

ORIGINAL ARTICLE

Fungus gnats of the genus *Urytalpa* Edwards (Diptera: Keroplatidae) in Japan

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Abstract

Three Japanese species of the genus *Urytalpa* are examined. *Urytalpa sapporoensis* (Okada) is transferred from *Zelmira*. *Urytalpa yoshidai* and *U. crassicauda* are described as new to science. Morphological characters indicate that *U. yoshidai* is closely related to *Asindulum montanum* Röder, and the genus *Urytalpa* is indicated to be non-monophyletic. A key to the Japanese species is given.

Key words: Keroplatinae, new species, Orfeliini, *Zelmira sapporoensis*.

INTRODUCTION

Urytalpa Edwards, 1929 is a small genus in the tribe Orfeliini of the subfamily Keroplatinae, and nine species have been referred to the genus (Krivoshchina & Mamaev 1988; Chandler 1994; Zaitzev & Menzel 1996; Kallweit & Plassmann 1999). Of these, six species are known from the western Palaearctic region, one is known from northern India and two are known from Primorskiy, Russia. In the present study, I identify three species of the genus from Japan: *Zelmira sapporoensis* Okada, 1938, and two species described here as new.

MATERIALS AND METHODS

Specimens were collected by sweeping and wet-head (80% ethanol) Malaise traps. Description of coloration is based on the specimens mounted from ethanol following the method of Sabrosky (1966). The terminology mainly follows Söli *et al.* (2000). Measurements and numbers of tibial setae are based on at least 10 specimens wherever possible. The tibial spur formula (length of each spur/maximum thickness of the tibial apex) is given in the following order. Spur of fore tibia: anterior spur of mid tibia: posterior spur of mid tibia: anterior

spur of hind tibia: posterior spur of hind tibia. The following abbreviations are used: h-Sc, distance from crossvein h to tip of Sc; h-Rs, distance from crossvein h to base of Rs; h-scr, distance from crossvein h to crossvein sc-r; S1–S8, first to eighth abdominal sternite; T1–T9, first to ninth abdominal tergite; MT, collected by Malaise trap; and KU, K. Uesugi. All of the specimens used here are deposited in the collection of the Laboratory of Systematic Entomology, Hokkaido University, except for some specimens that are in the Saigusa Collection of Kyushu University Museum (KUM).

SYSTEMATICS

Urytalpa belongs to the *Cloeophoromyia*–*Asindulum* group in the Orfeliini (Matile 1978, 1988, 1997). The group includes 10 genera, and its monophyly is well supported by characters of the male terminalia, such as the large aedeagus with long anterior apodeme. In this group, *Urytalpa* is distinguished from the other genera by the following characters: mouthparts shorter than head; palpus five-segmented; mesoscutum with bare areas; posterior margin of anterior thoracic spiracle without black setae; all veins reaching wing margin; basal part of M entirely reduced; branches of M and CuA setulose dorsally; tibial setulae irregularly arranged; male abdomen petiolated and laterally compressed.

The phylogenetic background of the genus is still unclear. *Urytalpa* has wide variation in male terminalia, and any robust characters suggesting its monophyly

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have not been found. Some species of *Urytalpa* (e.g. *U. nussbaumi* Chandler, 1994 and *U. yoshidai* sp. nov.) is inferred to have a close relationship with species in *Asindulum* Latreille, 1805.

In the species descriptions, the following characters commonly found in the species dealt with are omitted: setae black unless otherwise specified; antennal flagellomeres with pale brown pubescence; scape and pedicel with short black setulae; terminal flagellomere with apical papilla; occipital furrow extending from median ocellus to near occipital foramen; scutellar setae arranged in a transverse row; a small patch of minute setulae discernible just below the base of the halter; dorsal side of wing membrane with sparse short setulae posteriorly; fore tibia with semi-oval anteroapical depression densely covered with fine setulae; and mid tibia with posterior comb, hind tibia with anterior and posterior combs.

Key to the *Urytalpa* species in Japan

The key is applicable to the male only. The female is known for only one species, *U. sapporoensis*.

- 1 Abdomen uniformly dark brown, occasionally pale yellow on fourth segment. Branches of M and CuA with some setulae on dorsal side near apex. Mesoscutum setose on most of disk, with two pairs of small bare areas. Anepisternum setose dorsally *U. yoshidai* sp. nov.
- Abdomen brownish yellow with dark brown band markings. Branches of M and CuA with setulae almost along entire length of dorsal side. Mesoscutal setae clearly arranged in rows of acrostichals, dorsocentrals and laterals. Anepisternum setose dorsally or bare 2
- 2 Anepisternum bare. Terminalia with long posterior projections (Fig. 1A–D). Gonostylus with two projections dorsally (Fig. 1A,C) *U. crassicauda* sp. nov.
- Anepisternum setose dorsally. Terminalia almost circular in dorsal view, without posterior projections (Fig. 2B). Gonostylus cylindrical (Fig. 2A,C) *U. sapporoensis* (Okada)

Urytalpa crassicauda sp. nov. (Figs 1A–E, 3A)

Holotype. ♂, labeled 'Koyayama, Oda-chô, Ehimeken, Shikoku, Japan, 29.vii.2000, E. Yamamoto leg., by Malaise trap'.

