

A Remarkable New Species of the Genus *Leptelmis* SHARP from Amami-Ôshima, with Redescription of the Larva of *Leptelmis gracilis* SHARP (Coleoptera, Elmidae, Elminae)

Yuuki KAMITE¹⁾, Hiroyuki YOSHITOMI²⁾ and Masakazu HAYASHI³⁾

¹⁾Nagoya City Public Health Research Institute,
Hagiya-cho 1–11, Mizuho-ku, Nagoya, 467–8615 Japan
E-mail: optioservus@yahoo.co.jp

²⁾Entomological Laboratory, Faculty of Agriculture, Ehime University, 3–5–7 Tarumi, Matsuyama, 790–8566 Japan

³⁾Hoshizaki Green foundation, Sono, Izumo, 691–0076 Japan

Abstract A new species of the genus *Leptelmis*, *L. torikaii* sp. nov., is described from Amami-Ôshima, the Ryukyu Islands, Japan. The larva of *Leptelmis gracilis* is redescribed using SEM technology.

Key words: comparative morphology, SEM, riffle beetle, Elmini, Stenelmina.

Introduction

The genus *Leptelmis* SHARP, 1888 is a small genus in the family Elmidae and is represented by 24 species and two subspecies in the Afrotropical, the Palearctic, and the Oriental Regions (JÄCH *et al.*, 2016; KODADA *et al.*, 2016). The most species-rich area is the Oriental Region, however taxonomic study on the Oriental species is considered to be insufficient. Two species of the genus *Leptelmis*, *L. gracilis* SHARP and *L. parallela* NOMURA, had been recorded from Japan (Honshu, Shikoku, Kyushu), but HAYASHI *et al.* (2013) found out that *L. parallela* was just a winged morph of *L. gracilis*.

In 2017, two authors collected some specimens of this genus from Amami-Ôshima, the second largest island in the Ryukyu Islands. This is the first record of this genus from the Ryukyu Islands. After close examination including comparison with *L. gracilis* (redescribed in detail by HAYASHI & YOSHITOMI, 2014) and the Taiwanese species, *L. formosana* NOMURA (redescribed in detail by JENG & YANG, 1993), and some Chinese species, it is clear that the Amami specimens represent an undescribed species, which is described below.

In addition, the larva of *Leptelmis gracilis* is redescribed.

Material and Methods

The specimens were examined with a stereoscopic microscope (Olympus SZH10), a biological microscope (Olympus BX51) and scanning electron microscopes (SEM; HITACHI Miniscope® TM-3030Plus for adult observation, and JEOL JCM-6000 Neoscope Scanning Electron for larval observation).

Abbreviations:

AF: apterous form

MF: macropterous form

EL: elytral length along suture from scutellar base to elytral apices

EW: maximum width of elytra

PL: pronotal length along midline in dorsal view

PW: maximum width of pronotum

TL: total length of PL and EL

Type specimens and the material examined are deposited in the following collections:

CKN: collection of Yuuki KAMITE, Nagoya, Japan

EMEC: Essig Museum of Entomology, University of California, Berkeley, California, USA (W. D. SHEPARD)

EUMJ: Ehime University Museum, Matsuyama, Japan (H. YOSHITOMI)

HOWP: Hoshizaki Institute for Wildlife Protection, Izumo, Japan (M. HAYASHI)

NMW: Naturhistorisches Museum Wien, Vienna, Austria (M. A. JÄCH)

The terminology generally follows KODADA *et al.* (2016). The mean of the measurements is indicated in parenthesis after the ranges.

Taxonomy

Leptelmis torikaii KAMITE, YOSHITOMI et HAYASHI, sp. nov.

[Japanese name: Amami-yokomizo-doromushi]

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

Type series. Holotype (EUMJ), 1 male (AF), Toguchi-gawa, alt. 20–30 m, Toguchi, Tatsugô-chô, Amami-Ôshima, Japan, 12.III.2017, Y. KAMITE leg. Paratypes (CKN, EMEC, EUMJ, HOWP, NMW), 20 exs. (AF), same data as for the holotype; 11 exs. (AF), ditto, 21.IV.2017, H. YOSHITOMI leg.

Description. Adult. M a l e. Body elongate oval, convex dorsally. Coloration of body black, but ventral surface and legs reddish brown; tibia, tarsus and claws somewhat paler; antennae and mouth parts brown. Plastron present on head, pronotum, prosternum, meso- and metaventricle, abdominal ventrites 1–5 and legs except for tarsi and claws.

Head (Fig. 2C) almost flat on dorsal surface, pubescent; median area and around eyes and clypeus punctate. Eyes moderate in size, somewhat prominent. Clypeus transverse, about three times as wide as long. Labrum transverse, about twice as wide as long.

Pronotum (Fig. 2E) convex, pubescent, longer than wide, widest at basal 1/3, with large punctures except for antero-medial area; lateral margins constricted at apical 1/3; apical 1/3 with transverse groove and basal area with two oblique posteriorly convergent grooves; middle of anterior margin and antero-lateral corners produced anteriorly.

Elytra (Fig. 3A) elongate oval, moderately convex, widest at apical 1/3; intervals pubescent; basal part of striae punctures large and deep, gradually smaller and shallower to apex; basal area of interval III convex.

Prosternum with large punctures at basal 2/3; prosternal process narrowing posteriorly and slightly emarginate at apex. Meso- and metaventricle (Fig. 3E), and abdominal ventrites 1 and 2 covered with large punctures.

Abdominal ventrite V (Fig. 4A) bearing short stout setae in apical part, shallowly concave at apical margin. Tergite VIII (Fig. 4C) semicircular, sparsely covered with short setae. Sternite VIII (Fig. 4D) transverse, shallowly concave in caudal margin, with rather long median strut. Sternite IX (Fig. 4E) asymmetrical, shallowly concave in caudal margin, with long and slender lateral struts.

