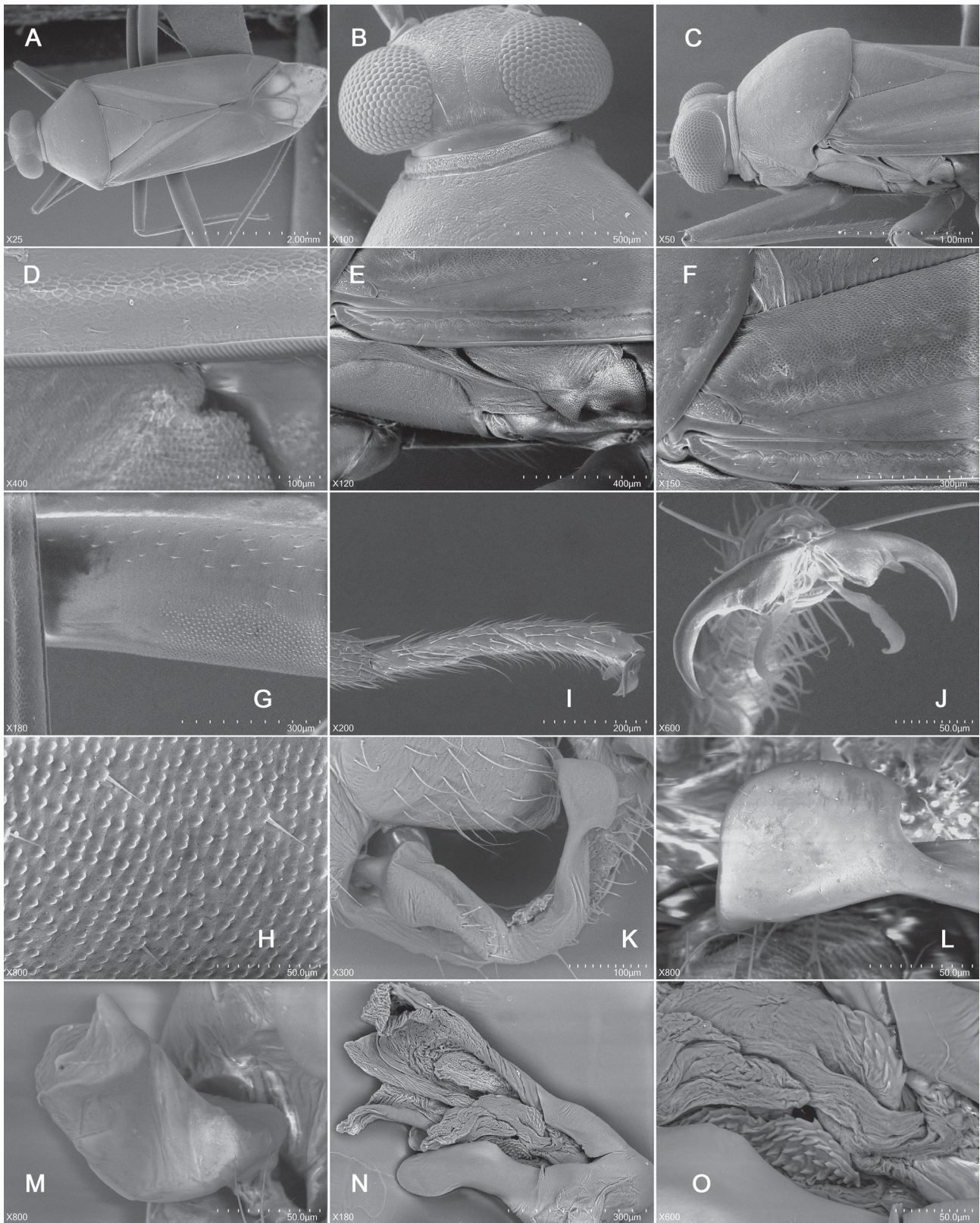


Fig. 13. Scanning electron micrographs for *Muttiocapsus cruciger* sp. nov., holotype male. A – dorsal habitus. B – head and anterior pronotum. C – anterior body, left lateral view. D – left forewing (embolial) edge. E – thoracic pleura, left lateral view. F – left hemelytron, anteriorly. G – stridulatory devices (forewing and metafemur). H – metafemoral surface. I – metatarsus. J – pretarsal structure of hind leg. K–L – left paramere. M – right paramere. N–O – vesica.

