ACTA ENTOMOLOGICA
MUSEI NATIONALIS PRAGAE
ISSN 1804-6487 (online) – 0374-1036 (print)

2022
62(1): 117–127
doi: 10.37520/aemnp.2022.008
www.aemnp.eu

RESEARCH PAPER

Two new species of the genus *Omoplax* (Hemiptera: Heteroptera: Tingidae) from Mukojima Island, with new records of lace bugs endemic to the Ogasawara Islands, Japan

Jun SOUMA[1,2)]

[1)] Entomological Laboratory, Graduate School of Bioresource and Bioenvironmental Sciences, Kyushu University, 744 Motooka, Nishi-ku, Fukuoka-shi, Fukuoka, 819-0395 Japan; e-mail: kodokusignal@gmail.com; https://orcid.org/0000-0002-2238-5015
[2)] Research Fellowship for Young Scientists (DC1), Japan Society for the Promotion of Science, Tokyo, Japan

Accepted:
20th March 2022

Published online:
21st June 2022

Abstract. This study describes two new species of the lace bug genus *Omoplax* Horváth, 1912 (Hemiptera: Heteroptera: Tingidae) from Mukojima Island, the Ogasawara Islands, Japan, under the names *O. karubei* sp. nov. and *O. mukojimensis* sp. nov. These new species differ from the other species of *Omoplax* mainly in the shape of the pronotum and hemelytron. In all, five species belonging to two endemic genera are recognized from the Ogasawara Islands: *Acanthomoplax tomokunii* Souma & Kamitani, 2021, *Omoplax desecta* (Horváth, 1912), *O. karubei* sp. nov., *O. majorcarinae* Guilbert, 2001, and *O. mukojimensis* sp. nov. Additionally, several new records of tingid taxa endemic to these islands are provided: *Acanthomoplax tomokunii* Souma & Kamitani, 2021 from Ototojima Island, and *Omoplax desecta* (Horváth, 1912) from the Mukojima Group, and Meijima, Mukohjima and Nakoudojima islands. An updated key to the species is presented to facilitate the identification of Ogasawaran lace bugs.

Key words. Hemiptera, Heteroptera, Tingidae, biodiversity, identification key, new species, oceanic islands, taxonomy, eastern Asia

Zoobank: http://zoobank.org/urn:lsid:zoobank.org:pub:AFB02C61-6BC9-452B-B609-E68ED62B7DCD

Introduction

The Ogasawara Islands are one archipelago of oceanic islands located approximately 1,000 km south of mainland Japan, with many endemic taxa (Shimizu 2003). This archipelago comprises three island groups, namely, the Mukojima, Chichijima and Hahajima groups (cf. Kawakami 2019). The lace bug fauna (Hemiptera: Heteroptera: Tingidae) known from the Ogasawara Islands to date comprises only three species belonging to two endemic genera, *Acanthomoplax tomokunii* Souma & Kamitani, 2021, *Omoplax desecta* (Horváth, 1912), and *O. majorcarinae* Guilbert, 2001 (Souma & Kamitani 2021). However, the endemic insects are endangered because of the invasive green anole, *Anolis carolinensis* Voight, 1832, which preys on various insect species (Makihara et al. 2004, Karube 2005) and often on hemipterans (Toda et al. 2009). Therefore, faunistic and taxonomic studies of the Ogasawaran hemipterans, including the endemic taxa of Tingidae are vital to conserve valuable insect fauna.

Mukojima Island is one of the islands of the Mukojima Group and has several endemic insects. This island has been subjected to extensive vegetation damage due to the introduction of the goat, *Capra aegagrus* Erxleben, 1777, and the black rat, *Rattus rattus* (Linnaeus, 1758), and much of the woody vegetation has been converted to herbaceous vegetation, with only a small portion of the native forest remaining along the streams. Many native insects depend on these native forests for their survival. Fortunately, the Tokyo Metropolitan Government successfully eradicated the goats by 2006 and the black rat by 2009. Therefore, the native forest of Mukojima Island has been recovering (cf. Ogasawara Islands Branch Office 2018; Kawakami 2019; H. Karube, pers. comm. 2021). Until now, many researchers were not interested in Mukojima Island because many rare species had already become extinct there. Therefore, mapping the diversity of the insect fauna of Mukojima Island through taxonomy and clarifying the existence of endemic species should increase the interest

of the government and researchers in Mukojima Island and contribute to the plan to reintroduce native plants in the future.

Recently, the author observed and sorted collections of the Ogasawaran lace bugs and found two undetermined species of the genus *Omoplax* Horváth, 1912 from Mukojima Island and the three known species mentioned above from many islands. These two undetermined species differ from both known species of *Omoplax* in their morphological characteristics and are considered undescribed species.

The present study describes and illustrates the two new species, *O. karubei* sp. nov. and *O. mukojimensis* sp. nov. Additionally, several new records of the three known species endemic to the Ogasawara Islands (i.e., *A. tomokunii*, *O. desecta*, and *O. majorcarinae*) are provided. Moreover, an updated key to the lace bug taxa occurring in the Ogasawara Islands and a photograph of the syntype of *O. desecta* are presented.

Material and methods

Dried specimens were used to observe, illustrate, and measure the morphological characteristics under a stereoscopic microscope (SZ60; Olympus, Tokyo, Japan) equipped with an ocular grid. Measurements were obtained using a micrometer on the ocular grid. The specimens were photographed using a digital microscope (Dino-Lite Premier M, Opto Science, Tokyo, Japan) and a compact digital camera (Tough TG-6, Olympus, Tokyo, Japan), and image stacks were processed using Adobe Photoshop 2021 ver.22.5.1. Morphological terms were generally assigned following the previous monographs (Drake & Davis 1960; Takeya 1962, 1963; Drake & Ruhoff 1965).

Abbreviations for the relevant institutions are as follows:

BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.;
ELHU	Laboratory of Systematic Entomology, Faculty of Agriculture, Hokkaido University, Sapporo, Japan;
ELKU	Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan;
KPMNH	Kanagawa Prefectural Museum of Natural History, Kanagawa, Japan;
KUM	Kyushu University Museum, Fukuoka, Japan;
NSMT	National Museum of Nature and Science, Ibaraki, Japan.

All specimens used in this study were deposited in ELHU, ELKU, KPMNH, KUM and NSMT.

Results

Description of new species

Omoplax Horváth, 1912

Omoplax Horváth, 1912: 336 (as subgenus of *Stephanitis*; upgraded by Takeya 1962: 74). Type species by monotypy: *Stephanitis* (*Omoplax*) *desecta* Horváth, 1912.

For detailed description see Horváth (1912) and Souma & Kamitani (2021).

Remarks. According to Souma & Kamitani (2021), *Omoplax* can be distinguished from the allied *Acanthomoplax* by the following characteristics: head with very short spines (with long spines in *Acanthomoplax*); paranotum carinate in anterior part and rounded in posterior part (rounded throughout its length in *Acanthomoplax*); outer margin of paranotum not sinusoidal in dorsal view (sinusoidal in dorsal view in *Acanthomoplax*), without robust denticles throughout its length (with robust denticles throughout its length in *Acanthomoplax*); anterior margin of hemelytron without robust denticles throughout its length (with robust denticles throughout its length in *Acanthomoplax*); R+M (radiomedial) vein of hemelytron indistinct (distinct in *Acanthomoplax*), without denticles throughout its length (with denticles throughout its length in *Acanthomoplax*). However, *O. karubei* sp. nov. and *O. mukojimensis* sp. nov., which are described below, closely match the diagnostic characteristics of *Omoplax* (cf. Horváth 1912; Souma & Kamitani 2021) but possess a rounded anterior part of the paranotum. Like in *Acanthomoplax*, *O. majorcarinae* occasionally possesses the rounded anterior part of the paranotum, and *O. karubei* sp. nov. possesses a distinct hemelytral R+M vein. Therefore, these two new species seem to be best placed in *Omoplax*; however, *Omoplax* cannot be distinguished from *Acanthomoplax* in the carinate anterior part of the paranotum and the indistinct hemelytral R+M vein. In addition to the diagnostic characters provided by Souma & Kamitani (2021) except for the aforementioned two features, *Omoplax* is separated from *Acanthomoplax* by the posteriorly widened paranotum (posteriorly narrowed in *Acanthomoplax*). In conclusion, *Omoplax* is still distinguished from *Acanthomoplax* by the following characteristics: head with very short spines; paranotum widened posteriad; outer margin of paranotum without robust denticles throughout its length; and anterior margin of hemelytron without robust denticles throughout their length; and R+M vein of hemelytron without denticles throughout its length.