Aedeagus (Fig. 4F–H) long, about 0.6 mm; phallobase long, membranous in mesal part, widest

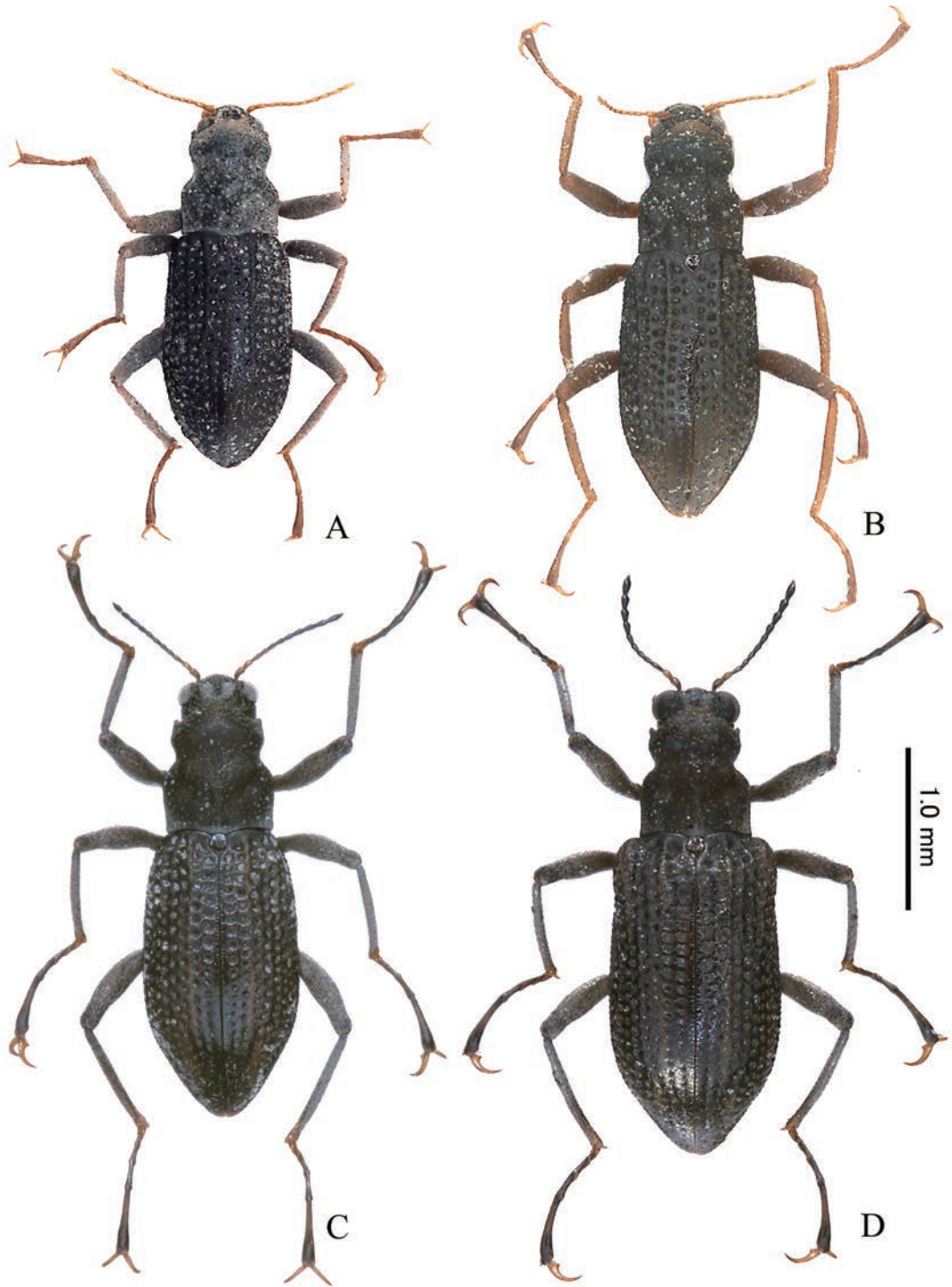


Fig. 1. Habitus of *Leptelmis* spp. — A (Holotype), B, *L. torikaii* sp. nov.; C (AF), D (MF), *L. gracilis* SHARP.

