



Revision of Japanese species of the genus *Ecnomus* McLachlan (Trichoptera: Ecnomidae), with descriptions of two new species

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Abstract

Five species of the genus *Ecnomus* McLachlan (Ecnomidae), including 2 new species, are recognized from Japan: *E. hokkaidensis* sp. nov. from Hokkaidô and *E. sakishimensis* sp. nov. from Ishigaki-jima and Iriomote-jima, Ryûkyû Islands, are described. *Ecnomus japonicus* Fischer, originally described from Kyûshû, is re-described. In addition, illustrations of the male and female genitalia are provided for *E. tenellus* (Rambur) and *E. yamashironis* Tsuda, which are common species in Japan. *Ecnomus kososiensis* Kobayashi, originally described from Honshû, and *E. tsudai* Kumanski, originally described from Korea, are synonymized under *E. tenellus* and *E. japonicus*, respectively.

Key words: caddisflies, new synonyms, distribution

Introduction

Species of the genus *Ecnomus* McLachlan are small to medium sized caddisflies whose larvae live on rocks in slow-flowing rivers and streams and along shorelines of lakes and ponds. They are distributed primarily in the Oriental, Afrotropical, and Australasian biogeographical regions, with 316 nominal species worldwide (Morse 2016). In Japan, the major part of which is included in the East Palaearctic region, only 4 species have been recorded previously: *E. tenellus* (Rambur 1842), *E. yamashironis* Tsuda 1942, *E. japonicus* Fischer 1970, and *E. kososiensis* Kobayashi 1987. *Ecnomus tenellus* is the most common species in Japan followed by *E. yamashironis*. They are both often enumerated in faunal studies of Japan (Kuhara 2015). On the other hand, few or no specimens of *E. kososiensis* and *E. japonicus* have been recorded after the original descriptions by Kobayashi (1959, 1987). This is partly due to inadequate descriptions. In this paper, I revise the Japanese *Ecnomus* species, resulting in 5 valid species and 2 new species.

Materials and methods

About 3000 adult *Ecnomus* specimens collected from throughout Japan were examined, including the type specimen of *E. kososiensis* deposited in Natural History Museum and Institute, Chiba (CBM). Both the holotype and paratype of *E. japonicus* are missing. Types of newly described species are deposited in Systematic Entomology, Hokkaido University (SEHU) and CBM.

Terminology generally follows Li & Morse (1997). Collectors are abbreviated as follows: AO = A. Ohkawa; NK = N. Kuhara; TI = T. Ito. To save space, the specimen list for *Ecnomus tenellus* does not include detail of localities, collection dates and collector names for most localities.

Ecnomus hokkaidensis sp. nov.

(Figs. 1A–J, 6)

Ecnomus sp.: Kuhara *et al.* 2007, appendix 69.

Diagnosis. The male of this species is very similar to that of *E. tenellus*, but can be distinguished from it by the shape and structure of the inferior appendages. In *E. hokkaidensis*, each inferior appendage bears a spatulate projection basodorsally, whereas *E. tenellus* has an ear-like dorsal projection at midlength. In ventral aspect, the inferior appendages are relatively longer and more slender and are angled abruptly inward at midlength in *E. hokkaidensis*, but they are stouter and smoothly curved in *E. tenellus*. The female of this species is characterized by sternum VII with 2 ventromesal plates.

Description. Adult (Fig. 1). Length of each forewing of male 4.5–5.7 mm (mean = 5.0 mm, n = 17), female 4.7–5.5 mm (mean = 5.0 mm, n = 14). Head frons with single frontal wart, pair of ellipsoidal dorsal hypomedial warts, and indistinct pair of small ventral hypomedial warts; vertex with pairs of oval antennal, preocellar, ocellar, and occipital warts (Figs. 1A, 1B). Pronotum with 2 pairs of warts; lateral warts indistinct laterally; medial warts round; mesonotum with pair of round scutal warts and pair of semicircular scutellar warts (Fig. 1A). Legs with tibial spur formula 3, 4, 4. Forewings each with fork of R₁ and forks I, II, III, IV and V, discoidal cell, median cell and thyridial cell; crossvein *m-cu* near bifurcation of medial vein; hind wings with forks II and V (Fig. 1C).

Male genitalia (Figs. 1D–H). Tergum IX long, reaching posterior margin of sternum IX (Fig. 1D); anterodorsal margin deeply and widely excised (Fig. 1E); sternum IX drop-shaped in lateral aspect (Fig. 1D), with longitudinal median line in ventral aspect (Fig. 1F); anteroventral margin deeply notched; posteroventral margin shallowly and broadly excised (Fig. 1F). Segment X with pair of finger-shaped posteroventral projections, each weakly bent inward at midlength and with 2 setae apically; anterolateral arms curved outward anteriorly (Fig. 1E). Superior appendages elongate-triangular, tapering to blunt apices in lateral aspect (Fig. 1D); mesal surfaces concave, each with short triangular projection near base bearing 3 apical setae (Fig. 1E); stout setae arising from apical and dorsal margins in distal 2/5 (Figs. 1D, 1E). Inferior appendages subequal in length with superior appendages; each elongate, slightly upcurved, thick basally, constricted medially in lateral aspect (Fig. 1D); with outer margin abruptly angled 45° inward at midlength, tapered to blunt apex in ventral aspect (Fig. 1F); with mesally-directed spatulate projection basodorsally (Fig. 1G). Basal plate of inferior appendages sclerotized, with pair of small triangular projections laterally 1/3rd distance from anterior end (Figs. 1F, 1G); with pair of small, longitudinal, posterodorsal projections directed anteromesad and bearing setae along margins (Fig. 1H). Phallus with strongly sclerotized phallobase, tubular, curved downward (Fig. 1H); distal 1/3 flattened dorsoventrally and spoon-shaped (Fig. 1G); parameres and basodorsal lobes absent.

Female genitalia (Figs. 1I, 1J). Sternum VII with 2 distinctly pigmented ventromesal plates; anterior plate oval; posterior plate wide, concave anteriorly with posterolateral extensions in ventral aspect (Fig. 1J). Ventral plates of sternum VIII suboval, each with 3 long setae along apical margin (Fig. 1J). Segment XI setose, unpigmented with narrow, oblique, sclerotized bands anterolaterally (Fig. 1I).

Holotype. male (pinned), Japan, Hokkaidô, Ishikari, Chitose-shi, Shikotsu-ko, Poropinai, 42.80°N, 141.34°E, 14.viii.2006, NK (SEHU).

