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Taxonomic Notes on the Mantispidae (Insecta: Neuroptera) from Japan

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Japanese Mantispidae are revised, redescribed and illustrated with details of male and female terminalia. The following seven species are recognised: *Austroclimaciella quadrituberculata* (Westwood, 1852); *Euclimacia badia* Okamoto, 1910; *Eumantispa harmandi* (Navás, 1909); *Tuberonotha strenua* (Gerstaecker, 1894); *Necyla shirozui* (Nakahara, 1961); *Mantispilla japonica* (McLachlan, 1875); and *M. transversa* Stitz, 1913. In addition, we propose synonymising *A. habutsuella* (Okamoto, 1910) and *A. subfusca* (Nakahara, 1912) with *A. quadrituberculata* and *M. j. diminuta* Matsumura, 1907 with *M. japonica*.

Key Words: Japanese Archipelago, biogeography, taxonomy, Mantispinae, mantisfly.

Introduction

Mantispidae, commonly known as mantispid or mantisfly, is an easily recognised family within Neuroptera, mainly characterised by its raptorial forelegs and typically elongate pronotum. Currently, there are approximately 400 extant species included within 44 genera, which are distributed worldwide, with the exception of Antarctica (Ohl 2004; Engel et al. 2018; Snyman et al. 2020). The extant family traditionally comprised four subfamilies: Symphrasinae, Drepanicinae, Calomantispinae, and Mantispinae. Although Symphrasinae was placed in Rhachiberothidae as a subfamily (Ardila-Camacho et al. 2021), Li et al. (2023) still considered that it is a part of Mantispidae. Therefore, as the taxonomic position of Symphrasinae is still under discussion, we have followed the traditional classification. The subfamily Mantispinae is the largest, encompassing 319 species across 35 genera (Oswald and Machado 2018). Notably, Mantispinae is the only subfamily distributed in the expansive region of the Japanese Archipelago (Snyman et al. 2018, 2020).

The taxonomy of Japanese Mantispidae was studied extensively from the late 19th to the mid-20th centuries (e.g., McLachlan 1875; Matsumura 1907; Navás 1909; Miyake 1910; Okamoto 1910, 1911; Nakahara 1912, 1913, 1961; Kuwayama 1925a, b, 1962; Yazaki 1927). However, most studies have focused on the body and wing colouration and the wing venation pattern, rather than on the male and female terminalia. Currently, the Japanese Mantispidae includes six genera, nine species, and one subspecies (Sekimoto and Yoshizawa 2016; Snyman et al. 2018). Nevertheless, taxonomic issues persist for certain Japanese species. For instance, Matsumura (1907) provided a simplified description of *Mantispa diminuta* Matsumura, 1907 based on the body length and pronotum colouration, without providing any information on the genitalia; therefore, further taxonomic clarification is necessary. Similarly, Okamoto (1910) and Nakahara (1912) described *Austroclimaciella habutsuella* (Okamoto, 1910) and *A. subfusca* (Nakahara, 1912), respectively, primarily based on markings on the head, pronotum and wings, without providing adequate information for species identification. Furthermore, based on the original description, the depository of the type specimen of *A. subfusca* remains unknown, with the type specimen seemingly lost according to Nakamura (2011).

In this study, we conducted a comprehensive review of the mantispid species of Japan, assigning seven species to six genera. Furthermore, we synonymised two species and one subspecies and conducted detailed examinations of the original descriptions of *A. habutsuella*, *A. subfusca* and *M. japonica diminuta*.

Materials and Methods

The specimens were obtained throughout the Japanese Archipelago from Honshu to Nansei Islands (Fig. 1). All specimens used for the present study were pinned and dried for preservation and are housed in the following institutions: Minoh Park Insect Museum, Osaka Japan (MPIM); Osaka Museum of Natural History, Osaka, Japan (OMNH); Systematic Entomology, School of Agriculture, Hokkaido University, Sapporo, Japan (SEHU); and Kagoshima Prefectural Museum, Kagoshima, Japan (KGPM). The abdomens of selected specimens were removed for KOH maceration and stored on the specimen pin in a small tube filled with

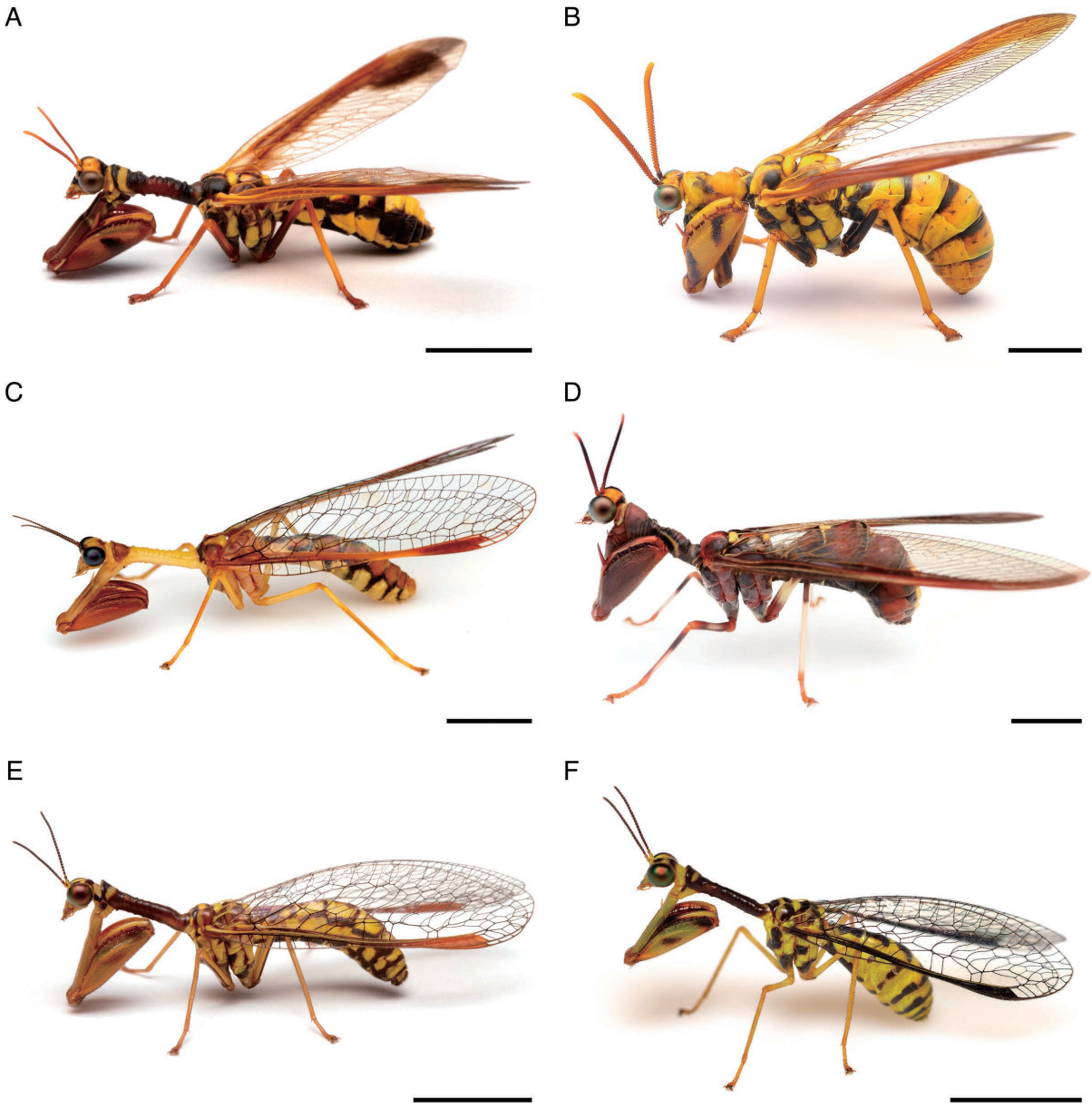

Fig. 1. Photographs of living mantispids from Japan. A, *Austroclimaciella quadrituberculata* (Westwood, 1852) (MPIM-HN-001, photograph © Hiroshi Nakamine); B, *Euclimacia badia* Okamoto, 1910 (HH-20210603, photograph © Hibiki Hoshito); C, *Eumantispa harmandi* (Navás, 1909) (SK-20210914, photograph © Seiya Kudo); D, *Tuberonotha strenua* (Gerstaecker, 1894) (KC-20190923, photograph © Kazuma Chiyoda); E, *Mantispilla japonica* (McLachlan, 1875) (MPIM-HN-010, photograph © Hiroshi Nakamine); F, *Mantispilla transversa* Stitz, 1913 (OMNH-N000009473, photograph © Rikio Matsumoto). Scale bars: 5.0 mm.

glycerin. The male and female terminalia were prepared by removing the apical segments of the abdomen and placed in a 10% potassium hydroxide (KOH) solution at room temperature for approximately 12 to 24 hours. After rinsing off the KOH solution with distilled water, the apex of the abdomen was then transferred to 80% ethyl alcohol (EtOH) for further examination.

The observation was made using a Nikon SMZ800 stereomicroscope. The photographic data of the specimens were taken using a Canon EOS 80D with a Canon EF–S 60 mm F2.8 Macro USM plus Kenko Extension Tubes, with the aid of a Canon MT-24EX twin flash. All figures were edited and assembled with Adobe Photoshop and Illustrator CC 2023.

The terminology of wing venations generally follows Ardila-Camacho et al. (2021). Although some authors interpreted the posterior-most branch of the RP (radius posterior) as MA (media anterior) in both fore- and hindwing (e.g., Aspöck et al. 1980; Lambkin 1986), we here consider it as a part of the RP, following Breitkreuz et al. (2017) and Winterton et al. (2019). The abbreviations of morphological terms used for wing venation are as follows: A, anal vein; A1–A3, first to third anal vein; Cu, cubitus; CuA, cubitus anterior; CuP, cubitus posterior; M, media; MA, media anterior; MP, media posterior; R, radius; RA, radius anterior; RP, radius posterior; rt, radial triangle; Sc, subcostal posterior. The terminology of the terminalia generally follows Ardila-

Camacho et al. (2021). The abbreviations of morphological terms used for terminalia are as follows: bc, bursa copulatrix; dv, diverticulum; ect, ectoproct; fc, fertilisation canal; fcd, fertilisation canal duct; gphVIII, gonapophyses VIII; gxVIII–XI, gonocoxites VIII to XI; gstX, gonostyli X; ml, median lobe of gonocoxites XI; sI–IX, sternite I to IX; tI–IX, tergite I to IX; vml, ventromedial lobe of ectoproct.

Taxonomy

Genus ***Austroclimaciella*** Handschin, 1961

Austroclimaciella Handschin, 1961: 287.

Type species. *Mantispa quadrituberculata* Westwood, 1852, by original designation.

Diagnosis [modified from Snyman et al. (2018)]. *Austroclimaciella* can be distinguished from all other Oriental and Palaearctic mantispid genera by the following combination of characters: pronotum, well-rounded prozone, conspicuously and regularly corrugated midzone; wing apices always with distinct pigmentation; small pores on the posterior margins of tergites IV–VIII.

Austroclimaciella quadrituberculata (Westwood, 1852)
[Japanese name: Tsumaguro-kamakirimodoki]
(Figs 1A, 3–5)

Mantispa quadrituberculata Westwood, 1852: 264, pl. 18, fig. 1 (as *4-tuberculata*; incorrect original spelling) [type locality: Northern India (India)].
Climaciella habutsuella Okamoto, 1910: 542 [type locality: Okinawa – Yakushima Island (Japan)]. syn. rev. [N.B.: Previously synonymised once by Kuwayama (1962).]
Climaciella miyakei Okamoto, 1910: 541 [type locality: Kyoto (Japan)].
Climaciella subfusca Nakahara, 1912: 562, figs 1–2 [type locality: Kuzaki, Harima (Japan)]. syn. nov.
Climaciella satsumensis Yazaki, 1927: 361, figs 1–6 [type locality: Ibusuki, Kagoshima (Japan)].
Climaciella tanegashimensis Yazaki, 1927: 363, figs 7–14 [type locality: Tanegashima, Kagoshima (Japan)].

Type material examined. *Climaciella habutsuella* Okamoto, 1910: holotype, male, "Japan/Matsumura//Ryukyu, Yakushima [backside of the previous label, handwritten in Japanese]// HOLOTYPE/*Climaciella*/*habutsuella*/det. H. OKAMOTO/1910 [handwritten on red paper card]//*Climaciella*/4-*tuberculata*/ WESTWOOD/Det. SATORU KUWAYAMA/1960 [handwritten, except "Det. SATORU KUWAYAMA"]//*Austroclimaciella*/*quadrituberculata*/(Westwood, 1852)/Det. Bao-Cheng Lai [handwritten]" (SEHU-Neur2-No1).

Material examined. Honshu: 1 male, 19 June 2001, Kasugayama, Nara-shi, Nara, M. Yagi leg. (OMNH-N000009459); 1 male, 22 August 2019, Wakakusayama, Nara-shi, Nara, R. Matsumoto leg. (OMNH-N000009460); 1 male, 16 July 2020, same locality and collector (OMNH-N000009461). **Kyushu:** 1 male, 3 July 2023, Motooka, Nishiku, Fukuoka-shi, Fukuoka, S. Yagi leg. (MPIM-HN-001); 1 female, 14 August 1933, Takeoka, Kagoshima-shi, Kagoshima, R. Tanaka leg. (OMNH). **Nansei Islands:** 1 female, 19 September 1978, Onoaida, Yakushima Is., Kagoshima, T. Saito leg. (MPIM-N001); 1 female, 6 August 1991, Mugio, Yakushima Is., Kagoshima, S. Yamane leg. (OMNH-N000009462).

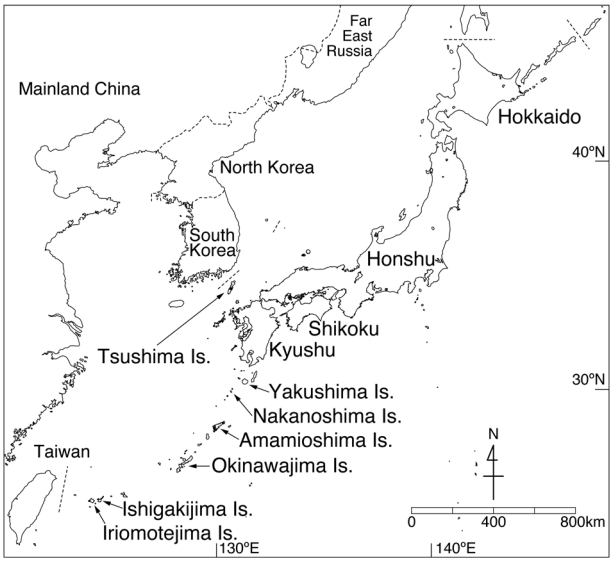

Fig. 2. A map of the Japanese Archipelago and the adjacent Far East Russia, Korea, mainland China and Taiwan.

Redescription. *Head.* Labrum orange. Clypeus, frons and vertex generally yellow except two black transverse stripes at front region (Fig. 3C) and one black transverse stripe at posterior margin of vertex (Fig. 3D). Some specimens with two black longitudinal stripes along eyes (Fig. 3E). Antennae: scape yelow, pedicel and flagellum dark orange to brown with 25–29 articles covered with short setae.

Thorax. Prothorax 3.4–4.8 mm long in males, 3.8–5.1 mm long in females, elongate, generally blackish red to black except black stripe at anterior margin and yellow stripe at broad section (Fig. 3B, D, E). Mesonotum generally dark brown to black except yellow scutellum. Metanotum generally dark brown to black except pale yellow region at anterior part of scutum and yellow scutellum.

Legs. Foreleg: coxa and trochanter dark reddish brown. Femur with posterior surface dark reddish brown to deep yellow with distorted triangular black spot in medial region, anterior surface dark reddish brown with black spot in medial region. Dark reddish brown femoral major process at proximal tow-fifths of femur length, dark reddish brown posteroventral row of processes present on distal three-fifths of femur length. Tibia to protarsus dark reddish brown to deep yellow (Fig. 3B). Midleg: femur to tarsus dark reddish brown, pretarsal claws with four to six apical teeth, arolium present. Hindleg: femur dark reddish brown, tibia dark yellow except proximal one-third dark reddish brown region, tarsus reddish brown, pretarsal claws with four to six apical teeth, arolium present.