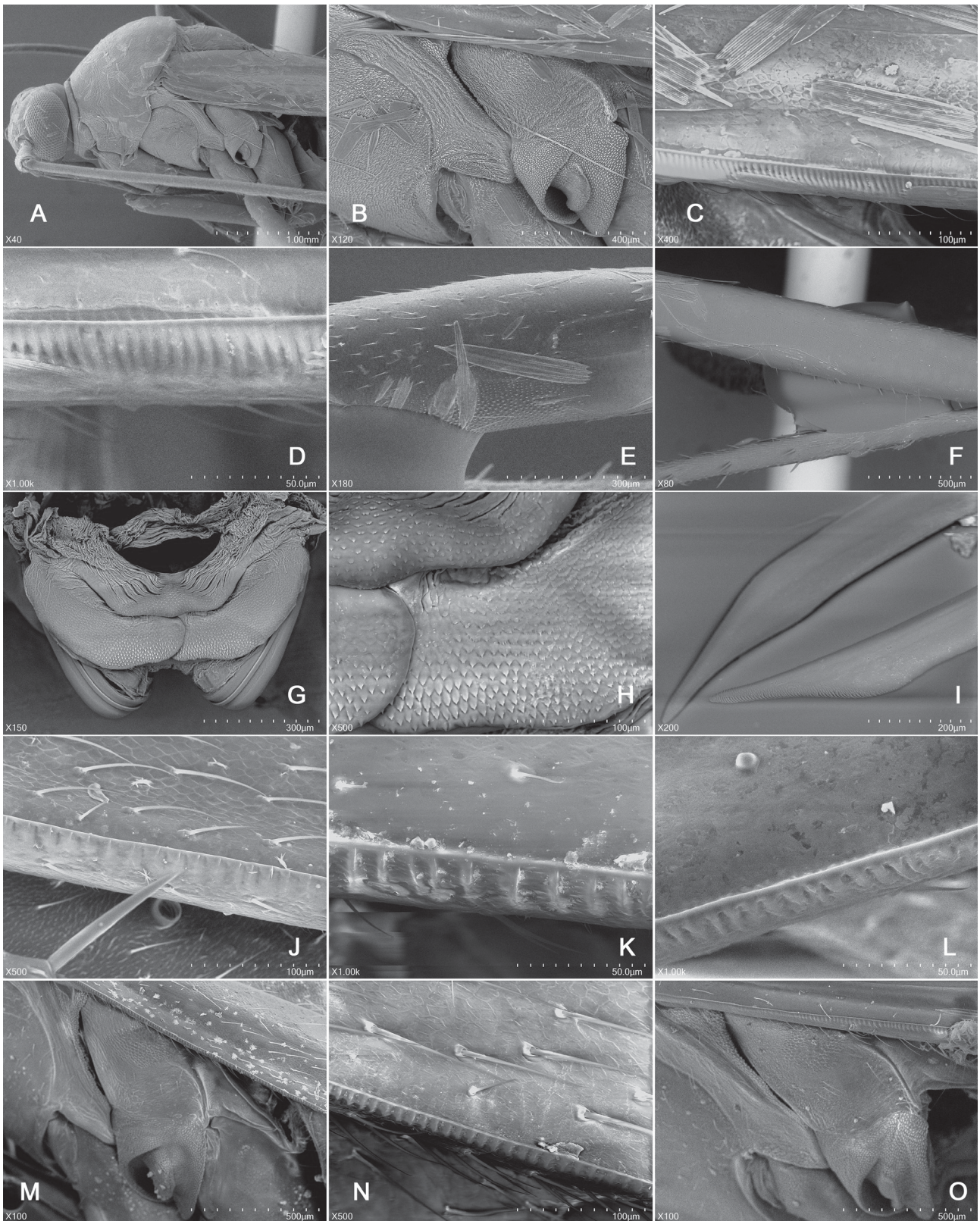


Fig. 14. Scanning electron micrographs for *Muttiocapsus teradai* sp. nov., holotype female (A–I), and forewing notches of related mirines (J–O). A – anterior body, left lateral view. B – thoracic pleura, left lateral view. C–D – left forewing (embolial) edge. E–F – metafemur. G–H – posterior wall. I – ovipositor (gonapophyses I). J – *Creontiades bipunctatus* Poppius, 1915. K – *Megacoelum infusum* (Herrich-Schaeffer, 1837). L – *Neomegacoelum vitreum* (Kerzhner, 1988). M – *Orientomiris nigripes* Yasunaga, 1997. N – *O. yaeyamanus* Yasunaga, 1997. O – *Vairocanamiris jordiribesi* Yasunaga, 2011.

nomere I shorter than head width across eyes; uniformly brown antennomere III; entirely pale pro- and mesofemora; different shape of metafemoral plectra (Figs 12H, 19D vs. 12I, 19I); and longer pygophoral process at base of left paramere (Figs 9E, 19F).

**Diagnosis.** This is one of the largest species among the known congeners and most similar in size and external features to *O. eurytus* (Yasunaga, 1988) (Figs 12I, 17G–I), from which the present new species can be readily distinguished by even shorter antennae, labium and legs; short antennomere I shorter than head width across eyes; uniformly brown antennomere III; entirely pale pro- and mesofemora; different shape of metafemoral plectra (Figs 12H, 19D vs. 12I, 19I); and longer pygophoral process at base of left paramere (Figs 9E, 19F).

**Description. Male** (holotype). Body almost uniformly fuscous, parallel-sided, large-sized; dorsal surface weakly shining, with rather sparsely distributed, pale, simple, semierect setae (Fig. 7G). Head shiny dark brown; vertex wide, 0.39 times as wide as head across eyes. Antenna brown, shorter than total body length (9.33 mm); segment I shorter than head width across eyes; basal 2/3 of segment II dark brown, with pale brown basal 1/3 and brown base; segment III about as long as basal width of pronotum; base of segment IV creamy yellow. Labium pale brown, exceeding apex of metacoxa and reaching abdominal sternum V; apical half of segment IV darkened. Pronotum including collar pale castaneous brown, darkened posteriorly; pleura orange brown, darkened ventrally; metathoracic scent efferent system creamy yellow on posterior half, relatively narrow and triangular (Fig. 19B); mesoscutum and scutellum dark brown. Hemelytron uniformly dark brown; exocorial serration as in Fig. 19I; membrane smoky brown. Coxae and legs pale brown; metafemur and basal half of metatibia darkened; metafemoral plectra as in Figs 12H, 19C; tibial spines dark brown; pretarsal structures as in Fig. 19E. Abdomen dark brown, partly speckled with reddish brown. Male genitalia (Figs 8F, 9D–F, 19F): pygophore with long process at base of left paramere (Figs 9E, 19F); right paramere short, about as long as hypophysis of left paramere (Fig. 9D); vesica with developed membranous lobes, with generally small lobal sclerites as in Figs 8F, 9F.

**Female.** Unknown.

**Measurements.** See Table 1.

**Etymology.** This giant, remarkable new species is named after Shohei Ohtani, a world famous Japanese or Asian-born baseball slugger (Los Angeles Dodgers, US Major League Baseball), in honor of his conspicuous, miraculous record-breaking performances in recent years; a noun in the genitive case.

**Biology.** Unknown.

**Distribution.** Taiwan (Kaohsiung).

### *Sakaeratiella* gen. nov.

**Type species.** *Adelphocorisella adelphocoroides* Yasunaga, Shishido & Yamada, 2016.

**Diagnosis.** This new genus can be distinguished from other mirines by several distinct features: presence of stri-

dulatory device (Figs 12T, 20D–20E); relatively porrect head; long labium much longer than antennal segment II; carinate posterior margin of pronotum; spines on apical metafemur; slender, tapered right paramere; and a single stout spicule on vesica.

**Description. Male** (holotype). Body elongate oval, nearly parallel-sided (Fig. 11F), rather small in *Orientomiris*-group (total body length 6.0 mm); basic coloration coffee brown; dorsal surface weakly shining, with uniformly distributed, pale brown, semierect, simple setae (Fig. 20B). Head oblique, somewhat porrect, triangular in dorsal view; vertex about 1.5 times as wide as eye, with faint, narrow, longitudinal, mesal sulcus; frons shallowly and obliquely striolate. Antenna longer than body; segment I shiny fuscous, somewhat clavate; segments II–IV uniformly creamy yellow, similar in thickness; segment II longer than metafemur; segment IV longer than I. Labium shiny dark brown, long, thick, reaching posterior margin of abdominal sternum VII, much longer than antennal segment II. Pronotum relatively shining, with yellowish white collar and carinate posterior margin (Fig. 20B), impunctate, with sparsely distributed, pale, simple, semierect setae (Fig. 20A); collar about as thick as antennal segment II; metathoracic scent efferent system relatively produced (Fig. 20C); scutellum matte, minutely and roughly rugose, slightly inflated (Fig. 20B). Hemelytra matte, almost uniformly coffee brown, covered with reticular microstructures; lateral margin of exocorium serrate (Fig. 20D). Metafemur with strong spines apically (Fig. 20F) and field of plectra dorsally (Figs 12T, 20E); apical part of metatibia with densely distributed, small spines (Fig. 20G); pretarsal structure as in Fig. 20I; parempodia relatively long. Male genitalia (Figs 20J–M): pygophore lacking process at base of parameres (Fig. 20J); left paramere with rather developed hypophysis (Fig. 20K); right paramere slender, tapered toward apex (Fig. 20L); vesica with a single long, stout spicule (Fig. 20M).

**Female.** Unknown.

**Etymology.** Named after the type locality, Sakaerat (Nakhon Ratchasima, Thailand), with diminutive suffix; feminine.

**Biology.** Unknown.

**Distribution.** Thailand (Nakhon Ratchasima).

### *Sakaeratiella adelphocoroides* (Yasunaga, Shishido & Yamada, 2016) comb. nov.

(Figs 11F, 12T, 20A–M)

*Adelphocorisella adelphocoroides* Yasunaga, Shishido & Yamada, 2016: 255 (sp. nov.).