Paratypes. 1 male (pinned), type locality, 12.viii.2005, NK (SEHU); 14 males (in alcohol), type locality, 10.viii.2005, NK (CBM); 4 males, type locality, 5.viii.2005, NK (SEHU).

Other specimens. [Hokkaidô] Kushiro: 2 males, Kushiro-chô, Hokuchiku-ura, 15.viii.2007, T. Kosugi; 6 males, 11 females, Kushiro-chô, Kushiro-gawa, 15.viii.2007, TI & T. Kosugi; 2 males, 2 females, Kushiro-chô, Takkobu-numa, 8.viii.2006, TI; 2 males, 1 female, Kushiro-shi, Iwabokki, 3.vii.1987, M. Itou; 1 female, Shibe-chô, Shirarutoro-ko, 7.vii.2006, TI. Sôya: 2 males, Sarufutsu-mura, Narita-gawa, Kaede-bashi, 31.vii.2007, NK & TI; 1 female, Sarufutsu-mura, Asajino, outlet of Kamuito-numa, 31.vii.2007, NK; 3 males, 4 females, Sarufutsu-mura, pond nr. Sarufutsu-gawa, 31.vii.2007, NK; 10 males, 2 females, Sarufutsu-mura, Sarufutsu-2-gôsen-gawa, Shôbu-bashi, 31.vii.2007, NK & TI. Rumoi: 6 males, 15 females, Rumoi-shi, Ôwada, el. 9-10 m, 2.viii.2015, NK. Ishikari: 2 males, 4 females, type locality, 5.viii.2005, NK; 1 male, 6 females, *ibid*, 12.viii.2005, NK; 1 female, *ibid*, 17.viii.2005, NK; 1 male, 2 females, *ibid*, 14.viii.2006, NK; 1 male, Chitose-shi, Shikotsu-ko, Okotan, 29.vii.1990, NK; 1 female, Chitose-shi, Shikotsu-ko, Shikotsuko-onsen, 9.viii.2006, NK; 6 males, 2 females, Chitose-shi, Shikotsu-ko, Shishamonai, 5.viii.2005, NK; 8 males, 12 females, *ibid*, 10.viii.2006, NK; 1 male, Eniwa-shi, Izari-gawa, el. 130 m, 2.viii.2015, TI; 1 male, Eniwa-shi, Izari-gawa, el. 170 m, 17.vii.2015, TI.

Etymology. Named for its distribution in Hokkaidô.

Distribution. Japan: Hokkaidô.

Habitat. Adults of this species have been collected beside slow flowing streams or rivers and shorelines of a pond in the Kushiro Marsh, Kushiro, and Lake Shikotsu-ko, Ishikari.

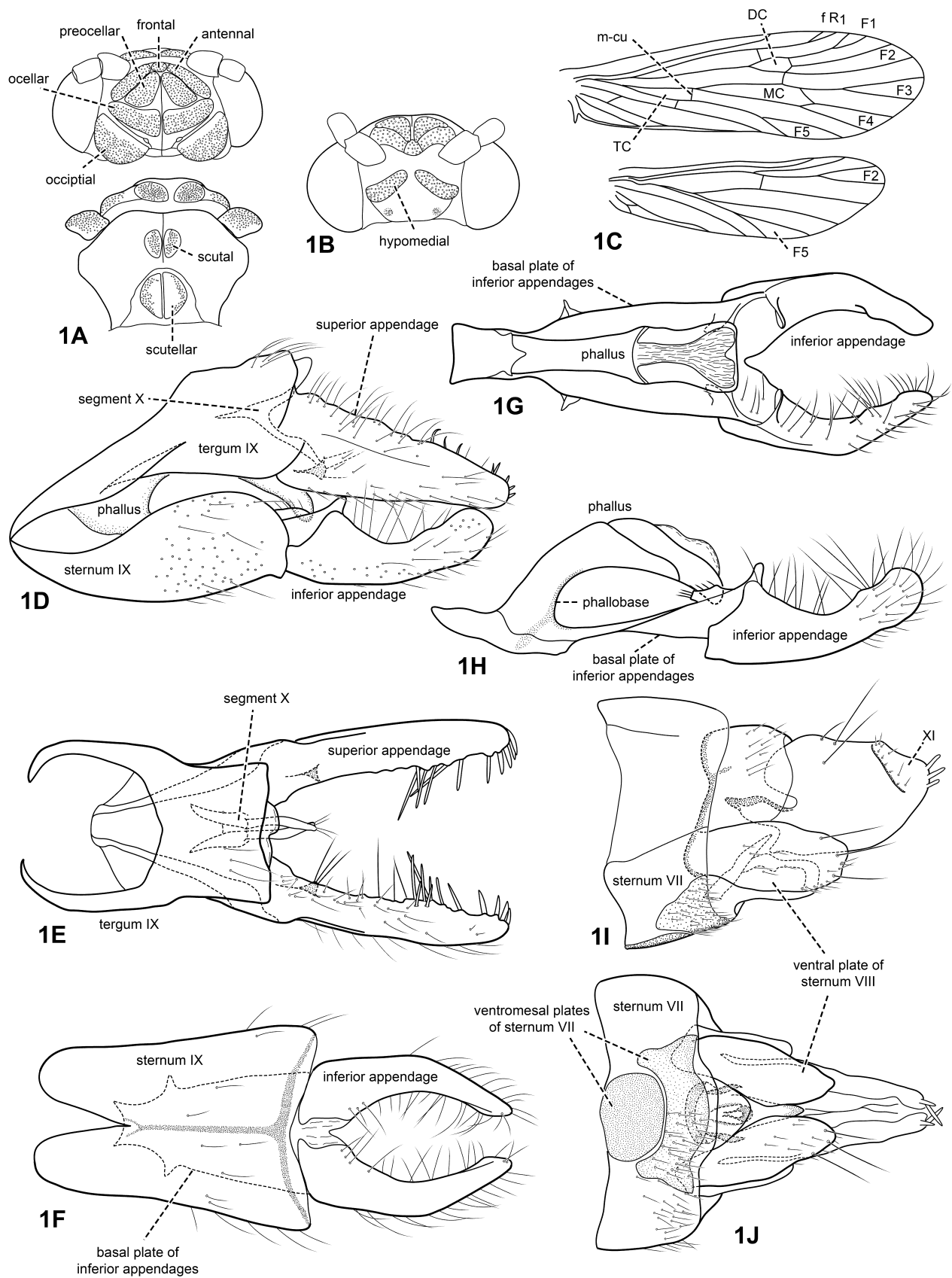


FIGURE 1. *Ecnomus hokkaidensis* sp. nov. (type locality; 1D–1F, holotype). 1A, head, prothorax and mesothorax, dorsal; 1B, head, frontal; 1C, right wings, venation, dorsal; 1D–1F, male genitalia: 1D, left lateral; 1E, dorsal; 1F, ventral; 1G–1H, male phallus and inferior appendages: 1G, dorsal; 1H, left lateral; 1I–1J, female genitalia: 1I, left lateral; 1J, ventral. Abbreviations: DC = discoidal cell; MC = median cell; TC = thyridial cell; m-cu = crossvein *m-cu*; f R₁ = fork of R₁; F1–F5 = fork 1–fork 5.