Wings. Forewing 13.5–17.0 mm long in males, 13.5–

18.1 mm long in females, elongate, anterior half, wing base, and distal one-third region pale brown, venation brown. Pterostigma dark orange. Radius Anterior (RA) and Radius Posterior (RP) veins partially fused at wing apex (Fig. 3F). Media (M) and Radius (R) veins fused along approximately basal one-quarter of wing length and M vein posteriorly retracted to Cubitus (Cu), forming radial triangle (rt) (Fig. 3F). Media Anterior (MA) proximally fused to first RP stem for a short distance (Fig. 3F, H, indicated arrowhead) or connected to it through short crossvein (Fig. 3I). Hind wing 12.0–15.0 mm long in males, 12.0–16.1 mm long in females, elongate, anterior half and distal one-third region

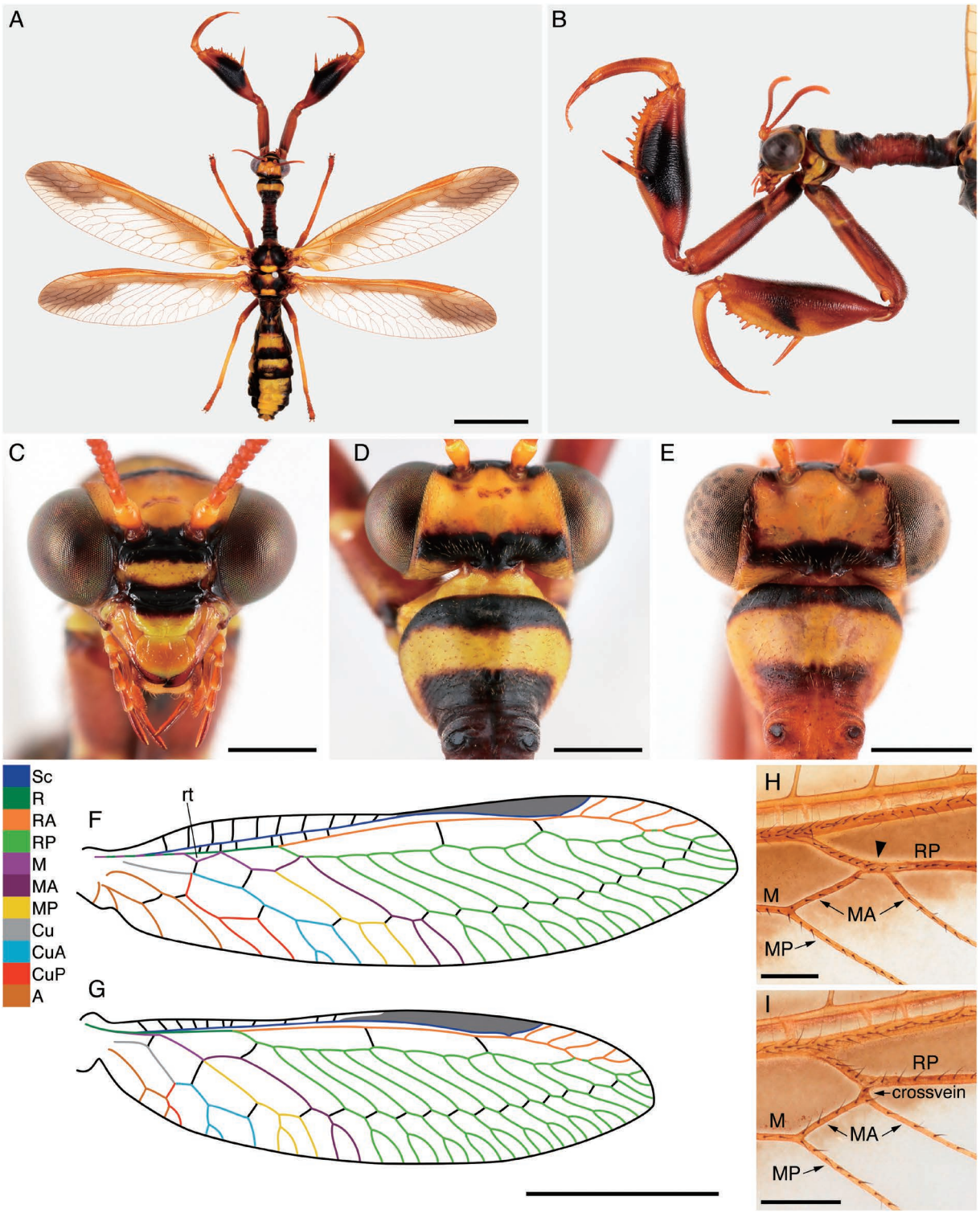

Fig. 3. *Austroclimaciella quadrituberculata* (Westwood, 1852), MPIM-HN-001 (A–D), OMNH-N000009461 (E), OMNH-N000009460 (F–H), OMNH-N000009462 (I). A, Male habitus, dorsal view; B, head, prothorax and forelegs, lateral view; C, head, frontal view; D, head and pronotum, dorsal view; E, ditto; F, forewing venation; G, hind wing venation; H, details of MA and first RP stem; I, ditto. Scale bars: A, F, G, 5.0 mm; B, 2.0 mm; C–E, 1.0 mm; H, I, 0.5 mm.

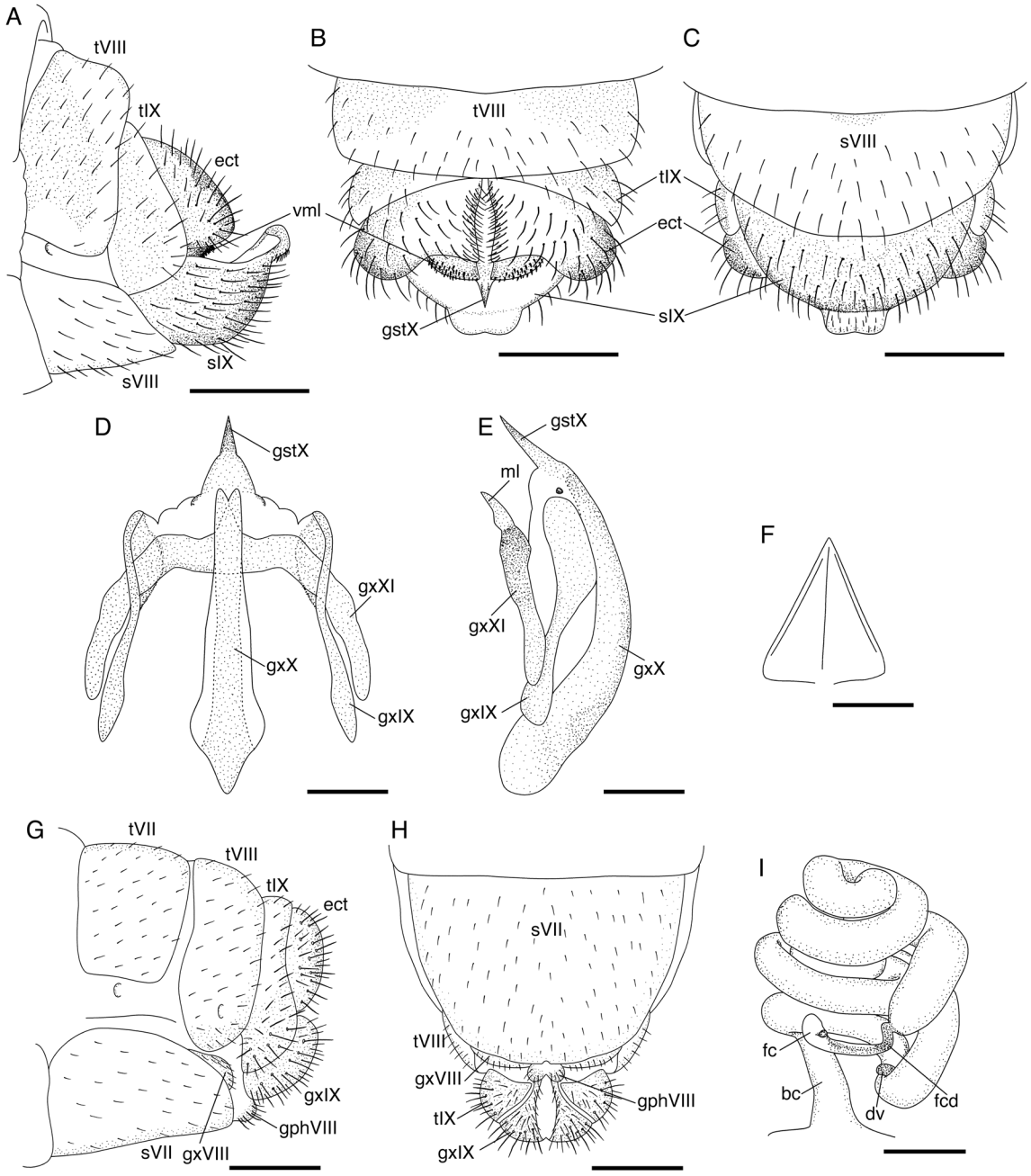

Fig. 4. Male and female terminalia of *Austroclimaciella quadrituberculata* (Westwood, 1852), OMNH-N000009461 (A–C), MPIM-HN-001 (D–F), OMNH-N000009462 (G, H), MPIM-N001 (I). A, Male terminalia, lateral view; B, ditto, dorsal view; C, ditto, ventral view; D, male genitalia, ventral view; E, ditto, left lateral view; F, hypandrium, dorsal view; G, female terminalia, lateral view; H, ditto, ventral view; I, spermatheca. Scale bars: A–C, G, H, 0.5 mm; D–F, I, 0.2 mm.

pale brown, venation brown. Pterostigma dark orange. RA and RP veins partly fused at wing apex (Fig. 3G). Cubitus Posterior (CuP) and First anal vein (A1) partly fused at distal portion (Fig. 3G).

Abdomen. Tergite I generally blackish brown to black. Anterotergite of tergite II generally blackish brown to black with dark yellow spot at center and posterotergite yellow to dark yellow with some brown spots at anterior half, blackish brown to black spot at posterior half with yellow margin. Tergites III and IV yellow at anterior half, and blackish brown to black at posterior half. Tergites V to VIII entirely yellow. All sternites generally black with yellow stripe at posterior margin.

Male terminalia (Fig. 4A–F). Ectoproct ellipsoid, covered with fine setae. Ventromedial lobe directed medially, with short and thick setae. Sternite IX semicircular, apex broadly projected and slightly concave at centre in ventral view, covered with fine setae. Gonostyli X sclerotised, long and thin, spine-like apex, with a pair of small sclerites at base of gonostyli X membrane. Gonocoxites X slightly wide with a small notch at apex in ventral view. Median lobe of gonocoxites XI acuminate. Hypandrium triangular in dorsal view.

Female terminalia (Fig. 4G–I). Gonocoxites VIII narrow, elongate, setose. Gonapophyses VIII slightly protruding,

setose. Ectoproct ellipsoid, covered with thin setae. Gonocoxites IX ellipsoid, covered with thin setae. Spermatheca strongly coiled, fertilisation canal duct base narrow and curved, diverticulum (dv) present.

Distribution. JAPAN: Honshu, Shikoku, Kyushu, Nansei Islands (Yakushima Is., Tanegashima Is.); TAIWAN; P. R. CHINA; INDONESIA; INDIA.

Comments. Okamoto (1910) described *C. habutsuella* (=*A. habutsuella*) based on a single male specimen collected from Yakushima Island, Southwestern Japan (Fig. 5A–H). This species can be distinguished from *C. quadrituberculata* (=*A. quadrituberculata*) by the number of antennal segments, prothorax colouration, and the number of branches in anterior radial cell 3 (rarp3) (Okamoto 1910). Subsequently, Kuwayama (1962) synonymised *A. habutsuella* with *A. quadrituberculata*, suggesting that these morphological features are individual variations. Nevertheless, Ohl (2004) and Snyman et al. (2018) recognised *A. habutsuella* as a distinct species. Snyman et al. (2018) presented additional figures (Snyman et al. 2018: fig. 4) and noted the absence of a broad black band on the posterior margin of the vertex. In contrast, the holotype specimen of *A. habutsuella* exhibits a black stripe on the posterior margin of the vertex (Fig. 5D). Therefore, we recommend the synonymisation of *A. habutsuella* with *A. quadrituberculata*.

Climaciella subfusca (=*A. subfusca*), another Japanese species, requires careful taxonomic examination. Nakahara (1912) described this species on the basis of wing venation, wing colour, and body length, using a single female specimen from Harima, Honshu. Unfortunately, efforts to locate type specimens deposited at the National Museum of Nature and Science, Tsukuba, Japan (Nakamura 2011), have been unsuccessful. The only references to the morphological attributes of this species are the original descriptions (Fig. 5I, J). Notably, this species exhibits pale brown pigmentation along the branches of RP veins in the forewing (Fig. 5J; Kuwayama 1925b, 1962). However, we believe that this morphological trait is subject to individual variation, suggesting that this species is a synonym for *A. quadrituberculata*.

Genus ***Euclimacia*** Enderlein, 1910

Euclimacia Enderlein, 1910: 362.

Type species. *Euclimacia partita* Enderlein, 1910, by original designation.

Diagnosis [modified from Snyman et al. (2018)]. *Euclimacia* can be distinguished from all other Oriental and Palaearctic mantispid genera by the following combination of characters: flagellomeres symmetric disc-like and perfoliate; pronotum shorter than pterothorax; wings conspicuously pigmented.

Euclimacia badia Okamoto, 1910
[Japanese name: Ooikubi-kamakirimodoki]
(Figs 1B, 6, 7)

Euclimacia badia Okamoto, 1910: 543, pl. 17, fig. 5 [type locality: Arikan (Taiwan)].

Euclimacia sauteri Navás, 1927: 39 [type locality: Kankau (Taiwan)].

Material examined. Nansei Islands: 1 male, 10 October 1996, Omotodake, Ishigakijima Is., Okinawa, M. Ogata leg. (OMNH-N000009463); 1 female, 27 October 2002, Maesedake, Ishigakijima Is., Okinawa, Y. Sawada leg. (OMNH); 1 male, 4 September 2006, same locality, E. Nishida leg. (OMNH-N000009464); 1 female, 2 August 2007, Nosokomape, Ishigakijima Is., Okinawa, O. Okamura. leg. (OMNH-N000009465); 1 male, 2 May 1982, Toyohara, Iriomotejima Is., Okinawa, A. Nagatomi leg. (OMNH-N000009466); 1 male, 22 July 1995, Funauki, Iriomotejima Is., Okinawa, T. Saito leg. (MPIM-4210); 1 male, 2 July 1997, Shirahama-rindo, Iriomotejima Is., Okinawa, T. Saito leg. (MPIM-4211); 1 male, 21 May 2003, same locality, T. Befu leg. (OMNH-N000009467); 1 male, 3 June 2021, Iriomote, Iriomotejima Is., Okinawa, H. Hoshito leg. (HH-20210603).

Redescription. *Head.* Generally yellow except black spot at frons, near base of antennal insertion and occiput (Fig. 6C, D). Antennae: scape blackish brown to black, pedicel and flagellum dark orange to brown with 42–45 articles, and flagellomeres symmetric disc-like and perfoliate.

Thorax. Prothorax 4.1–4.5 mm long in males, 4.3–4.6 mm long in females, very short, strongly wrinkled, median region of pronotum dorsally concave in lateral view; generally yellow except diagonal black spots on both sides and black stripe at posterior margin (Fig. 6B, D). Meso- and metanotum generally yellow except black spots at left and right ends.

Legs. Foreleg: posterior surface of coxa with proximal one-third region black and the other areas yellow, anterior surface with proximal half and ventral side blackish brown to black, remaining areas dark yellow. Femur with posterior surface generally yellow except two blackish-brown spots at proximal and medial regions, anterior surface blackish-brown except dark yellow spots at proximal, medial and distal regions. Dark yellow femoral major process at proximal one-third of femur length, yellow posteroventral row of processes present on distal two-thirds of femur length. Tibia to tarsus yellow to dark yellow with fine dense setae on inner ridge (Fig. 6B). Mid- and hindlegs: femora generally black except yellow longitudinal stripe at distal one-quarter, tibiae yellow with one small black spot at middle, their tarsi dark yellow, pretarsal claws with four to six apical teeth, arolium present.

Wings. Forewing 23.5–24.5 mm long in males, 20.0–23.7 mm long in females, elongate, anterior half and wing base pale brown, posterior half pale amber, venation brown. Pterostigma dark orange. Media (M) and Radius (R) veins fused along approximately basal one-sixth of wing length and M vein posteriorly retracted to Cubitus Anterior (CuA), forming radial triangle (rt) (Fig. 6E). Hind wing 19.5–21.0 mm long in males, 18.5–20.7 mm long in females, elongate, anterior half pale brown, posterior half pale amber, venation brown. Pterostigma dark orange. Cubitus Posterior (CuP) and First anal vein (A1) fused at distal portion (Fig. 6F).