Omoplax karubei sp. nov.

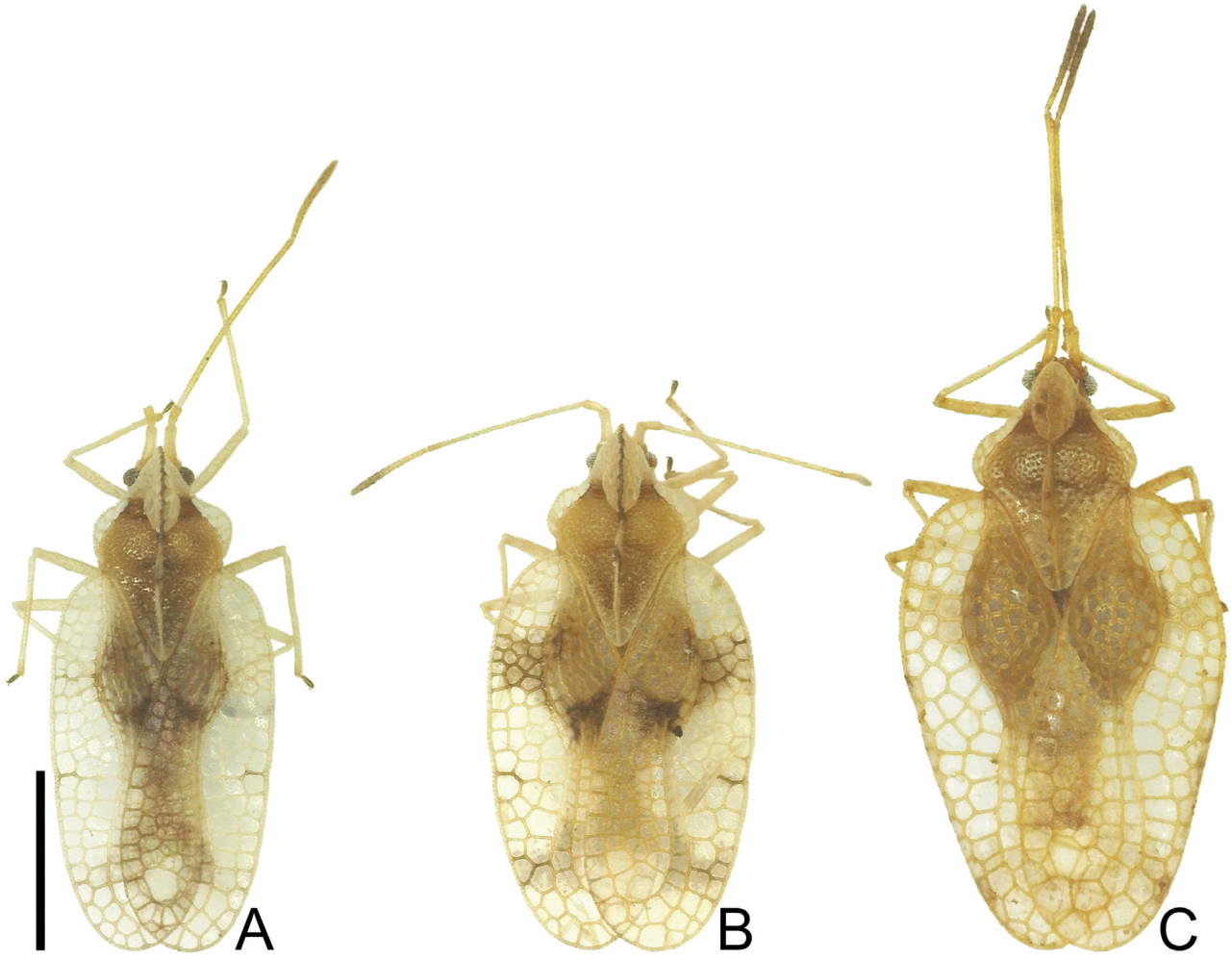
(Figs 1A, B, 2A, B, D, E, 3A, B, D, E, 4A, C, D, 5A)

Type material. Holotype: ♂ (macropterous; Fig. 1A) (KPMNH), "東京都小笠原村, 聟島" [= JAPAN: Ogasawara Islands: *Mukojima Group*: Mukojima Island], 13.vi.2019, leg. H. Karube. Paratypes: 1 ♂ 1 ♀ (macropterous), **JAPAN: Ogasawara Islands: *Mukojima Group*:** Mukojima Island: Oyama, Nishi-no-sawa, 14.vi.2019, leg. H. Karube (1 ♀, KPMNH) (Fig. 1B); Ooyama, 8.vii.1997, leg. T. Kishimoto (1 ♂, NSMT).

Diagnosis. *Omoplax karubei* sp. nov. is distinguished from the other species of *Omoplax* by the combination of the following characteristics: pronotal disc and body ventral side brown (Figs 1A, B, 4A, C, D); rostrum reaching posterior margin of metasternum; hood with 4 rows of areolae on highest part (Figs 2D, E); paranotum laminate throughout its length (Figs 2A, B, 5A); subcostal and discoidal areas of hemelytron distinguishable (Figs 3A, B, D, E); and R+M (radiomedial) vein distinct, carinate.

Description. ***Macropterous male*.** Head, calli, pronotal disc, markings on hemelytra and ventral surface in various shades of brown; compound eye dark red; hood, paranotum and hemelytron pale brown; areolae of pronotum and hemelytron transparent; pubescence on body yellowish (Figs 1A, 2A, D, 3A, D, 4A, C).