Paratypes. Honshu: 2♂, Shimashimadani (1♂, 1000–1300 m; 1♂, 1300–1700 m), Azumi, Nagano, 28.vii.1980 (K. Maetô) (KUM); Kyushu: 1♂, Shiratoriyama, Izumi, Kumamoto, 30.vii.1977 (T. Gotô)

(KUM); 1♂, Miike, Ebino, Miyazaki, 28.vii.1977 (T. Gotô) (KUM).

Male. Head dark brown, blackish brown around ocellar triangle. Lateral ocellus separated from eye margin by a distance approximately as long as the diameter of the median ocellus. Antenna brown, as long as or slightly longer than head and thorax combined; scape, pedicel and basal part of first flagellomere yellowish brown; flagellomeres slightly compressed laterally, slightly longer than thick in eighth flagellomere. Frons brown. Face, clypeus and mouthparts brownish yellow to brown.

Thorax brownish yellow. Mesoscutum slightly darkened medially. Mesoscutal setae arranged in irregular rows of acrostichals and dorsocentrals and in scattered rows of lateral setae; dorsocentral rows converging posteriorly; short irregular rows discernible at level of wing base, extending from row of lateral setae to near dorsocentrals. Mesopleuron bare. Metepisternum bare, but with only one minute setula on left side of body in holotype. One or two setae discernible just behind base of halter.

Wing (Fig. 3A) yellowish brown, length 5.4–6.3 mm. Veins dark brown. C extending slightly beyond tip of R_5 . Sc ending in C beyond base of R_s ($h\text{-}Sc/h\text{-}R_s = 1.3\text{--}1.6$). Crossvein $sc\text{-}r$ situated near crossvein h ($h\text{-}scr/h\text{-}Sc = 0.2\text{--}0.4$). Distance between tips of R_1 and R_4 0.7–0.9 times as long as R_4 . Ratio of radiomedial fusion : stem of M_1 and M_2 0.6–1.0.

Legs brownish yellow. Anteroapical depression of fore tibia dark brown. Fore tibia with 3–5 anteroventral (av), 0–2 anterodorsal (ad), 3–5 posterodorsal (pd), 2–7 posterior (p), 3–5 posteroventral (pv) setae; mid tibia with 3–6 av, 6–11 a, 0–3 ad, 7–13 pd, 5–13 p, 5–11 pv setae; hind tibia with 7–11 av, 8–12 anterior (a), 7–10 ad, 10–17 pd, 6–9 p, 9–11 pv setae. Tibial spur formula as follows. 1.3–1.5: 2.0–2.3: 2.6–2.9: 2.3–2.4: 3.1–3.3. Fore metatarsus slightly shorter than fore tibia (0.9:1).

Abdomen brownish yellow. T2–T8 with dark brown band on anterior third to half; band on T2 paler than those on T3–T8. Terminalia as in Figure 1A–E. T9 with Y-shaped depression anteriorly and deeply hollowed posterior margin at middle. Pair of large L-shaped projections discernible between T9 and gonocoxite (Fig. 1D); inner lobe of projection compressed, narrowed apically; inner lobe more strongly narrowed in left projection than in right. Gonocoxites widely separated from each other by membranous area (Fig. 1A). Gonostylus with anterior and posterior projections dorsally. Aedeagus large, extending to sixth segment anteriorly.