Remarks. The downward curved phallus with spoon-shaped apex indicates this species belongs to the *E. tenellus* Group of Li & Morse (1997). This is the fourth species in the Group distributed in the East Palaearctic region, as a result of *E. tsudai* and *E. kososiensis* becoming invalid names as discussed below.

***Ecnomus tenellus* (Rambur 1842)**

(Figs. 2A–D, 6)

Philopotamus tenellus Rambur 1842: 503 [Type locality: France]. (Type not seen.)

Ecnomus omiensis Tsuda 1942: 268–269, fig. 27 [Type locality: Japan, Honshû, Shiga and Kyôto]. Synonymized by Schmid (1958).

Ecnomus kososiensis Kobayashi 1987: 16, figs. 4–8, male, female [Type locality: Japan, Honshû, Shimane, Matsue]. **New synonym.**

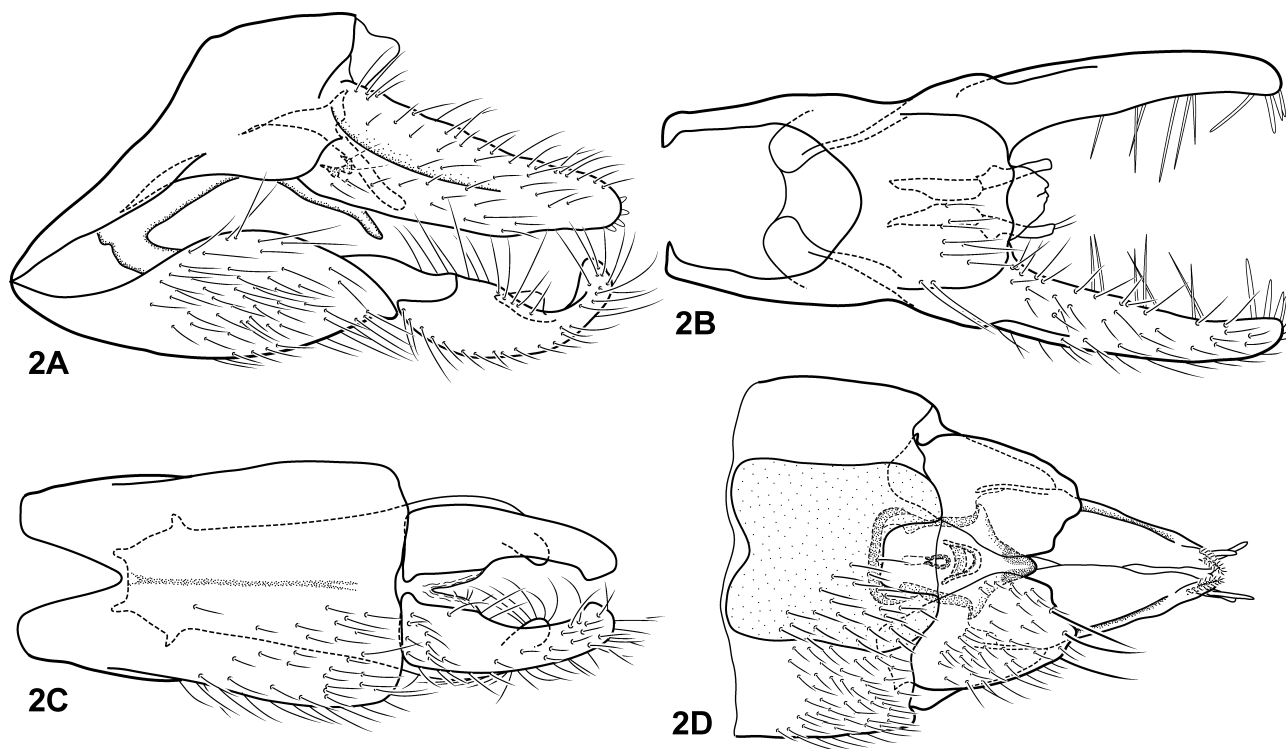


FIGURE 2. *Ecnomus tenellus* Rambur (Hokkaidô, Shikotsu-ko). 2A–2C, male genitalia: 2A, left lateral; 2B, dorsal; 2C, ventral; 2D, female genitalia, ventral.

Diagnosis. This species is easily distinguished from the other Japanese species by the upcurved inferior appendages each with a short ear-like dorsal projection at midlength in the male, and the posteromesal rectangular notch of the ventromesal plate of segment VII in the female.

Nielsen (1957, 1980) described external and internal morphology of the genital segments in detail for the male and female of this species, respectively. In addition, several authors described and illustrated the general morphology and genitalia of the two sexes (e.g., Schmid 1958; Li & Morse 1997; Arefina 2003). Illustrations of male (Fig. 2A–C) and female (Fig. 2D) genitalia of Japanese specimens are provided.

Specimens examined. 1 male (holotype of *Ecnomus kososhiensis*; CBM; specimen number of Kobayashi, 8294), ‘Kososhi (30 m), Matsue-shi, Shimane Pref.’, 15.X.1965, H. Kadowaki; 1 male, 1 female (paratypes of *Ecnomus kososhiensis*; CBM; specimens no. of Kobayashi, 8286), same location, 24.IX.1965, H. Kadowaki. [Hokkaidô] Kushiro, 171 males, 225 females; Tokachi, 44 males, 11 females; Sôya, 183 males, 140 females; Rumoi, 104 males, 58 females; Kamikawa, 96 males, 111 females; Ishikari, 178 males, 228 females; Iburi, 184 males, 176 females; Hiyama, 1 male; Oshima, 175 males, 78 females. [Honshû] Ibaraki, 2 males, 1 female; Gumma, 1 male; Kanagawa, 5 males, 4 females; Niigata, 2 males; Fukui, 2 males, 2 females; Yamanashi, 2 males; Nagano, 16 males, 47 females; Shizuoka, 2 males; Mie, 5 males, 2 females; Shiga, 9 males, 4 females; Shimane, 17

males, 12 females. [Shikoku] Ehime, 2 females; Kochi, 6 males, 5 females. [Kyûshû] Fukuoka, 6 males, 8 females. [Small islands around 4 mainlands] Rishiri-tô, 26 males; Iki-no-shima, 3 females. [Ryûkyû Islands] Okinawa-tô, 7 males, 2 females; Kume-jima, 5 males, 4 females; Ishigaki-jima, 13 males, 86 females, Iriomote-jima, 2 males, 7 females; Yonaguni-jima, 4 males, 1 female. [Europe] Great Britain, 5 males; Germany, 11 males, 3 females; Poland, 2 males, 2 females.