Body 2.3 times as long as maximum width across



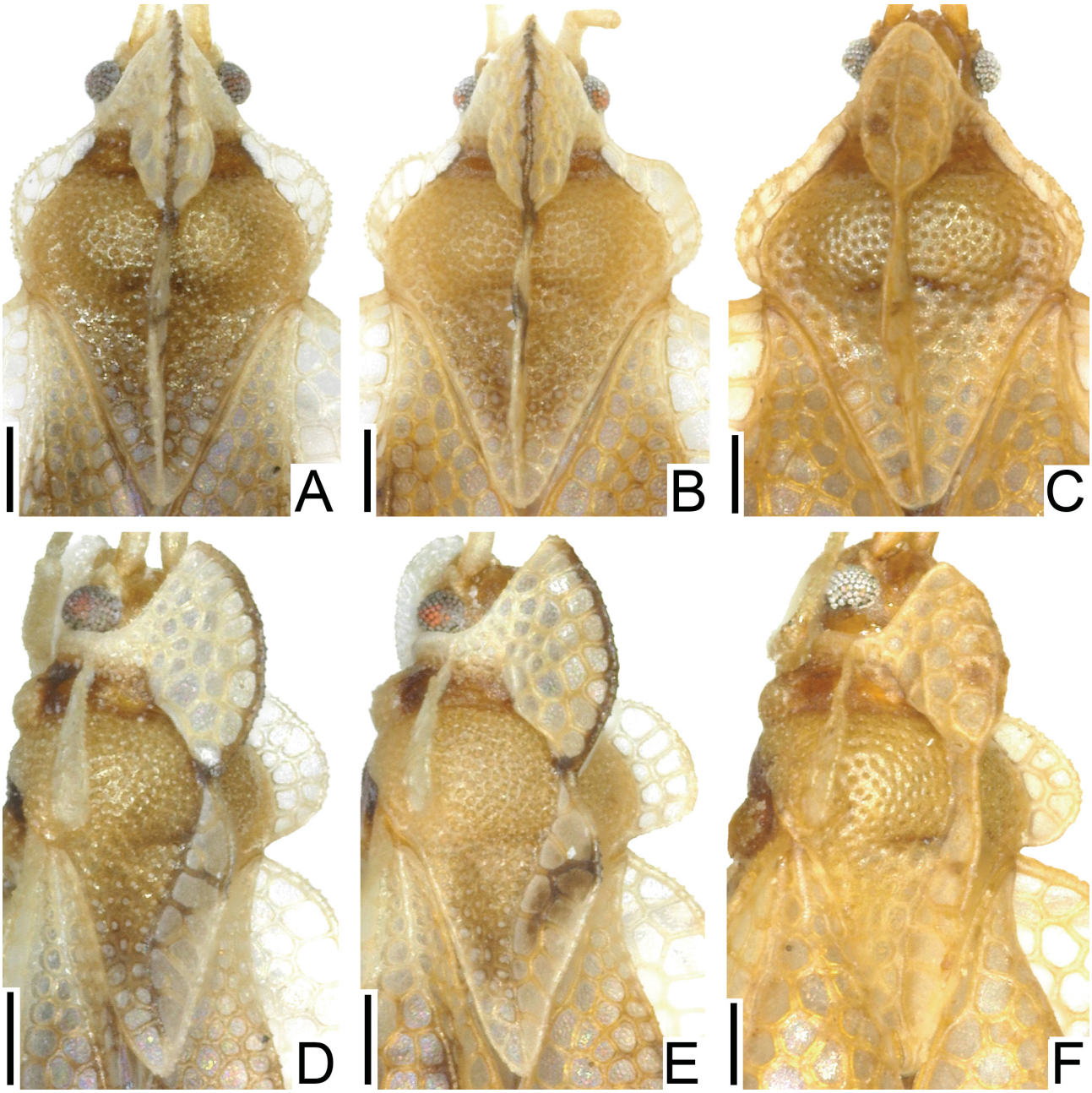
Figs 1A–C. Two species of *Omoplax* from Mukojima Island, the Ogasawara Islands, Japan, dorsal view: A, B – *O. karubei* sp. nov.: A – male, B – female. C – *O. mukojimensis* sp. nov.: female. Scale bar = 1.0 mm.

hemelytra (Fig. 1A). Head (Figs 2A, 4A) glabrous; pair of frontal spines separated from each other at apices, not reaching apex of clypeus; median spine as long as frontal spines, not reaching bases of frontal spines; pair of occipital spines longer than median spine, reaching middle part of compound eyes; antenniferous tubercles obtuse, slightly curved inward; clypeus smooth. Compound eye round in dorsal view. Antenna covered with pubescence; segment I cylindrical; segment II cylindrical, shortest among antennal segments; segment III longest among antennal segments; segment IV cylindrical, longer than segment I. Bucculae contiguous at anterior ends, with 3 rows of areolae throughout their length. Rostrum reaching posterior margin of metasternum.

Pronotum (Figs 2A, D, 5A) 1.5 times as long as maximum width across paranota, glabrous. Pronotal disc coarsely punctate. Hood shorter than median carina of pronotum, narrower than vertex at widest, higher than median carina of pronotum, with posterior margin extending to anterior part of pronotal disc, with 4 rows of areolae on highest part, with dorsal margin distinctly arched. Collar not covering compound eye. Median carina straight, extending to apex of posterior process, with 2 rows of areolae on highest part, with dorsal margin slightly arched. Calli smooth. Paranotum rounded throughout its length, subvertical, with 2 rows of areolae on widest part, with outer margin gently curved outward throughout its length. Posterior process triangular, obtuse at apex.

Hemelytron (Figs 3A, D) 2.7 times as long as its maximum width, extending beyond apex of abdomen, glabrous; maximum width across hemelytra 1.6 times as much as maximum width across paranota; apices close to each other in rest; subcostal and discoidal areas distinguishable; costal area with 4 rows of areolae on widest part; subcostal area with 3 rows of areolae on widest part; discoidal area with 5 rows of areolae on widest part; sutural area with 5 rows of areolae on widest part; hypocostal lamina with single row of areolae throughout its length; R+M (radiomedial) vein distinct, carinate.

Thoracic pleura (Fig. 2D) smooth in anterior part, coarsely punctate in posterior part. Ostiolar peritreme oblong. Sternal laminae (Fig. 4A) lower than bucculae; pro- and mesosternal laminae open at both anterior and posterior ends; metasternal laminae as high as mesosternal laminae, open at anterior ends, fused to each other at posterior ends. Legs (Fig. 1A) smooth, covered with pubescence; femora thickest in middle. Abdomen ellipsoidal. Pygophore (Fig. 4C) compressed dorsoventrally, semicircular in ventral



Figs 2A–F. Head and pronotum, dorsal and dorsolateral views: A, B, D, E – *Omoplax karubei* sp. nov.: A, D – male, B, E – female. C, F – *O. mukojimensis* sp. nov.: female. Scale bars = 0.2 mm.

view, elevated in center of venter, covered with pubescence.

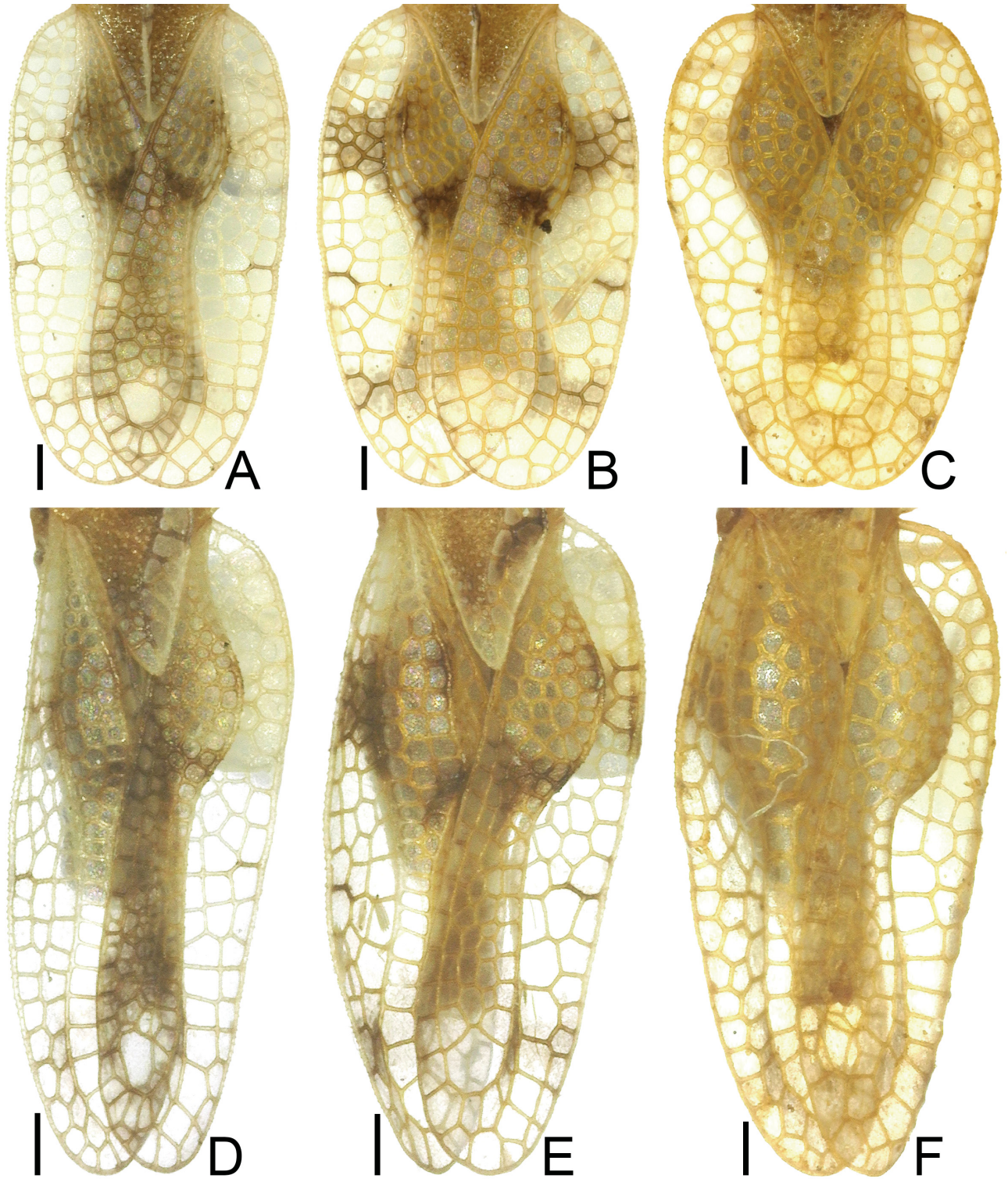
Measurements (n = 2). Body length with hemelytra 2.6–2.8 mm; maximum width across hemelytra 1.2 mm; length of antennal segments I to IV 0.2 mm, 0.1 mm, 1.1 mm, and 0.5 mm, respectively; pronotal length 1.2 mm; pronotal width across paranota 0.8 mm; hemelytral length 1.9–2.1 mm; maximum width of hemelytron 0.7–0.8 mm.