**Type material examined.** HOLOTYPE: ♂, THAILAND: Nakhon Ratchasima, Wang Nam Khiao, Sakaerat Environmental Research Station, 14°30'27"N, 101°55'39"E, 410 m alt., UV (mercury) light trap, 25.xii.2012, T. Yasunaga & T. B. Shishido (DOAT) (AMNH\_PBI 00380437).

**Remarks.** This taxon was described from a single male specimen and provisionally placed in *Adelphocorisella* Miyamoto & Yasunaga, 1993. However, present reassessment of characters suggest that the species is obviously not a member of *Adelphocorisella* and cannot be accommodated by any known mirine genera.

**Taxa not belonging to the *Orientomiris* group*****Nythomiris* gen. nov.**

**Type species.** *Nythomiris nepalicus* sp. nov., here designated.

**Diagnosis.** Due to lacking stridulatory device, this new genus is excluded from the *Orientomiris*-group and presumably has a closer relationship to *Poppiocapsidea* Yasunaga, 1998 (cf. Figs 11E, 15N–P), from which *Nythomiris* gen. nov. can be readily distinguished by the pronotum with brown maculae and yellowish posterior margin, and the scutellum and hemelytra almost glabrous. In *Poppiocapsidea*, the pronotum is usually widely pale, without paler posterior margin (Fig. 11E), and the scutellum and hemelytra are uniformly furnished with short, semierect setae (Fig. 15H), in addition to different structures of the genitalia (YASUNAGA 1998, CHÉROT et al. 1999). The 5th (final) instar nymph (Fig. 3B) is similar in general appearance (body shape and spotted color pattern) to those of *Adelphocorisella* species (cf. MIYAMOTO & YASUNAGA 1993, YASUNAGA 2001); however, the structures of the body surface and genitalia in adults are obviously different between *Nythomiris* gen. nov. and *Adelphocorisella* (Figs 200–P, MIYAMOTO & YASUNAGA 1993, PAGOLA-CARTE et al. 2022).

**Description.** Body elongate oval, parallel-sided, rather small (total length 5.0–6.0 mm); basic coloration stramineous brown; dorsal surface shining, with dark maculae as in Figs 3A, C–D, 4E, impunctate, smooth, with sparsely distributed, pale, short, simple setae (Fig. 15C). **Head** smooth, vertical (Figs 15B, L); vertex with shallow, longitudinal, mesal sulcation, without basal transverse carina (Fig. 15L); clypeus weakly produced. **Antenna** generally pale brown, long, almost linear, longer than body; segment I shorter than head width across eyes, thicker than segment II; segment II usually shorter than metafemur; segment III usually longer than basal width of pronotum; segment IV longer than I. **Labium** reaching apex of metacoxa, shorter than metafemur. **Thorax:** Pronotum smooth, impunctate, nearly glabrous (Figs 15B, L), with creamy yellow posterior margin (Figs 3A, C–D); calli weakly demarcated from disk (Figs 15B, L); mesoscutum with irregular, transverse wrinkles; scutellum shiny creamy yellow, slightly darkened mesally, with dark apex, weakly inflated (Figs 15B); metathoracic scent efferent system relatively large (Figs 15B, M). **Hemelytron** pale brown, shining, almost glabrous, densely covered with reticular microstructures (Fig. 15E); corium with dark macula medially; apical part of clavus darkened; cuneus reddish brown, with yellowish apex; exocorium (embolium) without serrate margin. **Legs** long, generally slender; surface of metafemur smooth; tarsi relatively short (Figs 15H–I); pretarsal structure as in Figs 15G, J; pulvilli rather developed. **Male genitalia** (Figs 5A–C, E–G, 6D–G, 16A–C, L–P). Pygophore lacking noticeable process at base of left paramere (Figs 16A, L); left paramere semi-circular, with sharply pointed hypophysis (Figs 5A, E, 16B, N); right paramere straight, with somewhat flattened and widened hypophysis (Figs 5B, F, 6D, E); vesica with four homologous lobal sclerites or spicules (Figs 6D, F). **Female genitalia** (Figs 5D, H,

16D–K). Genital chamber with sclerotized anterior margin (Figs 5D, H, 16D, K); sclerotized rings thick-rimmed, rather small (Figs 5D, H, 16D, K); posterior wall with developed, widened interramal lobes (Figs 16E, H), lacking noticeable dorsal structure; interramal lobe with densely distributed, scaly microstructures (Figs 16F, I).

**Etymology.** From Greek, *nythos* (= dumb, inarticulate, silent) combined with mirid generic name *Miris* Fabricius, 1794, referring to included species lacking stridulatory device; masculine.

**Biology.** Two congeners herein described are considered arboreal.

**Distribution.** Nepal (Makawanpur), Thailand (Ayutthaya).

***Nythomiris nagamasai* sp. nov.**

(Figs 3A–B, 4A–B, 5A–D, 6D–E, 15A–H, 16A–G)

**Type material.** HOLOTYPE: ♂, THAILAND: Phranakhon Si Ayutthaya, Huntra, Rajamangala University of Technology Suvarnabhumi (RMUTSB), Huntra Campus, 14°22'39.3"N 100°36'22.0"E, on flowers of *Acacia* sp., 24.viii.2008, T. Yasunaga (DOAT) (AMNH\_PBI 00378800). PARATYPES: THAILAND: Same data as for holotype, 3 ♀♀ (TYCN); same locality and collector, flowers of *Cassia* sp., 24.x.2008, 1 ♂ 3 ♀♀ (SNUC, TYCN, ZRC).

**Diagnosis.** Recognized by its pale dorsum; narrow vertex; reddish striae on frons; rather shorter antennomere II that is shorter than metafemur; tapered left paramere; short spicules and lobal sclerites on vesica; and rather enlarged sclerotized rings. These characters enable differentiation from the other congener, *N. nepalicus* sp. nov.

**Description.** As in generic description. Body generally pale brown (Fig 12); dorsal surface relatively shining, almost glabrous or with very sparsely distributed, pale, simple, semierect setae (Figs 15B–C). Head shiny pale brown; vertex narrow, 0.18–0.22 (♂) / 0.24–0.26 (♀) times as wide as head across eyes; frons with several reddish striae. Antenna pale brown; segment I with reddish, faint, small spots apically; segment II shorter than metafemur; apical half of segment II and apical 3/4 of each III and IV brown. Labium shiny pale brown, slightly exceeding apex of mesocoxa; segment I and apical 1/3 of segment IV dark reddish brown. Pronotum pale castaneous brown, partly irregularly and symmetrically maculate, with creamy brown posterior margin; collar yellowish brown, with several reddish, small spots; pleura castaneous, somewhat matte, with creamy yellow metathoracic scent efferent system; mesoscutum pale reddish brown; scutellum yellowish brown, with faint, brown stripe mesally. Hemelytron shiny pale brown, with dark brown, slash-like macula on median corium; inner half of clavus darkened; cuneus dark reddish brown, with creamy yellow apex; membrane pale smoky brown, semitransparent. Coxae castaneous brown; apical 1/3–1/2 of meso- and metacoxae pale brown (Figs 18–19); legs pale brown; metafemur and metatibia castaneous brown; metatarsomere II as long as III (Fig. 15H); pretarsal structures as in Fig. 15G. Abdomen shiny castaneous brown. Male genitalia (Figs 5A–C, 6D–E, 16A–C): left paramere rather gradually tapered toward apex (Figs 5A, 16B); vesical spicules and lobal-sclerites short (Figs 6D, 16C). Female genitalia (Figs 5D, 16D–G): sclerotized ring elongate ovoid, relatively large (Fig. 5D).