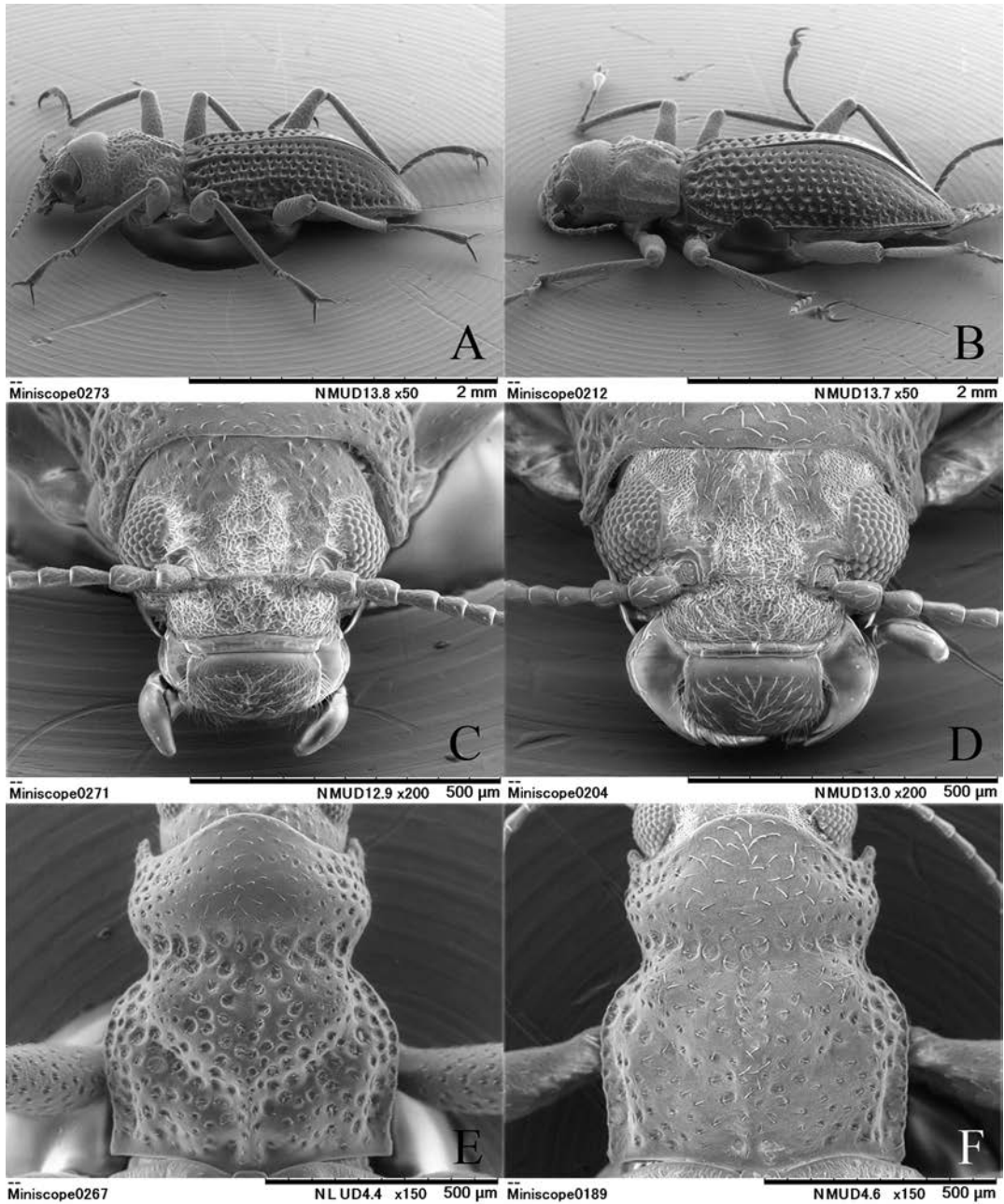


Fig. 2. SEM photographs of *Leptelmis* spp. — A, C, E & *L. torikaii* sp. nov.; B, D & F, *L. gracilis* SHARP (AF). — A & B, Habitus in dorso-lateral view; C & D, head; E & F, pronotum.

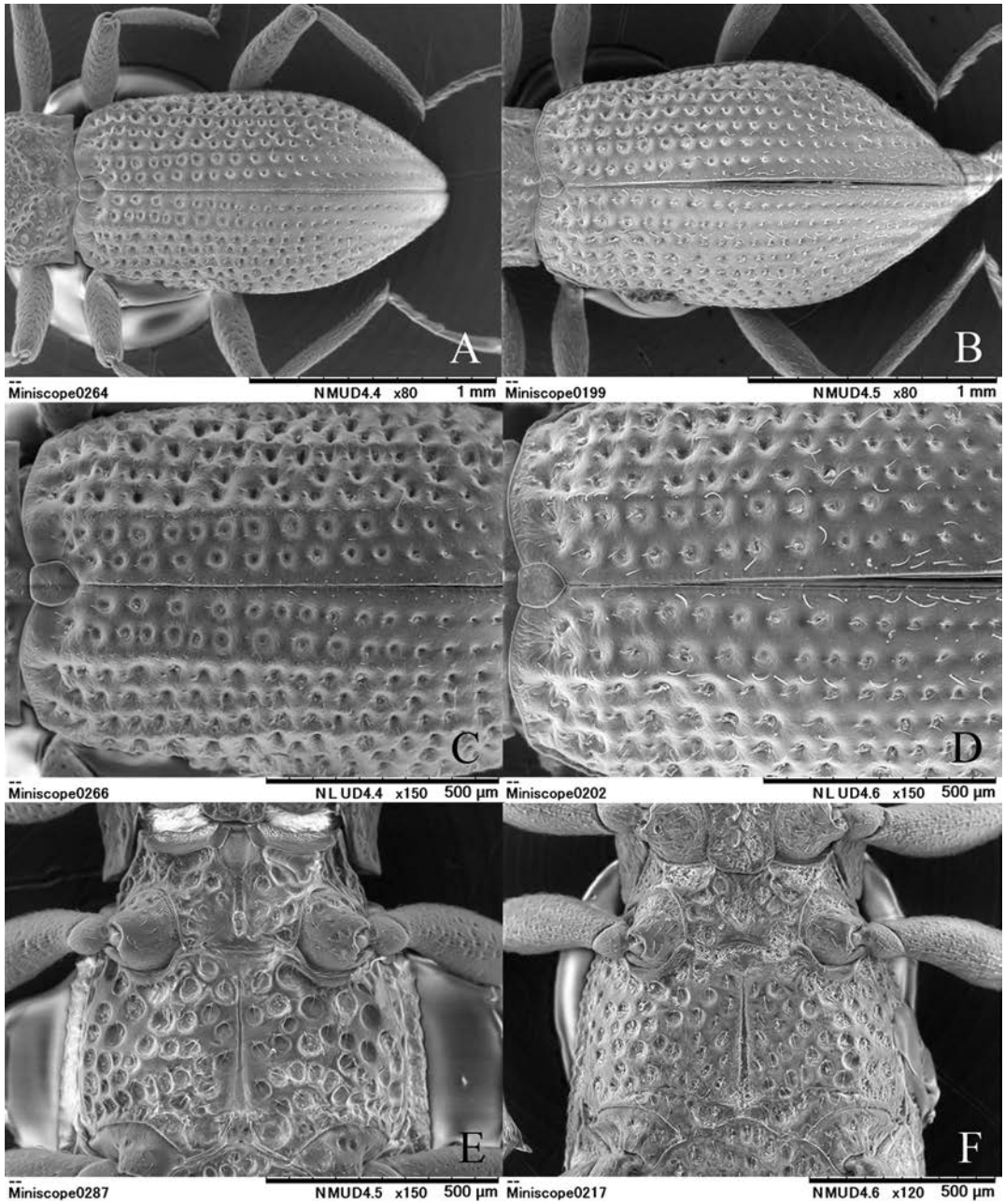


Fig. 3. SEM photographs of *Leptelmis* spp. — A, C, E & *L. torikaii* sp. nov.; B, D, F & *L. gracilis* SHARP (AF). — A & B, Elytra; C & D, basal part of elytra; E & F, meso- and metaventrite.

Table 1. Measurement data and ratios of *Leptelmis* spp.

	<i>torikaii</i>	<i>gracilis</i>	
	AF n = 10	MF n = 3	AF n = 10
TL (mm)	2.23–2.62 (2.46)	2.62–2.85 (2.71)	2.75–2.95 (2.83)
PW (mm)	0.60–0.70 (0.67)	0.65–0.70 (0.68)	0.73–0.79 (0.75)
PL (mm)	0.78–0.90 (0.83)	0.75–0.80 (0.78)	0.80–0.91 (0.85)
EL (mm)	1.45–1.72 (1.62)	1.82–2.05 (1.92)	1.90–2.08 (1.99)
EW (mm)	0.80–0.93 (0.88)	1.02–1.05 (1.03)	1.08–1.17 (1.11)
PW/PL	0.77–0.85 (0.81)	0.87–0.88 (0.87)	0.80–0.93 (0.89)
EL/EW	1.78–2.00 (1.84)	1.77–1.95 (1.86)	1.73–1.89 (1.80)
EL/PL	1.83–2.13 (1.96)	2.28–2.56 (2.46)	2.09–2.51 (2.35)
EW/PW	1.19–1.38 (1.31)	1.47–1.57 (1.51)	1.47–1.51 (1.48)
TL/EW	2.67–3.00 (2.78)	2.54–2.71 (2.62)	2.50–2.65 (2.56)

at basal 1/3; parameres long and rather wide, as long as phallobase, with slightly pointed apices, with plate-like projections in ventro-basal parts; penis slender, evenly tapering apically.