Macropterous female. General appearance very similar to that of male (Figs 1B, 2B, E, 3B, E, 4D) except for the following characters: body 2.0 times as long as maximum width across hemelytra; antennal segment III shorter than in male; hemelytron 2.5 times as long as its maximum width; maximum width across hemelytra 1.8 times as much as maximum width across paranota; terminalia pentagonal in ventral view.

Measurements (n = 1). Body length with hemelytra 2.9 mm; maximum width across hemelytra 1.4 mm; length of antennal segments I to IV 0.2 mm, 0.1 mm, 1.0 mm, and 0.5 mm, respectively; pronotal length 1.2 mm; pronotal width across paranota 0.8 mm; hemelytral length 2.2 mm; maximum width of hemelytron 0.9 mm.

Brachypterous morph. Unknown in both sexes.

Differential diagnosis. In the key to all described tingid species endemic to the Ogasawara Islands (Souma & Kamitani 2021), the new species described above differs from other species in the combination of the following characteristics: head with very short spines (Figs 2A, B, D, E, 5A); paranotum rounded throughout its length; outer margin of paranotum and anterior margin of hemelytron without robust denticles throughout their length (Figs 3A, B);



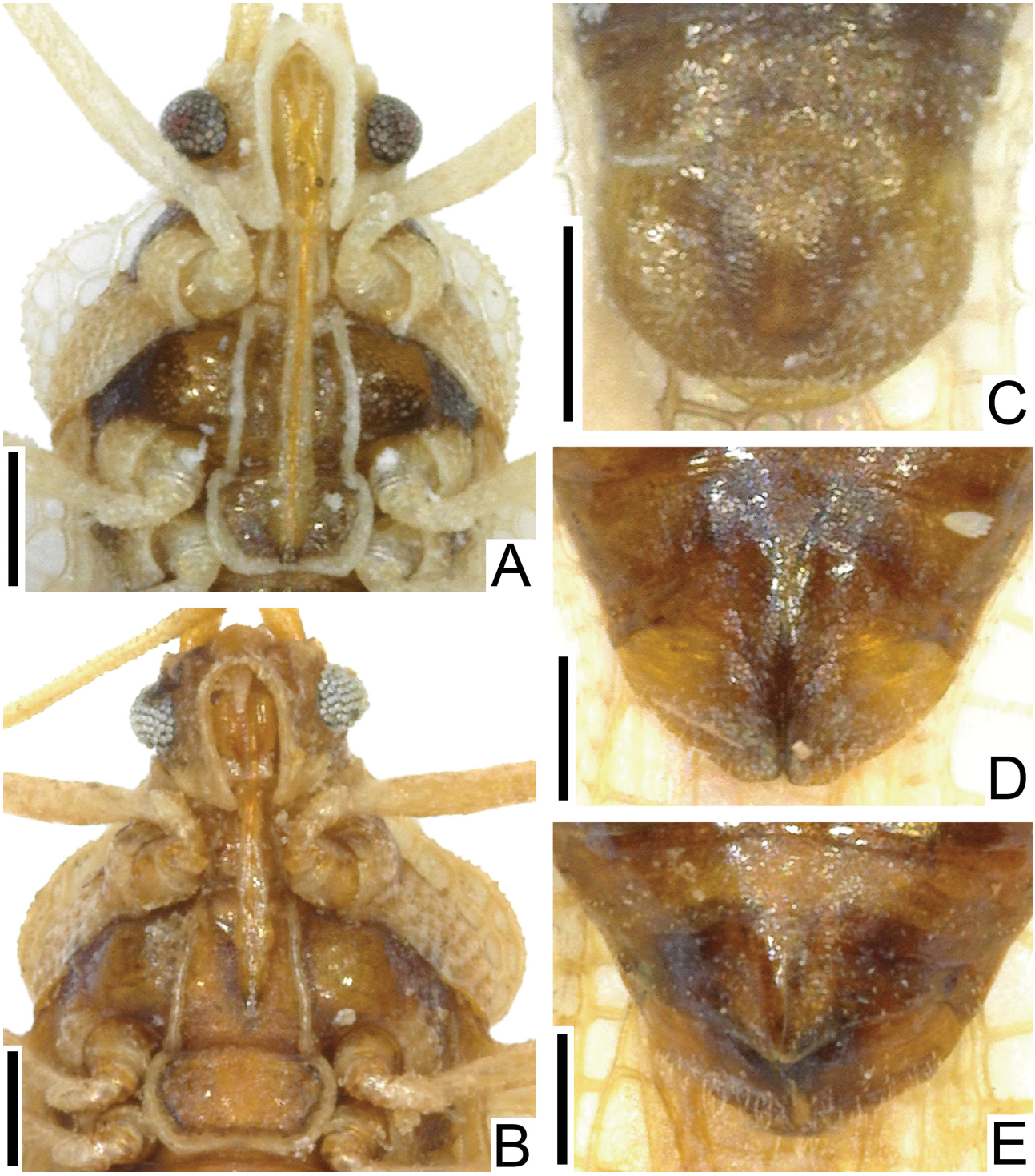
Figs 3A–F. Hemelytra, dorsal and dorsolateral views: A, B, D, E – *Omoplax karubei* sp. nov.: A, D – male, B, E – female. C, F – *O. mukojimensis* sp. nov.: female. Scale bars = 0.2 mm.

and R+M (radiomedial) vein of hemelytron distinct, without denticles throughout its length (Figs 3D, E). In general appearance, *Omoplax karubei* sp. nov. strongly resembles *O. mukojimensis* sp. nov. described below. However, the former is easily distinguished from the latter by the following features: rostrum reaching posterior margin of metasternum; hood with 4 rows of areolae on highest part; subcostal and discoidal areas of hemelytron distinguishable; and R+M vein distinct, carinate.