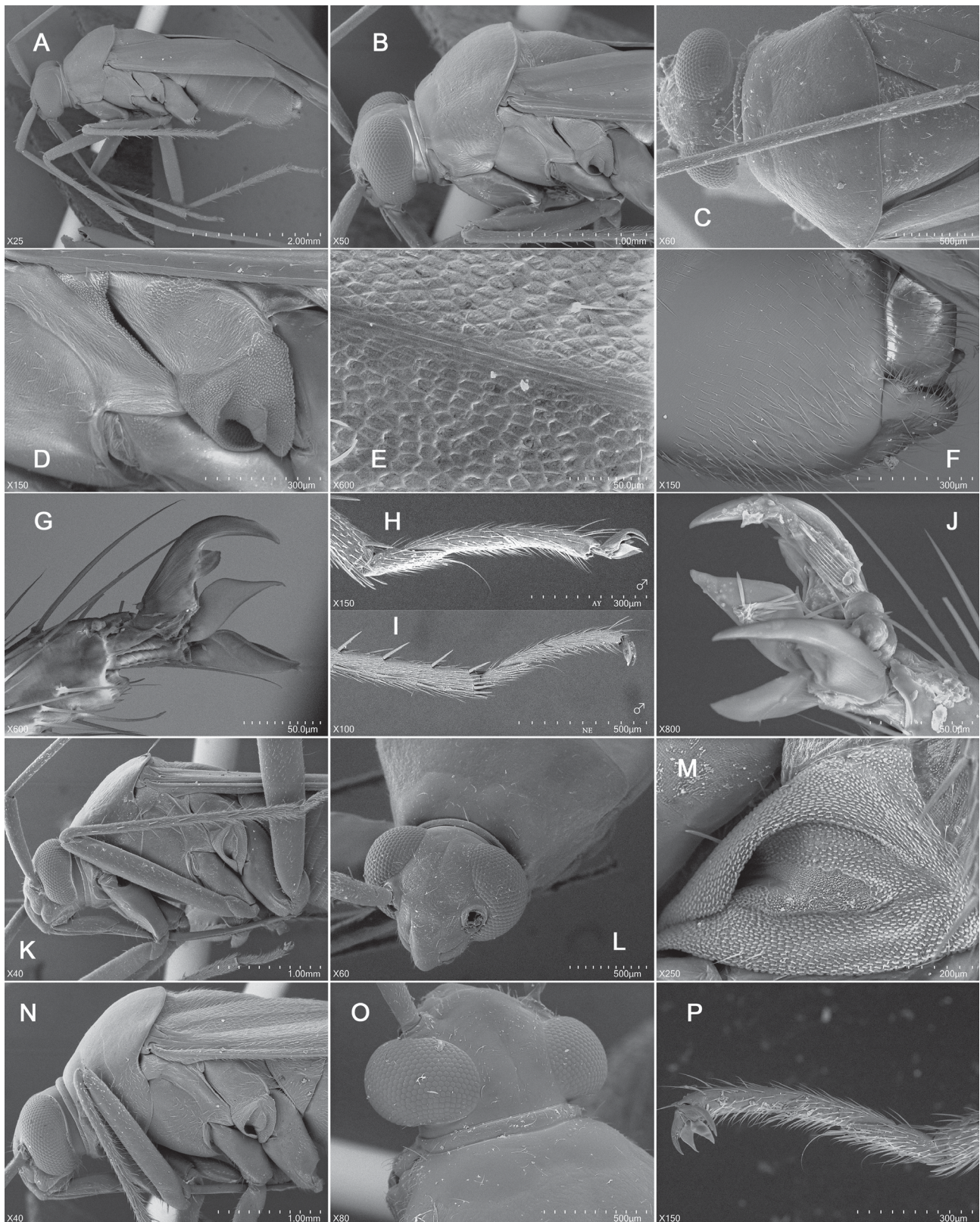


Fig. 15. Scanning electron micrographs for *Nythomiris nagamasai* sp. nov., male (A–H), *N. nepalicus* sp. nov., male (I–M) and *Poppiocapsidea biseratensis* (Distant, 1903), female (N–P). A – left lateral habitus. B, K, N – anterior body, left lateral view. C – same, dorsal view. D – thoracic pleura, left lateral view. E – corium and clavus. F – genital segment, left lateral view. G, J – pretarsal structure of hind leg. H, I, P – metatarsus. L, O – head and pronotum, dorsal view. M – metathoracic scent efferent system.