F e m a l e. Abdominal ventrite V (Fig. 4B) bearing short stout setae in apical part, gently arcuate in apical margin. Tergite VIII (Fig. 4I) semicircular, sparsely covered with short setae. Sternite VIII (Fig. 4J) trapezoidal, gently arcuate in caudal margin, with long median strut. Ovipositor (Fig. 4K) relatively long; approximate ratio of stylus, distal portion of coxite, basal portion of coxite, and valvifer (n = 1) as 1.0 : 3.6 : 1.8 : 6.4; vagina lacking serration.

Measurement data and ratios. See Table 1.

Etymology. The specific name is dedicated to Mr. Hisahiro TORIKAI who guided the first author's field investigation in Amami-Ōshima and found the type locality of this new species.

Ecological notes. The habitat of this species is a small stream at low elevation. Adults of this species mainly held onto submerged roots of *Ipomoea indica* (BURM.) MERR (Fig. 5D) or Zingiberaceae. They were collected with *Elmomorphus amamiensis* NOMURA (Dryopidae) and *Dryopomorphus amami* YOSHITOMI et SATŌ (Elmidae).

Remarks. In Asia, 16 species and two subspecies of the genus were recorded so far (JÄCH *et al.*, 2016; Fig. 8). Judging from the presence of plate-like projections of parameres, this species is related to southern Chinese species, *Leptelmis fujiana* YANG et ZHANG, 2002 known from Fujian, *L. brunne-lineata* ZHANG, SU et YANG, 2003 and *L. vittata* ZHANG, SU et YANG, 2003 known from Guangxi (YANG & ZHANG, 2002; ZHANG *et al.*, 2003), but differs from them by the elongate phallobase and slender penis. In contrast, *Leptelmis gracilis* SHARP, 1888 (known from mainland Japan and Korea) and *L. formosana* NOMURA, 1962 (known from Taiwan) have slender parameres lacking plate-like projections (JENG & YANG, 1993; HAYASHI & YOSHITOMI, 2014). Taking into consideration these relationships, it appears that *L. torikaii* sp. nov. is an example of relict endemic species in Amami-Ōshima of the central Ryukyus, similar to the Amami rabbit (*Pentalagus furnessi* (STONE)) and the Amami jay (*Garrulus lidthi* BONAPARTE) (BCJ, 2010).

The larva of this species is unknown.

Wing dimorphism in the new species is not recognised in the present time, and all 32 specimens of the type series are of the apterous form (AF). The percentage of the appearance of macropterous form (MF) in *L. gracilis* is relatively low (24.2 % in HAYASHI *et al.*, 2013), and it is expected that the MF of *L. torikaii* sp. nov. will be discovered in near future.

Adult *Leptelmis gracilis* live in middle to lower stream reaches (frequently in large rivers), and