Etymology. The new species is named in honor of Haruki Karube, who collected the holotype.

Biology. Adults were collected in June and July. Nymph is unknown. It inhabits the laurilignosa ecosystem of the Ogasawara Islands in subtropical climate belonging to the Oceanian Region. Host plant is unknown.

Distribution. Japan: Ogasawara Islands: Mukojima Group: Mukojima Island.



Figs 4A–E. A–B – rostra and sternal laminae, ventral view: A – *Omoplax karubei* sp. nov.; B – *O. mukojimensis* sp. nov. C–E – apical part of the abdomen, ventral view: C, D – *O. karubei* sp. nov.: C – male, D – female; E – *O. mukojimensis* sp. nov.: female. Scale bars = 0.2 mm.

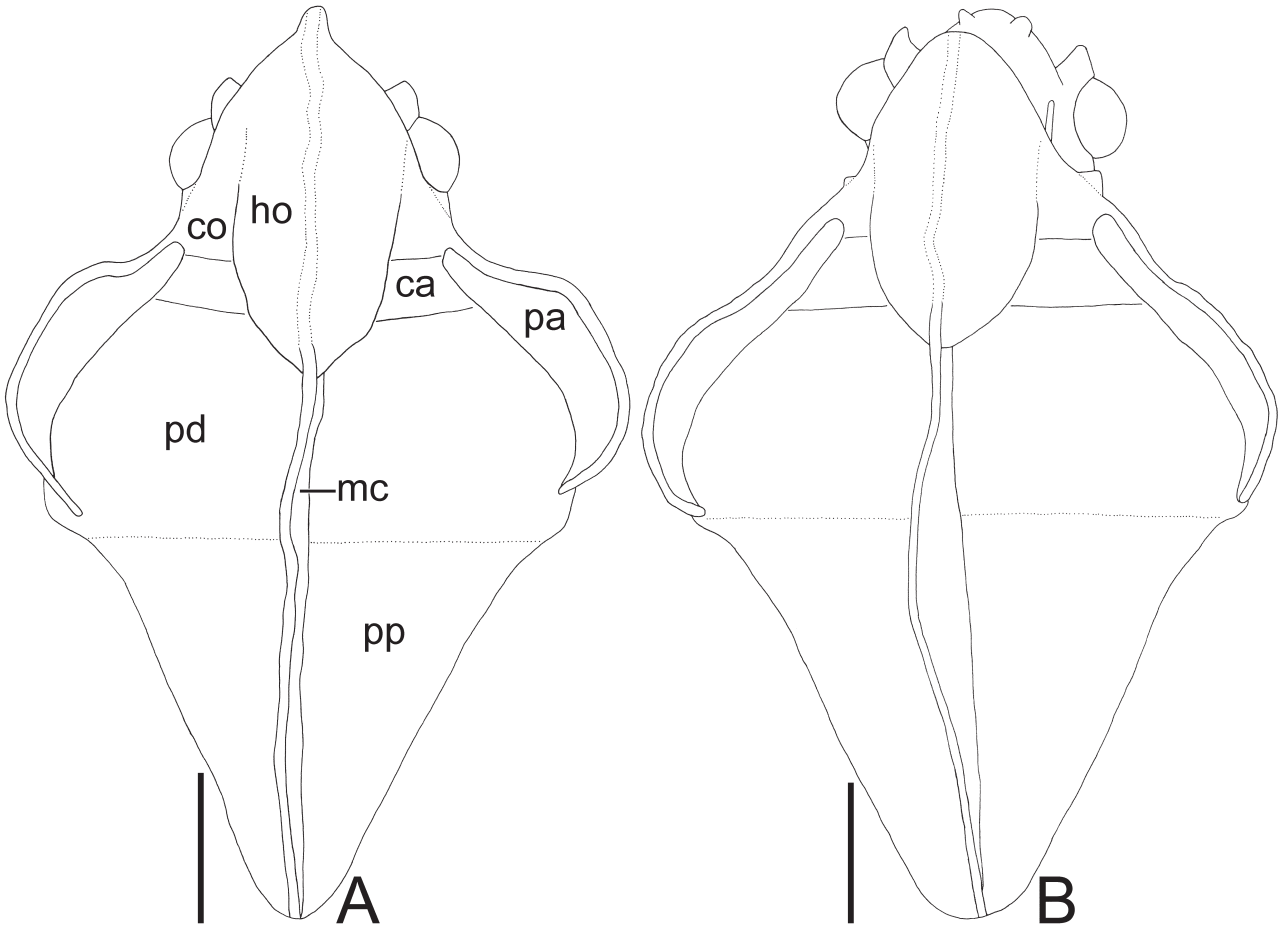
Omoplax mukojimensis sp. nov.

(Figs 1C, 2C, F, 3C, F, 4B, E, 5B)

Type material. Holotype: ♀ (macropterous; Fig. 1C) (KPMNH), "東京都小笠原村聟島南部 18. VI. 2006 苅部治紀採集" [= JAPAN: JAPAN: Ogasawara Islands: *Mukojima Group*: Mukojima Island: Southern part, 18.vi.2006, leg. H. Karube].

Diagnosis. *Omoplax mukojimensis* sp. nov. is distinguished from the other species of *Omoplax* by the combination of the following characteristics: pronotal disc and body ventral side brown (Figs 1C, 4B, E); rostrum reaching middle part of mesosternum; hood with 3 rows of areolae on highest part (Fig. 2F); paranotum rounded throughout its length (Figs 2C, 5B); subcostal and discoidal areas of hemelytron indistinguishable (Figs 3C, F); and R+M (radiomedial) vein indistinct, not carinate.

Description. ***Macropterous female.*** Head, calli, pronotal disc, markings on hemelytra and ventral surface in various shades brown; compound eye dark red; hood, paranotum and hemelytron pale brown; areolae of pronotum and hemelytron transparent; pubescence on body yellowish (Figs 1C, 2C, F, 3C, F, 4B, E).



Figs 5A–B. Line drawings of head and pronotum, dorsal view: A – *Omoplax karubei* sp. nov.; B – *O. mukojimensis* sp. nov. Abbreviations: ca – calli; co – collar; ho – hood; mc – median carina; pa – paranotum; pd – pronotal disc; pp – posterior process. Scale bars = 0.2 mm.