Distribution. Widely distributed in the East and West Palaearctic, Oriental and Afrotropical regions. In Japan: Hokkaidô, Honshû, Shikoku, Kyûshû, Rishiri-tô, Iki-no-shima, Ryûkyû Islands (Okinawa-tô, Kume-jima, Ishigaki-jima, Iriomote-jima, Yonaguni-jima).

Habitat. Most specimens shown above were collected along shorelines of lakes and ponds, suggesting that the larvae prefer lentic waters. In Britain, however, larvae of this species also inhabit slow-flowing rivers in addition to lakes (Edington & Hildrew, 1995).

Remarks. Kobayashi (1987) described *E. kososiensis* from Honshû, Japan. Judging from the original description, this species seems to be similar to *E. tenellus*, but he did not mention the diagnostic characters to discriminate them. My examination of the type specimen of *E. kososiensis* reveals that it agrees well with specimens of *E. tenellus* collected in Japan and Europe, and hence *E. kososiensis* is placed as a junior subjective synonym of *E. tenellus*.

Ecnomus yamashironis Tsuda 1942

(Figs. 3A–D, 6)

Ecnomus yamashironis Tsuda 1942: 267–268, fig. 26 [Type locality: Japan, Honshû, Shiga and Kyôto]. (Type not seen.)

Diagnosis. This species can be distinguished from the other Japanese species by the elongate and straight inferior appendages in the male and the trilobed posterior margin of the ventromesal plate of segment VII in the female.

In the original description, Tsuda (1942) described and illustrated the male genitalia of this species. In addition, Li & Morse (1997) and Arefina (2003) re-described the male and female genitalia based on Chinese and Far East Russian specimens, respectively. Illustrations of the male (Figs. 3A–C) and female (Fig. 3D) genitalia of the Japanese specimens are provided.

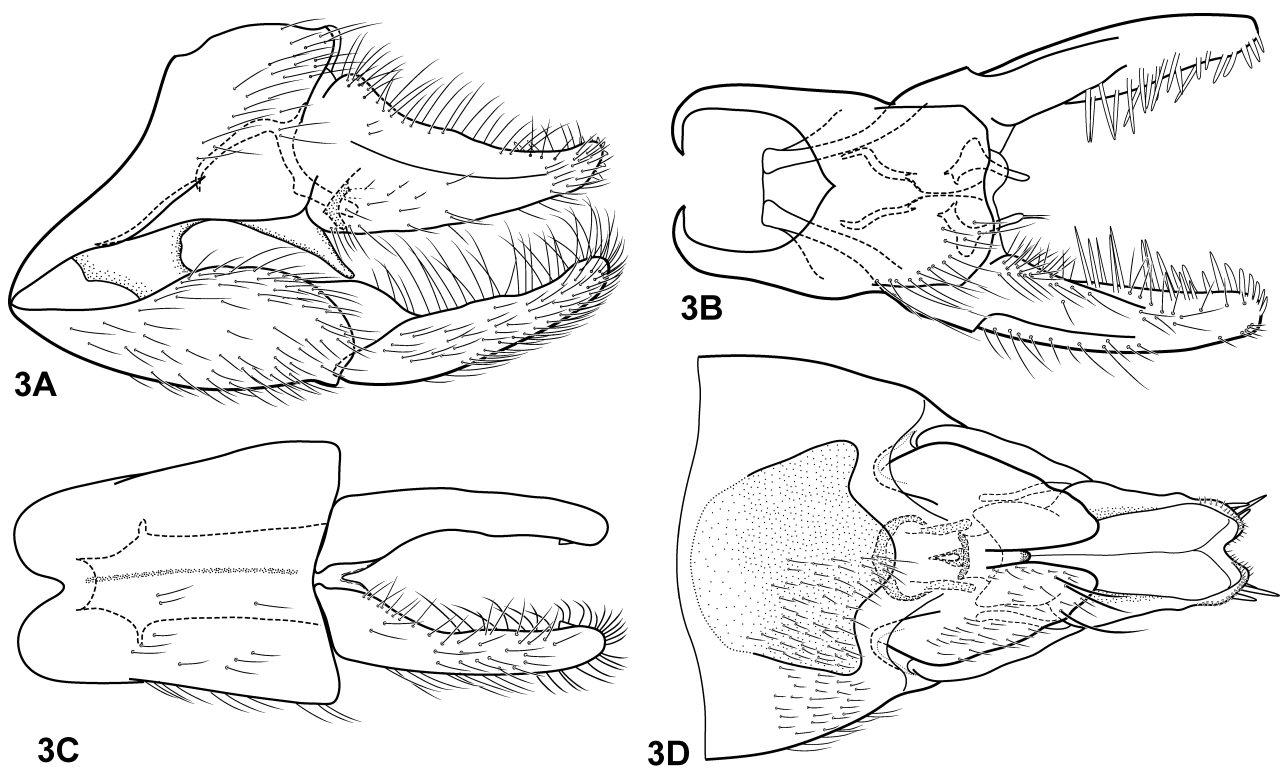


FIGURE 3. *Ecnomus yamashironis* Tsuda (Honshû, Shizuoka, Kakida-gawa). 3A–3C, male genitalia: 3A, left lateral; 3B, dorsal; 3C, ventral; 3D, female genitalia, ventral.