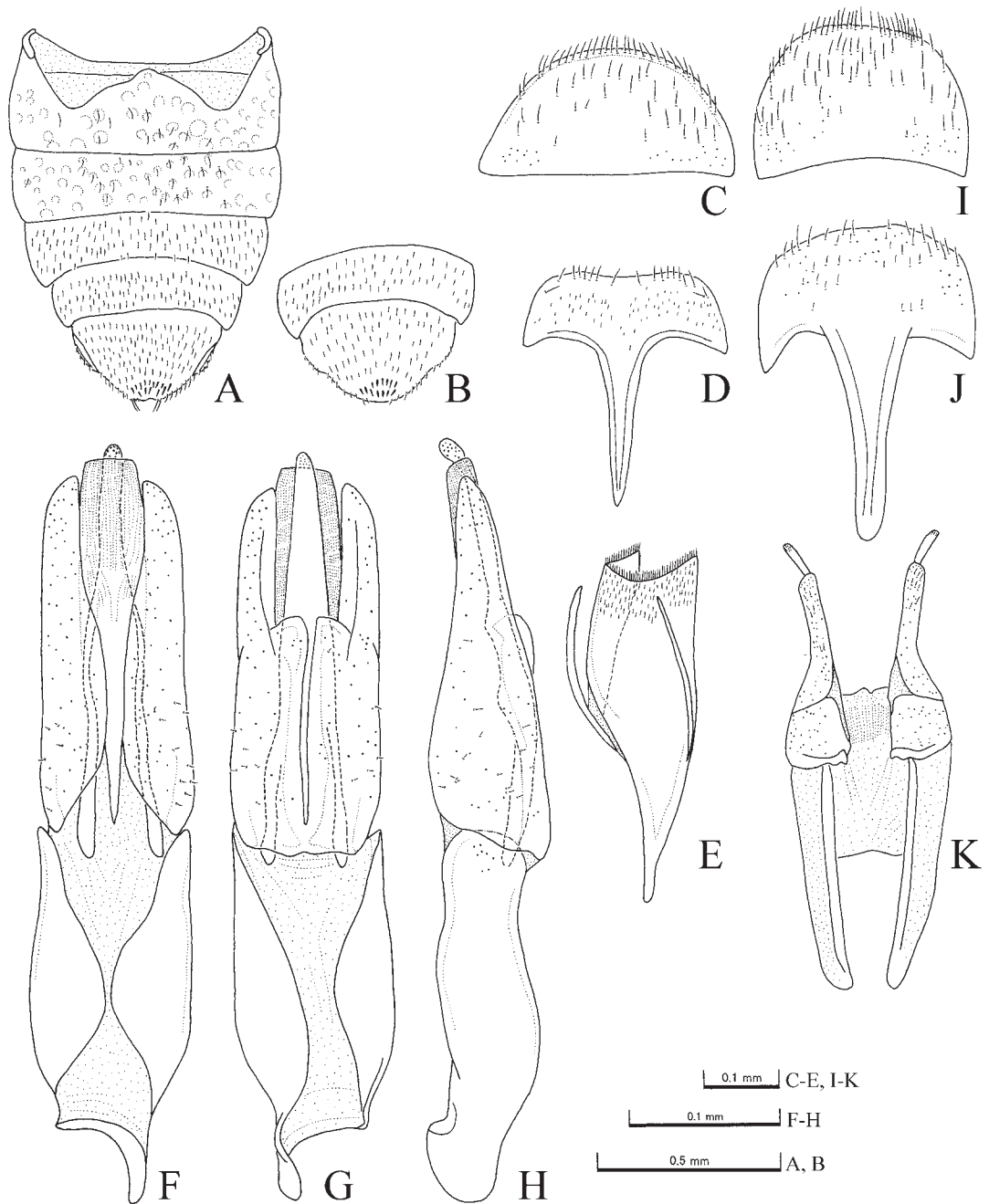


Fig. 4. Abdominal ventrites (A & B), male (C–H) and female (I–K) genitalia of *Leptelmis torikaii* sp. nov. — A, Ventrites I–V, male; B, ventrites IV–V, female; C & I, tergite VIII; D & J, sternite VIII; E, sternite IX; F–H, aedeagus in dorsal (F), ventral (G), and lateral (H) views; K, ovipositor.



Fig. 5. Living *Leptelmis torikaii* sp. nov. (A & B) and its type locality (C & D); D, showing a close up of habitat (submerged rootlets of *Ipomoea indica*).

are collected from the riparian roots of reeds and willows and from decaying submerged wood (HAYASHI & YOSHITOMI, 2014). Adult *L. torikaii* sp. nov. live in a small, low elevation stream and were collected mainly from the submerged roots of *Ipomoea indica* and Zingiberaceae.

Distribution. Japan (Amami-Ôshima).

***Leptelmis gracilis* SHARP, 1888**

[Japanese name: Yokomizo-doromushi]

(Figs. 1C, D, 2B, D, F, 3 B, D, F, 6 & 7)

Leptelmis gracilis SHARP, 1888: 244; HAYASHI & YOSHITOMI, 2014: 237; JÄCH & KODADA, 2016: 599; JÄCH *et al.*, 2016: 107.

Leptelmis parallela NOMURA, 1962: 46 (synonymized by HAYASHI & YOSHITOMI, 2014: 237).

Leptelmis coreana JUNG et BAE, 2012: 255 (synonymized by JUNG *et al.*, 2014: 103).

Leptelmis ochra JUNG et BAE, 2012: 256 (synonymized by JUNG *et al.*, 2014: 103).

Material examined. Adults. 9 exs. (AF, CKN), Shikke, Gifu-shi, Gifu Pref., 2.IX.2006, Y. KAMITE leg.; 1 ex. (AF, CKN), Muko-gawa, Aimoto, Sanda-shi, Hyôgo Pref., 8.VII.2006, M. MORI leg.; 12 exs. (AF, CKN), Kaibara-gawa, Kaibara-chô, Tanba-shi, Hyôgo Pref., 16.IX.2006, M. MORI leg.; 4 exs. (AF, CKN), Hii-gawa, Takeshi-chô, Shimane Pref., 20.IX.2006, Y. KAMITE leg.; 1 ex. (AF, CKN), Higashiogawa, Hanzan-chô, Kagawa Pref., 10.VI.2002, Y. KAMITE leg.; 2 exs. (AF, CKN), Kawan-

ishichō, Marugame-shi, Kagawa Pref., 13.V.2002, H. FUJIMOTO leg.; 1 ex. (AF, CKN), Murasaki-gawa, Haruyoshi, Kokuraminami-ku, Kitakyushu-shi, Fukuoka Pref., 30.VIII.2003, T. OGATA leg. Larvae. 1 ex. (HOWP), Ibo-gawa, Ibo, Hikawa-chō, Izumo-shi, Shimane Pref., 5.XI.2016, M. HAYASHI leg.; 2 exs. (HOWP), ditto, 30.III.2017, M. HAYASHI leg.; 5 exs. (HOWP), ditto, 30.IV.2017, M. HAYASHI leg.

Redescription of mature larva. Body length is ca. 5.0 mm in expanded specimen preserved in 70 % ethanol; ca. 4.0 mm in dry condition.

Body elongate and flat, gradually narrowing middle to apex; slightly convex dorsally and flattened ventrally; meso- and metathorax and abdominal segments I to VIII with blade-like lateral projections on both sides; remarkably prominent spiracles on mesothorax and abdominal segments I to VIII; middle suture present on thorax and abdominal segments I to VII; body color entirely cream-colored but head and apical half of abdominal segment IX dark brown. Two types of granules on body surface; large granules with a pectinate seta.

Head (Figs. 6A, 7C & D) more or less flat, visible from above, well exposed from prothorax; width as long as length; eyes not prominent in both sides; clypeus transverse and entirely smooth, with setae on base; frons and vertex with granules and indistinct setae with short branched setae; posterior edge emarginate; epicranial stem present but short; frontoclypeal suture distinct. Antenna with three antennomeres; 1st shorter than 2nd, with pectinate setae on frontal margin; 2nd longest, in 1st to 3rd, with slender sensorial appendage; 3rd slender and shorter than sensorial appendage of 2nd. Labrum transverse and short, with short branched setae and long simple setae along frontal margin; epipharynx with dense setae. Mandible tridentate at apex, articulated pubescent process in inner margin, long, dense setae in outer margin. Maxilla and labium forming a unit (maxillolabial unit). Maxilla with palp having four palpomeres; cardo small; stipes large; galea and lacinia separate, setose apically. Labium narrow with palp with two palpomeres; ligula short and transverse; mentum long, apex wider than base, with scattered branched setae; submentum short and transverse.

Thorax (Figs. 6B–G, 7E & F) dentate on lateral sides and hind margin; dorsum with two types of granules. Prothorax longer than width, 1.9 times as long as mesothorax; with two ventral sclerites, procoxae closed posteriorly by a postero-medial sclerite; pectinate setae on front and hind margins; areas of lacking granules and setae on apical and middle parts. Meso- and metathorax transverse, dense granules and setae with a pectinate seta on dorsum. Mesothorax with five ventral sclerites. Legs 5-segmented, short and stout; apical segment long and simple without setae.

Abdomen (Figs. 6H, 7A, B, G & H) 9-segmented. Segments I to VIII transverse, granules with branched setae on dorsum and lateral parts; pleural sclerites on segments I to VII. Segment IX with longitudinal ridge on dorsum, longer than width, gradually narrowing to apex; ridge with short spines; apex with a pair of spines on the sides; ventral side flat with dense granules and scattered setae; ventral operculum pentagonal in shape, with branched setae on lateral side; opercular claws and anal gills present.