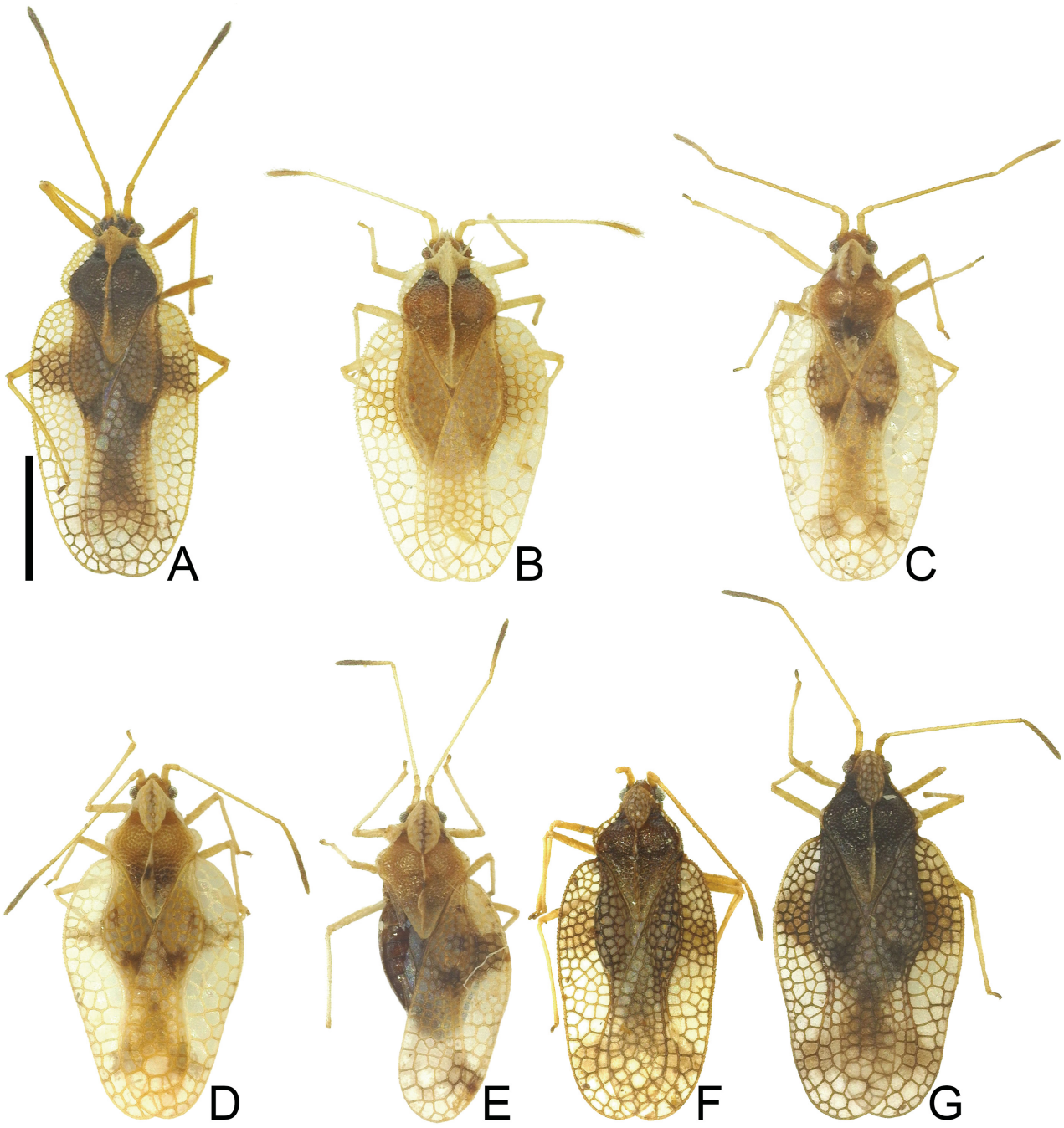
Body 1.8 times as long as maximum width across hemelytra (Fig. 1C). Head (Figs 2C, 4F) glabrous; pair of frontal spines separated from each other at apices, not reaching apex of clypeus; median spine as long as frontal spines, not reaching bases of frontal spines; pair of occipital spines longer than median spine, reaching middle part of compound eyes; antenniferous tubercles obtuse, slightly curved inward; clypeus smooth. Compound eye round in dorsal view. Antenna covered with pubescence; segment I cylindrical; segment II cylindrical, shortest among antennal segments; segment III longest among antennal segments; segment IV cylindrical, longer than segment I. Bucculae contiguous at anterior ends, with 3 rows of areolae throughout their length. Rostrum reaching middle part of mesosternum.

Pronotum (Figs 2C, F, 5B) 1.4 times as long as maximum width across paranota, glabrous. Pronotal disc coarsely punctate. Hood shorter than median carina of pronotum, narrower than vertex at widest part, higher than median carina of pronotum, with posterior margin extending to anterior part of pronotal disc, with 3 rows of areolae on highest part, with dorsal margin distinctly arched. Collar not covering compound eye. Median carina straight, extending to apex of posterior process, with 2 rows of areolae on highest part, with dorsal margin slightly arched. Calli smooth. Paranotum rounded throughout its length, subvertical, with 2 rows of areolae on widest part, with outer margin gently curved outward throughout its length. Posterior process triangular, obtuse at apex.

Hemelytron (Figs 3C, F) 2.6 times as long as its maximum width, extending beyond apex of abdomen, glabrous; maximum width across hemelytra 2.0 times as much as maximum width across paranota; apices close to each other in rest; subcostal and discoidal areas indistinguishable; costal area with 4 rows of areolae on widest part; subcostal-discoidal area with 7 rows of areolae on widest part; sutural area with 5 rows of areolae on widest part; hypocostal lamina with single row of areolae throughout its length; R+M (radiomedial) vein indistinct, not carinate.

Thoracic pleura (Fig. 2F) smooth in anterior part, coarsely punctate in posterior part. Ostiolar peritreme oblong. Sternal laminae (Fig. 4B) lower than bucculae; pro- and mesosternal laminae open at both anterior and posterior ends; metasternal laminae as high as mesosternal laminae, open at anterior ends, fused to each other at posterior ends. Legs (Fig. 1C) smooth, covered with pubescence; femora thickest in middle. Abdomen ellipsoidal. Terminalia (Fig. 4E) pentagonal in ventral view, covered with pubescence.

Measurements (n = 1). Body length with hemelytra 3.3 mm; maximum width across hemelytra 1.8 mm; length of antennal segments I to IV 0.2 mm, 0.1 mm, 1.0 mm, and 0.6 mm, respectively; pronotal length 1.3 mm; pronotal width across paranota 0.9 mm; hemelytral length 2.6 mm; maximum width of hemelytron 1.0 mm.



Figs 6A–G. Three tingid species endemic to the Ogasawara Islands, Japan, dorsal view: A–B – *Acanthomoplax tomokunii* Souma & Kamitani, 2021: A – male from Hahajima Island, B – female from Ototojima Island. C–E – *Omoplax desecta* (Horváth, 1912): C – male from Mukohjima Island, D – female from Meijima Island, E – female from Nakoudojima Island. F–G – *O. majorcarinae* Guilbert, 2001: F – male from Hahajima Island, G – female from Chichijima Island. Scale bar = 1.0 mm.

***Brachypterous morph*.** Unknown.

***Male*.** Unknown.

Differential diagnosis. In the key to all described tingid species endemic to the Ogasawara Islands (Souma & Kamitani 2021), the new species described above differs from the other species in the combination of the following characteristics: head with very short spines (Figs 2C, F, 5B); paranotum rounded throughout its length; outer margin of paranotum without robust denticles throughout its length; anterior margin of hemelytron without robust denticles throughout its length (Fig. 3C); and R+M (radiomedial) vein of hemelytron without denticles throughout its length (Fig. 3F). In general appearance, *Omoplax mukojimensis* sp. nov. strongly resembles *O. karubei* sp. nov. described above. However, the former is easily distinguished from the latter by the following features: rostrum reaching middle part of mesosternum; hood with 3 rows of areolae on highest part; subcostal and discoidal areas of hemelytron indistinguishable; and R+M vein indistinct, not carinate.

Etymology. The specific epithet refers to its occurrence on Mukojima Island, the Ogasawara Islands, Japan; an adjective.