Specimens examined. [Hokkaidô] Sôya: 2 females, Sarufutsu-mura, Narita-gawa, Kaede-bashi, 31.vii.2007, NK; 1 female, Sarufutsu-mura, Nigori-kawa, Wakakusa-bashi, 1.viii.2007, TI; 19 males, 5 females, Sarufutsu-mura, Asajino, outlet of Kamuito-numa, 31.vii.2007, NK; 7 males, Sarufutsu-mura, Sarufutsu-2-gôsen-gawa, Shôbu-bashi, 8.vii.2007, NK & TI; 24 males, 18 females, *ibid*, 31.vii.2007, NK & TI; 2 males, 1 female, Sarufutsu-mura, tributary of Sarufutsu-gawa, 15.vii.2006, NK; 15 males, 4 females, Toyotomi-chô, Sarobetsu-gawa, Kaiun-bashi, 16.vii.2006, NK; 1 female, Wakkanai-shi, Masuhoro-gawa, 20.viii.1997, TI & AO. Rumoi: 21 males, 53 females, Rumoi-shi, Ôwada, el. 9-10 m, 2.viii.2015, NK. Ishikari: 1 male, Chitose-shi, Neshikoshi, Chitose-gawa, 20.viii.1997, NK; 1 male, Chitose-shi, Bibi, Chitose-ko, 28.vii.2007, TI. [Honshû] Ibaraki: 1 male, 2 females, Ishige-machi, Kinu-gawa, 16.vii.1997, K. Tojo; 4 males, Yasato-machi, Gorindô, Koise-gawa, 16.v.1998, N. Kawase. Shizuoka: 3 males, 3 females, Shimizu-chô, Kakita-gawa, 27.v.2001, T. Nozaki, & K. Tanida. Mie: 2 males, 1 female, Kameyama-shi, pond in Sekichô-washiyama, 5.ix.2013, TI; 6 males, 8 females, *ibid*, 10.ix.2014, TI. Shimane: 1 male, 3 females, Ôda-shi, Sambe, Ukinuno-no-ike, 5.viii.2001, AO.

Distribution. Japan (Hokkaidô, Honshû), Korea, China, Russian Far East.

Habitat. Many specimens shown above were collected along slow-flowing, lowland rivers, suggesting that the larvae may prefer lotic waters. According to Nishino & Tanida (1992), however, adults can be collected also along shorelines of Lake Biwa-ko in central Honshû.

***Ecnomus japonicus* Fischer 1970**

(Figs. 4A–D, 6)

Ecnomus serrata Kobayashi 1959: 347–348, fig. 3, male [type locality: Japan, Kyûshû, Fukuoka, Yoshii]. Preoccupied by *Ecnomus serratus* Ulmer 1930. (Type not seen.)

Ecnomus japonicus Fischer 1970: 242. [replacement name for *Ecnomus serrata* Kobayashi]

Ecnomus tsudai Kumanski 1992, 62–63, figs. 35–40, male, female [type locality: North Korea, Province Pyôngannam-do] **New synonym.**

Diagnosis. The upturned apices of the male inferior appendages of this species are similar to those of *E. connatus* Li & Morse 1997 from China, but *E. japonicus* can be distinguished from the latter by the shape of the superior appendages, which are parallel-sided in lateral aspect; and the parameres, which are flattened and boot-shaped. These boot-shaped parameres are also unique among Japanese species. The female is distinguished from the other Japanese species by the combination of the lack of a ventromesal plate of sternum VII and the large ventral plates of segment VIII.

Description. Adult (Fig. 4). Length of each forewing of male 4.7–5.4 mm (mean = 5.2 mm, n = 6), female 5.2–5.4 mm (mean = 5.3 mm, n = 4). Warts on head and thorax similar to those of *E. hokkaidensis* **sp. nov.** except as follows: Preocellar warts on head vertex subtriangular (Fig. 4A); frons with pairs of large dorsal hypomedial warts and distinct small ventral hypomedial warts (Fig. 4B); medial warts on pronotum slightly larger than in *E. hokkaidensis* (Fig. 4A). Venation similar to *E. hokkaidensis* but forewing crossvein *m-cu* meeting median vein well before bifurcation of medial vein (Fig. 4C).

Male genitalia (Figs. 4D–H). Tergum IX short, about 1/2 as long as sternum IX (Fig. 4D); anterodorsal margin shallowly excised (Fig. 4F); sternum IX without longitudinal median line (Fig. 4E); in lateral aspect ventral margin nearly linear, dorsal margin expanded around midlength (Fig. 4D); in ventral aspect anterior and posterior margins shallowly excised (Fig. 4E). Segment X represented by pair of short broad plates, each triangular in dorsal aspect with 3 setae apically (Fig. 4F). Superior appendages elongate, parallel-sided with rounded apices in lateral aspect (Fig. 4D), inner surfaces with black stout peg-like setae in apical 1/4; finger-like projection arising from each ventrobasal corner, with 2 or 3 setae apically (Fig. 4F). Inferior appendages extending to or slightly beyond posterior end of superior appendages, upcurved preapically (Fig. 4D); basal plate semisclerotized, with pair of small narrow lateral projections at 1/3rd distance from anterior end (Fig. 4G). Phallus bulbous basally, acute apically; parameres moderately sclerotized, short, flattened, boot-shaped in lateral aspect, directed posterodorsad; dorsobasal lobe distinct (Fig. 4H).

Female genitalia (Figs. 4I, 4J). Ventromesal plates of sternum VII absent. Ventral plates of sternum VIII large, subquadrate in lateral aspect, each with 3 long setae along apical margin (Fig. 4I); outer surfaces slightly sinuate (Fig. 4J). Segment X short (Fig. 4I). Segment XI setose, well pigmented (Figs. 4I, 4J).