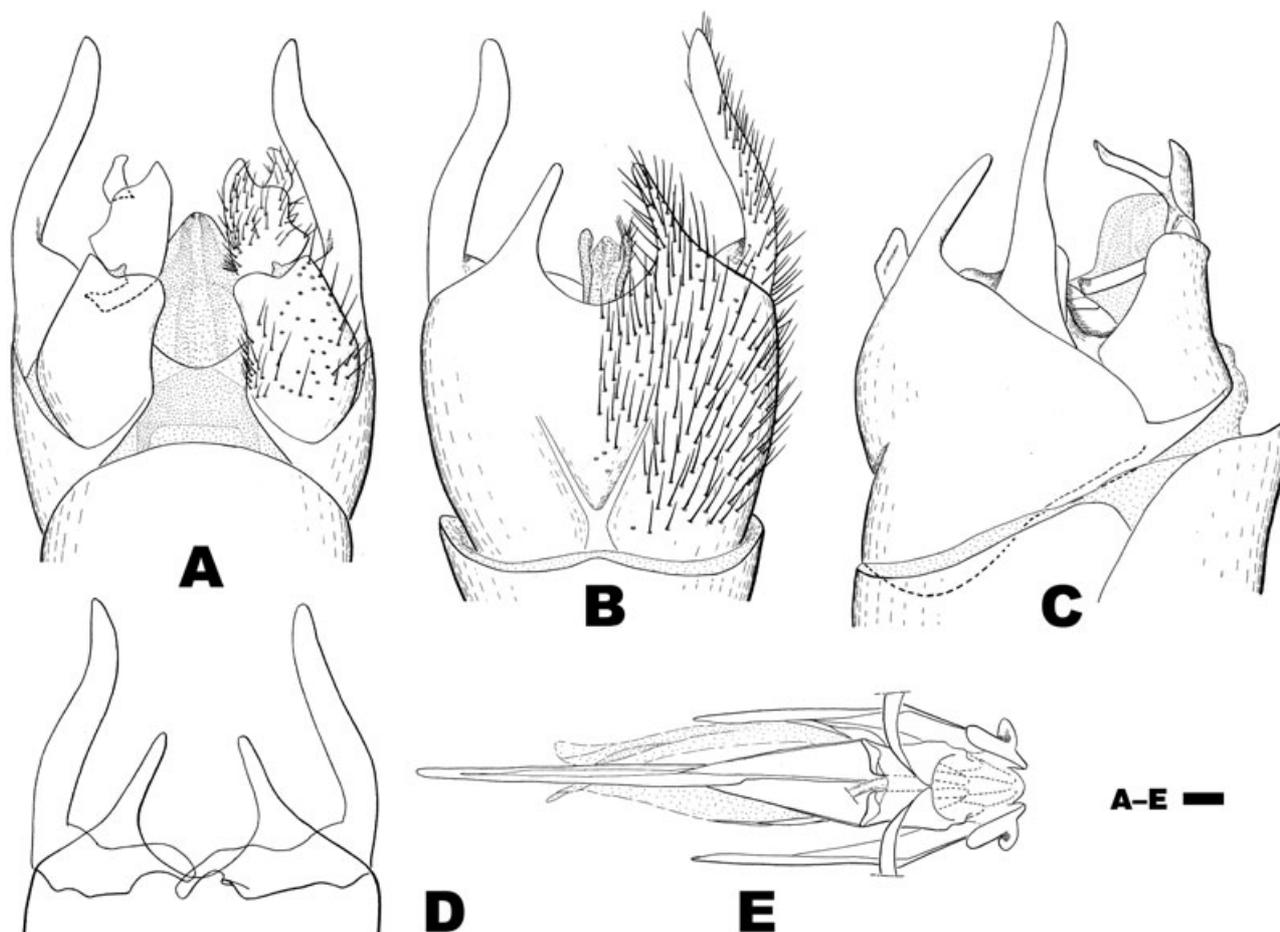


Figure 1 *Urytalpa crassicauda* sp. nov. male terminalia (A–D, holotype; E, paratype). (A) Ventral view, (B) dorsal view, (C) lateral view, (D) posterior projections in dorsal view and (E) aedeagus in dorsal view. Scale line: 0.1 mm.

Female. Unknown.

Distribution. Japan (Honshu, Kyushu and Shikoku).

Remarks. This species is characterized by having a pair of large L-shaped posterior projections of the male terminalia. The Y-shaped depression of T9 and gonostylus with two dorsal projections are also good characters to distinguish this species from other members of *Urytalpa*.

Etymology. The specific name refers to the large male terminalia of the species.

Urytalpa sapporoensis (Okada) comb. nov.

(Figs 2A–F, 3B)

Zelmira sapporoensis Okada (1938): 28.

Material examined. Hokkaido: ♂ (holotype) labeled ‘JAPAN: HOKKAIDO, Sapporo, 26.vii.1935, I. Okada’, ‘Holo-type *Zelmira sapporoensis* OKADA,

1938’ (red label), ‘holotype *Urytalpa sapporoensis* (OKADA, 1938) des. U. Kallweit 1997, ♂’, ‘K-4’; ♀ (paratype) labeled ‘JAPAN: HOKKAIDO, Sapporo, 26.vii.1935, I. Okada’, ‘Allo-type *Zelmira sapporoensis* OKADA, 1938’ (red label), ‘paratype *Urytalpa sapporoensis* (OKADA, 1938) des. U. Kallweit 1997, ♀’. 9♂2♀ (MT), Kikanko-gawa, Kawanishi, Obihiro (A. Ohkawa) (2♂, 11–14.vii.1995; 6♂2♀, 18–21.vii.1995; 1♂, 25–28.vii.1995); 5♂ (MT), Hyakumatsu-zawa, Sapporo, 14.vii.1998 (K. Mizota *et al.*); 13♂5♀, same locality (KU) (1♂, 21.vii.1999; 2♂3♀ (MT), 25.vii.2000; 7♂1♀, 27.vii.1999; 1♀, 1.viii.2000; 3♂ (MT), 8.viii.2000); 4♂ (MT), Kannon-zawa, Sapporo (T. Yoshida) (3♂, 3–22.vii.2002; 1♂, 7.viii.–13.ix.2002); 10♂2♀ (MT), Maruyama, Sapporo (K. Mizota *et al.*) (1♂1♀, 24.vii.1999; 1♂, 31.vii.1999; 7♂1♀, 7.viii.1999; 1♂, 14.viii.1999);