Abdomen. Tergite I entirely yellow. Anterotergite of tergite II generally black with yellow spot at posterior region and

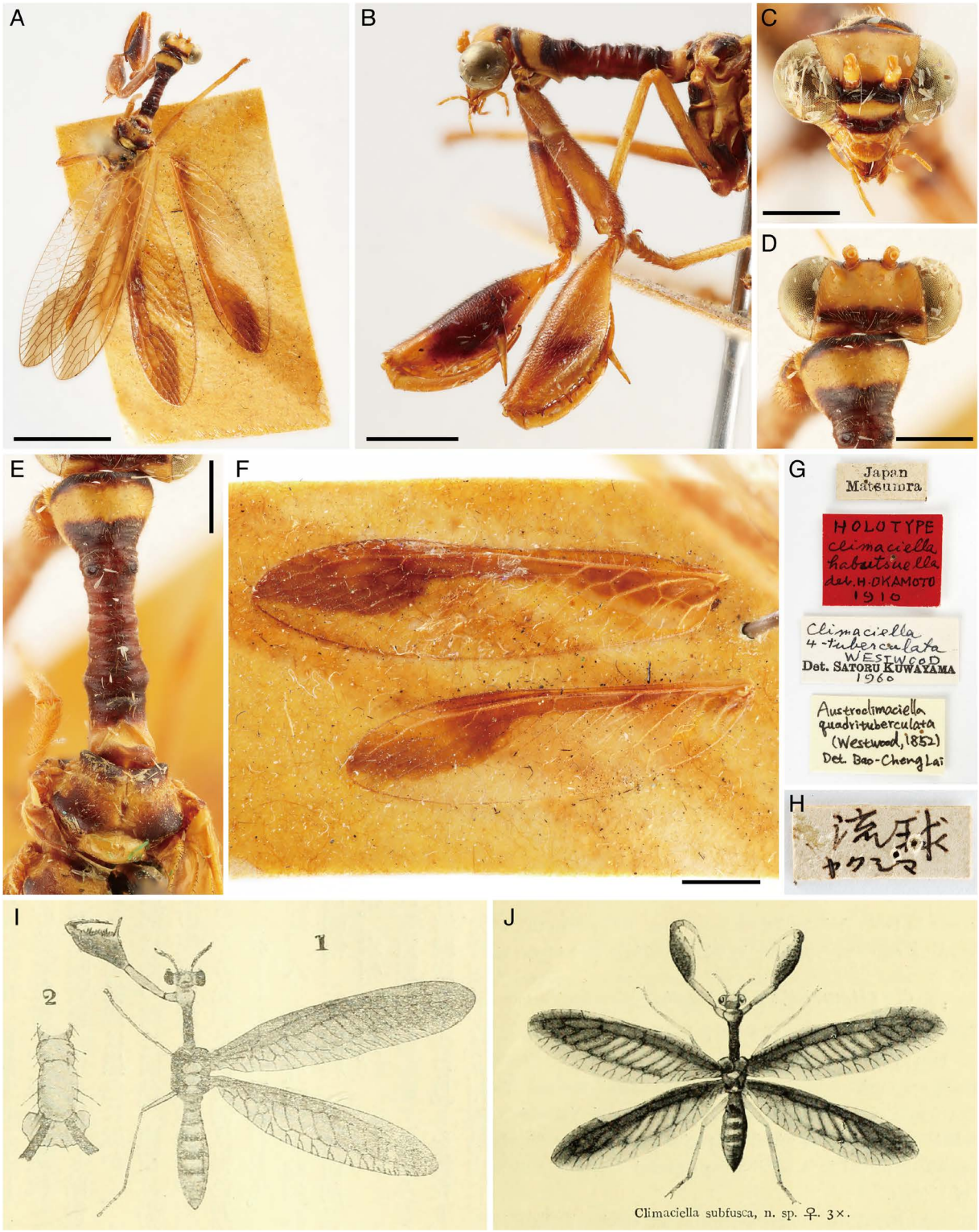

Fig. 5. Holotype specimen of *Climaciella habutsuella* Okamoto, 1910, SEHU-Neur2-No1 and illustrated *C. subfusca* Nakahara, 1912. A, Habitus; B, head, prothorax and forelegs, lateral view; C, head, frontal view; D, head and pronotum, dorsal view; E, pronotum and mesonotum, dorsal view; F, left fore- and hind wings; G, H, labels of holotype specimen of *C. habutsuella*; I, illustrated *C. subfusca* in original description (Nakahara 1912); J, ditto in Nakahara (1913). Scale bars: A, 5.0 mm; B, F, 2.0 mm; C–E, 1.0 mm.

posterotergite yellow with a black stripe at posterior margin. Tergites III to VII yellow with black stripe at anterior margin. Tergite VIII entirely yellow. Sternite I generally black exept inverted triangular yellow spot at midline. Sternite II yellow with black stripe at posterior margin. Sternites III to VII yellow with black stripe at anterior margin. Sternite VIII entirely yellow in the male.

Male terminalia (Fig. 7A–G). Ectoproct ellipsoid, covered with fine setae. Ventromedial lobe with short and thick setae. Sternite IX semicircular, apex broadly projected at

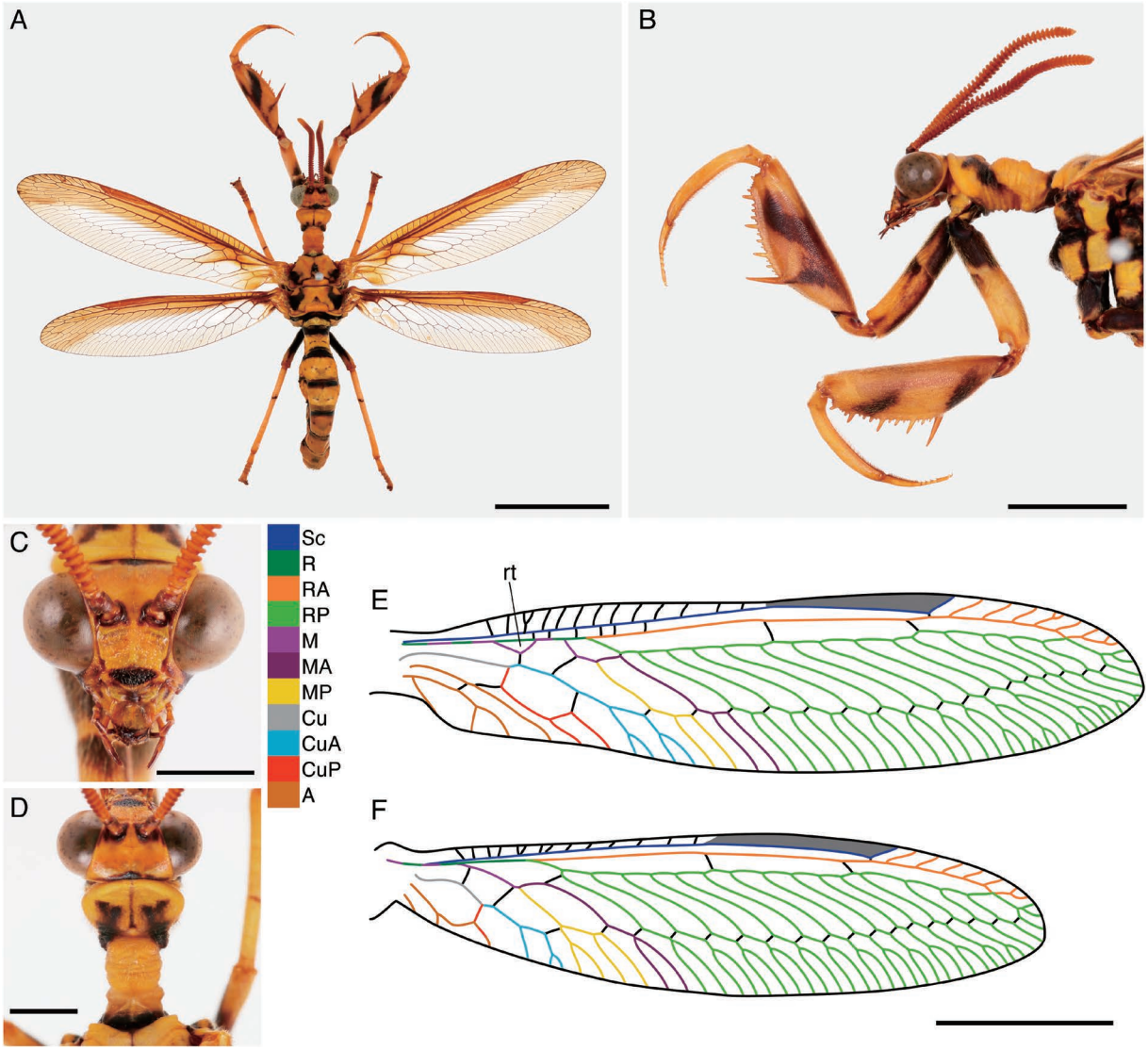

Fig. 6. *Euclimacia badia* Okamoto, 1910, OMNH-N000009463 (A), MPIM-4210 (B–D), MPIM-4211 (E, F). A, Male habitus, dorsal view; B, head, prothorax and forelegs, lateral view; C, head, frontal view; D, head and pronotum, dorsal view; E, forewing venation; F, hind wing venation. Scale bars: A, 10.0 mm; B, E, F, 5.0 mm; C, D, 2.0 mm.

centre in ventral view, covered with fine setae. Gonostyli X sclerotised, short and thin, spine-like apex, with a pair of small sclerites at base of gonostyli X membrane. Gonocoxites X broad with notch at apex in ventral view. Median lobe of gonocoxites XI acuminate. Hypandrium internum triangular with two concave sides in dorsal view.

Female terminalia (Fig. 7H–J). Gonocoxites VIII narrow, small, setose. Gonapophyses VIII slightly protruding. Ectoproct ellipsoid, covered with thin setae. Gonocoxites IX ellipsoid, covered with thin setae. Spermatheca coiled, base of fertilisation canal duct narrow and strongly curved.

Distribution. JAPAN: Nansei Islands (Ishigakijima Is., Iriomotejima Is.); TAIWAN; PHILIPPINES (?).

Genus ***Eumantispa*** Okamoto, 1910

Eumantispa Okamoto, 1910: 538.

Type species. *Eumantispa suzukii*, Okamoto, 1910 (= *Mantispa harmandi* Navás, 1909), by original designation.

Diagnosis [modified from Yang and Liu (2010)]. *Eumantispa* can be distinguished from other mantispid genera by the following combination of characters: prothorax long and straight; pronotum smooth without setae, but with a series of regular grooves; wings elongate and narrow, forewing with more than three Radial cells.

Eumantispa harmandi (Navás, 1909)
[Japanese name: Ki-kamakirimodoki]
(Figs 1C, 8, 9)

Mantispa harmandi Navás, 1909: 480 [type locality: Nipón medio. Cercanías de Tokyo (Japan)].

Mantispa nawae Miyake, 1910: 216, pl. 12, fig. 4, 4a, b [type locality: Mt. Ibukiyama, Hida (Japan)].

Mantispa sasakii Miyake, 1910: 217, pl. 12, fig. 2, 2a, b [type locality: Mt. Daimanji in Oki-island (Japan); Urami-no-taki road in Nikko (Japan)].

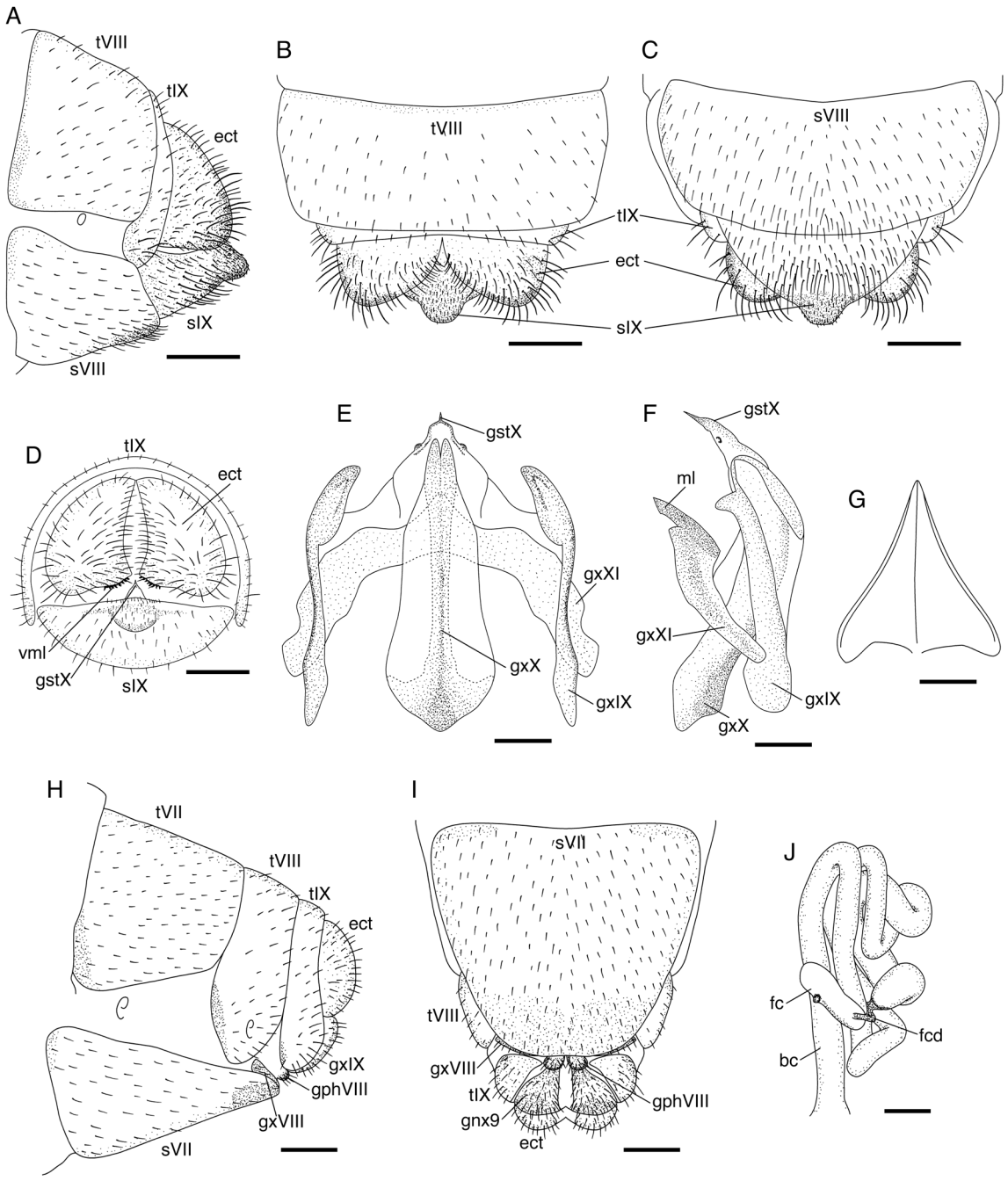

Fig. 7. Male and female terminalia of *Euclimacia badia* Okamoto, 1910, MPIM-4210 (A–D), MPIM-4211 (E–G), OMNH-N000009465 (H–J). A, Male terminalia, lateral view; B, ditto, dorsal view; C, ditto, ventral view; D, ditto, posterior view; E, male genitalia, ventral view; F, ditto, left lateral view; G, hypandrium, dorsal view; H, female terminalia, lateral view; I, ditto, ventral view; J, spermatheca. Scale bars: A–D, H, I, 0.5 mm; E–G, J, 0.2 mm.

Eumantispa suzukii Okamoto, 1910: 538, fig. 2, pl. 17, fig. 1 [type locality: Kyoto (Japan)].

Material examined. **Honshu:** 1 ex., 14 September 2021, Kansuizawa, Arakawa, Aomori-shi, Aomori, S. Kudo leg. (SK-20210914); 1 male, 2 females, 26 July 1998, Torinoo – Suzuharashitsugen, Mikurajima-mura, Mikurajima Is., Tokyo, O. Tominaga leg. (OMNH); 1 male, 23 July 1994, Ikenotaira, Myoko-shi, Niigata, M. Takahama leg. (MPIM-4179); 1 male, 19 August 1985, Hakusan, Hakusan-shi, Ishikawa, M. Takahama leg. (MPIM-4192); 1 female, 21 August 1985, same locality, T. Saito leg. (MPIM-4191); 1 female, 22 September 1976, Wakasa-cho, Fukui, T. Saito leg. (MPIM-N004); 2 males, 30 July 1989, Koukura-toge, Minamiechizen-cho, Fukui, T. Saito leg. (MPIM-4188, N005); 1 female, 12 August 1989, Gozaishikosen, Nirasaki-shi, Yamanashi, K. Mizuno leg. (OMNH); 1 female, 23 July 1994, Iizunakogen, Nagano-shi, Nagano, M. Takahama leg. (MPIM-4180); 1 male, 2 females, 28 August 1970, Ontake, Otaki-mura, Nagano, M. Takahama leg. (MPIM-4174–6); 1 male, 22–23 July 1990, Kanmuriyama-toge, Ibigawa-cho, Gifu, T. Saito leg. (MPIM-4186); 1 female, 6 September 1994, Ena-shi, Gifu, M. Taka-

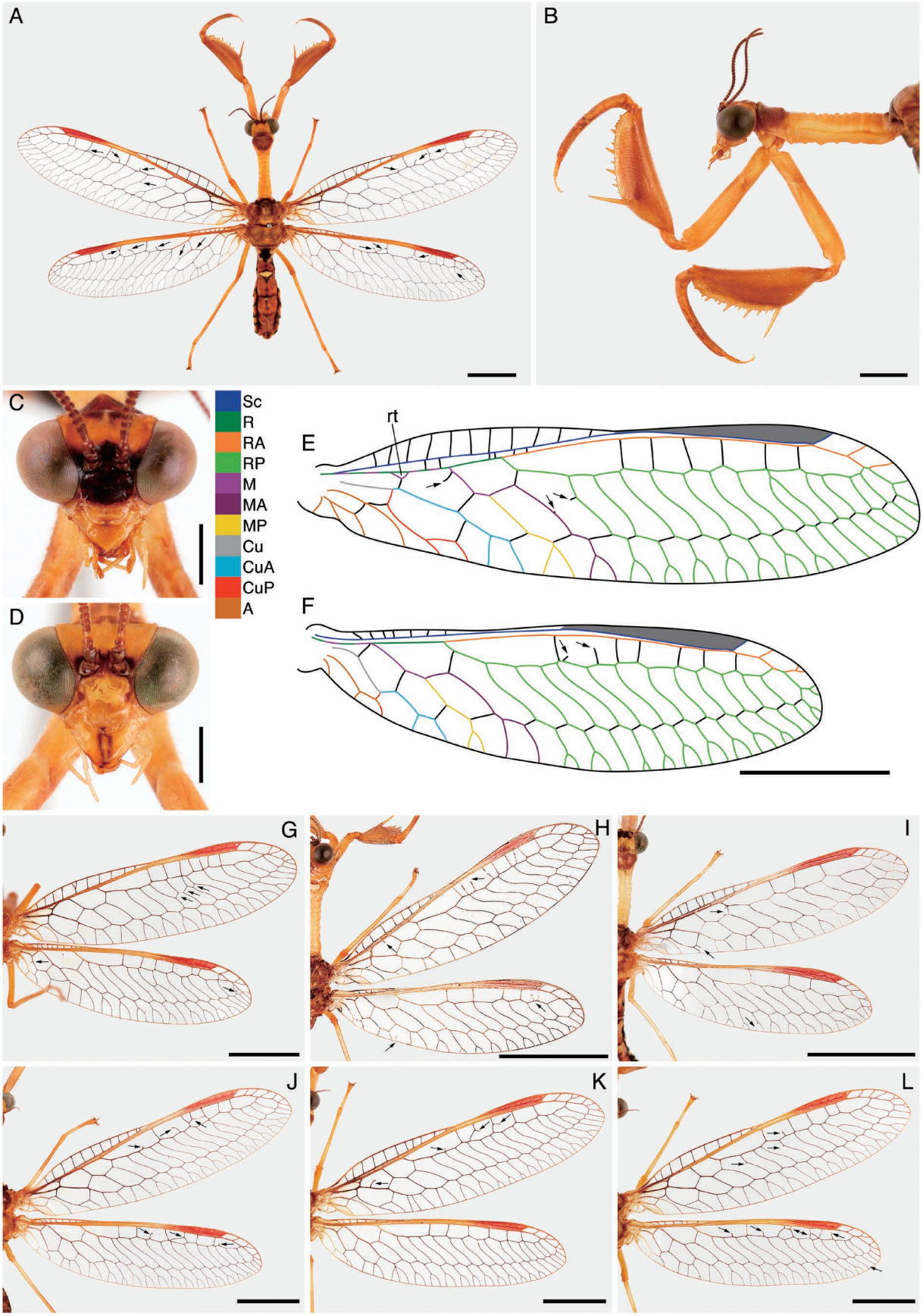

Fig. 8. *Eumantispa harmandi* (Navás, 1909), MPIM-N002 (A), MPIM-N003 (B, K), MPIM-4186 (C, L), MPIM-N004 (D, J), MPIM-N005 (E, F), MPIM-4184 (G), MPIM-4188 (H), MPIM-N006 (I). A, Female habitus, dorsal view; B, head, prothorax and forelegs, lateral view; C, male head, frontal view; D, female head, frontal view; E, forewing venation and anomalies (short arrows); F, hind wing venation and anomalies (short arrows); G–L, variation of fore- and hind wing venation and anomalies (short arrows). Scale bars: A, E–L, 5.0 mm; B, 2.0 mm; C, D, 1.0 mm.