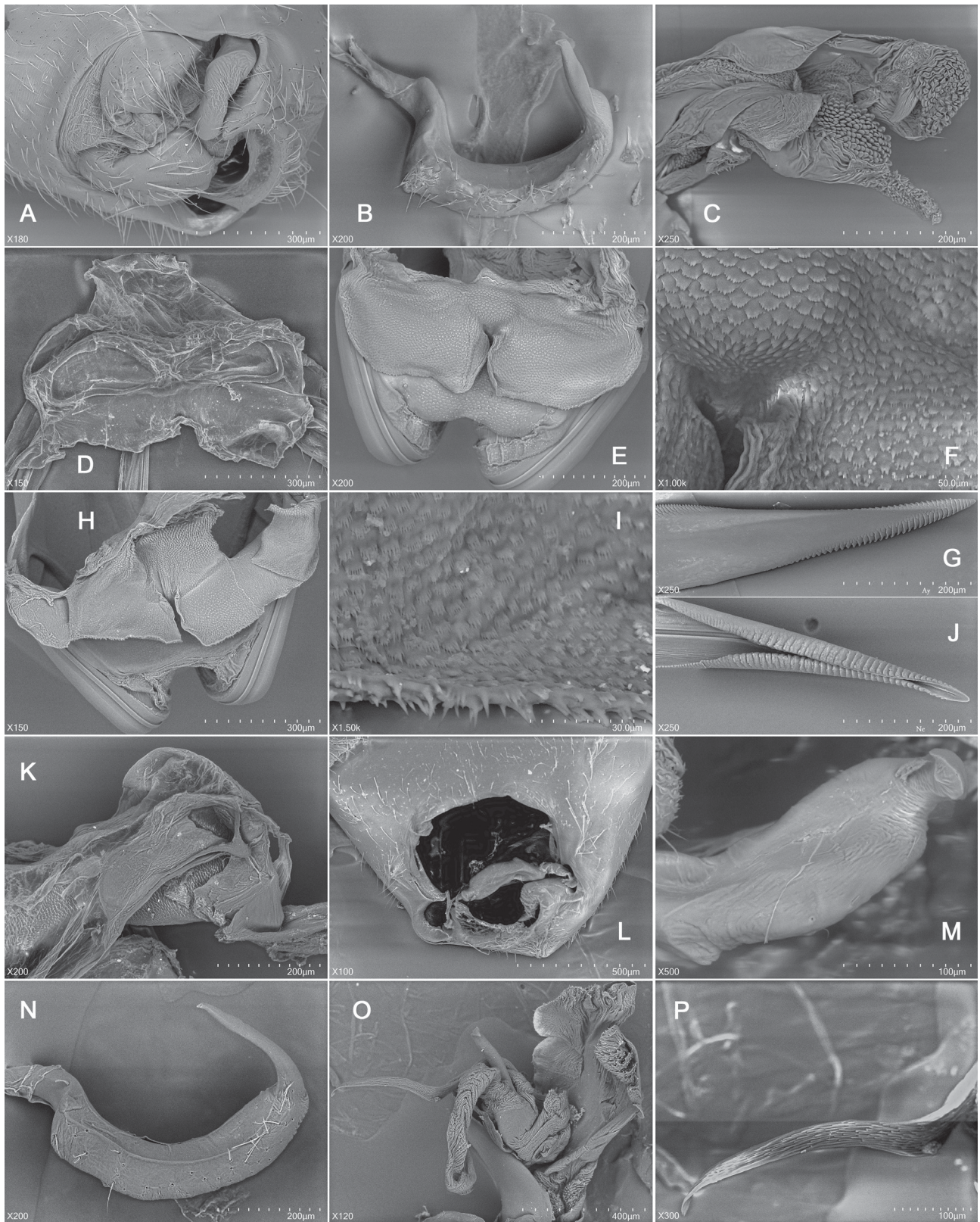


Fig. 16. Scanning electron micrographs for male and female genitalia of *Nythomiris nagamasai* sp. nov. (A–G) and *N. nepalicus* sp. nov. (H–J). A, L – male genital segment (pygophore), dorsal view. B, N – left paramere. C, O–P – vesica. D, K – genital chamber. E–F, H–I – posterior wall. G, J – ovipositor (gonapophysis I). M – right paramere.

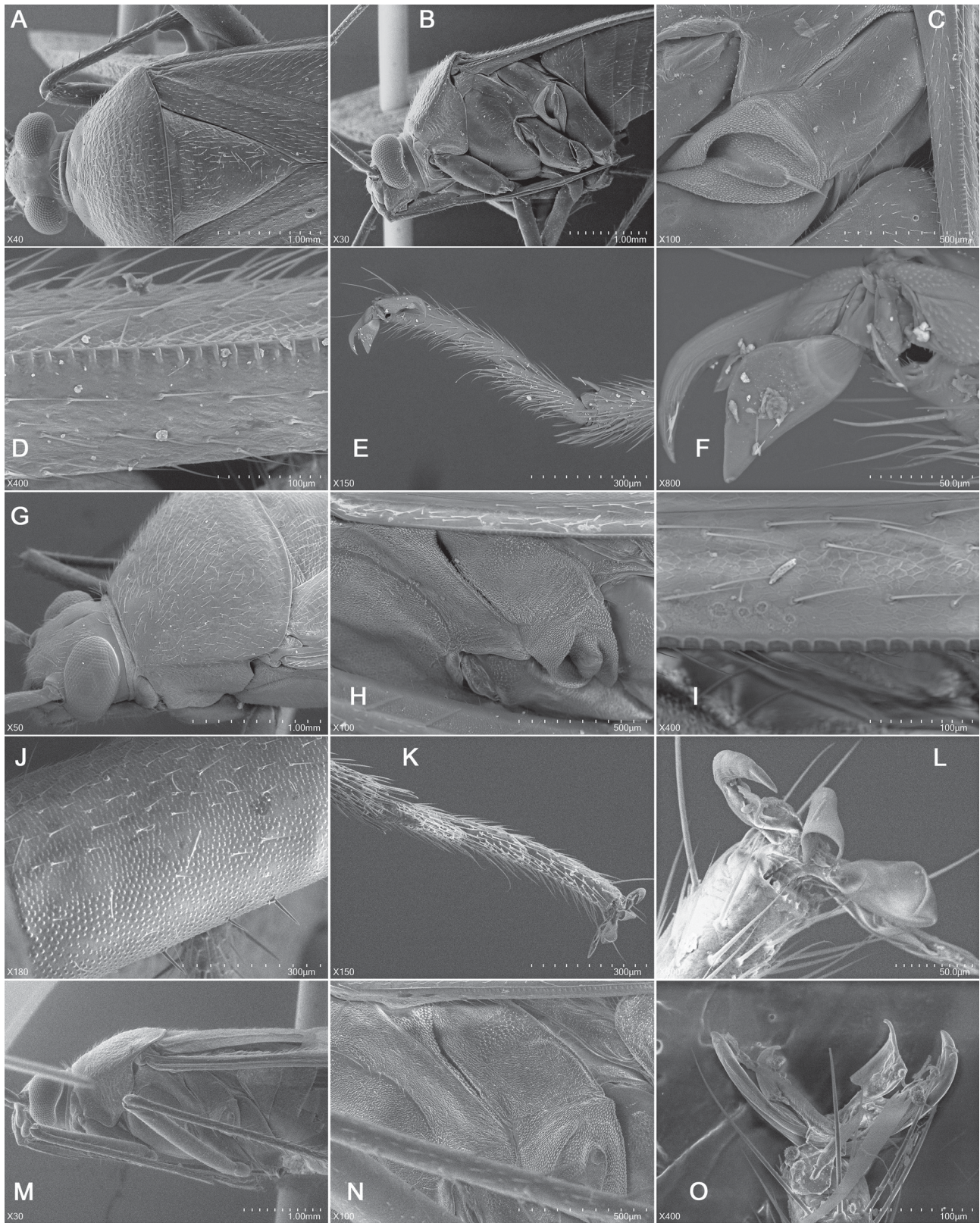


Fig. 17. Scanning electron micrographs for males of *Orientomiris andrzeji* sp. nov. (A–F), *O. chiangmai* sp. nov. (G–L) and *O. norioi* sp. nov. (M–O). A – anterior body, dorsal view. B, M – same, left lateral view. C, H, N – thoracic pleura, left lateral view. D, I – forewing notches. E, K – metatarsus. F, L, O – pretarsal structure of hind leg. G – anterior body, left dorso-lateral view. J – metafemur, dorsal surface.



