Zootaxa 1339: 1–29 (2006)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

1339

The genus *Goera* Stephens (Trichoptera: Goeridae) in Japan

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Accepted by R. Holzenthal: 8 Sept. 2006; published: 19 Oct. 2006

Abstract

We revise the Japanese species of *Goera* (Trichoptera: Goeridae), and confirm 15 species. Six new species, *G. akagiae* Tanida and Nozaki, *G. dilatata* Nozaki and Tanida, *G. nigrosoma* Nozaki and Tanida, *G. shikokuensis* Nozaki and Tanida, *G. tajimaensis* Tanida and Nozaki, and *G. uchina* Tanida and Nozaki, are described. *Goera gyotokui* Kobayashi and *G. nipponensis* Navás are synonymized with *G. curvispina* and *G. japonica*, respectively. *Goera tenuis* Ulmer and *G. tungusensis* Martynov are newly recorded for the Japanese fauna. Females of *G. curvispina*, *G. kawamotonis*, *G. lepidoptera* Schmid, *G. spicata* Schmid and *G. tenuis* are described for the first time

Key words: Trichoptera, Goeridae, *Goera*, Japan, new species, new records

Introduction

Goera Stephens 1829 is a large genus of Trichoptera distributed in the Holarctic, Oriental, African and Australian biogeographic regions. In Japan, 9 named species have been recorded (Nozaki *et al*. 2000, Satake *et al*. 2005), however, some taxonomic problems remain. For example, the specific status of *Goera nipponensis* Navás 1933 and *Goera gyotokui* Kobayashi 1957 should be confirmed since their genitalic characteristics in original descriptions closely resemble those of *Goera japonica* Banks 1906 and *Goera curvispina* Martynov 1935, respectively. Furthermore, adult stages of 3 species separated with only tentative alphabetic designations of *Goera* (as GB (Tsuda and Akagi 1962), GC (Akagi 1974) and GD (Tanida 1997)) have not yet been described.

Through the course of our study on Japanese *Goera*, we recognized 15 species in the Japanese fauna. In this paper, we describe or redescribe males and females of all species, including 6 new species.

Material and methods

Adult specimens deposited in our own and other collections have been used for this study. Male and female genitalia were figured after treatment in hot 10% KOH. Morphological terms mainly follow Yang and Armitage (1996) and Armitage and Arefina (2003). The depositories of the specimens are abbreviated as follows: Brian J. Armitage, Midwest Biodiversity Institute, Columbus, Ohio (BJA), Natural History Museum and Institute, Chiba (CBM), Canadian National Collection, Ottawa (CNC), Deutsches Entomologisches Institut, Eberswald (DEI), K. Tanida, Osaka Prefecture University, Sakai (KT), M. Aoyagi, Osaka (MA), Mineo Kobayashi, Yokohama (MK), N. Kuhara, Chitose (NK), National Museum of Natural History, Smithsonian Institution, Washington, DC (NMNH), Osaka Museum of Natural History, Osaka (OMNH), T. Nozaki, Kanagawa Environmental Research Center, Hiratsuka (TN).

***Goera japonica* Banks 1906**
Fig. 1

Goera japonica Banks 1906, 108–109, male; Tsuda and Akagi 1955, 235–236, larva, case; Chihara 1956, 81–82, pupa; Tsuda and Akagi 1962, 140, larva, case; Kobayashi 1971, 35–36, male, female; Tani 1977, 205, male; Kobayashi 1984, 20, male, female; Tanida 1985, 197, larva, case.
Goera nipponensis Navás 1933, 107–108, male, female. **Syn. nov.**

Adult. Body, wings, antennae yellowish brown. Head short; ocelli absent; anterior setal warts round in female, absent in male; posterior setal warts large and oval. Antennae 8–11 mm long; scape ca. 1.5 mm long, with long setae. In male maxillary palpi, distal segment oval, membranous and elastic with long setae on outer surface and brown scale lope on mesal surface; apical tube-like lobe bearing many black scales is housed in the mesal surface, expanded one very long. Male abdominal sternite VI with 9–19 long spines in comb-like arrangement, central one usually longest and broad but number, length and shape variable; sternite V with several small spines. Female abdominal sternite VI with 6–20 small spines, sternite V usually bears several tiny spines.