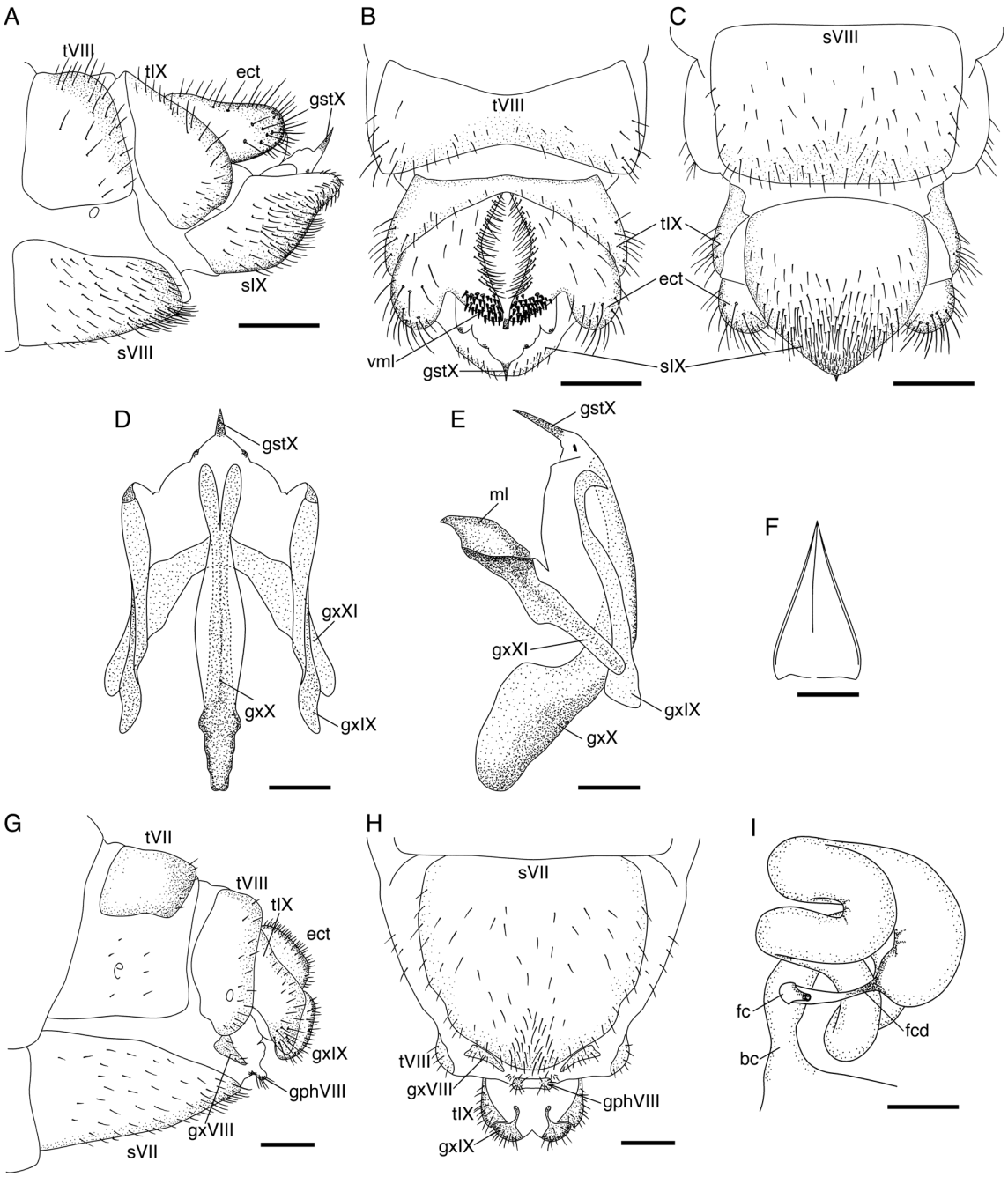

Fig. 9. Male and female terminalia of *Eumantispa harmandi* (Navás, 1909), MPIM-4186 (A–C), MPIM-4182 (D–F), MPIM-N003 (G, H), MPIM-4178 (I). A, Male terminalia, lateral view; B, ditto, dorsal view; C, ditto, ventral view; D, male genitalia, ventral view; E, ditto, left lateral view; F, hypandrium, dorsal view; G, female terminalia, lateral view; H, ditto, ventral view; I, spermatheca. Scale bars: A–C, G, H, 0.5 mm; D–F, I, 0.2 mm.

hama leg. (MPIM-4178); 1 female, 31 August 1991, Sasaritoge, Hirogawaraobana-cho, Sakyo-ku, Kyoto-shi, Kyoto, A. Yonetsu leg. (OMNH); 1 female, 21 June 1999, Aogaiyama, Toyono-cho, Osaka, M. Takahama leg. (MPIM-4183); 1 male, 15 July 1999, Aogaiyama, Toyono-cho, Osaka, M. Takahama leg. (MPIM-4182); 1 male, 15 July 1994, Kurokawa, Kawanishi-shi, Hyogo, T. Saito leg. (MPIM-4187); 1 male, 29 August 1995, Kamiakotani, Inagawa-cho, Hyogo, T. Saito leg. (MPIM-N006); 1 female, 28 August 1997, same locality, M. Takahama leg. (MPIM-N002); 1 male, 22 August 1995, Hyonosen, Yabu-shi, Hyogo, T. Saito leg. (MPIM); 1 male, 1 female, 19–20 August 1983, Odaigahara, Kamikitayama-mura, Nara, M. Takahama leg. (MPIM-4181, N003); 3 females, 9 August 1969, Dogoyama, Shobara-shi, Hiroshima, M. Takahama leg. (MPIM-4184, 4185, 4190); 1 male, 19 August 1996, Azumayama, Shobara-shi, Hiroshima, T. Saito leg. (MPIM). **Shikoku:** 1 female, 26 August 1993, Koutsusan, Yoshinogawa-shi, Tokushima, O. Tominaga leg. (OMNH); 1 male, 1 female, 29 July 1995, Daisenzan, Mannou-cho, Kagawa, O. Tominaga leg. (OMNH); 1 male, 24 August 1993, Tounaru, Dozanmine, Niihama-shi, Ehime, O. Tominaga leg. (OMNH); 1 female, 25 August 1993, same locality and collector (OMNH); 1 male,

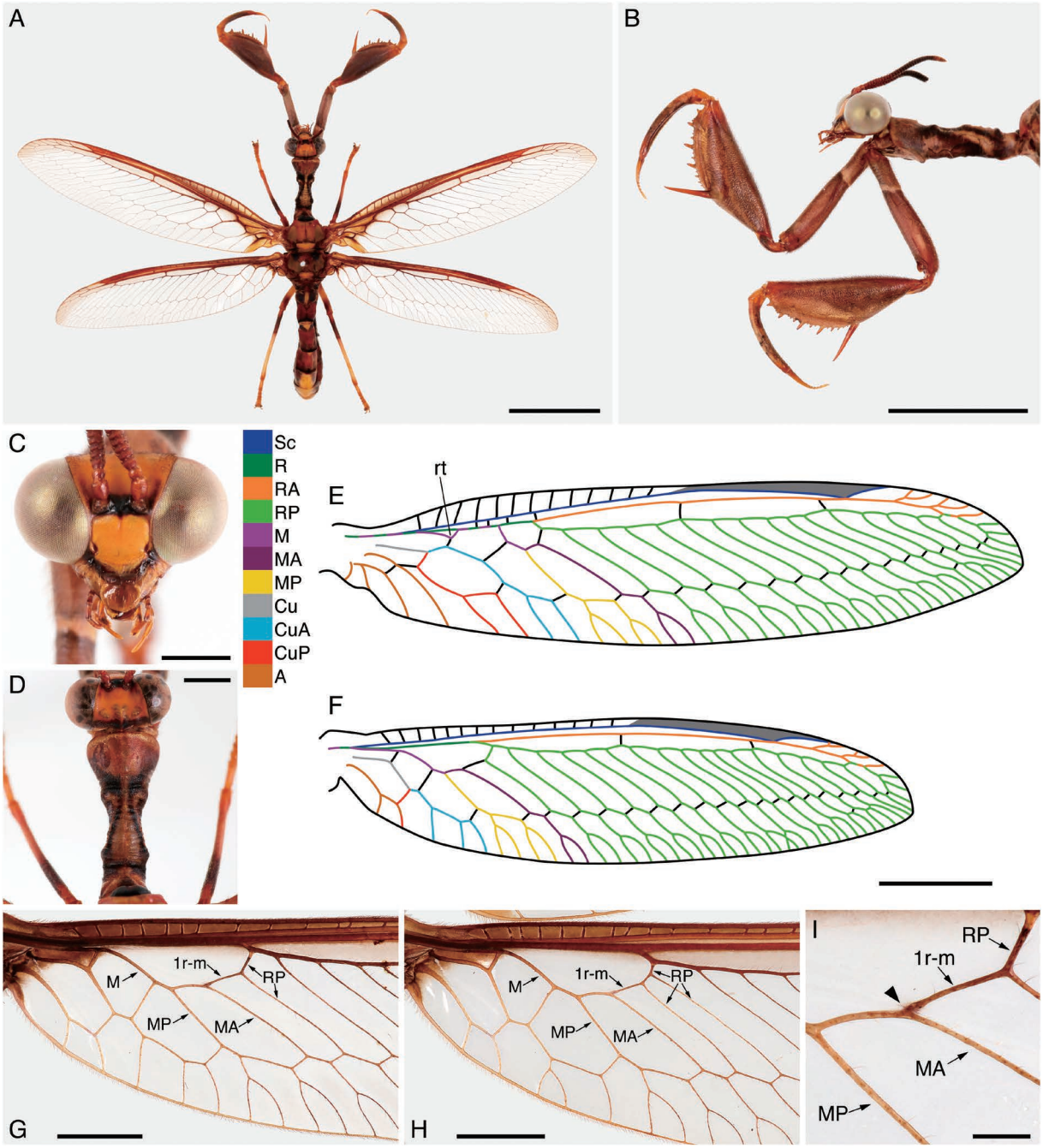

Fig. 10. *Tuberonotha strenua* (Gerstaecker, 1894), OMNH-N000009468 (A, D–F), OMNH-N000009469 (B, C), MPIM-HN-002 (G, I), MPIM-HN-003 (H). A, Female habitus, dorsal view; B, head, prothorax, and forelegs, lateral view; C, head, frontal view; D, head and pronotum, dorsal view; E, forewing venation; F, hind wing venation; G, details of hind wing M and RP venation; H, ditto; I, details of MA and 1r-m connection. Scale bars: A, 10.0 mm; B, E, F, 5.0 mm; C, 1.0 mm; D, G, H, 2.0 mm; I, 0.5 mm.

24 August 1993, Kanpuzan-tunnel, Ino-cho, Kochi, O. Tominaga leg. (OMNH). **Kyushu:** 1 female, 15 September 1977, Toishibuchi, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, O. Tominaga leg. (OMNH); 1 female, 17 September 1977, Kamisaka, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, I. Hiura leg. (OMNH); 2 males, 4 June 1983, Mokkokuyama, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, T. Saito leg. (MPIM).

Redescription. *Head.* Labrum and clypeus pale yellow. Frons with black or blackish brown in males (Fig. 8C) or pale yellow in females (Fig. 8D). Vertex generally yellow except one black or blackish brown spot near base of antenna in males (Fig. 8C) or one brown stripe in females (Fig. 8D) and rhombus brown spot at posterior margin. Antennae: scape and pedicel dark brown, flagellum brown with 28–36 articles covered with short setae.

Thorax. Prothorax 3.5–5.6 mm long in males, 4.1–6.8 mm long in females, elongate, generally yellow except brown spot at anterior broad section, posterior tubular section wrinkled with about 10 grooves. Mesonotum with prescutum dark brown, scutum dark brown to brown except yellow middle region, scutellum yellow. Metanotum generally

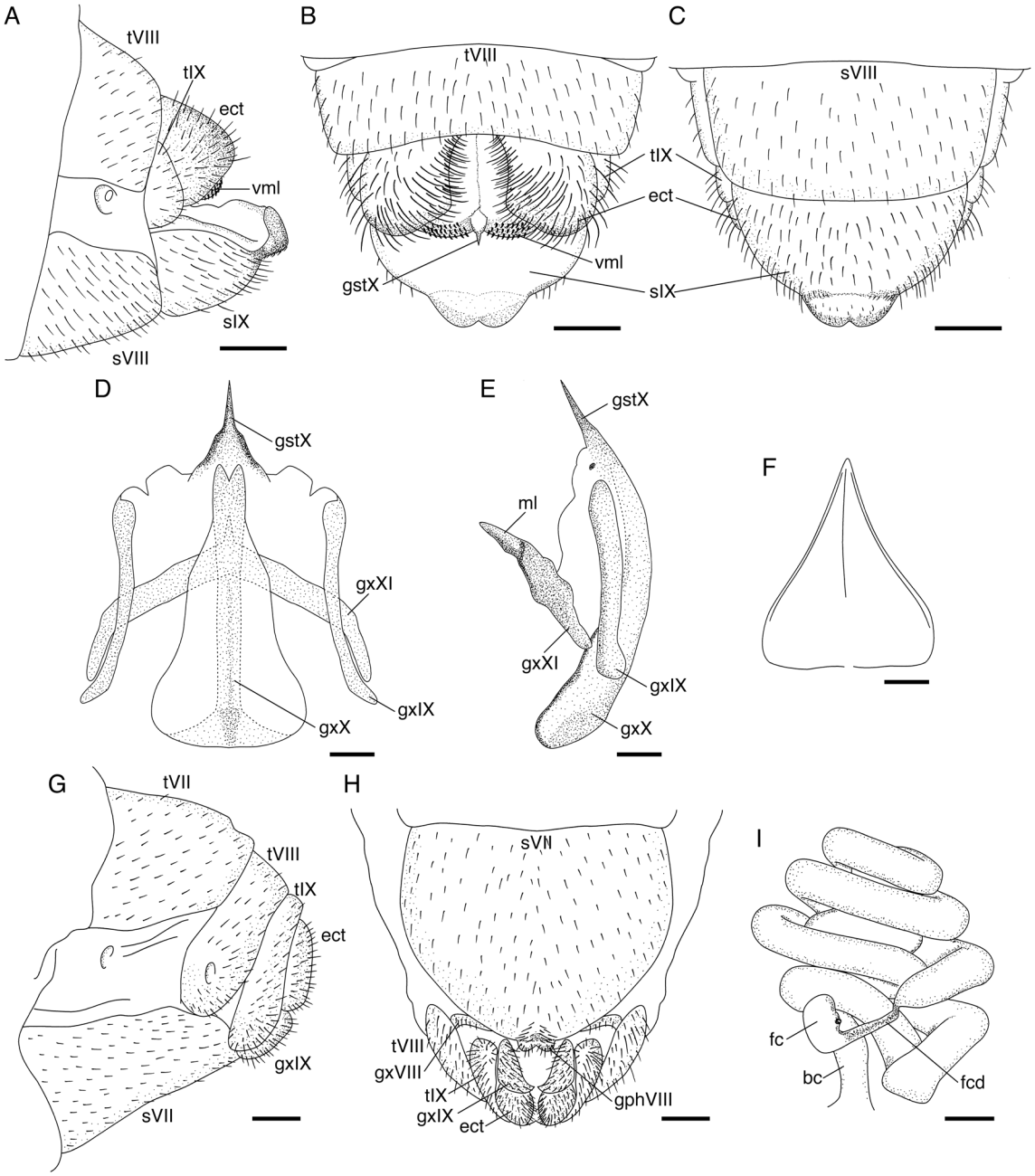

Fig. 11. Male and female terminalia of *Tuberonotha strenua* (Gerstaecker, 1894). OMNH-N000009470 (A–C), OMNH-N000009471 (D–F), OMNH-N000009468 (G–I). A, Male terminalia, lateral view; B, ditto, dorsal view; C, ditto, ventral view; D, male genitalia, ventral view; E, ditto, left lateral view; F, hypandrium, dorsal view; G, female terminalia, lateral view; H, ditto, ventral view; I, spermatheca. Scale bars: A–C, G, H, 0.5 mm; D–F, I, 0.2 mm.

brown except yellow middle region.