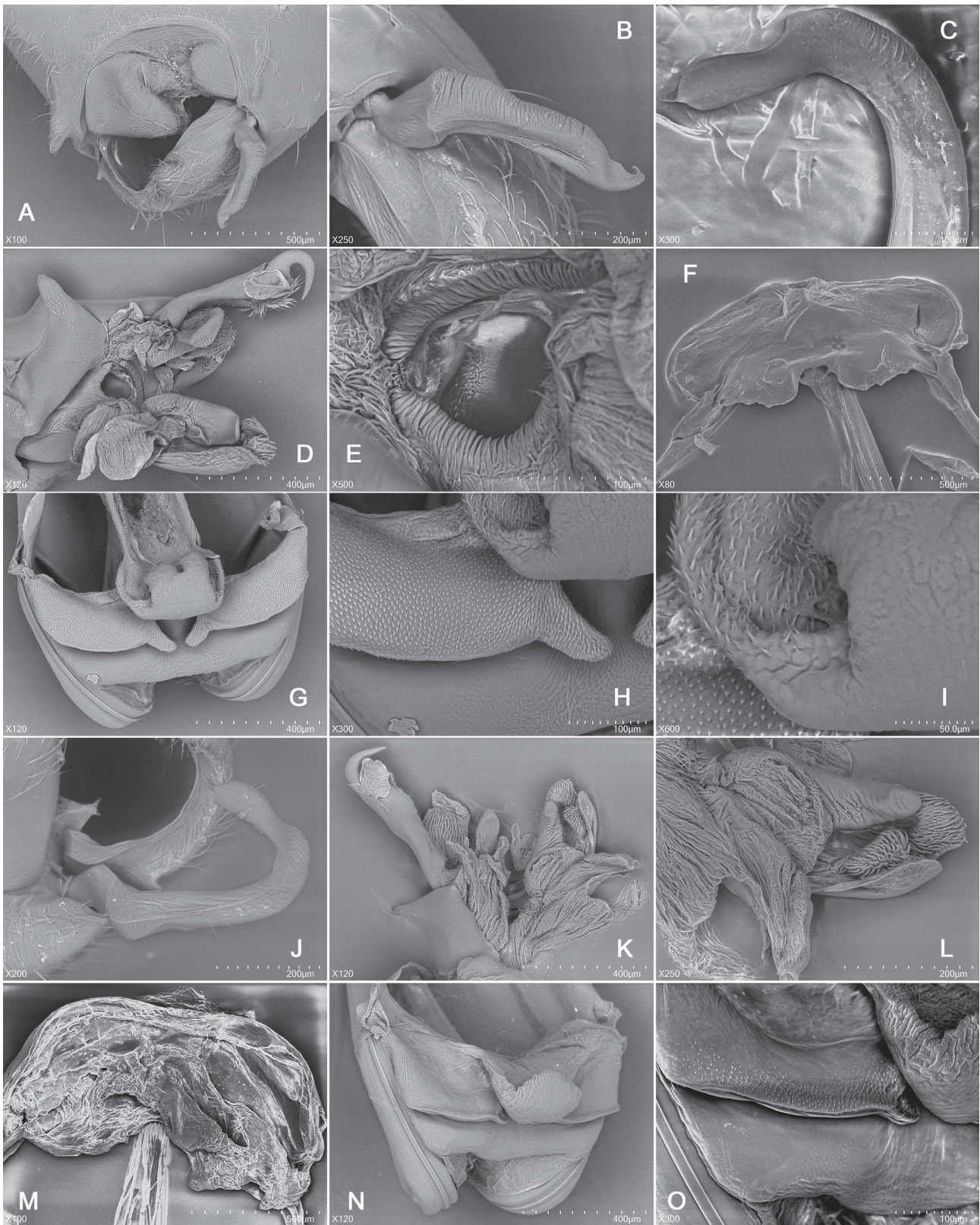


Fig. 18. Scanning electron micrographs for male and female genitalia of *Orientomiris andrzeji* sp. nov. (A–I) and *O. Chiangmai* sp. nov. (J–O). A – male genital segment (pygophore). B – right paramere. C, J – left paramere. D, K–L – vesica. E – secondary gonopore. F, M – genital chamber. G–I, N–O – posterior wall.

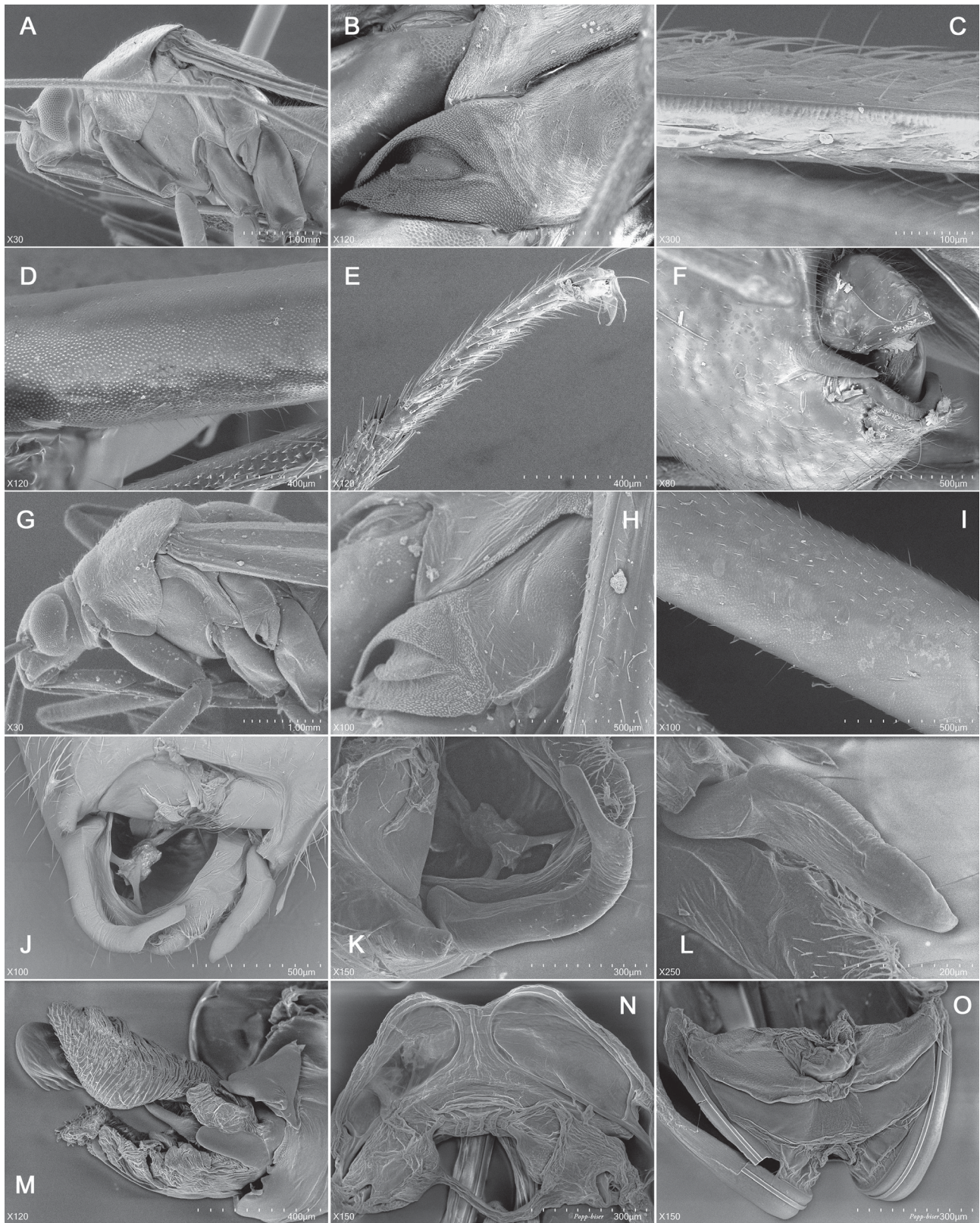


Fig. 19. Scanning electron micrographs for *Orientomiris shoheii* sp. nov., holotype male (A–F), *O. eurytus* (Yasunaga, 1988), female (G–I), and genitalia of *O. norioi* sp. nov. (J–M) and *Poppiocapsidea biseratensis* (Distant, 1903) (N–O). A, G – anterior body, left lateral view. B, H – thoracic pleura, left lateral view. C – forewing notches. D, I – metafemur, dorsal surface. E – metatarsus. F – male genital segment (pygophore), left lateral view. J – same, dorsal view. K – left paramere. L – right paramere. M – vesica. N – genital chamber. O – posterior wall.