Description of immature larva. Body length is ca. 4.0 mm in expanded specimen preserved in 70 % ethanol; ca. 3.0 mm in dry condition. Prominent spiracles lacking on mesothorax and abdominal segments I to VIII.

Ecology. HAYASHI and YOSHITOMI (2014) discussed the ecology of this species. The larvae examined in this study were collected from roots of *Carex dispalata* BOOTT in a small stream in Shimane Prefecture.

Distribution. Japan (Honshu, Shikoku, Kyushu), South Korea.

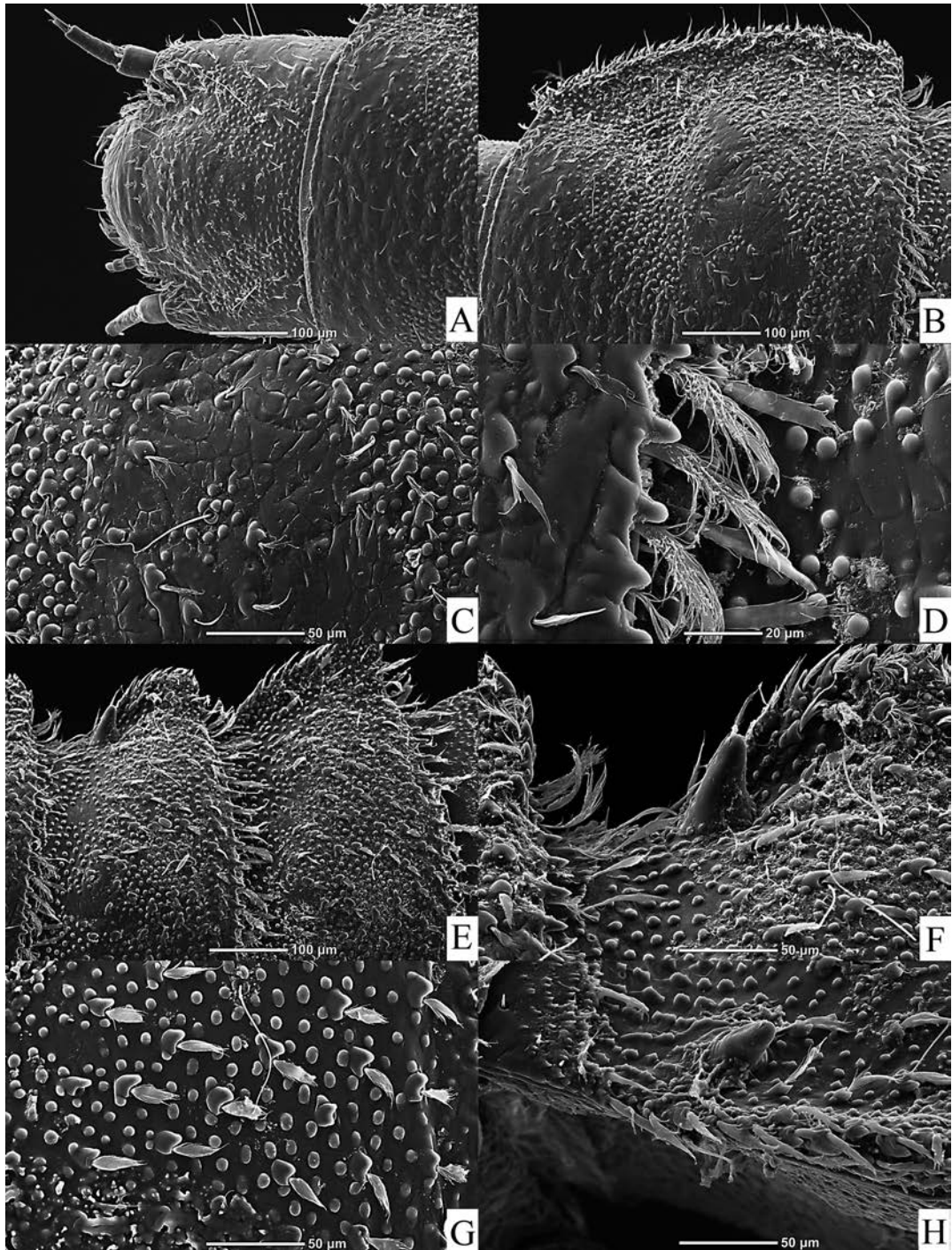


Fig. 6. SEM photographs of mature larva of *Leptelmis gracilis* SHARP. — A, Head; B, C & D, prothorax (C, middle part; D, basal margin); E, meso- and metathorax; F, prominent spiracle of mesothorax; G, granules and setae of mesothorax; H, prominent spiracle of abdominal segment I. — A–G, Dorsal view; H, lateral view. Scale bars: A, B & E in 100 µm; C, F–H in 50 µm; D in 20 µm.