Legs. Foreleg: coxa yellow or dark yellow, trochanter pale brown, femur to tarsus generally pale brown. Yellow femoral major process at proximal one-third of femur length, yellow posteroventral row of processes present on distal two-thirds of femur length. Mid- and hindlegs: yellow to dark yellow, tarsal claws with four to six apical teeth, arolium present.

Wings. Forewing 13.0–21.0 mm long in males, 15.2–25.0 mm long in females, elongate, membrane hyaline, venation brown. Pterostigma dark orange. Radius Anterior (RA) and Radius Posterior (RP) veins partly fused at wing apex (Fig. 8E). Media (M) and Radius (R) veins fused along approximately basal one-fifth of wing length and M vein posteriorly retracted to Cubitus Anterior (CuA), forming radial triangle (rt) (Fig. 8E). Anterior radial cells (rarps) subdivided into four to eight cells (Fig. 8A, E, G–L). Hind wing 11.0–17.6 mm long in males, 13.0–21.2 mm long in females, elongate, membrane hyaline, venation brown. Pterostigma dark orange. RA and RP veins partly fused at wing apex (Fig. 8F). Anterior radial cells (rarps) subdivided into four to eight cells (Fig. 8A, F–L). Cubitus Posterior (CuP) and First anal vein (A1) partly fused at distal portion (Fig. 8F). Many venational abnormalities (anomalies) are found on both fore- and hind wings (Fig. 8A, E–L, indicated small arrows).

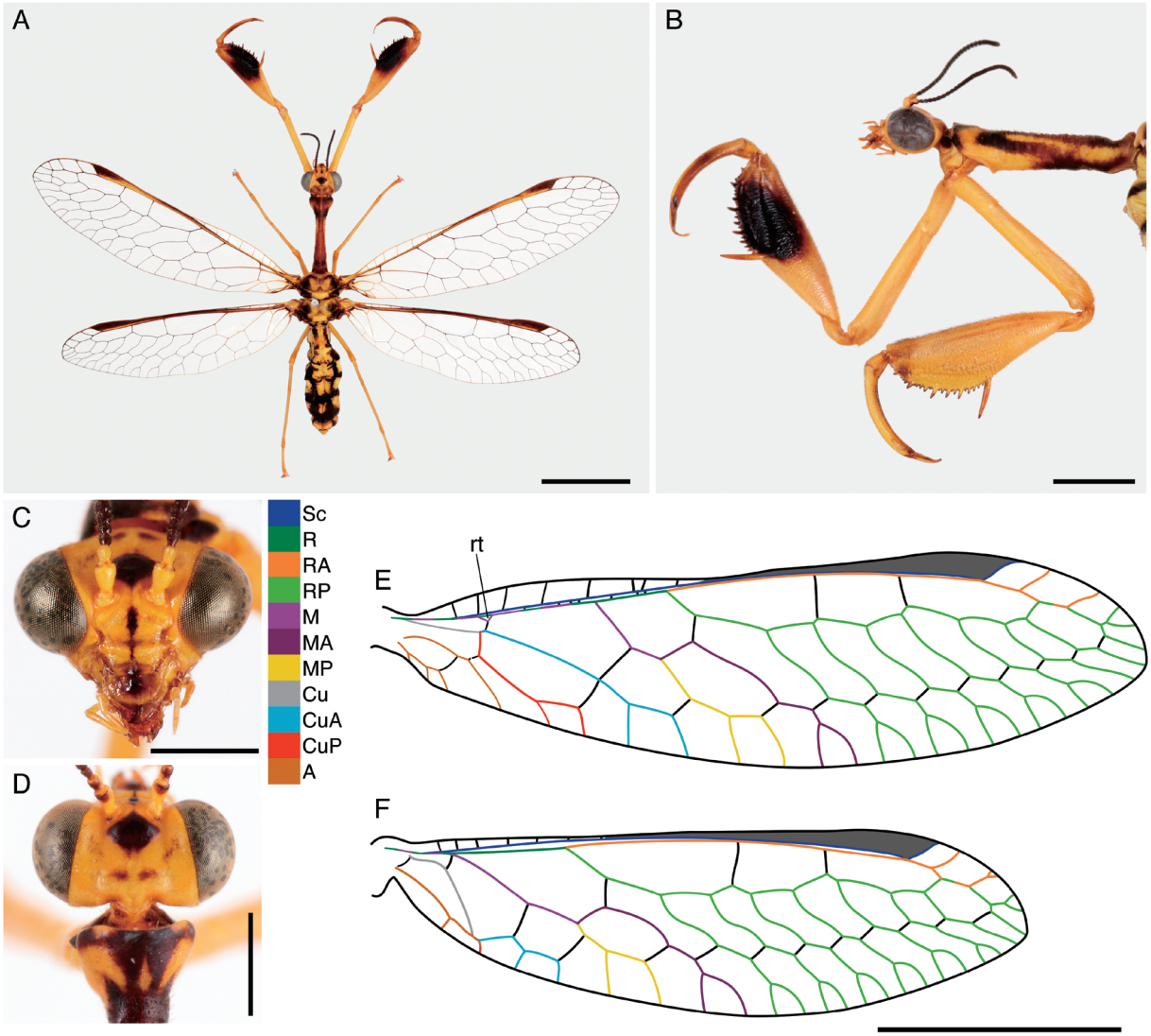

Fig. 12. *Necyla shirozui* (Nakahara, 1961), MPIM-HN-004 (A, E, F), MPIM-HN-005 (B), MPIM-4173 (C, D). A, Female habitus, dorsal view; B, head, prothorax and forelegs, lateral view; C, head, frontal view; D, head and pronotum, dorsal view; E, forewing venation; F, hind wing venation. Scale bars: A, E, F, 5.0 mm; B, 2.0 mm; C, D, 1.0 mm.

Abdomen. Tergite I yellow to dark brown. Anterotergite of tergite II generally dark brown, posterotergite generally orange with one black stripe near posterior margin and yellow at posterior margin. Tergites III and IV generally orange with yellow spot and an inverted triangular black stripe at anterior margin. Tergites V to VIII entirely orange. Sternites I and II entirely yellow. Sternites III to VII yellow with one black transverse stripe at posterior margin.

Male terminalia (Fig. 9A–F). Ectoproct slightly elongate, and covered with long fine setae. Ventromedial lobe directed medially, with short and thick setae. Sternite IX subpentagonal, apex broadly rounded in ventral view, covered with fine setae. Gonostyli X sclerotised, long and thin, spine-like apex, with a pair of small sclerites at base of gonostyli X membrane. Gonocoxites X with obviously forked apex. Median lobe of gonocoxites XI slightly acuminate. Hypandrium internum elongate, triangular in dorsal view.

Female terminalia (Fig. 9G–I). Gonocoxites VIII narrow, elongate, and slightly curved and triangular, setose. Gonapophyses VIII small and slightly protruding, setose. Ectoproct ellipsoid, covered with thin setae. Gonocoxites IX ellipsoid, covered with thin setae. Spermatheca coiled, base of fertilisation canal duct narrow and straight.

Distribution. JAPAN: Honshu, Shikoku, Kyushu; FAR EAST RUSSIA; SOUTH KOREA; P. R. CHINA.

Comments. Yang and Liu (2010) provided illustrations of the male genitalia and female spermatheca of *E. harmandi* (Yang and Liu 2010: figs 7–9). However, the morphological characteristics of gonocoxites X and XI within the male genitalia differ from the figures presented in this study (Fig. 9A–G). Given that the type locality of this species is Japan, our redescription based on the Japanese specimens of *E. harmandi* suggests that the Chinese specimens redescribed by Yang and Liu (2010) may represent an undescribed species.

Genus ***Tuberonotha*** Handschin, 1961

Tuberonotha Handschin, 1961: 282.

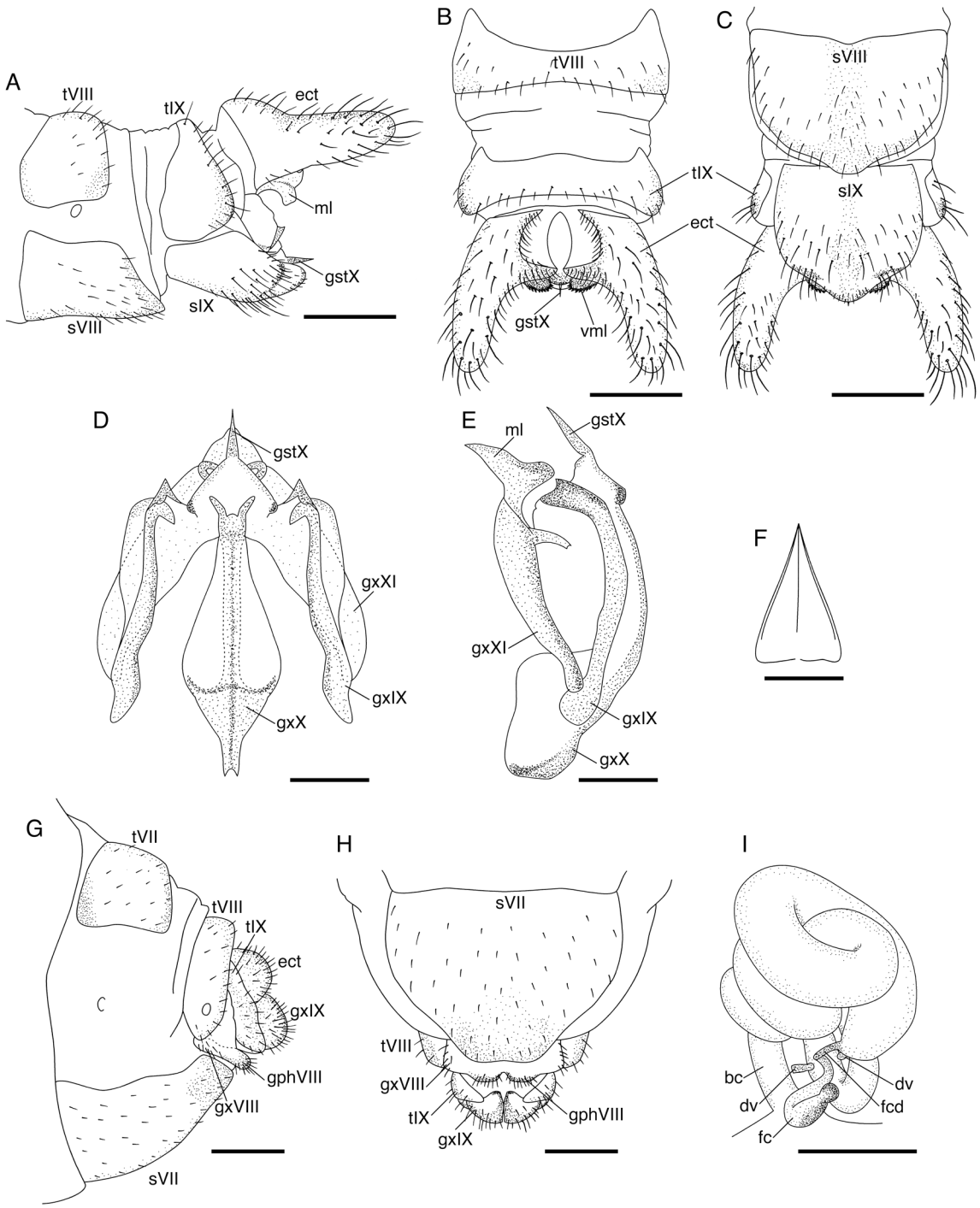

Fig. 13. Male and female terminalia of *Necyla shirozui* (Nakahara, 1961), MPIM-4173 (A–C), MPIM-N007 (D–F), MPIM-4167 (I), MPIM-HN-004 (G, H), MPIM-4167 (I). A, Male terminalia, lateral view; B, ditto, dorsal view; C, ditto, ventral view; D, male genitalia, ventral view; E, ditto, left lateral view; F, hypandrium, dorsal view; G, female terminalia, lateral view; H, ditto, ventral view; I, spermatheca. Scale bars: A–C, G, H, 0.5 mm; D–F, I, 0.2 mm.

Type species. *Mantispa strenua* Gerstaecker, 1894, by original designation.

Diagnosis [modified from Snyman et al. (2018)]. *Tuberonotha* can be distinguished from all other Oriental and Palaearctic mantispid genera by the following combination of characters: pronotum conspicuous irregularly rugose, distinct constriction posterior to maculae followed by the prominent dorsal hump on midzone.

Tuberonotha strenua (Gerstaecker, 1894)
[Japanese name: Oo-kamakirimodoki]
(Figs 1D, 10, 11)

Mantispa strenua Gerstaecker, 1894: 150 [type locality: Java occidentalis (Indonesia)].

Mantispa magna Miyake, 1910: 214, pl. 12, fig. 3, 3a–c [type locality: Fukuokaken, Kiushu and Soeda, Fukuokaken, Kiushu (Japan)].

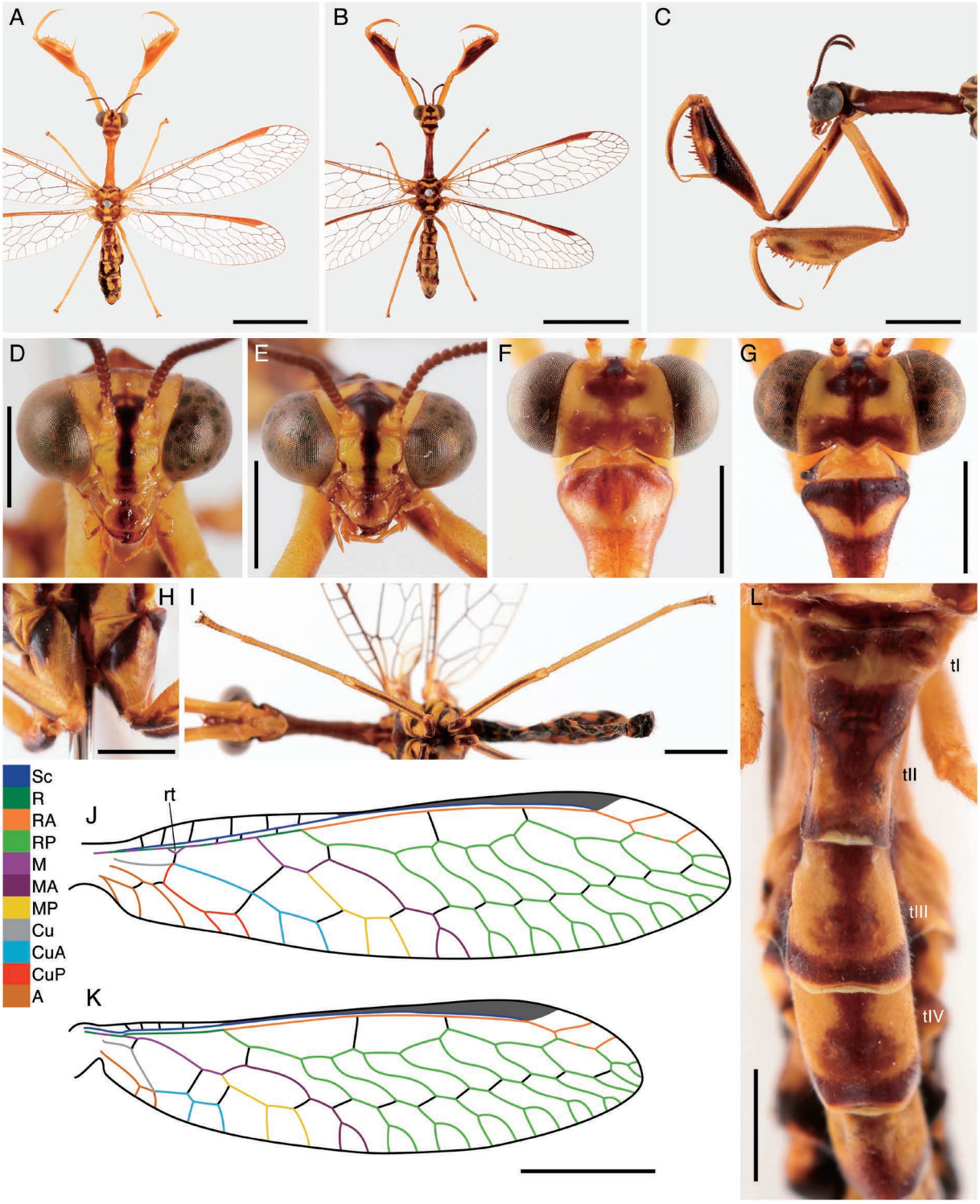

Fig. 14. *Mantispilla japonica* (McLachlan, 1875), MPIM-N008 (A, F), MPIM-4155 (B, G), MPIM-HN-006 (C), MPIM-4153 (D), MPIM-4154 (E), MPIM-HN-010 (H, I), MPIM-HN-007 (J, K), MPIM-N009 (L). A, Habitus of the pale brown female specimen, dorsal view; B, habitus of the brown female specimen, dorsal view; C, head, prothorax and forelegs, lateral view; D, head of the pale brown specimen, frontal view; E, head of the brown specimen, frontal view; F, head and pronotum of the pale brown specimen, dorsal view; G, head and pronotum of the brown specimen, dorsal view; H, coxa of mid and hind legs, left lateral view; I, mid and hind legs, ventral view; J, forewing venation; K, hind wing venation; L, tergites, dorsal view. Scale bars: A, B, 5.0 mm; C, I–K, 2.0 mm; D–H, L, 1.0 mm.