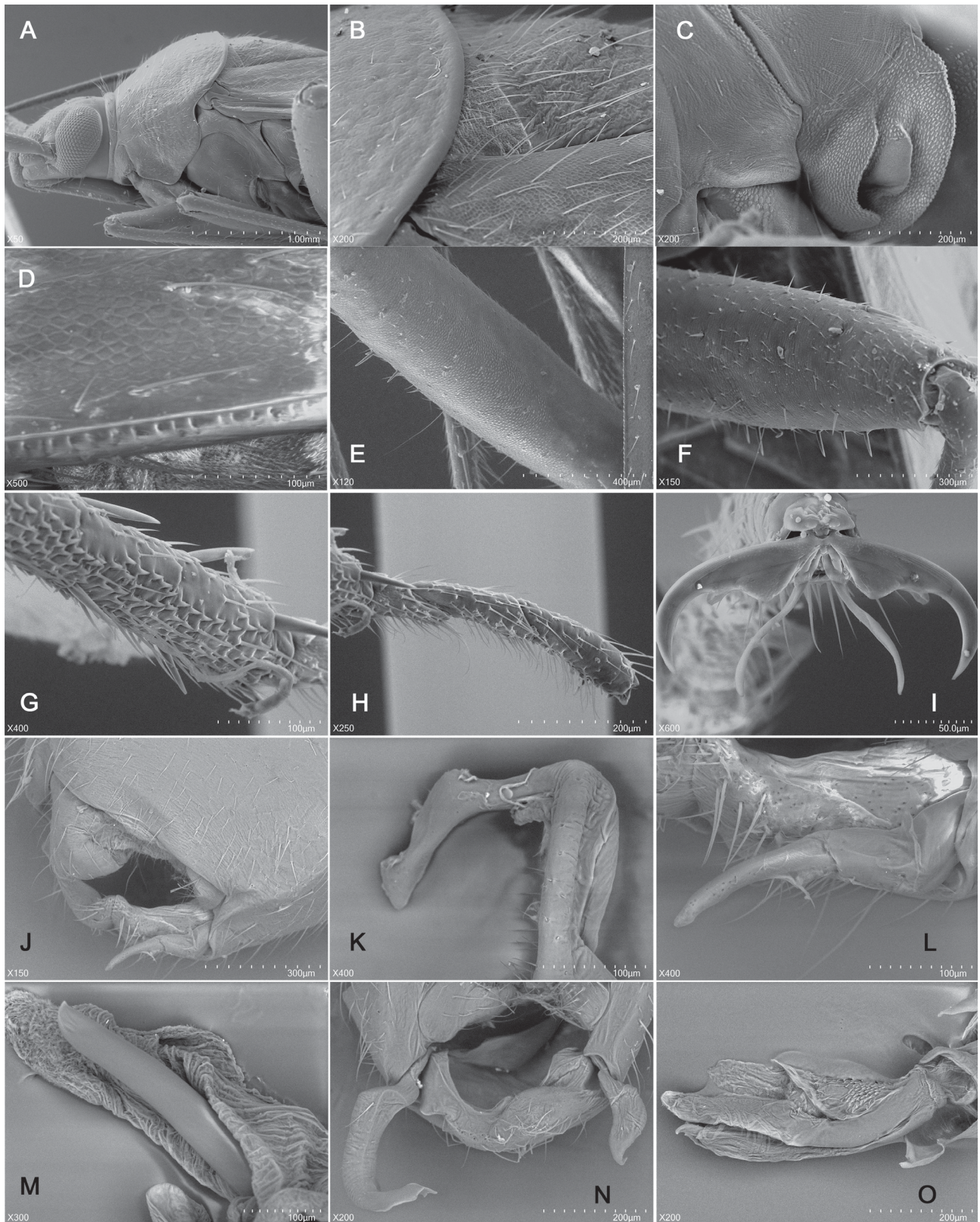


Fig. 20. Scanning electron micrographs for *Sakaeratiella adelphocoroides* (Yasunaga, Shishido & Yamada, 2016), holotype male (A–M), and male genitalia of *Adelfphocorisella lepedezae* Miyamoto & Yasunaga, 1993 (N–O). A – anterior body, left lateral view. B – pronotum, scutellum and anterior forewing. C – metathoracic scent efferent system. D – forewing notches. E – metafemur, dorsal surface. F – same, ventral surface. G – apex of metatibia. H – metatarsus. I – pretarsal structure of hind leg. J, N – genital segment (pygophore). K – left paramere. L – right paramere. M, O – vesica.

**Measurements.** See Table 1.

**Etymology.** Named after a Japanese 'samurai' (warrior), Nagamasa Yamada (1590–1630), who emigrated to the old Siamese capital, Ayutthaya (the Kingdom of Ayudhya), and worked as a commander under King Songtham; a noun in the genitive case.

**Biology.** All specimens (including several teneral adults and final instar immature forms, Fig. 3B) were collected from inflorescences of broadleaf trees of the family Fabaceae, such as *Acacia* sp. and *Cassia* sp. Based on collection records, a bivoltine life cycle is presumed for *N. nagamasai* sp. nov.

**Distribution.** Thailand (Phranakhon Si Ayutthaya).

### *Nythomiris nepalicus* sp. nov.

(Figs 3C–D, 4C–E, 5E–H, 6D–E, 15I–P, 16H–P)

**Type material.** HOLOTYPE: ♂, NEPAL: Makawanpur Dist., Chitwan National Park, Machan Resort [current Parsa Wildlife Reserve], 27°32'06"N, 84°44'17"E, 270 m, on flowers of *Mallotus* sp., 7–9.xi.2005, T. Yasunaga, M. Takai & B. Shishido (AMNH\_PBI 00378801) (NMTU). PARATYPES: NEPAL: same data as for holotype, 1 ♂ 1 ♀ (TYCN); Bagmati Zone, Kathmandu, Tripureshwor, 27.693555, 85.316545, UV lighting, 17.vi.2006, T. Yasunaga, 1 ♀ (TYCN).

**Diagnosis.** Distinguished from the other congener, *N. nagamasai* sp. nov., by its medially darkened, wider vertex; dark striae on frons; brown ring near base of antennomere I; basally annulated antennomere II; longer labium reaching apex of metacoxa; widely concaved median part of metathoracic scent efferent system; and darker pronotum and hemelytra, in addition to allopatric distribution pattern of each species.