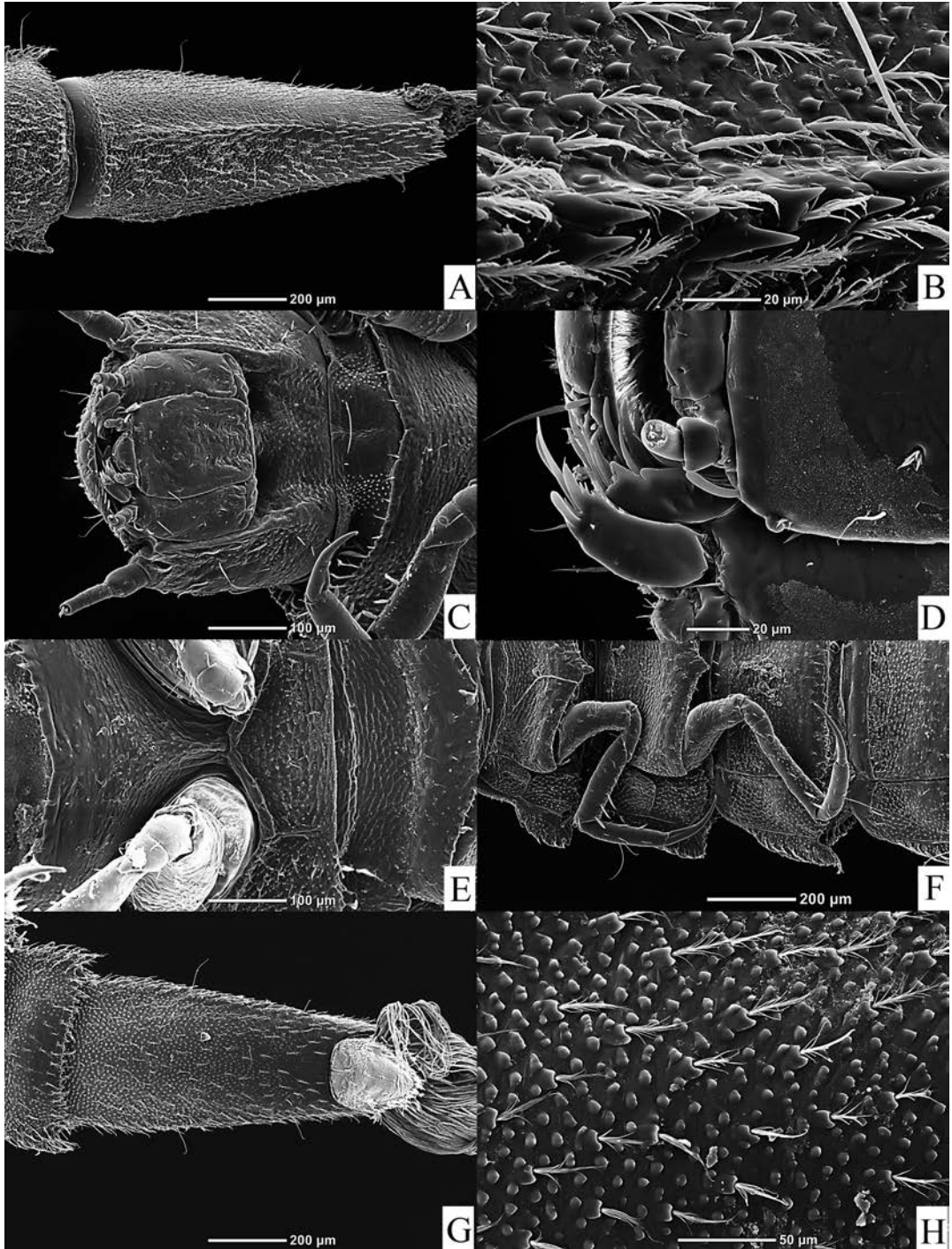


Fig. 7. SEM photographs of mature larva of *Leptelmis gracilis* SHARP. — A, B, G & H, Abdominal segment IX; C & D, head; E, pro- and mesothorax; F, meso- and metathorax and abdominal segments I to II. — A & B, Dorsal view; C–H, ventral view. Scale bars: A, F & G in 200 μm ; C & E in 100 μm ; H in 50 μm ; B, D in 20 μm .

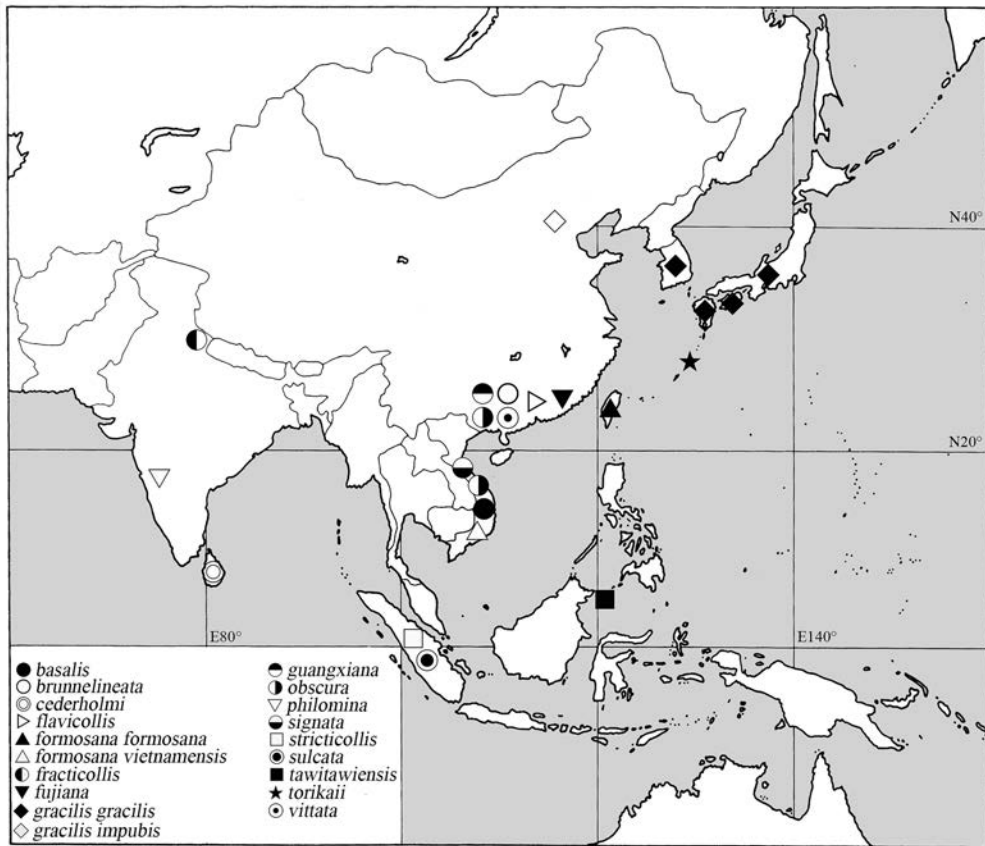


Fig. 8. Geographical distribution of Asian *Leptelmis*.