Material examined. **Shikoku:** 1 male, 24 September 2023, Kaminojiri, Kumakogen-cho, Ehime, K. Yasuda leg. (MPIM); 1 male, 12 October 2018, Nishidani, Niyodogawa-cho, Kochi, M. Mori leg. (MPIM-HN-002); 1 male, 15 August 2020, Befukyo, Monobe-cho, Kami-shi, Kochi, T. Befu leg. (OMNH-N000009469); 1 female, 19 September 2020, Kuroson, Shimanto-shi, Kochi, T. Befu leg. (OMNH-N000009468). **Kyushu:** 1 female, 16 August 1954, Hikosan, Soeda-machi,

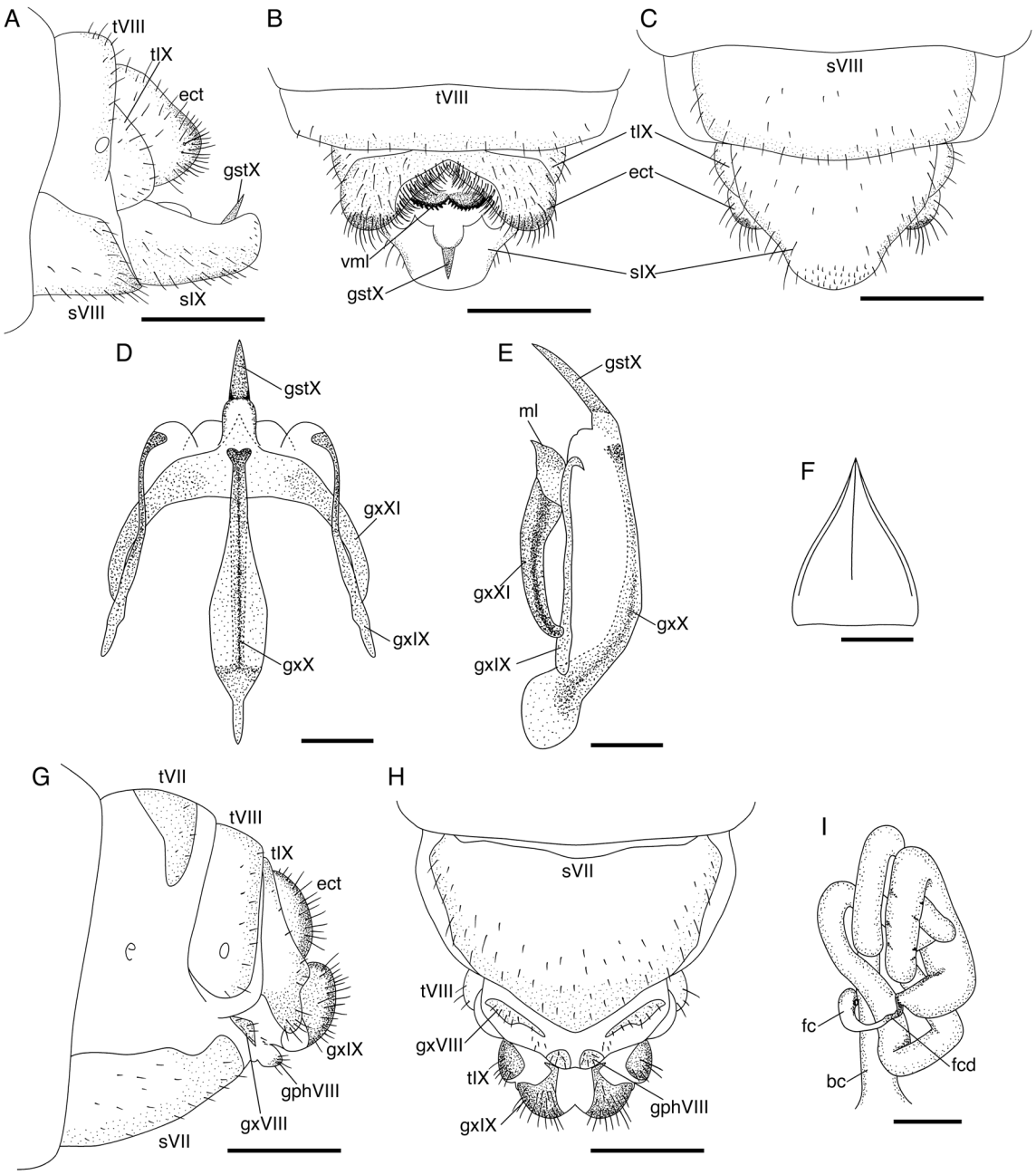

Fig. 15. Male and female terminalia of *Mantispilla japonica* (McLachlan, 1875), MPIM-HN-006 (A–C), MPIM-HN-007 (D–F), MPIM-HN-008 (G, H), MPIM-HN-009 (I). A, Male terminalia, lateral view; B, ditto, dorsal view; C, ditto, ventral view; D, male genitalia, ventral view; E, ditto, left lateral view; F, hypandrium, dorsal view; G, female terminalia, lateral view; H, ditto, ventral view; I, spermatheca. Scale bars: A–C, G, H, 0.5 mm; D–F, I, 0.2 mm.

Fukuoka, C. Okuma leg. (OMNH-N000009470); 1 male, 19 September 1968, Akama, Munakata-shi, Fukuoka, M. Kuramoto leg. (OMNH-N000009470); 1 male, 13 September 1969, same locality and collector (OMNH-N000009471); 2 females, 11 September 2020, Taradake, Tara-cho, Saga, K. Tatsuta leg (MPIM); 1 male, 23 September 2019, Koumu, Kishikumachi, Goto-shi, Nagasaki, K. Chiyoda leg. (KC-20190923); 1 male, 19 August 2009, Oike, Kurodake, Yufu-shi, Oita, M. Mori leg. (MPIM-HN-003).

Redescription. *Head.* Labrum pale brown to dark yellow. Clypeus black. Frons yellow. Vertex generally pale brown to brown except black stripes near base of antenna and at posterior margin of vertex (Fig. 10C, D). Antennae: all segments generally brown except some flagellomeres orange at apex, flagellum with 32–37 articles.

Thorax. Prothorax 5.0–6.1 mm long in males, 5.8–7.4 mm long in females, irregularly wrinkled. Pronotum irregularly rugose in dorsal view, generally brown to blackish brown with pale brown diagonal lines on both posterior half sides and with pale brown elongate triangular spot on posterior half in dorsal view (Fig. 10B, D). Meso- and metanotum generally brown except yellow scutellum.

Legs. Foreleg: entirely dark brown, with pale brown stripe at proximal one-quarter of coxa (Fig. 10B). Dark brown

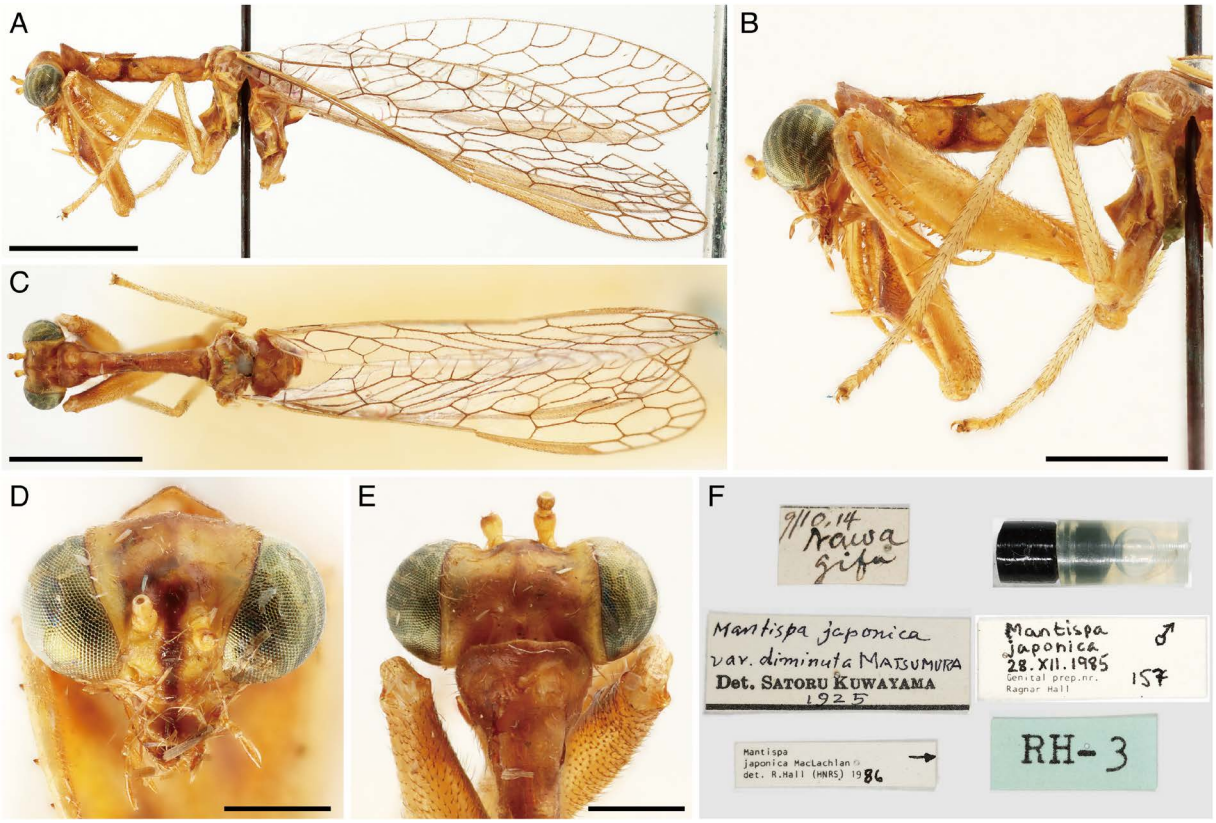

Fig. 16. Identified specimen as *Mantispa japonica diminuta* Matsumura, 1907, SEHU-RH-3. A, Habitus, lateral view; B, head, prothorax and forelegs, lateral view; C, habitus, dorsal view; D, head, frontal view; E, head and pronotum, dorsal view; F, labels. Scale bars: A, C, 2.0 mm; B, 1.0 mm; D, E, 0.5 mm.

femoral major process at proximal two-fifths of femur length, dark brown posteroventral row of processes present on distal three-fifths of femur length. Midleg: femur dark brown, tibia proximal one-third dark brown and rest pale brown, tarsus pale brown, pretarsal claws with five to six apical teeth, arolium present. Hindleg: femur pale milky yellow except dark brown at proximal and distal region, tibia dark brown at proximal one-third and rest pale milky yellow with brownish marking at distal region, tarsus brown, pretarsal claws with five to six apical teeth, arolium present.

Wings. Forewing 20.5–27.5 mm long in males, 22.5–31.4 mm long in females, elongate, generally hyaline with wing base, costal to subcostal area, and apical region pale brown, venation brown. Pterostigma brown. Radius Anterior (RA) and Radius Posterior (RP) veins partly fused at wing apex (Fig. 9E). Media (M) and Radius (R) veins fused along approximately basal one-quarter of wing length and M vein posteriorly retracted to Cubitus Anterior (CuA), forming radial triangle (rt) (Fig. 10E). Hind wing 18.5–24.5 mm long in males, 20.8–27.0 mm long in females, elongate, generally hyaline with wing base, costal to subcostal area, and apical region pale brown, venation brown. Pterostigma dark brown. RA and RP veins partly fused at wing apex. Proximal r-m crossvein (1r-m) present between most proximal branch of RPs and Media Anterior (MA) (Fig. 10F–I). Some specimens most proximal RP branch further (Fig. 10H). Slightly gap present at connection of MA and 1r-m (Fig. 10I, indicated arrowhead). Cubitus Posterior (CuP) and First anal vein (A1) partly fused at distal portion (Fig. 10F).

Abdomen. Tergite I generally blackish brown. Anterotergite of tergite II generally blackish brown with a longitudinal yellow stripe at middle in dorsal view, posterotergite generally dark brown with one transverse black stripe near posterior margin and yellow at posterior margin. Tergites III and IV generally dark brown with an inverted triangular yellow spot. Tergites V to VIII with yellow spot at middle in dorsal view and blackish brown on both sides. All sternites generally blackish brown except sternite II with a yellow stripe at posterior margin.

Male terminalia (Fig. 11A–F). Ectoproct ellipsoid, covered with fine setae. Ventromedial lobe directed medially, with short and thick setae. Sternite IX semicircular, apex broadly projected and slightly concave at centre in ventral view, covered with fine setae. Gonostyli X sclerotised, long and thin, spine-like apex, with a pair of small sclerites at base of gonostyli X membrane. Gonocoxites X broad with a notch at apex in ventral view. Median lobe of gonocoxites XI acuminate. Hypandrium internum triangular with two slightly concave sides in dorsal view.

Female terminalia (Fig. 11G–I). Gonocoxites VIII narrow, elongate, setose. Gonapophyses VIII small, slightly protruding, setose. Ectoproct ellipsoid, covered with thin setae. Gonocoxites IX ellipsoid, covered with thin setae. Spermatheca strongly coiled, base of fertilisation canal duct narrow.

Distribution. JAPAN: Shikoku, Kyushu; PHILIPPINES;

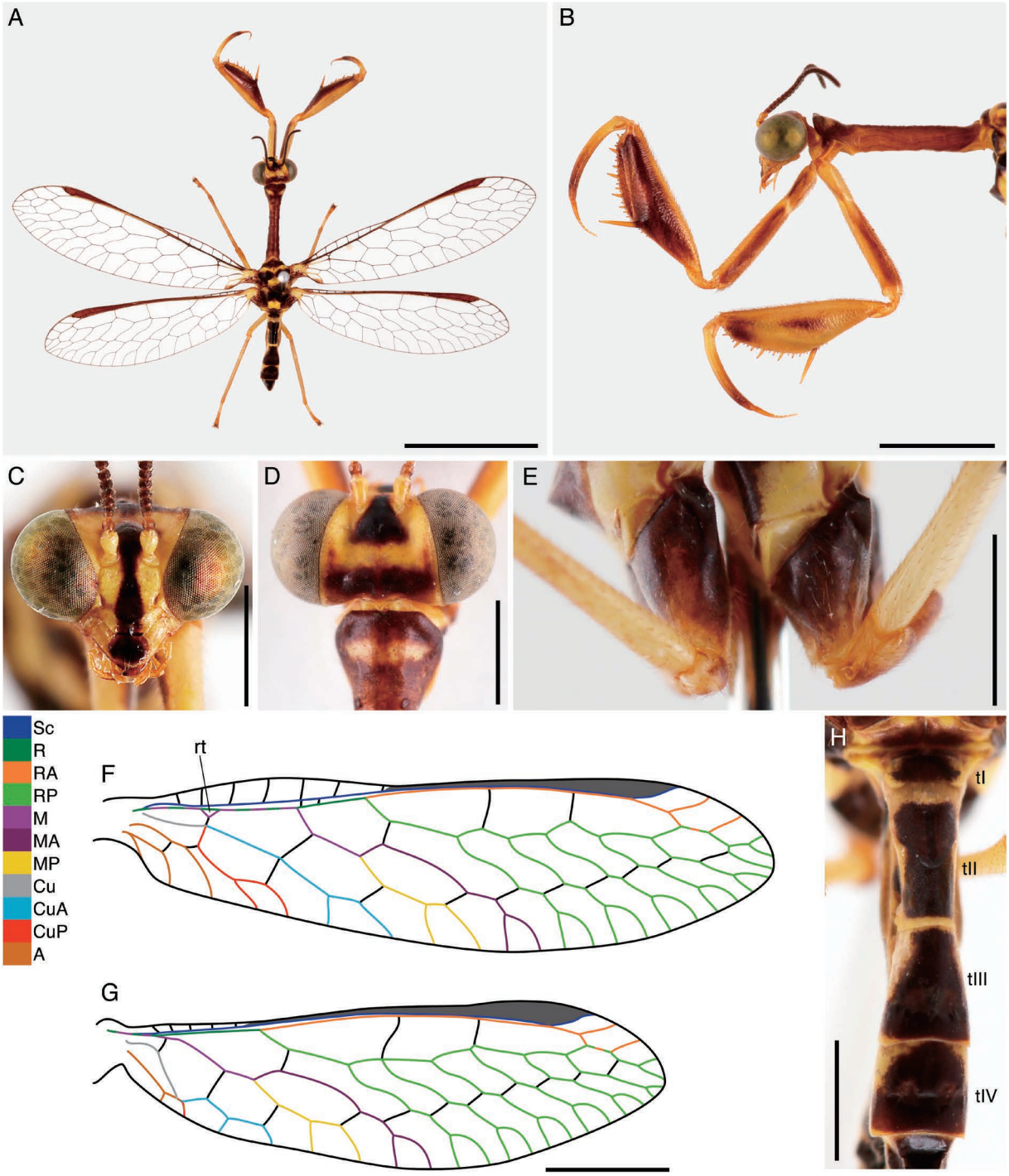

Fig. 17. *Mantispilla transversa* Stitz, 1913, MPIM-N010 (A, E, H), MPIM-4194 (B), MPIM-4205 (C), MPIM-4207 (D), MPIM-4209 (F, G). A, Female habitus, dorsal view; B, head, prothorax and forelegs, lateral view; C, head, frontal view; D, head and pronotum, dorsal view; E, coxa of mid and hind legs, left lateral view; F forewing venation; G, hind wing venation; H, tergites, dorsal view. Scale bars: A, 5.0 mm; B, F, G, 2.0 mm; C–E, H, 1.0 mm.