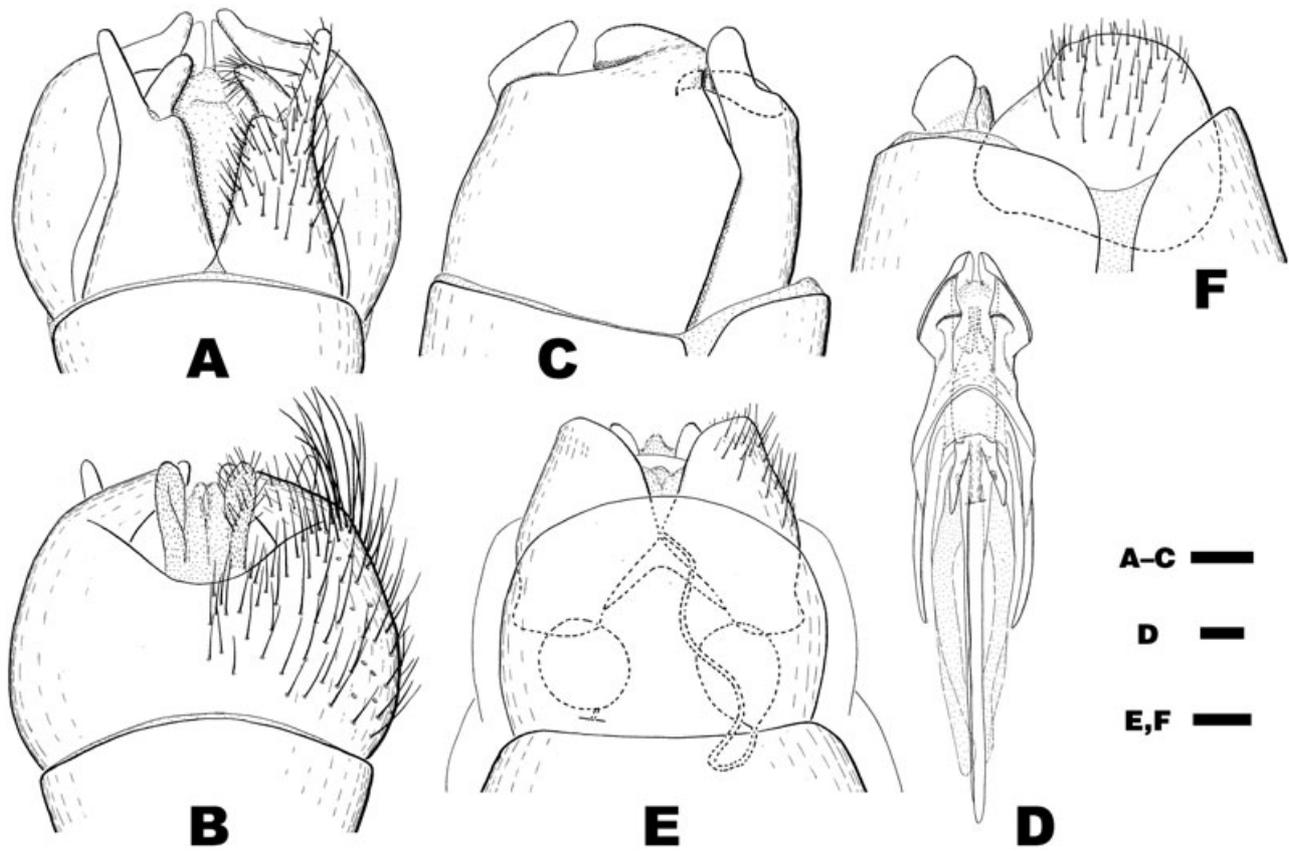


Figure 2 *Urytalpa sapporoensis* (Okada, 1938): (A–D) male and (E,F) female terminalia. (A) Ventral view, (B) dorsal view, (C) lateral view, (D) aedeagus in dorsal view, (E) ventral view and (F) lateral view. Scale lines: 0.1 mm.