Biology. The holotype was collected in April. Nymph is unknown. It inhabits the laurilignosa ecosystem of the

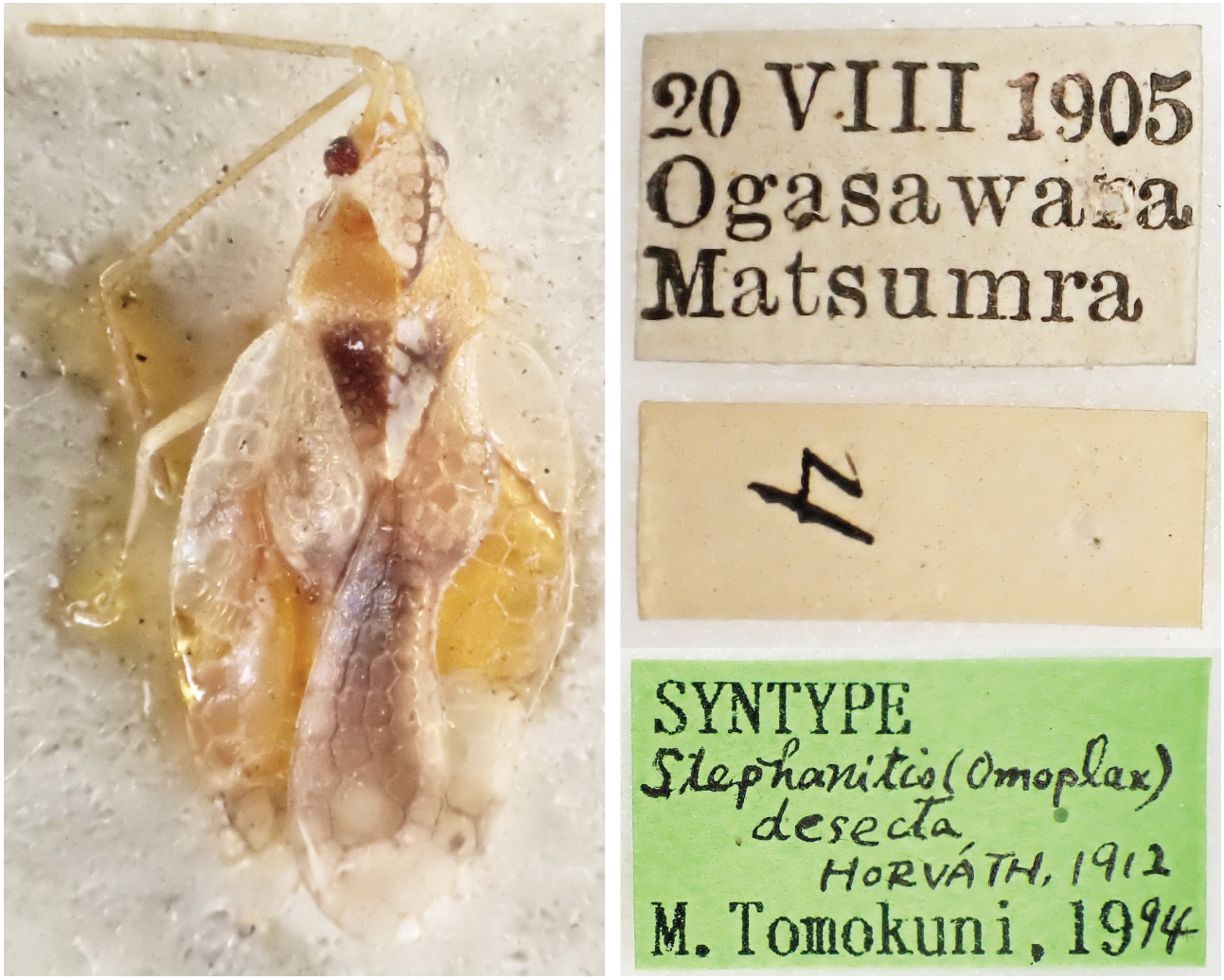


Fig 7. Syntype of *Omoplax desecta* (Horváth, 1912) deposited in ELHU and its labels.

Ogasawara Islands in subtropical climate belonging to the Oceanian Region. Host plant is unknown.
Distribution. Japan: Ogasawara Islands: Mukojima Group: Mukojima Island.

New records of tingid species endemic to the Ogasawara Islands

Acanthomoplax tomokunii Souma & Kamitani, 2021

(Figs 6A, B)

Acanthomoplax tomokunii Souma & Kamitani, 2021: 6. Holotype: ♀ (macropterous), Japan: Ogasawara Isls., Hahajima I., Mt. Chibusayama (ELKU).

For detailed description see Souma & Kamitani (2021).

Material examined (1 ♂ 1 ♀, macropterous). **JAPAN: Ogasawara Islands:** ***Chichijima Group*****:** Ototojima Island: 2.viii.1996, leg. T. Matsumoto (1 ♀, NSMT) (Fig. 6B). ***Hahajima Group*****:** Hahajima Island: nr. Koumori-dani, 20.iv.1997, leg. K. Matsumoto (1 ♂, NSMT) (Fig. 6A).

Distribution. Japan: Ogasawara Islands: Chichijima Group: Ototojima Island, Anijima Island; Hahajima Group: Hahajima Island (Souma & Kamitani 2021). New record from Ototojima Island.

Omoplax desecta (Horváth, 1912)

(Figs 6C–E, 7)

Stephanitis (*Omoplax*) *desecta* Horváth, 1912: 337. Syntype (Fig. 7): ♀ (macropterous), Japan: Bonin Is, Ogasawara (ELHU).
Omoplax desecta: Takeya (1962): 74 (new combination).

For detailed description and other references see Horváth (1912) and Souma & Kamitani (2021).

Type material examined. Syntype: 1 ♀ (macropterous; Fig. 7) (ELHU), "Ogasawara 20 VIII 1905 Matsumura" [= JAPAN: Ogasawara Islands: 20.viii.1905, leg. S. Matsumura].

Additional material examined (20 ♂♂ 21 ♀♀ 1 abdomen missing, all macropterous). **JAPAN: Ogasawara Islands:** ***Mukojima Group*****:** Nakoudojima Island: 16.vii.2008, leg. H. Karube (1 ♀, KPMNH) (Fig. 6E). ***Chichijima Group*****:** Ototojima Island: 2.viii.1996, leg. T. Matsumoto (3 ♂♂, NSMT); "広根周辺" [= near Mt. Hirone], 7.vi.2019, leg. H. Karube (4 ♂♂ 2 ♀♀, KPMNH). Anijima Island: 17.ii.2007, leg. H. Sato (1 ♀, KPMNH); "ヤギ柵" [= Goat fence located at Central plateau], 2010, leg. Japan Forest Technology Association (1 ♀, KPMNH); "シマムロカーブ" [= Shimamuro curve located at Central plateau], 18.viii.2010, leg. Japan Forest Technology Association (2 ♀♀, KPMNH). Chichijima Island: Kiyose–Okumura, 2.xii.2016, leg. K. Nakashima (1 ♂ 3 ♀♀, ELKU). ***Hahajima Group*****:** Hahajima Island: Chibusayama, 15.iv.1993, leg. T. Yasunaga (1 ♀, KUM); Shizukazawa, 20.iv.1997, leg. T. Matsumoto (1 ♀, NSMT). Mukohjima Island: 12.vi.2003, leg. S. Suda (12 ♂♂ 8 ♀♀ 1 abdomen missing, KPMNH) (Fig. 6C). Meijima Island: 13.vi.2003, leg. S. Suda (2 ♀♀, KPMNH) (Fig. 6D).

Distribution. Japan (Ogasawara Islands: Mukojima Group: Nakoudojima Island; Chichijima Group: Ototojima Island, Anijima Island, Chichijima Island; Hahajima Group: Hahajima Island, Mukohjima Island, Meijima Island) (Horváth 1912, Souma & Kamitani 2021). New records from Mukojima Group, and Meijima, Mukohjima and Nakoudojima islands.

Omoplax majorcarinae Guilbert, 2001

(Figs 6F, G)

Omoplax majorcarinae Guilbert, 2001: 551. Holotype: ♂ (macropterous), Japan: Bonin Islands, Chichijima, Chuo san (BPBM).

For detailed description and other references see Guilbert (2001) and Souma & Kamitani (2021).