**Description.** As in generic description. Basic coloration pale brown; dorsum relatively shining, with dark maculae (Figs 3C–D), almost glabrous (Figs 3C, 15L). Head pale grayish brown; vertex irregularly darkened mesially, wide, 0.28–0.30 (♂)/0.32–0.34 (♀) times as wide as head across eyes; frons with several dark brown striae. Antenna pale brown; segment I with brown ring near base; segment II with dark apical 1/3 and two annulations in middle and at base, about as long as metafemur; apical half of segment III and apical 3/4 of IV brown. Labium shiny pale brown, slightly exceeding apex of metacoxa; segment I and apical 1/3 of segment IV dark reddish brown. Pronotum brown, irregularly and widely speckled with fuscous maculae (as in Figs 3C–D), with creamy yellow collar and posterior margin; pleura castaneous, somewhat matte; metathoracic scent efferent system with creamy yellow, widely and semi-circularly concaved medially (Fig. 15M); scutellum yellowish white, with triangular fuscous macula at base and dark apex. Hemelytron shiny pale brown, with dark brown, rather squared macula on median corium; apical part and inner half of clavus darkened; base of corium darkened; cuneus fuscous brown, margined by scarlet fascia, with creamy yellow apex; membrane pale smoky brown, semitransparent. Coxae and legs pale brown; procoxa partly reddish brown; legs pale brown; metafemur sometimes with brown rings apically; apical part of metatibia partly darkened; metatarsomere II shorter than III (Fig. 15I); pretarsal structures as in Fig. 15J. Abdomen castaneous brown. Male genitalia (Figs 5E–G, 6F–G, 16L–P): left

paramere with stout sensory lobe and sharp hypophysis (Figs 5E, 16N); vesical spicules and lobal sclerites elongate (Figs 5G, 6G, 16O–P). Female genitalia (Figs 5H, 16H–J): sclerotized rings semi-circular, relatively small, separated from each other mesally (Fig. 5H).

**Measurements.** See Table 1.

**Etymology.** Named for Nepal; latinized as an adjective.

**Biology.** The adults were collected by sweep-netting the inflorescences of *Mallotus* sp. (Euphorbiaceae). However, its accurate breeding host is yet to be confirmed with immature forms.

**Distribution.** Nepal (Makawanpur District, or subtropical savanna-zone of southern Himalayas).

## Discussion

In the Miridae, no report on sound production organs had been available, until SCHUH (1974, 1984) first hypothesized that the minutely serrate or notched edge of forewing (exocorium) and minute bumps or plectra on the dorsal surface of metafemur in some members of Hallodapini (Phylinae) acted as stridulatory organs. Recently, the stridulatory function (emitted sound) of two hallodapine species, *Hallodapus centrimaculatus* (Poppius, 1909) and *H. ravenar* (Kirkaldy, 1902), was verified by YASUNAGA et al. (2019) and TAMADA et al. (2020).

SCHUH & WEIRAUCH (2020) pointed out fifteen patterns of stridulatory structures in various groups of Heteroptera, and the stridulatory apparatus found in mirid bugs predominantly corresponds to the 'forewing edge-metafemur' type. So far, the wing edge-metafemur stridulatory devices have been observed in Cylapinae, Deraeocorinae, Orthotylinae, and Phylinae (DAVRANOGLU et al. 2023). The present work additionally confirms that 25 species in 9 genera of the subfamily Mirinae, tribe Mirini possess stridulatory devices (see list in Material and methods), although further careful experiments are required to verify the actual sound emission. Incidentally, most of *Hallodapus* species are known to inhabit ground surface covered with grasses and herbs. TAMADA et al. (2020) assumed that stridulation may be a significant mean of communication on the messy ground surface for these epigeic bugs. On the other hand, mirine species of the *Orientomiris*-group usually inhabit the aerial parts of plants. Therefore, the purpose of stridulation in mirines may be different from that of hallodapines.

FIEBER (1858) and DISTANT (1883) established *Megacoelem* for the European species *M. infusum* (Herrich-Schaeffer, 1837) and *Creontiades* for the American *C. rubrinervis* (Stål, 1862), respectively. Subsequently, numerous mirine species were described from the Oriental Region and placed in these two genera, based only on superficial similarities (e.g. DISTANT 1904, 1909, 1910; POPPIUS 1914, 1915a, b; REUTER 1906); some species were also described under *Adelphocoris* Reuter, 1896 or *Phytocoris* Fallén, 1814 proposed for European species. To clarify the taxonomic confusion, or 'garbage' genera in Asia, YASUNAGA (1997) proposed *Orientomiris* to accommodate seven Japanese species (one of them, *O. nigripes* Yasunaga, 1997, was described as a subspecies of *O. yaeyamanus* Yasunaga,

1997 and recently upgraded to species by YASUNAGA 2023), and YASUNAGA (1998) additionally transferred nine Chinese species of *Megacoelum* to the genus. CHÉROT et al. (1999) created a hypothetical “*Creontiades*-complex” composed of *Creontiades*, *Megacoelum* and some allied genera. CHÉROT & MALIPATIL (2016) and YASUNAGA et al. (2021) included eighteen Oriental species in *Orientalmiris*, most of which were originally described under *Creontiades* or *Megacoelum*. *Orientalmiris* is currently represented by 38 members from the Oriental and Eastern Palearctic Region. Nonetheless, a number of undescribed species belonging to *Orientalmiris* still remain in subtropical and tropical Asia (cf. YASUNAGA et al. 2021). The latest putative grouping is *Adelphocoris-Creontiades-Megacoelum* complex, suggested by CHÉROT & MALIPATIL (2016); however, the ACM complex was defined to comprise approximately 20 genera from the Old World. Several recent works also presumed other plausible lineages, i.e. *Adelphocoris-Adelphocorisella-Creontiades-Phytocoris* (YASUNAGA & SCHWARTZ 2015, PAGOLA-CARTE et al. 2022), *Cheilocapsus-Cheilocapsidea-Pantilius-Vairocanamiris* (YASUNAGA 2011, 2018a).

If stridulatory devices are properly applied to the classification of the complex as a synapomorphy, nine genera, herein included in the *Orientalmiris*-group, may be more plausibly separated from other superficially similar taxa. The stridulatory devices are not possessed by the typical genus groups of the tribe Mirini, such as *Miris* Fabricius, 1794, *Gigantomiris* Miyamoto & Yasunaga, 1988, *Mermitelocerus* Reuter, 1905 and many superficially similar Asian genera (e.g. *Macrolygus* Yasunaga, 1992, *Mahania* Poppius, 1915, *Castanopsides* Yasunaga, 1992, *Gotoshinomiris* Yasunaga, 2016, *Philostephanus* Distant, 1904, *Liocapsus* Poppius, 1915, and the taxa listed in the Material and methods section). Therefore, the taxa composed of *Orientalmiris*-group are currently posited to constitute a monophyletic group. Nonetheless, the present conclusion is provisional, as most of the specimens I could examine in this work were Asian elements. Further broader survey is encouraged to ascertain the possession of the stridulatory organs for all known relevant taxa.

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