12♂4♀ (MT), Miyanomori, Sapporo (KU) (1♂, 11.vii.2000; 6♂4♀, 18.vii.2000; 5♂, 25.vii.2000); 36♂7♀, Shikotsu-ko, Chitose (KU) (2♂2♀ (MT), 11.vii.2000; 31♂3♀, 20.vii.2000; 3♂2♀, 28.vii.2000); 4♂1♀ (MT), Toro-ko, Shibeche (K. Yoshiyama and T. Ito) (3♂, 11–21.vii.2001; 1♂1♀, 21–31.vii.2001); 5♂ (MT), Moizari-gawa, Eniwa, 3–13.viii.2001 (T. Ohkawara and T. Ito); 13♂2♀ (MT), Onneto, Ashoro, 23.vii.–30.viii.2002 (KU).

Male. Head dark brown. Lateral ocellus separated from eye margin by a distance as long as or slightly shorter than its diameter. Antenna brown and distinctly longer than head and thorax combined; scape, pedicel and basal part of first flagellomere yellowish brown; eighth flagellomere 1.9–2.3 times as long as thick. Mouthparts yellow.

Thorax pale brownish yellow, occasionally rather darkened. Mesoscutum with three dark brown vittae, sometimes fused each other: median vitta occasionally paler than lateral one, extending from anterior margin

of scutum to level of wing base; lateral vitta extending from level of anterior spiracle to scutellum. Mesoscutal setae arranged in irregular rows of acrostichals and dorsocentrals and in scattered rows of lateral setae; dorsocentral rows converging posteriorly. Scutellum and mediotergite usually brown. Anterior spiracle occasionally with one to four setae posteriorly and ventrally. Anepisternum setose dorsally. One or two setae discernible just behind base of halter.

Wing (Fig. 3B) pale brown, length 4.2–5.2 mm. Veins brown. C extending fifth to third distance from tip of R_5 to M_1 . Sc ending in C at level of base of R_s ($h-Sc/h-R_s = 0.8-1.1$). Crossvein sc-r situated at level of basal fourth to third between h and tip of Sc, occasionally almost untraceable. Distance between tips of R_1 and R_4 0.9–1.4 times as long as R_4 . Ratio of radiomedial fusion: stem of M_1 and M_2 0.4–0.9.

Legs pale brownish yellow. Anteroapical depression of fore tibia dark brown. Fore tibia with 1–9 av, 0–1 ad, 0–3 pd, 2–5 p, 0–5 pv setae; mid tibia with 1–10 av,

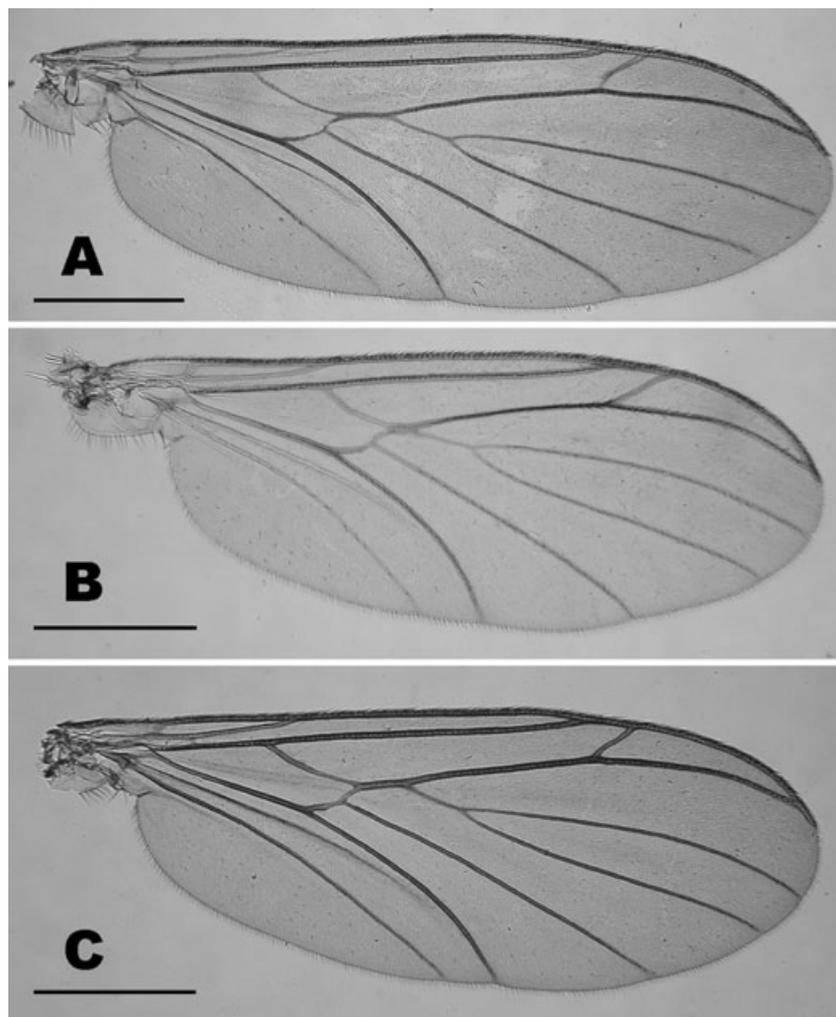


Figure 3 Wings of (A) *Urytalpa crassicauda* sp. nov.; (B) *Urytalpa saporogensis* (Okada, 1938); and (C) *Urytalpa yoshidai* sp. nov. Scale lines: 1 mm.