Material examined (2 ♂♂ 9 ♀♀, macropterous). **JAPAN: Ogasawara Islands:** ***Chichijima Group*****:** Anijima Island: "ヤギ柵手前" [= Front of goat fence located at Central plateau], 8.vii.2009, leg. Japan Forest Technology Association (1 ♀, KPMNH). Chichijima Island: 4.v.1974, leg. Y. Hori (1 ♂, NSMT); "大村" [= Omura], 18.vi.1976, leg. Y. Kurosawa (1 ♀, NSMT) (Fig. 6G); Mt. Tsutsuji-yama, 28.vii.1996, leg. T. Kishimoto (1 ♀, NSMT). ***Hahajima Group*****:** Hahajima Island: Kitamura, 4.vi.1976, leg. T. Nakane (1 ♂ 3 ♀♀, NSMT) (Fig. 6F); Mt. Chibusa-yama, 7.vii.1997, leg. K. Matsumoto (2 ♀♀, NSMT); "石門" [= Sekimon], 27.vi.2009, leg. Japan Forest Technology Association (1 ♀, KPMNH).

Remarks. The paranotum of *Omoplax majorcarinae* is usually carinate in the anterior part and rounded in the posterior part (Fig. 6G) (Guilbert 2001, Souma & Kamitani 2021). However, a few examined specimens have a uniformly rounded paranotum (Fig. 6F).

Distribution. Japan: Ogasawara Islands: Chichijima Group: Anijima Island, Chichijima Island; Hahajima Group: Hahajima Island (Guilbert 2001, Souma & Kamitani 2021).

Key to species of Tingidae occurring in the Ogasawara Islands, Japan

1 Head with long spines (Figs 6A, B); paranotum narrowed posteriad; outer margin of paranotum with robust denticles throughout its length; anterior margin of hemelytron with robust denticles throughout its length; R+M (radiomedial) vein of hemelytron with denticles throughout its length. .... ***Acanthomoplax tomokunii*** Souma & Kamitani, 2021

– Head with very short spines (Figs 2D–F, 5B); paranotum widened posteriad (Figs 2A–C, 5A); outer margin of paranotum without robust denticles throughout its length; anterior margin of hemelytron without robust denticles throughout its length (Figs 3A–C); R+M vein of hemelytron without denticles throughout its length (Figs 3D–F). 2

2 Rostrum reaching posterior margin of metasternum (Fig. 4A). 3

– Rostrum reaching middle part of mesosternum (Fig. 4B). 4

3 Paranotum carinate in anterior part and rounded in posterior part (Figs 6C–E); R+M vein of hemelytron indistinct, not carinate. .... ***Omoplax desecta*** (Horváth, 1912)

– Paranotum rounded throughout its length (Figs 2A, B, D, E, 5A); R+M vein of hemelytron distinct, carinate (Figs 3A, B, D, E). ..... ***O. karubei*** **sp. nov.**

4 Pronotal disc and body ventral side black (Figs 6F, G); hood with 4–5 rows of areolae at highest part; paranotum carinate in anterior part and rounded in posterior part (occasionally rounded throughout its length); subcostal and discoidal areas of hemelytron distinguishable. ..... ***O. majorcarinae*** Guilbert, 2001

– Pronotal disc and body ventral side brown (Figs 2C, 4B, E); hood with 3 rows of areolae at highest part (Fig. 2F); paranotum rounded throughout its length (Fig. 5B); subcostal and discoidal areas of hemelytron indistinguishable (Figs 3C, F). .... ***O. mukojimensis*** **sp. nov.**

Acknowledgements

The author sincerely thanks Haruki Karube, Kyohei Watanabe (KPMNH), Munetoshi Maruyama, Junna Matsumoto (KUM), Masaaki Tomokuni, and Takuya Kiyoshi (NSMT) for the loan of valuable materials; Kouichi Matsumoto (the Society for Conservation of Native Insects in Ogasawara, Tokyo, Japan) and the Japan Forest Technology Association, Tokyo, Japan for depositing specimens to KPMNH; the Nature Conservation Office of Ogasawara, Tokyo, Japan and the Kanto Regional Forest Office, Tokyo, Japan for allowing Haruki Karube and Kouichi Matsumoto to conduct research in the Ogasawara Islands; Kazunori Yoshizawa and Masahiro Ohara (ELHU) for permitting photography of the syntype of *Omoplax desecta*; and Kyosuke Okuda (Saitama, Japan) for providing valuable materials. This work was partially supported by a Grant-in-Aid for JSPS Fellows (JP20J20483) to the author from the Japan Society for the Promotion of Science, Tokyo, Japan. The author would like to thank Editage (www.editage.com) for English language editing. The author really appreciate Petr Kment (National Museum, Prague, Czech Republic), Eric Guilbert (Muséum national d'Histoire naturelle, Paris, France), and Alexander H. Knudson (North Dakota State University, Fargo, U.S.A.) for critical comments to the manuscript.

References

DRAKE C. J. & DAVIS N. T. 1960: The morphology, phylogeny, and higher classification of the family Tingidae, including the description of a new genus and species of the subfamily Vianaidinae (Hemiptera: Heteroptera). *Entomologica Americana* **39**: 1–100.

DRAKE C. J. & RUHOFF F. A. 1965: Lacebugs of the world, a catalog (Hemiptera: Tingidae). *Bulletin of the United States National Museum* **243**: i–viii + 1–634, frontis piece, pls. 1–56.

GUILBERT E. 2001: Western Pacific Tingidae (Heteroptera): New species and new records. *Memoirs of the Queensland Museum* **46**: 543–554.

HORVÁTH G. 1912: Species generis Tingitidarum *Stephanitis*. *Annales Historico-Naturales Musei Nationalis Hungarici* **10**: 319–339.

KARUBE H. 2005: The influence of the introduced lizard, *Anolis carolinensis* on the native insect fauna of the Ogasawara Islands. *Bulletin of the Herpetological Society of Japan* **2005 (2)**: 162–168 (in Japanese).

KAWAKAMI K. 2019: The history of anthropogenic disturbance and invasive alien species impact on the indigenous avifauna of the Ogasawara Islands, southern Japan. *Japanese Journal of Ornithology* **68**: 237–262 (in Japanese, English summary).

MAKIHARA H., KITAJIMA H., GOTO H., KATO T. & MAKINO S. 2004: An evaluation of predation impact of the introduced lizard *Anolis carolinensis* on the endemic insect fauna of the Ogasawara Islands based on insect collection records and feeding experiments, with special reference to longicorn beetles (Insecta: Coleoptera: Cerambycidae). *Bulletin of the Forestry and Forest Products Research Institute* **3 (2)**: 165–183 (in Japanese).

SHIMIZU Y. 2003: The nature of Ogasawara and its conservation. *Global Environmental Research* **7 (1)**: 3–14.

SOUMA J. & KAMITANI S. 2021: Taxonomic review of the lace bug genus *Omoplax* (Hemiptera: Heteroptera: Tingidae) endemic to "Oriental Galapagos" (the Ogasawara Islands, Japan) with the description of its new allied genus and species. *Entomological Science* **24 (1)**: 3–11.

OGASAWARA ISLANDS BRANCH OFFICE 2018: *Efforts by the Tokyo Metropolitan Government-Removal of goats and restoration of vegetation in the Mukojima Archipelago*. Available from: https://www.soumu.metro.tokyo.lg.jp/07ogasawara/nature/grapple_mukojima.html (accessed 10 December 2021) (in Japanese).

TAKEYA C. 1962: Taxonomic revision of the Tingidae of Japan, Korea, the Ryukyus and Formosa Part 1 (Hemiptera). *Mushi* **36 (5)**: 41–75.

TAKEYA C. 1963: Taxonomic revision of the Tingidae of Japan, Korea, the Ryukyus and Formosa Part 2 (Hemiptera). *Mushi* **37 (4)**: 27─52.

TODA M., NAKAGAWA N. & SUKIGARA N. 2009: Ecology and control of green anole *Anolis carolinensis*, invasive alien species in the Ogasawara Islands. *Chikyu Kankyo* **14 (1)**: 39–46 (in Japanese).