Key to Species of the Genus *Leptelmis* SHARP from Japan

- 1a. Elytra with large humeri; lateral margins subparallel (Fig. 1D).*L. gracilis* SHARP (MF)
- 1b. Elytra with reduced humeri; lateral margins not subparallel (Fig. 1A–C).2
- 2a. Body larger (TL 2.75–2.95 mm, Table 1). Legs blackish. Head lacking widely distributed plas-tron (Fig. 2D, not punctated area). Pubescence of pronotum and elytra longer (Figs. 2F & 3D). Punctures of pronotum, meso- and metaventrite (Fig. 3F), and abdominal ventrites 1 and 2 smaller. Apical 1/3 of lateral margins of elytra more expanded (Fig. 3B). Aedeagus relatively slender; parameres slender, with obtuse apices, lacking plate-like projections in ventro-basal parts; penis subparallel-sided near base to apical 1/3. Distributed in Honshu, Shikoku, Kyushu. *L. gracilis* SHARP (AF)
- 2b. Body smaller (TL 2.23–2.62 mm, Table 1). Legs reddish. Head with widely distributed plas-tron (Fig. 2C, not punctated area). Pubescence of pronotum and elytra shorter (Figs. 2E & 3C). Punctures of pronotum, meso- and metaventrite (Fig. 3E), and abdominal ventrites 1 and 2 larger. Apical 1/3 of lateral margins of elytra not so expanded (Fig. 3A). Aedeagus relatively stout; parameres wide, with slightly pointed apices, with plate-like projections in ventro-basal parts; penis slender, evenly tapering apically. Distributed in Amami-Ōshima. *L. torikaii* sp. nov.

Acknowledgements

We thank Mr. Hisahiro TORIKAI who guided the first author's collecting trip in Amami-Ōshima. We would also like to acknowledge Mr. Seibun HIGA who identified *Ipomoea indica* (BURM.) MERR. We also thank Dr. William D. SHEPARD (EMEC) and Dr. Manfred A. JÄCH (NMW) for reading the manuscript and Mr. Hirofumi FUJIMOTO, Mr. Masato MORI and the late Mr. Takeshi OGATA for offering adult specimens of *Leptelmis gracilis*.

要 約

上手雄貴・吉富博之・林 成多：奄美大島から注目すべきヨコミゾドロムシ属 *Leptelmis* の1新種およびヨコミゾドロムシ *L. gracilis* 幼虫の再記載 (鞘翅目ヒメドロムシ科ヒメドロムシ亜科)。——— ヨコミゾドロムシ属 *Leptelmis* は、日本においてヨコミゾドロムシ *L. gracilis* SHARP のみが本州、四国、九州から知られていたが、琉球列島から本属初記録となる新たな種を奄美大島から発見し、アマミヨコミゾドロムシ *L. torikaii* sp. nov. として記載した。本新種は体型がヨコミゾドロムシの無翅型に似ているが、より小型であること、脚が赤みをおびること、頭部のプラストロン構造が広く分布すること、前胸背板および上翅の毛がより短いこと、前胸背板、中・後胸腹板、腹部第1節および第2節の点刻が大きいこと、上翅側縁部の先端1/3がそれほど拡がらないこと、および雄交尾器の形態により区別することができる。本新種は流水中の主にノアサガオやショウガ科の根から得られ、タイプロカリティーの細流のみから見つかっている。ヨコミゾドロムシは大河川にも生息することから、生息環境においても違いが見られた。また、走査型電子顕微鏡観察に基づきヨコミゾドロムシ幼虫を再記載した。

References

- BCJ (Biodiversity Center of Japan, Nature Conservation Bureau, Ministry of the Environment), 2010. Biodiversity of Japan. A Harmonious Coexistence between Nature and Humankind. 210 pp. Tokyo, Heibonsha Ltd. (In Japanese.)
- HAYASHI, M., S. D. SONG & T. SOTA, 2013. Patterns of hind-wing degeneration in Japanese riffle beetles (Coleoptera: Elmidae). *European Journal of Entomology*, **110** (4): 689–697.
- HAYASHI, M., & H. YOSHITOMI, 2014. Taxonomic treatments of two Japanese elm mid beetles, *Stenelmis vulgaris* NOMURA and *Leptelmis gracilis* SHARP (Coleoptera: Elmidae), with descriptions of their larvae. *Japanese Journal of Systematic Entomology*, **20** (2): 235–244.
- JÄCH, M. A., & J. KODADA, 2016. Elmidae. pp. 591–603. In LÖBL, I., & D. LÖBL (eds.), *Catalogue of Palaearctic Coleoptera*, **3. Scarabaeoidea – Scirtoidea – Dascilloidea – Buprestoidea – Byrrhoidea**. Revised and updated edition. XXVIII + 983 pp. Leiden, Brill.
- JÄCH, M. A., J. KODADA, M. BROJER, W. D. SHEPARD & F. ČIAMPOR, 2016. Coleoptera: Elmidae and Protelmidae. *World Catalogue of Insects*, **14**. XXI + 318 pp. Leiden, Brill.
- JENG, M.-L., & P.-S. YANG, 1993. Elmidae of Taiwan Part II: Redescription of *Leptelmis fomosa* (Coleoptera: Dryopoidea). *Entomological News*, **104** (1): 53–59.
- JUNG, S. W., & Y. J. BAE, 2012. Riffle beetle genus *Leptelmis* (Coleoptera Elmidae) in Korea with descriptions of two new species. *Animal Cells and Systems*, **16** (3): 254–259.
- JUNG, S. W., M. A. JÄCH & Y. J. BAE, 2014. Review of the Korean Elmidae (Coleoptera: Dryopoidea) with descriptions of three new species. *Aquatic Insects*, **36** (2): 93–124.
- KODADA, J., M. A. JÄCH & F. ČIAMPOR, 2016. 19.2 Elmidae CURTIS, 1830. Pp. 561–589. In BEUTEL, R. G., & R. A. B. LESCHEN (eds.), *Handbook of Zoology*, **4** (Part 38), *Coleoptera, Beetles*, **1. Morphology and Systematics (Archostemata, Adepaga, Myxophaga, Polyphaga partim)**. 2nd ed. xvii + 684 pp. Berlin – New York, Walter de Gruyter.
- NOMURA, S., 1962. Some new and remarkable species of the Coleoptera from Japan and its adjacent regions. *Tôhō-Gakuhô*, (12): 35–51, 2 pls.
- SHARP, D., 1888. Descriptions of some new Coleoptera from Japan. *The Annals and Magazine of natural History*, **6** (2): 242–245.

- YANG, J., & Z. ZHANG, 2002. Elmididae. Pp. 811–824. In B. HUANG (ed.), *Fauna of Insects in Fujian Province of China*, 6. 894 pp. Fujian Scientific Technology Publishing, Fuzhou. (In Chinese, with English title and summary.)
- ZHANG, Z., H. SU & C. YANG, 2003. Three new species and one new record of *Leptelmis* (Coleoptera: Dryopoidea: Elmididae). *Entomotaxonomia*, **25** (3): 189–194. (In Chinese, with English title and summary.)

Manuscript received 13 July 2017;
revised and accepted 21 October 2017.