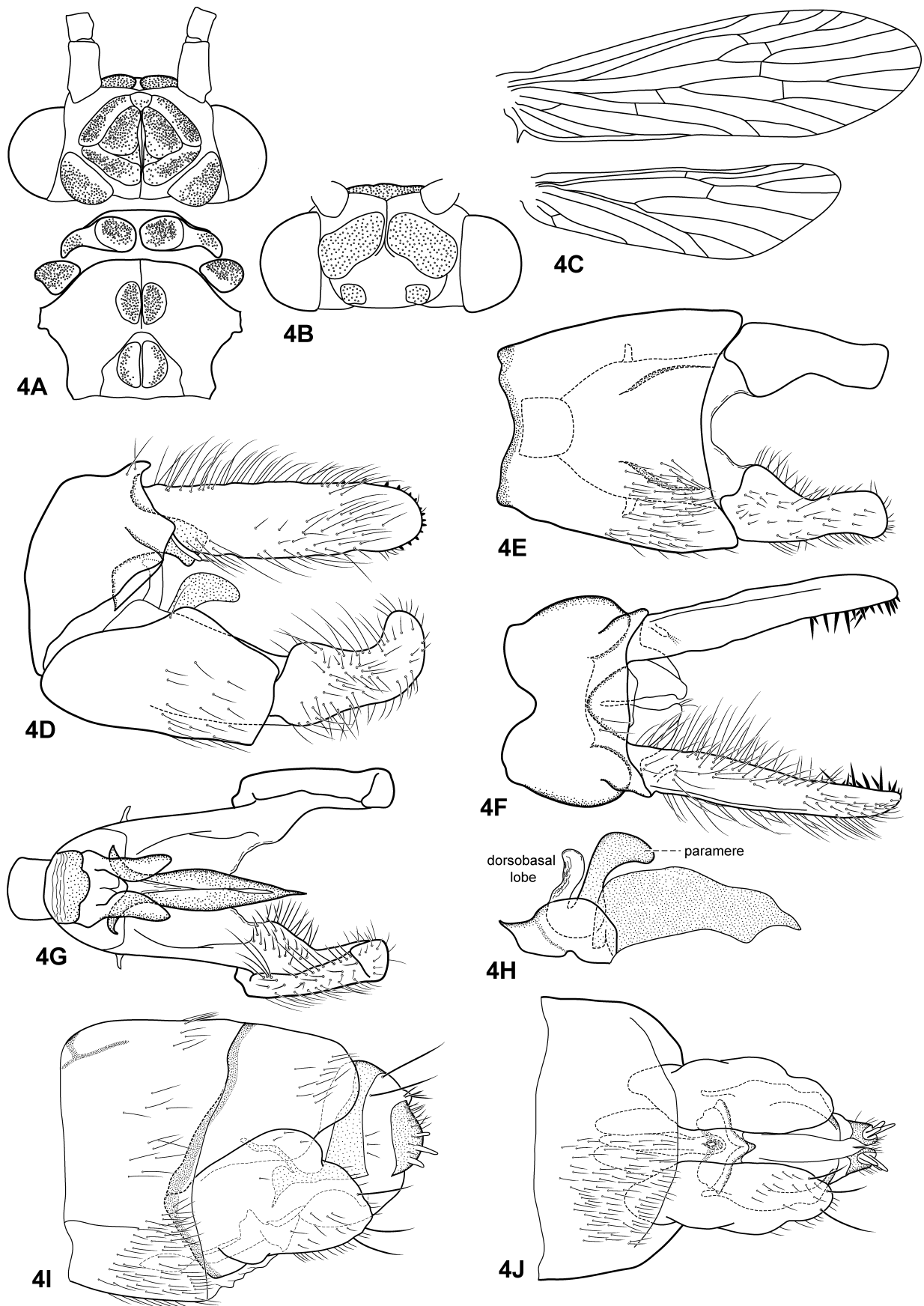


FIGURE 4. *Ecnomus japonicus* Fischer (Sikoku, Tokushima, Taniuchi-gawa). 4A, head, prothorax and mesothorax, dorsal; 4B, head, frontal; 4C, right wings, venation, dorsal; 4D–4F, male genitalia: 4D, left lateral; 4E, dorsal; 4F, ventral; 4G, male phallus and inferior appendages, dorsal; 4H, phallus, left lateral; 4I–4J, female genitalia: 4I, left lateral; 4J, ventral.

Specimens examined. [Hokkaidô] Rumoi: 6 females, Rumoi-shi, Ôwada, Rumoi-gawa, el. 10 m, 2.viii.2015, NK. [Honshû] Ibaraki: 1 male, Takahagi-shi, Yokokawa, Oyama-dam, 17.vii.2010, N. Katsuma. Kanagawa: 1 male, Sagami-hara-shi, Mikage, 28.v.2007, N. Katsuma. Mie: 1 male, Ise-shi, Kôraibiro, 4.ix.2004, H. Morita; 1 male, Ise-shi, Tsurugi-tôge, 15.vi.2002, H. Morita; 3 males, Kumano-shi, Kiwachô, 12.viii.2009, H. Morita. Shiga: 1 female, Higashiômi-shi, Yuzurio-chô, Kanzaki-gawa, Kazaoka-dani, el. 380 m, 6.ix.2013, TI; 1 male, Yogo-chô, Suganami, 6.viii.2008, T. Ushijima. Kyôto: 1 male, Ayabe-shi, 16.ix.2006, NK; 1 male, Sonobe-chô, 22.viii.2000, S. Tsukaguchi. [Shikoku] Tokushima: 5 males, 3 females, Aioi-chô, Taniuchi-gawa, 3.ix.2004, S. Tsukaguchi; 1 male, Kamiyama-chô, Minamigyôshano, Akui-gawa, 28.v.2004, K. Nio. Kôchi: 1 male, Niyodo-mura, Mori, 11.vii.2004, M. Takai. [Kyûshû] Fukuoka: 1 female, Hisayama-machi, Ino, Todoroki-gawa, 21.ix.2000, AO. [Tsushima] 2 males, 2 females, Tsushima-shi, Kamiagata-cho, Sago, 1.5 km South of Kônoki-yama, 22-23.vii.2009, R. B. Kuranishi. [Korea] 2 males, 2 females, Gyeongsangbuk-do, Cheongdo, Unmun-myeon, Sinwon-ri, 30.viii.2015, S. Inaba & S. Park.

Distribution. Japan: Hokkaidô, Honshû, Shikoku, Kyûshû, Tsushima. Korea, Russian Far East (Khabarovsk and Primorye Territories).

Habitat. Adults were collected beside a lowland river in Hokkaidô.

Remarks. The male genitalia of *Ecnomus tsudai* Kumanski, described from Korea is essentially identical to that of this species judging from the original description (Kumanski 1992) and examination of Korean specimens. Thus, I conclude that *E. tsudai* is a junior subjective synonym of *E. japonicus*. *Ecnomus japonicus* belongs to the *E. connatus* Group of Li & Morse (1997), because the phallus is bulbous basally and acute apically, the superior appendages are elongate, and sternum IX lacks longitudinal median line.

Ecnomus sakishimensis sp. nov.

(Figs. 5A–G, 6)

Diagnosis. The male of this species is somewhat similar to that of *E. ramayana* Malicky & Chantaramongkok 1993 described from Thailand, but can be distinguished from the latter and also other *Ecnomus* species by the unique shape and structure of the inferior appendages which are short and subtriangular in lateral aspect and have a mesal projection. The female is characterized by the ventral plates of segment VIII, which are relatively small and constricted in the basal half.