INDONESIA; NEW GUINEA; AUSTRALIA.

Genus ***Necyla*** Navás, 1913

Necyla Navás, 1913: 280 (incorrect original spelling as *Nicyla*).

Orientispa Poivré, 1984: 27 (type species: *Cercomantispa shirozui* Nakahara, 1961, by original designation).

Type species. *Necyla exigua* Navás, 1913 (as *Nicyla* [sic] *exigua*), by original designation.

Diagnosis [modified from Snyman et al. (2018)]. *Necyla* can be distinguished from all other Oriental and Palaearctic mantispid genera by the following combination of characters: pronotum bearing setae, a simple or unmodified pterostigma, and A1 in the hind wing forked and fused with CuA for a significant distance distal to the fork.

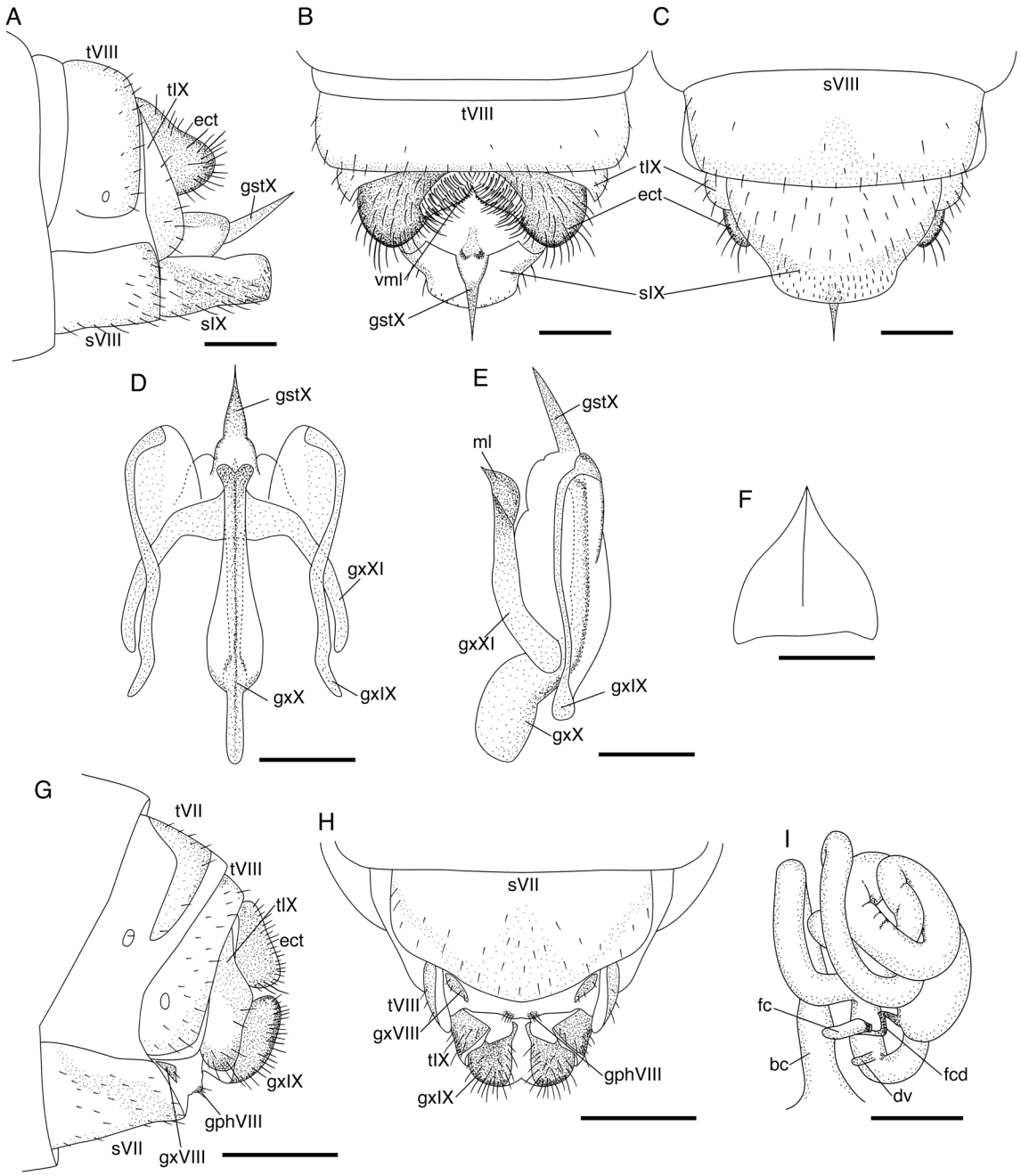

Fig. 18. Male and female terminalia of *Mantispilla transversa* Stitz, 1913, MPIM-4196 (A–C), MPIM-4200 (D–F), MPIM-4209 (G, H), MPIM-4208 (I). A, Male terminalia, lateral view; B, ditto, dorsal view; C, ditto, ventral view; D, male genitalia, ventral view; E, ditto, left lateral view; F, hypandrium, dorsal view; G, female terminalia, lateral view; H, ditto, ventral view; I, spermatheca. Scale bars: A–C, G, H, 0.5 mm; D–F, I, 0.2 mm.

Necyla shirozui (Nakahara, 1961)
[Japanese name: Tsushima-kamakirimodoki]
(Figs 12, 13)

Cercomantispa shirozui Nakahara, 1961: 63, figs 1–9 [type locality: Kamizaka-Shiratake, Tsushima (Japan)].

Material examined. **Kyushu:** 1 female, 18 August 1968, Ariakeyama, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, I. Hiura leg. (OMNH); 1 male, same date and locality, K. Tani leg. (OMNH); 1 male, 5–7 August 1975, Tsushima Is., Nagasaki, Y. Miyatake leg. (OMNH); 1 male, 23 May 1976, Izuharajoshi, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, I. Hiura leg. (OMNH); 1 female, 23 May 1976, Shimizuyama, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, I. Hiura leg. (OMNH); 1 female, 15 September 1977, Mitsushima-machi, Tsushima-shi, Tsushima Is., Nagasaki, O. Tominaga leg. (OMNH); 1 female, 16 September 1977, Komoda, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, I. Hiura leg. (OMNH); 2 males, 4 June 1983, Azamo, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, T. Saito leg. (MPIM-4173, N007); 2 females, 4 June 1983, Mokkokuyama, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, T. Saito leg. (MPIM); 1 female, 6

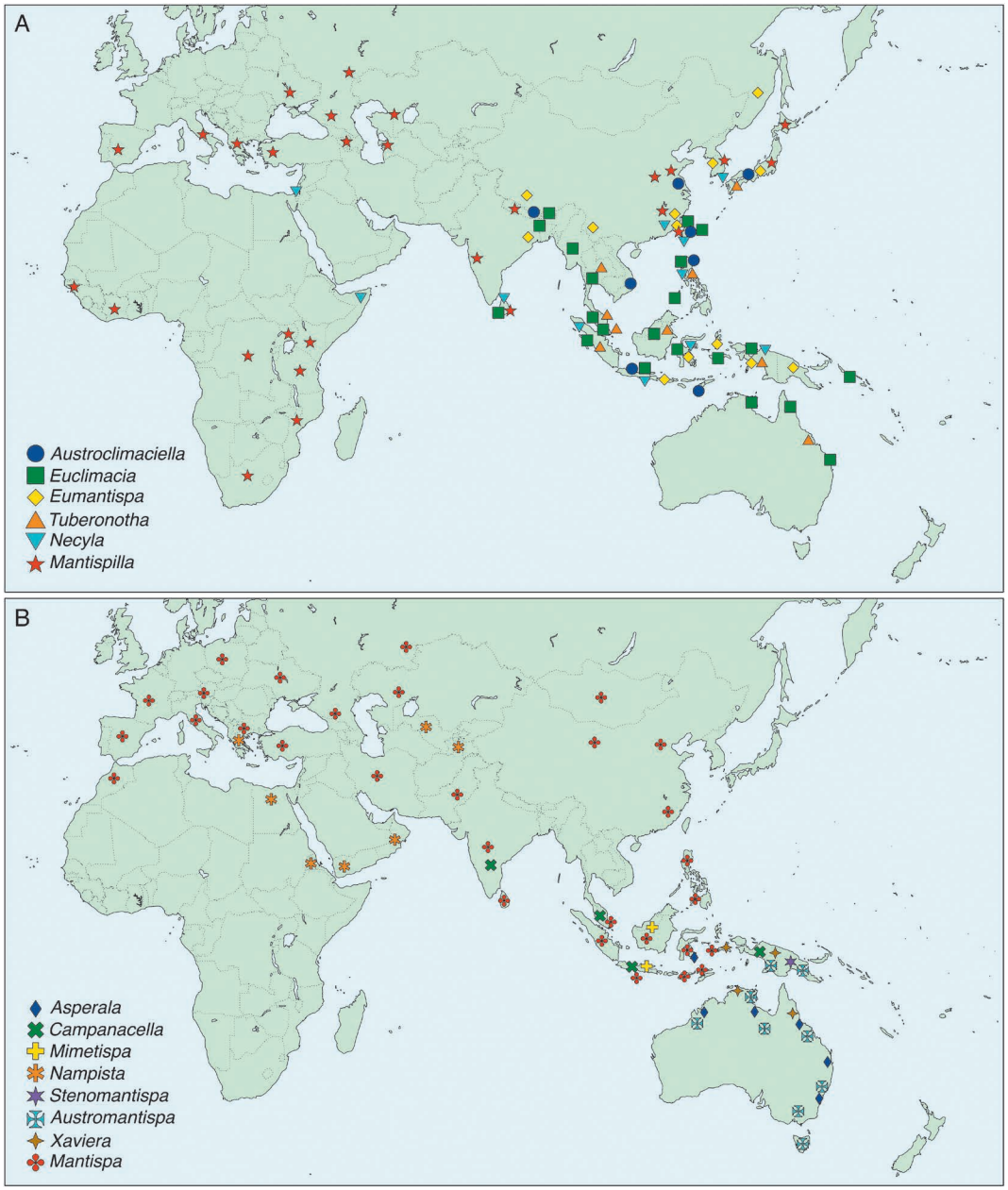

Fig. 19. Distribution map of mantispine genera in the Oriental and Palaearctic regions. A, Six genera also distributed in Japan; B, eight genera not distributed in Japan. The distribution of the genus *Mantispa* in the Afrotropical region is doubtful and is therefore omitted (Snyman et al. 2012, 2018). Distribution data taken from Snyman et al. (2018).

June 1983, Kamisaka, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, T. Saito leg. (MPIM-4167); 1 male, 2 June 1996, Sagohigashisato, Kamiagata-machi, Tsushima-shi, Tsushima Is., Nagasaki, R. Matsumoto leg. (OMNH); 1 male, 24 July 1997, Tendohoshihokora, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, O. Tominaga leg. (OMNH); 1 male, 24 July 1997, Sumo, Mitsushima-machi, Tsushima-shi, Tsushima Is., Nagasaki, O. Tominaga leg. (OMNH); 1 male, 26 July 1997, Mitake, Kamiagata-machi, Tsushima-shi, Tsushima Is., Nagasaki, O. Tominaga leg. (OMNH); 1 male, 20 June 2001, Saozaki, Kamiagata-machi, Tsushima-shi, Tsushima Is., Nagasaki, R. Matsumoto leg. (OMNH); 1 female, 20 June 2001, Unatsura, Kamiagata-machi, Tsushima-shi, Tsushima Is., Nagasaki, R. Matsumoto leg. (OMNH); 2 males, 9 August 2001, Takeshiki, Mitsushima-machi, Tsushima-shi, Tsushima Is., Nagasaki, Y. Kawakami leg. (OMNH); 2 females, 19 June 2022, Tateasan-rindo, Tsutsu, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, H. Ono leg. (MPIM-HN-004, 005).

Redescription. *Head.* Labrum brown to yellow with a black spot at middle. Clypeus and frons entirely yellow with one longitudinal black stripe. Vertex generally yellow with diamond-shaped black spot and few brown spots (Fig. 12C, D). Antennae: scape and pedicel yellow on ventral side, with brown spot on dorsal side (Fig. 12A, C, D). Flagellum black with 25–28 articles covered with short setae.

Thorax. Prothorax 2.4–4.1 mm long in males, 3.1–4.5 mm long in females, elongate, generally brown to blackish brown

with sickle-shaped yellow spot on anterior half and yellow diagonal line from middle anterior to the posterior region on both sides (Fig. 12B). Meso- and metanotum generally yellow except on lateral regions.

Legs. Foreleg: coxa and trochanter entirely yellow or dark yellow. Femur with posterior surface entirely yellow, anterior surface with proximal one-third yellow and rest blackish brown to black. Dark yellow femoral major process at middle of femur length, posteroventral row of processes with posterior surface yellow and anterior surface entirely blackish brown present on distal half of femur length (Fig. 12B). Tibia to tarsus with posterior surface entirely yellow, those of anterior surface dark yellow to brown. Mid- and hindlegs: yellow, tarsal claws with four to six apical teeth, arolium present.

Wings. Forewing 8.5–14.0 mm long in males, 9.2–16.5 mm long in females, elongate, membrane hyaline, venation generally black except dark yellow on wing base. Pterostigma yellow to dark brown. Radius Anterior (RA) and Radius Posterior (RP) veins partly fused at wing apex (Fig. 12E). Media (M) and Radius (R) fused along approximately basal one-quarter of wing length and M vein posteriorly retracted to Cubitus Anterior (CuA), forming small radial triangle (rt) (Fig. 12E). Hind wing 7.0–11.5 mm long in males, 8.5–13.5 mm long in females, elongate, membrane hyaline, venation generally black except dark yellow on wing base region. Pterostigma dark brown. RA and RP veins partly fused at wing apex (Fig. 12F). Cubitus Posterior (CuP) entirely fused with First anal vein (A1) at distal portion (Fig. 12F).

Abdomen. Tergite I generally blackish brown. Tergite II generally blackish brown or yellow with black stripes on lateral margins. Tergites III to VII yellow with black stripes at lateral and posterior margins. Tergite VIII entirely yellow. Sternite I generally yellow with black stripes on lateral and posterior margins. Sternites II to VII yellow to blackish brown with black stripes on lateral and posterior margins.

Male terminalia (Fig. 13A–F). Ectoproct elongate, finger-like shaped, covered with fine setae. Ventromedial lobe with short and thick setae. Sternite IX subpentagonal, apex rounded in ventral view, covered with fine setae. Gonostyli X sclerotised, long and thin, spine-like apex, with a pair of small sclerites at base of gonostyli X membrane. Gonocoxites X broadened at middle with two finger-like projections at apex. Median lobe of gonocoxites XI acuminate with ear-like projections on both sides. Hypandrium internum in dorsal view elongate, triangular.

Female terminalia (Fig. 13G–I). Gonocoxites VIII narrow, setose. Gonapophyses VIII slightly protruding, setose sclerite. Ectoproct ellipsoid, covered with thin setae. Gonocoxites IX ellipsoid, covered with thin setae. Spermatheca strongly coiled, base of fertilisation canal duct narrow and curved, with two diverticula (dv) present.

Distribution. JAPAN: Kyushu (Tsushima Is.).

Remarks. New (2003) mentioned that this species is distributed also in Indonesia and Sri Lanka. However, it was excluded from the distribution areas in this paper due to doubtful identifications and very distant occurrences from the type locality.

Genus ***Mantispilla*** Enderlein, 1910

Mantispilla Enderlein, 1910: 346 (as subgenus of *Mantispa* Illiger, 1798).

Sagittalata Handschin, 1959: 215 (type species: *Mantispilla hilaris* Navás, 1925, by original designation).

Perlamantispa Handschin, 1960: 191 (type species: *Mantis perla* Pallas, 1772, by original designation).

Type species. *Mantispa indica* Westwood, 1852, by original designation.

Diagnosis [modified from Snyman et al. (2018)]. *Mantispilla* can be distinguished from all other Oriental and Palaearctic mantispid genera by the following character: procoxae with longitudinal pigmented stripe on the anterolateral sides.

Mantispilla japonica (McLachlan, 1875)
[Japanese name: Hime-kamakirimodoki]
(Figs 1E, 14–16)

Mantispa japonica McLachlan, 1875: 178 [type locality: Yokohama (Japan)].

Mantispa diminuta Matsumura, 1907: 169 [type locality: Nakano, Tokyo (Japan)]. syn. rev. [N.B.: Previously synonymised once by Nakahara (1912, 1913).]