6–11 a, 1–6 ad, 5–10 pd, 5–11 p, 2–8 pv setae; hind tibia with 0–9 av, 7–15 a, 6–17 ad, 11–20 pd, 3–12 p, 0–10 pv setae. Tibial spur formula as follows. 1.2–1.6: 1.7–2.0: 2.2–2.8: 1.6–2.1: 2.6–3.1. Fore metatarsus shorter than fore tibia (0.7–0.8:1).

Abdomen pale brownish yellow. T2–T5 with anterior dark brown band, variable in length, usually occupying anterior half or more on T2–T3 and anterior third to half on T4–T5; bands on T4–T5 often pale. T6–T8 dark brown, occasionally yellow posterolaterally. Sternites sometimes brown anteriorly. Terminalia as in Figure 2A–D. Apex of gonostylus and sometimes median part of T9 dark brown. T9 circular in dorsal view, slightly longer than height. Gonocoxite narrowed and digitiform beyond level of base of gonostylus. Gonostylus cylindrical, pointed apically.

Female. Similar to male, but coloration occasionally darker than in male; antenna as long as or slightly shorter than head and thorax combined; wing length 4.0–5.8 mm; Sc occasionally long, ending in C beyond base of Rs; abdomen brownish yellow to brown; T1 dark brown, occasionally yellowish brown posteriorly; T2–T7 with anterior dark brown band, variable in length, usually narrow on posterior segments. Terminalia as in Figure 2E,F. Spermathecae sclerotized, almost globular.

Distribution. Japan (Hokkaido).

Remarks. This species was originally described by Okada (1938) under *Zelmira* Meigen, 1800, which was suppressed by the International Commission on Zoological Nomenclature (1963). Okada treated *Zelmira* in a broad sense and described four species from Japan

under the genus: *Z. daisenana* Okada, 1938, *Z. mikado* Okada, 1939, *Z. sciaraeformis* Okada, 1939 and *Z. sapporoensis*. Generic placement of these four species has been unfixed except for *Z. mikado* transferred to *Proceroplatus* Edwards, 1925 (Søli *et al.* 2000), and the species were listed as 'doubtful species' in the Palaearctic catalog (Krivoshchina & Mamaev 1988). I also examined *Z. daisenana* and *Z. sciaraeformis*, and concluded that they are not members of *Urytalpa*. Therefore, these two species are not dealt with in this paper. Before the present study, U. Kallweit (Staatliches Museum für Tierkunde, Dresden) examined the holotype and referred the species to *Urytalpa* (see the type material mentioned above). He has not, however, yet published the new combination that I propose here.

In the specimens examined, particularly those from the eastern part of Hokkaido, one to several setae are often observed behind each anterior thoracic spiracle. The presence of these setae is not in accordance with the generic diagnosis of *Urytalpa*. However, the present species is referred to *Urytalpa* because the spiracular setae are not consistently present, and even if present, they are few in number and rarely arranged in a row as in the genera (e.g. *Neoplattyura* Malloch, 1928) which have distinct spiracular setae.

In having a circular T9, this species is similar to *U. trivittata* (Lundström, 1914) known from Europe, but can be easily distinguished from it by the digitiform apex of gonocoxite and the cylindrical gonostylus (in *U. trivittata* the former not protruded beyond base of gonostylus and the latter broadened basally (fig. 10 from Lundström 1914)).

***Urytalpa yoshidai* sp. nov.** (Figs 3C, 4A–F)

Holotype. ♂, labeled '42°28'N, 141°02'E, Kôzan-chô, Noboribetsu-shi, Hokkaidô, Japan, 28.vii.–11.viii.2002, T. Yoshida leg., by Malaise trap'.

Paratypes. Hokkaido: 15♂, same data as holotype; Honshu: 1♂, Shimofukuda, Yatsuka, Okayama, 2.viii.2001 (KU); 1♂, Makihara, Daisen, Tottori, 3.viii.2001 (KU); 1♂, Daisen, Tottori, 8.viii.1978 (T. Gotô) (KUM); 1♂, Hirasano, Shiga, 30.viii.1969 (O. Yata) (KUM).