Description. Adult (Fig. 5). Length of each forewing of male 3.5–5.0 mm (mean = 4.3 mm, n = 13), female 3.7–5.1 mm (mean = 4.5 mm, n = 8). General appearance similar to *E. japonicus*.

Male genitalia (Fig. 5A–E). Tergum IX short, about 1/2 to 2/3 as long as sternum IX (Fig. 5A); anterodorsal margin deeply notched (Fig. 5B); sternum IX without longitudinal median line; anteroventral margin shallowly excised; posterior margin nearly straight (Fig. 5C). Segment X represented by pair of short, broad plates, each with 3 setae along posteromesal margin (Fig. 5B). Superior appendages slender, long, almost parallel-sided with round apices in lateral aspect (Fig. 5A), weakly curved inward in dorsal aspect (Fig. 5B); inner surfaces concave, bearing black peg-like stout setae along dorsal and apical margins in distal 1/3 (Fig. 5B); finger-like projection arising from each ventrobasal corner, with 2 setae apically (Fig. 5B). Inferior appendages short, as long as high, not reaching posterior end of superior appendages, subtriangular in lateral aspect (Fig. 5A); each with inner projection curved dorsomesad, tapered to apex (Figs. 5A, 5C); basal plate semisclerotized, with pair of small lateral projections at midlength (Fig. 5C). Phallus bulbous basally, acute apically, sclerotized laterally and membranous dorsally, including pair of sclerites; parameres moderately sclerotized, flattened, subtriangular in lateral aspect, directed posterodorsad; dorsobasal lobe distinct (Fig. 5E).

Female genitalia (Figs. 5F, 5G). Ventromesal plate of sternum VII absent. Ventral plates of sternum VIII relatively small, constricted in lateral aspect (Fig. 5F) and projecting anterad laterally at basal 1/3rd to 1/2nd; each with basal part adhering to main body of segment; distal part flap-like, each with 3 long setae along posterior margin (Figs. 5F, 5G). Segment X with small sclerites on posterior unpigmented portion (Fig. 5F). Segment XI setose, well pigmented (Figs. 5F, 5G).

Holotype. male (in alcohol), Japan, Ryûkyû Islands, Iriomote-jima, Taketomi-chô, Ômijya-gawa, Ômijya-bashi, 24.39°N, 123.86°E, 24.iii.1999, TI & AO (SEHU).

Paratypes. 4 males, (in alcohol), same data as holotype (CBM); 5 males, Iriomote-jima, Taketomi-chô, Aira-

gawa, nr. R. 217, 28–30.x.2012, TI (SEHU); 3 males (in alcohol), Iriomote-jima, Taketomi-chô, Aira-gawa, 13–17.iii.2002, T. Yoshida & H. Sugaya (CBM).

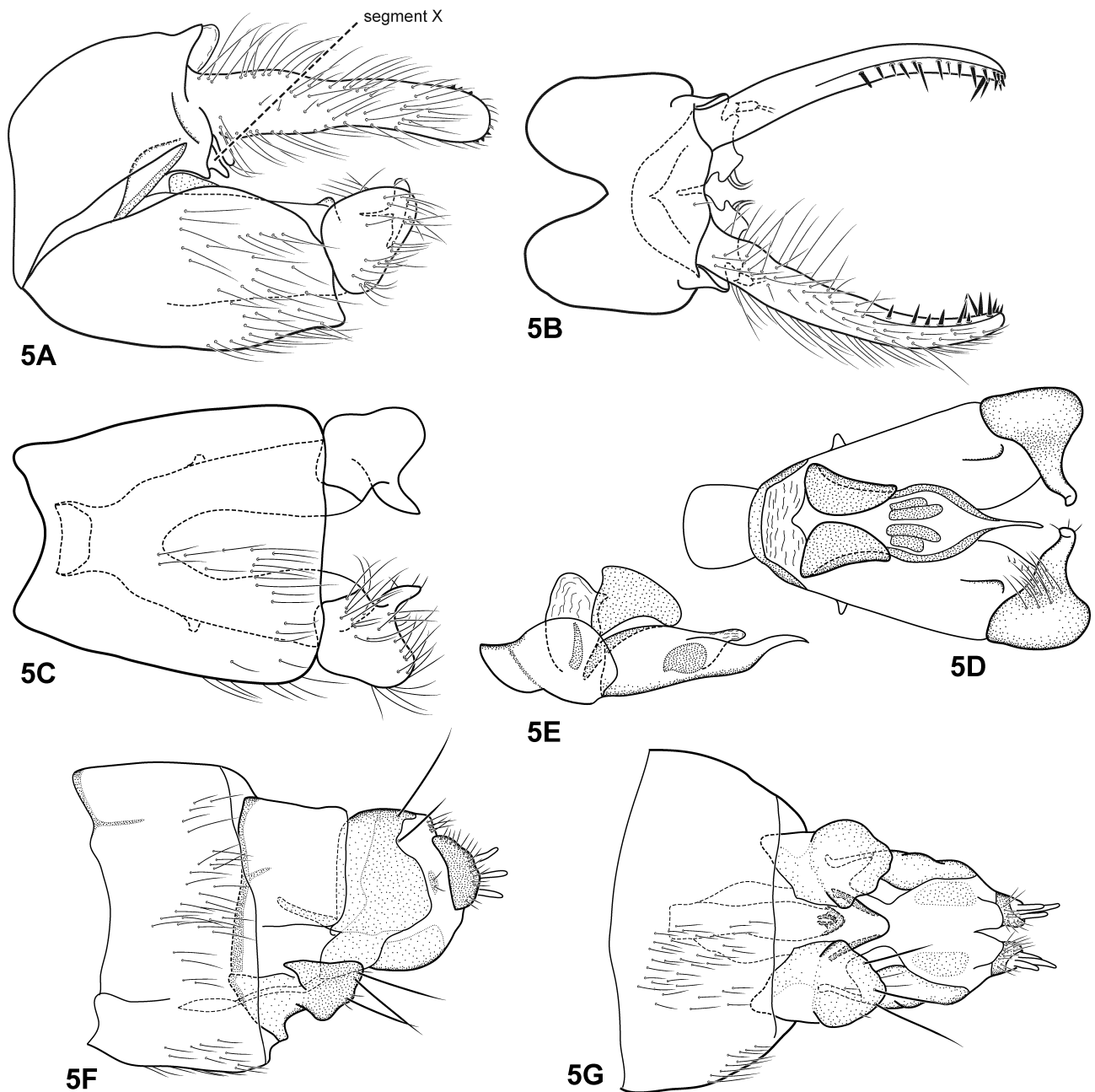


FIGURE 5. *Ecnomus sakishimensis* sp. nov. (type locality; 5A–5C, holotype). 5A–5C, male genitalia: 5A, left lateral; 5B, dorsal; 5C, ventral; 5D, male phallus and inferior appendages, dorsal; 5E, phallus, left lateral; 5F–5G, female genitalia: 5F, left lateral; 5G, ventral.