Material examined. Honshu: 1 male, 1 female, 12 August 2015, Mitakeko, Yokote-shi, Akita, S. Fujie leg. (OMNH); 1 male, 17 July 2017, Minamiakagiyama, Shibukawa-shi, Gunma, R. Matsumoto leg. (OMNH); 1 male, 21 August 1993, Kawamata, Chichibu-shi, Saitama, M. Uchida leg. (OMNH); 3 females, 17 July 1993, Kinshozan, Ogawamachi, Saitama, M. Uchida leg. (OMNH); 1 female, 15 July 1995, same locality and collector (OMNH); 1 male, 1 female, 10 September 2020, Magi, Otsuki-cho, Otuki-shi, Yamanashi, Y. Sakamoto leg. (MPIM-HN-006–9); 1 male, 10 September 1914, Gifu, Nawa leg. (SEHU-RH-3); 1 male, 23 September 2005, Okuizumi, Honkawane-cho, Shizuoka, O. Tominaga leg. (OMNH); 1 male, 20 July 1969, Odaigahara, Odai-cho, Mie, M. Takahama leg. (MPIM-4161); 1 male, 1 female, 22 July 1999, Aogaiyama, Toyono-cho, Osaka, M. Takahama leg. (MPIM-4154, 4155); 2 females, 12 August 1999, same locality and collector (MPIM-4156, 4157); 1 female, 2 October 1978, Minoh-koen, Minoh-shi, Osaka, T. Saito leg. (MPIM); 1 male, 30 June 1995, same locality and collector (MPIM); 1 female, 15 July 1999, same locality, M. Takahama leg. (MPIM-4153); 1 female, 25 July 1996, Shimotodoromi, Minoh-shi, Osaka, T. Saito leg. (MPIM-N008); 1 female, 29 August 1995, Kamiakotani, Inagawa-cho, Hyogo, T. Saito leg. (MPIM-N009); 3 males, 16 July 1996, Kamiakotani, Inagawa-cho, Hyogo, M. Takahama leg. (MPIM); 1 female, 28 August 1997, same locality and collector (MPIM); 1 male, 22 August 1995, Hyonosen, Yabu-shi, Hyogo, T. Saito leg. (MPIM); 1 female, 12 July 2023, Sugitani, Higashiyoshino-mura, Nara, K. Kagawa leg. (MPIM-HN-010); 1 male, 4 females, 14 September 1969, Oshikakei, Misasa-cho, Tottori, M. Takahama leg. (MPIM-4168–72); 1

male, 1 female, 9 August 1969, Dogoyama, Shobara-shi, Hiroshima, M. Takahama leg. (MPIM-4159, 4163). **Shikoku:** 2 males, 2 females, 30–31 July 1970, Yunoki, Otoyo-cho, Kochi, M. Takahama leg. (MPIM-4158, 4162, 4164, 4165). **Kyushu:** 1 male, 5–7 August 1975, Tsushima-shi, Tsushima Is., Nagasaki, Y. Miyatake leg. (OMNH); 1 female, 17 September 1977, Sasuna, Kamiagata-machi, Tsushima-shi, Tsushima Is., Nagasaki, O. Tominaga leg. (OMNH); 1 female, 4 June 1983, Mokkokuyama, Izuhara-machi, Tsushima-shi, Tsushima Is., Nagasaki, T. Saito leg. (MPIM-4152); 1 female, 27 May 2003, Inokodani, Kobayashi-shi, Miyazaki, R. Matsumoto leg. (OMNH). **Nansei Islands:** 1 male, 2 females, 7 July 2019, Nanatsuyama, Nakanoshima Is., Tokara Isls., Kagoshima, H. Ono leg. (MPIM); 1 male, 10 September 2023, Nazeuragami-cho, Amami-shi, Amamioshima Is., Kagoshima, K. Matsuhira leg. (KGPM); 1 male, 18 September 2023, same locality and collector (KGPM); 1 female, 21 September 2023, same locality and collector (KGPM); 1 male, 23 September 2023, same locality and collector (KGPM), see Matsuhira (2023).

Redescription. Body colour varies from pale brown to brown (Fig. 14A, B).

Head. Generally yellow with one longitudinal dark brown stripe on labrum to vertex (Fig. 14D, E) and brown spot at posterior margin of vertex (Fig. 14F, G). Antennae: scape and pedicel yellow. Flagellum dark brown with 22–26 articles covered with short setae.

Thorax. Prothorax 2.3–4.0 mm long in males, 2.9–4.5 mm long in females, elongate, entirely pale brown to brown with one or two yellow spot(s) at anterior broad section. Meso- and metanotum generally brown except yellow region at anterior region of sctum and yellow scutellum.

Legs. Foreleg: coxa in posterior surface generally yellow with longitudinal brown stripe from distal half to one-third, anterior surface generally yellow with longitudinal brown stripe (Fig. 14C). Femur in posterior surface generally yellow with few brown spots, anterior surface entirely dark brown except pale spot at ventromedial region. Dark yellow femoral major process at proximal two-fifths of femur length, dark yellow posteroventral row of processes present on distal three-fifths of femur length (Fig. 14A–C). Tibia generally yellow, gradually brown towards apex. Tarsus dark yellow to brown. Mid- and hindlegs: coxa generally dark yellow except brown spots at proximal region (Fig. 14H). Trochanter brown. Femur generally dark yellow with longitudinal brown stripe on ventral side (Fig. 14I). Tibia and their tarsi dark yellow, pretarsal claws with four or five apical teeth, arolium present.

Wings. Forewing 7.8–14.5 mm long in males, 8.9–17.2 mm long in females, elongate, membrane hyaline, venation generally brown except pale yellow on wing base. Pterostigma brown to dark brown. Radius Anterior (RA) and Radius Posterior (RP) veins partly fused at wing apex (Fig. 14J). Media (M) and Radius (R) veins fused along approximately basal one-quarter of wing length and M vein posteriorly retracted to Cubitus (Cu), forming small radial triangle (rt) (Fig. 14J). Hind wing 6.9–12.3 mm long in males, 7.9–15.0 mm long in females, elongate, membrane hyaline, venation generally brown to dark brown except pale yellow on wing base region. Pterostigma brown to dark brown. RA and RP veins partly fused at wing apex (Fig. 14K). Cubitus Posterior (CuP) entirely fused with First anal vein (A1) at distal portion (Fig. 14K).

Abdomen. Tergite I generally brown to blackish brown. Anterotergite of tergite II generally brown to blackish brown, posterotergite generally yellow with brown to black longitudinal stripes on medial and lateral margins. Tergites III to VIII generally yellow except brown to black stripes on midline and posterior margin (Fig. 14L). All sternites entirely brown to black or with yellow spot on middle region of sternites I to V.

Male terminalia (Fig. 15A–F). Ectoproct slightly protruding, ellipsoid, covered with fine setae. Ventromedial lobe with short and thick setae. Sternite IX subpentagonal, apex broadly rounded in ventral view, covered with fine setae. Gonostyli X sclerotised, long and thin, with spine-like apex. Gonocoxites X relatively narrow and slightly broad with small notch at apex in ventral view. Median lobe of gonocoxites XI slightly acuminate. Hypandrium internum triangular with two slightly concave sides in dorsal view.

Female terminalia (Fig. 15G–I). Gonocoxites VIII narrow, elongate, setose. Gonapophyses VIII slightly protruding, setose. Ectoproct ellipsoid, covered with thin setae. Gonocoxites IX ellipsoid, covered with thin setae. Spermatheca strongly coiled, base of fertilisation canal duct narrow and curved.

Distribution. JAPAN: Hokkaido, Honshu, Shikoku, Kyushu, Nansei Islands (Nakanoshima Is., Amamioshima Is.); FAR EAST RUSSIA; SOUTH KOREA; P. R. CHINA.

Comments. Matsumura (1907) briefly described *M. diminuta* based on body colouration and length. Miyake (1910) translated this Japanese description into English as follows: "Allied to *Mantispa japonica*, but smaller, antennae blackish fuscous, the basal part yellow; T-shaped blackish fuscous mark on the vertex, occiput dark fuscous; legs yellowish white; body length 8 mm; expanse 22 mm." However, Miyake (1910) raised concerns regarding the validity of this species based on a brief description without detailed morphological information, whereas Okamoto (1910, 1911) suggested that *M. diminuta* is a different species from *M. japonica*. In contrast, Nakahara (1912, 1913) disagreed and stated that there were no discernible morphological differences between *M. diminuta* and *M. japonica*, concluding that *M. diminuta* is synonymous with *M. japonica*. Finally, Kuwayama (1925a) identified *M. diminuta* as a subspecies of *M. japonica*, distinguishing it from *M. japonica* based on the following morphological features: "In *diminuta*, the dilated anterior portion is mostly brownish and not clearly margined with a dark brownish band, but only with the ground colour, and also licking or slightly showing the yellowish band, the size is smaller than that of the latter species [quoted from the original text of Kuwayama (1925a)]."

Unfortunately, we could not locate a type specimen for *M. diminuta*. However, we found another specimen in the collection of the Systematic Entomology, Hokkaido University, which Dr. Satoru Kuwayama identified as *M. japonica*

diminuta from Gifu Prefecture, central Honshu (Fig. 16). Notably, this specimen is characterised by a small body size and pale colour of the head and prothorax (Fig. 16A–E), similar to *M. diminuta*. Nevertheless, these minor differences are not enough to differentiate it from the type specimen as a distinct subspecies. Therefore, we propose that *M. j. diminuta* is a junior synonym of *M. japonica*.

(insertion of Figs 17, 18)

Mantispilla transversa Stitz, 1913
[Japanese name: Minami-hime-kamakirimodoki]
(Figs 1F, 17, 18)

Mantispilla transversa Stitz, 1913: 5, fig. 5 [type locality: Formosa (Taiwan)].

Material examined. Nansei Islands: 1 female, 3 May 2023, Kunigamison-shinrin-koen, Hentona, Kunigami-son, Okinawajima Is., Okinawa, T. Shinohara and N. Namai leg.; 1 ex, 16 June 2023, same locality and collector; 1 ex, 13 September 2023, same locality and collector; 1 male, 27 April 2019, Takeda, Ishigakijima Is., Okinawa, R. Matsumoto leg. (OMNH-N000009473); 1 male, 4–6 April 1995, Funaura, Iriomotejima Is., Okinawa, T. Saito leg. (MPIM-4207); 2 females, 24 July 1995, same locality and collector (MPIM-4198, 4199); 3 males, 4 females, 25 July 1995, same locality and collector (MPIM-4193–7, 4208, 4209); 2 males, 6 females, 2 July 1997, Shirahama-rindo, Iriomotejima Is., Okinawa, T. Saito leg. (MPIM-4200–6, N010); 1 male, 20 October 2017, Ohtomi, Iriomotejima Is., Okinawa, H. Ohishi leg. (OMNH).

Redescription. *Head.* Generally yellow with one longitudinal black stripe from labrum to vertex and a dark brown spot at posterior margin of vertex (Fig. 17C, D). Antennae: scape yellow, pedicel brown. Flagellum dark brown with 24–29 articles covered with short setae.

Thorax. Prothorax 2.3–3.3 mm long in males, 2.5–4.1 mm long in females, elongate, entirely brown to dark brown with one or two yellow spot(s) at anterior broad section. Meso- and metanotum generally blackish brown except yellow region at anterior margin of scutum and yellow scutellum.

Legs. Foreleg: coxa with posterior surface generally yellow with longitudinal brown stripe from distal half to one-third; anterior surface generally yellow with longitudinal brown stripe (Fig. 17B). Femur posterior surface generally yellow with few brown spots, anterior surface entirely dark brown. Yellow femoral major process at proximal two-fifths of profemur length, yellow posteroventral row of processes present on distal three-fifths of profemur length (Fig. 17B). Tibia generally yellow, gradually brown towards apex. Tarsus brown to dark brown. Mid- and hindlegs: coxa entirely dark brown (Fig. 17E). Trochanter dark yellow. Femur to their tarsi yellow to dark yellow, pretarsal claws with three or four apical teeth, arolium present.

Wings. Forewing 7.6–11.0 mm long in males, 9.0–12.6 mm long in females, elongate, membrane hyaline, venation generally dark brown except yellow on wing base. Pterostigma dark brown. Radius Anterior (RA) and Radius Posterior (RP) partly fused at wing apex (Fig. 17F). Media (M) and Radius (R) fused along approximately basal one-quarter of wing length, M vein posteriorly retracted to Cubitus (Cu), forming small radial triangle (rt) (Fig. 17F). Hind wing 6.5–9.1 mm long in males, 7.0–10.5 mm long in females, elongate, membrane hyaline, venation generally dark brown except yellow on wing base. Pterostigma dark brown. RA and RP veins partly fused at wing apex (Fig. 17G). Cubitus Posterior (CuP) entirely fused with First anal vein (A1) at distal portion (Fig. 17G).

Abdomen. Tergite I generally yellow with black spot at dorsal region. Anterotergite of tergite II generally black with yellow stripe at anterior margin, posterotergite generally black with yellow stripe at lateral margins. Tergites III to V with triangular black spot, yellow on anterior regions (Fig. 17H). Tergites VI to VIII generally yellow with black stripe at posterior margins. Sternites I and II entirely black. Sternites III to VII generally yellow with black stripe at posterior margins.

Male terminalia (Fig. 18A–F). Ectoproct slightly protruding, ellipsoid, covered with fine setae. Ventromedial lobe with short and thick setae. Sternite IX subpentagonal, apex broadly rounded in ventral view, covered with fine setae. Gonostyli X sclerotised, long and thin, with spine-like apex. Gonocoxites X relatively narrow and slightly broad with small notch at apex in ventral view. Median lobe of gonocoxites XI slightly acuminate. Hypandrium internum short, triangular with slightly concave sides in dorsal view.

Female terminalia (Fig. 18G–I). Gonocoxites VIII narrow, small, setose. Gonapophyses VIII slightly protruding, small, setose. Ectoproct ellipsoid, covered with thin setae. Gonocoxites IX ellipsoid, covered with thin setae. Spermatheca strongly coiled, base of fertilisation canal duct narrow, curved, diverticulum (dv) present.

Distribution. JAPAN: Nansei Islands (Okinawajima Is., Ishigakijima Is., Iriomotejima Is.); TAIWAN; P. R. CHINA (?).

Key to Species of Japanese Mantispidae

1. Antenna longer than prothorax, flagellomeres disc-like, pronotum shorter than pterothorax (Fig. 6A, B). . . . . *Euclimacia badia* Okamoto, 1910
— Antenna shorter than prothorax, flagellomeres moniliform, pronotum longer than pterothorax. 2
2. Wing membrane partly with amber pigmentation or amber areas 3
— Wing membrane hyaline. 4
3. Pronotum prozone with transversal yellow stripe and midzone conspicuously corrugated (Fig. 3B, D, E). . . . . *Austroclimaciella quadrituberculata* (Westwood, 1852)
— Pronotum irregularly rugose, generally brown to blackish brown (Fig. 10B) . . . . . *Tuberonotha strenua* (Gerstaecker, 1894)
4. Fore- and hind wing with more than four anterior Radial cells (Fig. 8A, E–L). . . . . *Eumantispa harmandi* (Navás, 1909)

— Fore- and hind wing with three anterior Radial cells 5
5. Forecoxa without longitudinal stripe on anterolateral side (Fig. 12B). . . . . *Necyla shirozui* (Nakahara, 1961)
— Forecoxa with longitudinal stripe on anterolateral side. . . . 6
6. Mid- and hind femur with a longitudinal brown stripe on ventral side (Fig. 14I). . . . . *Mantispilla japonica* (McLachlan, 1875)
— Mid- and hind femur without a longitudinal brown stripe on ventral side . . . . . *Mantispilla transversa* Stitz, 1913

Discussion

The Japanese Archipelago, located at the eastern end of Eurasia, has remarkable insect diversity, with over 32000 species of insects, despite that this archipelago covers only 0.3% of the world's land area. The Japanese islands are renowned for their high species diversity and numerous endemic species (Tojo et al. 2017). In fact, Japan is recognised as a worldwide biodiversity hotspot (e.g., Marchese 2015). The lacewings (Neuroptera) are no exception; for example, five of 11 species of the genus *Nipponeurorthus* Nakahara, 1958 (Nevrorthidae) are endemic to Japan (Aspöck et al. 2017). However, none of the species of Mantispidae are endemic to Japan, and the species diversity is not necessarily higher than that of neighbouring regions. The numbers of mantispine genera and species in Japan and its surrounding countries and regions are as follows: six genera and seven species in Japan; five genera and 11 species in Taiwan; five genera and 24 species in China; and two genera and two species in Korea (Snyman et al. 2018).

As shown in Fig. 19A, the genera distributed in Japan are consistent with those distributed widely in the Eurasia or Palaearctic region. In particular, the genus *Mantispilla* is well-known in the Old World, namely the Oriental to Afrotropical realms. A few genera are widely found in Eurasia (e.g., *Mantispilla* and *Necyla*), and some genera with ranges mainly in Southeast Asia (e.g., *Euclimacia* and *Tuberonotha*) are also distributed in Japan. This distribution pattern is a distinct geographic feature of the Japanese Islands, which extend longitudinally from north to south over 2700 km. For a comparison, Fig. 19B shows the distribution map of genera not distributed in Japan. All genera are distributed within a limited geographical area, except for *Mantispa*, which is not distributed in the Far East region, including Japan, despite being a widely distributed genus from Eurasia to Southeast Asia.

Taxonomic knowledge is the fundamental basis for evaluating the distribution and ecology of Mantispidae, particularly within the Oriental and Palaearctic regions. The ongoing worldwide decline in insect diversity and abundance is concerning (e.g., Sánchez-Bayo and Wyckhuys 2019; Janzen and Hallwachs 2021). Using our work from recent Japan as the basis, a taxonomic review of Neuroptera from the Oriental and Palaearctic Regions is required before irreversible destruction, loss of habitat and climate change.

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Authors Contributions

Hiroshi Nakamine: Conceptualisation; Formal analysis; Investigation; Resources; Visualisation; Writing – original draft; Writing – review & editing. Shûhei Yamamoto: Investigation; Resources; Visualisation; Writing – original draft; Writing – review & editing.

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Declarations

Competing interests. The authors declare no conflicts of interest.

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