Male. Head dark brown. Lateral ocellus separated from eye margin by a distance half to as long as its diameter. Antenna approximately as long as head and thorax combined, with basal part of first flagellomere yellowish brown; flagellomeres slightly compressed laterally, almost as long as thick in eighth flagellomere. Face and clypeus usually yellowish brown medially, higher than wide and produced ventrad to level of ventral margin

of eye. Mouthparts dark brown except labrum yellowish brown to brown, weakly elongated (Fig. 4F), distance from ventral margin of eye to tip of labela 0.5–0.7 times as long as eye height; labela directed ventrad. Postgena occasionally yellowish brown.

Thorax dark brown. Mesoscutum brownish yellow in ground color, with three dark brown wide vittae: median vitta extending from anterior margin to level of wing base, narrowed posteriorly; lateral vitta extending from level of anterior spiracle to scutellum, occasionally fused with median one. Mesoscutum setose on most of disk, with two pairs of small bare areas: anterior pair narrow, situated on median vitta and extending from anterior margin to approximately the middle of the mesoscutum; posterior pair oval, each one situated on lateral vitta and extending from level of wing base to scutellum. Scutellum brownish yellow, dark brown medially. Anepisternum setose dorsally. Anepimeron yellowish brown. One to five setae discernible just behind base of halter. Metepisternum and metepimeron yellowish brown ventrally. Halter dark brown with yellow stem.

Wing (Fig. 3C) pale brown, length 4.8–5.5 mm. Veins dark brown. Branches of M and CuA with some setulae on dorsal side near apex. C extending fifth to third distance from tip of R₅ to M₁. Sc ending in C slightly beyond level of base of R_s (h-Sc/h-R_s = 1.1–1.3). Crossvein sc-r situated near crossvein h (h-scr/h-Sc = 0.2–0.4). Distance between tips of R₁ and R₄ 0.7–2.0 times as long as R₄. Ratio of radiomedial fusion : stem of M₁ and M₂ 0.4–0.9.

Legs brownish yellow. Dorsobasal part of fore coxa, ventrobasal fourth to half of mid femur and basal half or more of hind femur usually brown. Anteroapical depression of fore tibia dark brown. Fore tibia with 2–6 av, 0–3 a, 0–6 ad, 1–7 pd, 2–8 p, 3–6 pv setae; mid tibia with 2–7 av, 5–11 a, 1–7 ad, 7–11 pd, 4–10 p, 4–8 pv setae; hind tibia with 4–10 av, 6–14 a, 4–13 ad, 9–17 pd, 3–9 p, 5–13 pv setae. Tibial spurs blackish brown, formula as follows. 1.8–2.1: 2.2–2.5: 3.4–3.9: 2.2–2.6: 3.6–4.2. Fore metatarsus slightly shorter than fore tibia (0.9:1).

Abdomen dark brown; fourth segment entirely pale yellow in some specimens from Honshu. Terminalia as in Figure 4A–E. T9 semicircularly hollowed medially, with a pair of digitiform processes posteriorly. Gonocoxites widely separated from each other by membranous area, lobated posteriorly, lobes being setose also on inner surface; dorsal margin with semicircular and incurved protrusion developed before apex of gonocoxite. Gonostylus cylindrical, broadened basally, with