Other specimens. [Ryûkyû Islands] Ishigaki-jima: 6 males, 3 females, Ishigaki-shi, Hokusui, Nagura-gawa, el. 3–28 m, 13–21.x.1999, K. Konishi; 2 males, 1 female, *ibid*, 11–15.iv.2005, TI; 1 female, *ibid*, 22.iii.2009, TI. 1 male, *ibid*, 11.iii.2011, TI; 1 female, *ibid*, 12.iv.2011, TI; 3 males, 14 females, *ibid*, 25–26.x.2012, TI; 1 male, Ishigaki-shi, Nagura-gawa, el. 95 m, 26.x.2012, TI; 1 male, 3 females, Ishigaki-shi, tributary of Nagura-gawa, el. 9 m, 11–13.iv.2011, TI; 2 males, 1 female, Ishigaki-shi, stream nr. Nagura-dam, el. 70 m, 11.iv.2011, TI. Iriomote-jima: 1 male, Taketomi-chô, Aira-gawa, 24.iii.1999, TI & AO; 1 male, 2 females, *ibid*, 13–17.iii.2002, T. Yoshida & H. Sugaya; 2 females, *ibid*, 1.xii.2013, TI; 1 male, Taketomi-chô, Ôtomi, Nishifunatsuki-gawa, 23.iii.1999, TI & AO; 1 female, *ibid*, 30.x.2012, TI; 2 males, same data as holotype; 1 male, type locality, 13.iv.2005, TI; 4 females, type locality, 9.x.2012, TI.

Etymology. Named for its distribution in the Sakishima Islands, which is the southern part of the Ryûkyû Islands, including Ishigaki-jima and Iriomote-jima.

Distribution. Japan: Ryûkyû Islands (Ishigaki-jima, Iriomote-jima).

Habitat. The above specimens were collected beside streams and rivers, mainly in the middle reaches.

Remarks. This species belongs to the *E. connatus* Group of Li & Morse (1997), because the phallus is bulbous basally and acute apically, the superior appendages are elongate, and sternum IX lacks a longitudinal median line. The Ryûkyû Islands, except the northern part, are usually considered to be included in the Oriental region (Toda *et al.* 2003), hence this is an Oriental species.

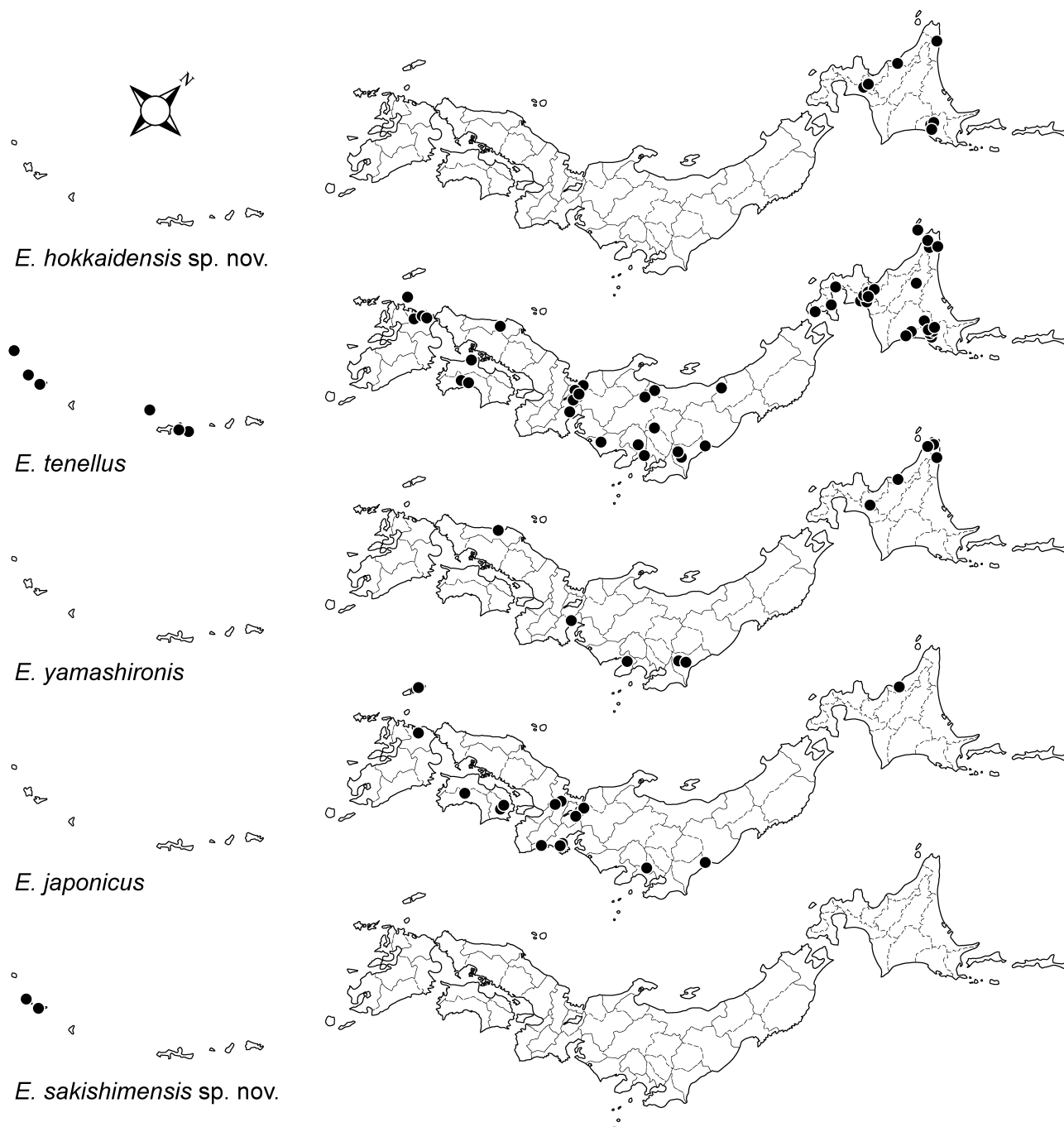


FIGURE 6. Collection sites of *Ecnomus* species in Japan.

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