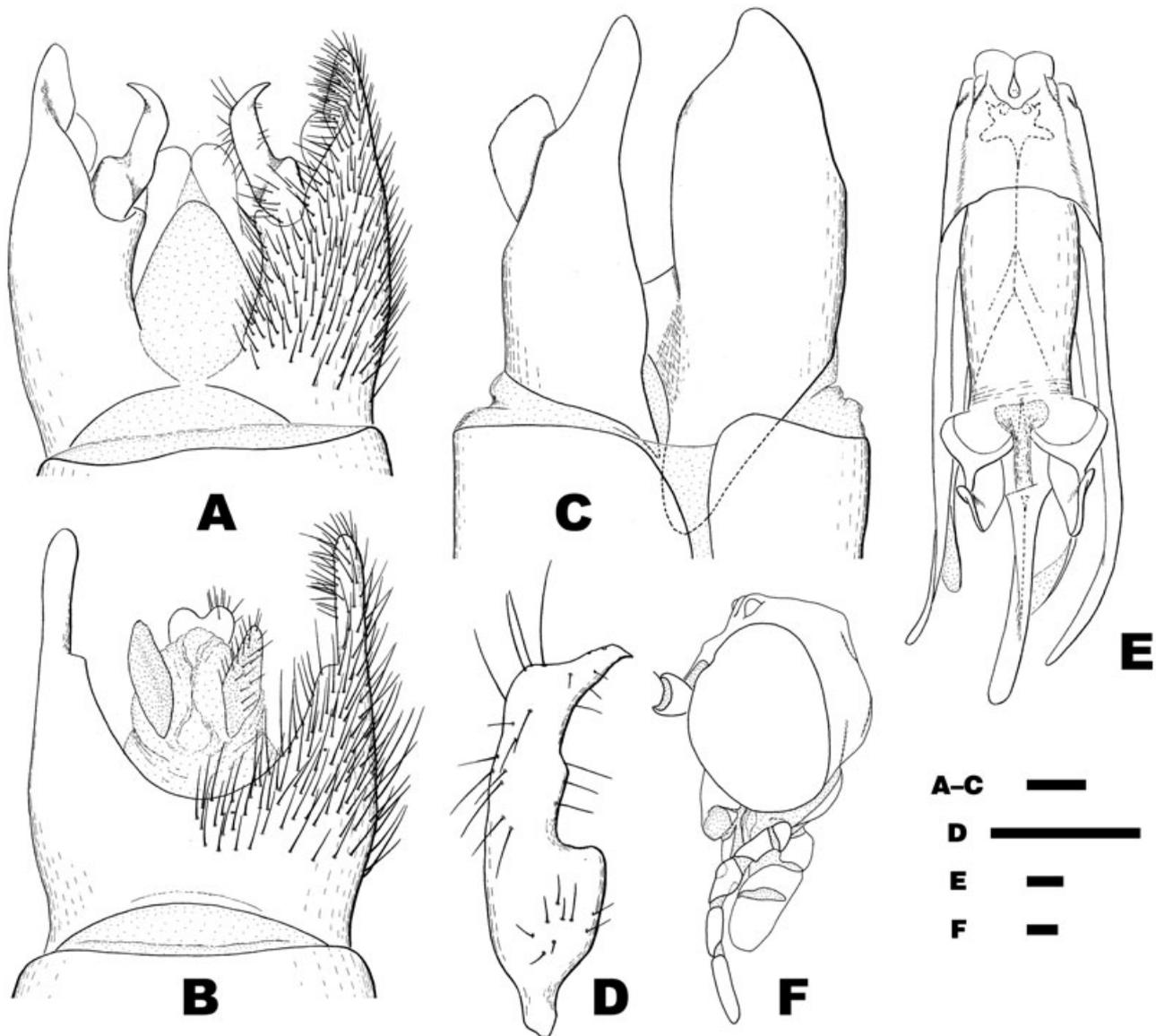


Figure 4 *Urytalpa yoshidai* sp. nov. male terminalia (A–E) and head (F) (A–D, holotype; E, F, paratype). (A) Ventral view (T9 and proctiger omitted), (B) dorsal view (gonopods and aedeagus omitted), (C) lateral view, (D) right gonostylus in ventrolateral view, (E) aedeagus in dorsal view and (F) head in lateral view. Scale lines: 0.1 mm.

apex pointed, slightly curved outward. Aedeagus extending to seventh segment anteriorly; posterior apex sclerotized into pair of reniform projections.

Female. Unknown.

Distribution. Japan (Hokkaido, Honshu).

Remarks. Some paratypes collected in Honshu are clearly different from the specimens from Hokkaido in having a pale yellow fourth abdominal segment. The Honshu form is also slightly different in having a

more acute posterodorsal corner of the gonostylus. However, in other external and genital features, no significant differences are found between these two local forms.

Judging from its external features, this species should be assigned to *Urytalpa* in the present classification. However, some characters support its close relationship to *Asindulum*, at least to *Asindulum montanum* Röder, 1887, rather than to other members of

Urytalpa. One male specimen determined as *A. montanum* by J. R. Vockeroth is available for the present study. I could not find enough information in the literature to determine whether the characters mentioned below for *A. montanum* are also found in other *Asindulum* species. *Urytalpa yoshidai* shares two apomorphic characters with *A. montanum*; namely, the elongated mouthparts and apically setulose branches of M and CuA. Although the elongation of mouthparts in *U. yoshidai* is not strong enough to assign the species to *Asindulum*, it is intermediate between the two genera (ratio of length of mouthparts : eye height 0.5–0.7 in *U. yoshidai* (Fig. 4F), 1.6 in *A. montanum*, and 0.3–0.5 in *U. crassicauda* and *U. sapporoensis*). Moreover, *U. yoshidai* lacks, as well as *A. montanum*, two apomorphic characters shared by other Japanese *Urytalpa* species; namely, mesoscutal setae clearly arranged in acrostichals, dorsocentrals and laterals and T9 expanded ventrad, covering lateral sides of gonocoxites (in *U. yoshidai* and *A. montanum*, the former scattered on most of disk with two pairs of small bare areas and the latter situated as a roof above gonocoxites). These two species show resemblance in their external appearances and in the structures of male terminalia, such as semicircular dorsal protrusion of the gonocoxite, shape of the gonostylus and apical structure of the aedeagus.

Concerning *A. montanum*, it should be noted that the abdomen of the species is petiolated and laterally compressed like species of the *Urytalpa*. This character contradicts the diagnosis of *Asindulum* given by Matile (1978).

Etymology. This species is named in honor of Takuma Yoshida who collected most of the type material.

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