Male genitalia. Segment IX long, oblique in lateral aspect; ventromesal lobe long, about 5 times as long as wide in ventral aspect. Dorsal process of tergum X absent. Paired ventrolateral processes of tergum X long, strongly sclerotized, branched in apical third, each branch acute. Preanal appendages long, about 2/3 as long as ventrolateral processes. Inferior appendages large; basal segment elongate, oblique, large; distal segment distinct, bearing long dorsal lobe with rounded apex, mesal process strongly sclerotized with acute apex directed laterad. Phallus simple, tubular, dorsum of apical half membranous, phallic apodema triangular in lateral aspect.

Female genitalia. Tergum X bilobed, each 2 times as long as wide, apices triangular in lateral aspect. Supragenital plate long, relatively acute in ventral aspect. Lamellae slightly bilobed, rounded apically. Gonopod plate about as long as wide; apicomesal process trapezoid. Spermathecal sclerite slender with paired lateral lip in ventral aspect, bearing rectangular box anteriorly.

Larva. Larval stage has been described by Tsuda and Akagi (1955) and Tanida (1985).

Specimens examined. **Hokkaido:** 1 male, 3 females, Nishifuren-gawa, Bekkai-cho, 12.vii.1985, T. Nozaki (TN); 2 males, 3 females, Saromabetsu-gawa, Hanazono, saroma-cho, 7.viii.1985, T. Nozaki (TN); 10 males, 16 females, Masuhoro-gawa, Koetoi, Wakkanai-shi, 9.viii.1999, T. Ito and A. Ohkawa (TN); 1 female, Kaminisama, Iwaonai, Asahi-cho, Shibetsu-shi, 9.vii.1985, T. Nozaki (TN); 1 male, 2 females, Iwafuchi-gawa, Kumaishi-cho, 1–10.vii.1995, Y. Ito and T. Ito (TN); **Miyagi:** 1 female, Yoko-kawa, 500 m a.s.l., Shichigashuku-machi, 5.vii.1998, T. Hattori (TN); **Akita:** 2 male pupae, Lake Towada-ko, Wainai, Kosaka-machi, 7.vii.1998, H. Kato (TN); **Fukushima:** 3 males, 2

females, Surikami-gawa, Nakamoniwa, Iisaka-cho, Fukushima-shi, 31.v.1997, T. Kishimoto(TN); **Tochigi:** 1 male, 7 females, Kinomata-gawa, Kitamuro, Kuroiso-shi, 6.vi.1987, T. Nozaki (TN); **Gumma:** 3 males, 4 females, Sanba-gawa, Onishi, Fujioka-shi, 29.v.1991, S. Ishiwata (TN); **Tokyo:** 1 female, Yagawa, Kunitachi-shi, 14.vi.1986, N. Kobayashi (TN); 7 males, 3 females, Tama-gawa, Nagata-bashi, Fussa-shi, 23.vii.1993, T. Nozaki *et al*. (TN); **Kanagawa:** 1 male, 1 female, Sagami-gawa, Okada, Atsugi-shi, pupae collected on 23.iii.1981 emerged on 30.iii–7.iv.1981 by T. Nozaki (TN); 2 males, Sakai-gawa, Komatsu, Shiroyama-machi, larvae collected on 21.iii.1984, emerged on 10–13.iv.1984 by T. Nozaki (TN); 10 females, Sawai-gawa, wada, Fujino-machi, 11.vii.1984, T. Nozkai (TN); 2 females, Magino, Fujino-machi, 8.vii.1988, T. Nozaki (TN); **Niigata:** 2 females, Noguchi, Arakawa-machi, 31.v–15.vi.1985, S. Togashi (TN); **Sado:** 1 female, Tassha-gawa, Sado-shi, 1.viii.1988, N. Nishimura (TN); **Nagano:** 2 females, Lake Kizaki, Omachi-shi, 12.x.1987, M. Uenishi (TN); 1 male, 2 females, Oguro-gawa, 900m a.s.l., Ina-shi, 14.vii–19.ix.1999, T. Tsuruishi; 1 female, Shira-kawa, 1060m a.s.l., Mitake, Kiso-machi, 4.viii.1998, T. Nozaki (TN); **Gifu:** 1 male, Hatsushika-dani, 300 m a.s.l., Motosu-shi, 4.v.1996, T. Hattori (TN); **Shizuoka:** 6 females, Okitsu-gawa, Shimizu-shi, 4.x.1986, T. Nozaki (TN); 1 female, Sugari-gawa, Tadarai, Hamamatsu-shi, 8.v.1987, T. Nozaki (TN); **Aichi:** 1 female, Mudoji, Kasamatsu-cho, S. Funakoshi and M. Nakamura (TN); **Mie:** 3 males, 136 females, Shiroishi, Fujiwara-cho, Inabe-shi, 26.iv.–4.vii.1992, H. Morita (TN); **Hyogo:** 1 male, Nanagama, Shinonsen-cho, 29.vii.1989, C. Kugo (TN); **Nara:** 3 males, 1 female, Takami-gawa, Higashiyoshino-mura, 15.vi.1996, T. Nozaki (TN); **Hiroshima:** 1 male, 1 female, Nagaya, Yoshida-cho, Akitakata-shi, 31.vii.1999, S. Nakamura (TN); 1male, 2 females, Shimominauchi, Yuki-cho, Saeki-ku, Hiroshima-shi, 25.iv.1999, S. Nakamura (TN); **Tokushima:** 1 female, Takanose-kyo, Kito-son, 18.vii.1998, I. Yamashita (TN); **Ehime:** 3 females, Teppoishi-gawa, Kumakogen-cho, 22.v.1999, T. Ito and A. Ohkawa (TN); **Kochi:** 1 male, Yosagoe-toge, Ino-cho, 10.vii.1999, I. Yamashita (TN); **Tsushima:** 4 males, Izuhara-machi, Tsushima-shi, 18.ix.1992, H. Maruyama (TN); **Yaku-shima:** 6 females, Shiratani-unsui-kyo, 620m a.s.l., Kamiyaku-cho, 12.vii.1992, T. Ogata (TN); 14 males, Yukawa-bashi, Miyanoura-gawa, Kamiyaku-cho, 9.v.2006, T. Ito (TN).

Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu, Sado, Tsushima, Yaku-shima), Russia (Sakhalin, Kuriles).

Japanese name. Ningyo-tobikera.

Remarks. This species is the most common *Goera* species in Japanese main islands and is also distributed in adjacent islands. Tsuda and Akagi (1955) synonymized *Goera squamifera* Martynov 1909 collected from Siberia with this species, and several records as *G. japonica* from Russia and Korea have been published in recent years (Kumanski 1991; Arefina 1997; Choe *et al*. 1999). However, their illustrations suggest that the continental species is the same species as *Goera interrogationis* Botosaneanu 1970. Although *G. interrogationis* is very similar to *G. japonica* in male and female genitalia, it differs from

the latter in unbranched ventrolateral processes of male tergum X, in many tiny spines on phallus, and in the shape of female segment X in lateral aspect. Although we examined several specimens collected from Russia (Ussuri River) and Korea, *G. japonica* was not found at all. Since Martynov (1935) recorded *G. squamifera* also from Amur region, this species may be the same species as *G. interrogationis* not *G. japonica*. Confirmation of this possible synonymy awaits examination of the holotype of *G. squamifera*.

Navás (1933) described *Goera nipponensis* based on material collected from Kofou (?Kofu, Yamanashi, central Honshu). In the original description of *G. japonica* by Banks (1906), comb-like spines on male abdominal segment was described as 'comb on venter of male has 5 teeth each side, and the middle one is not much longer than the others'. On the other hand, Navás (1933) pointed out that his species has 13 teeth with longer central one on the male abdominal sternite. The character is, however, variable, and we could not recognize any related species of *G. japonica* in Honshu. Navás's description, especially the illustration of male abdominal segments, agrees with that described here for *G. japonica*. This strongly suggests that *G. nipponensis* must be a junior subjective synonym of *G. japonica*, although we could not examine its holotype.

***Goera ogasawaraensis* Kuranishi 2005**
Fig. 2

Goera ogasawaraensis: Satake *et al*. 2005, 378–379, male, female.
Goera sp.: Tomokuni and Sato 1978, 117–118, larva, case.

Adult. Small yellowish brown species. General morphology is very similar to *G. japonica*, but length of forewing is 5.5–6.5 mm. Distal segment of male maxillary palpi oval, membranous and elastic, extended apical lobe short. Male abdominal sternite VI with 8–10 long spines in comb-like arrangement. Female abdominal sternite VI and male abdominal sternite V without tiny spine.

Male genitalia. Similar to *G. japonica* except for the following characters. Ventromesal lobe of segment IX not so slender as in *G. japonica*, about 3 times as long as wide in ventral aspect. Ventrolateral processes of tergum X undivided, apices slightly curved laterally in dorsal aspect. Phallus scoop-like.

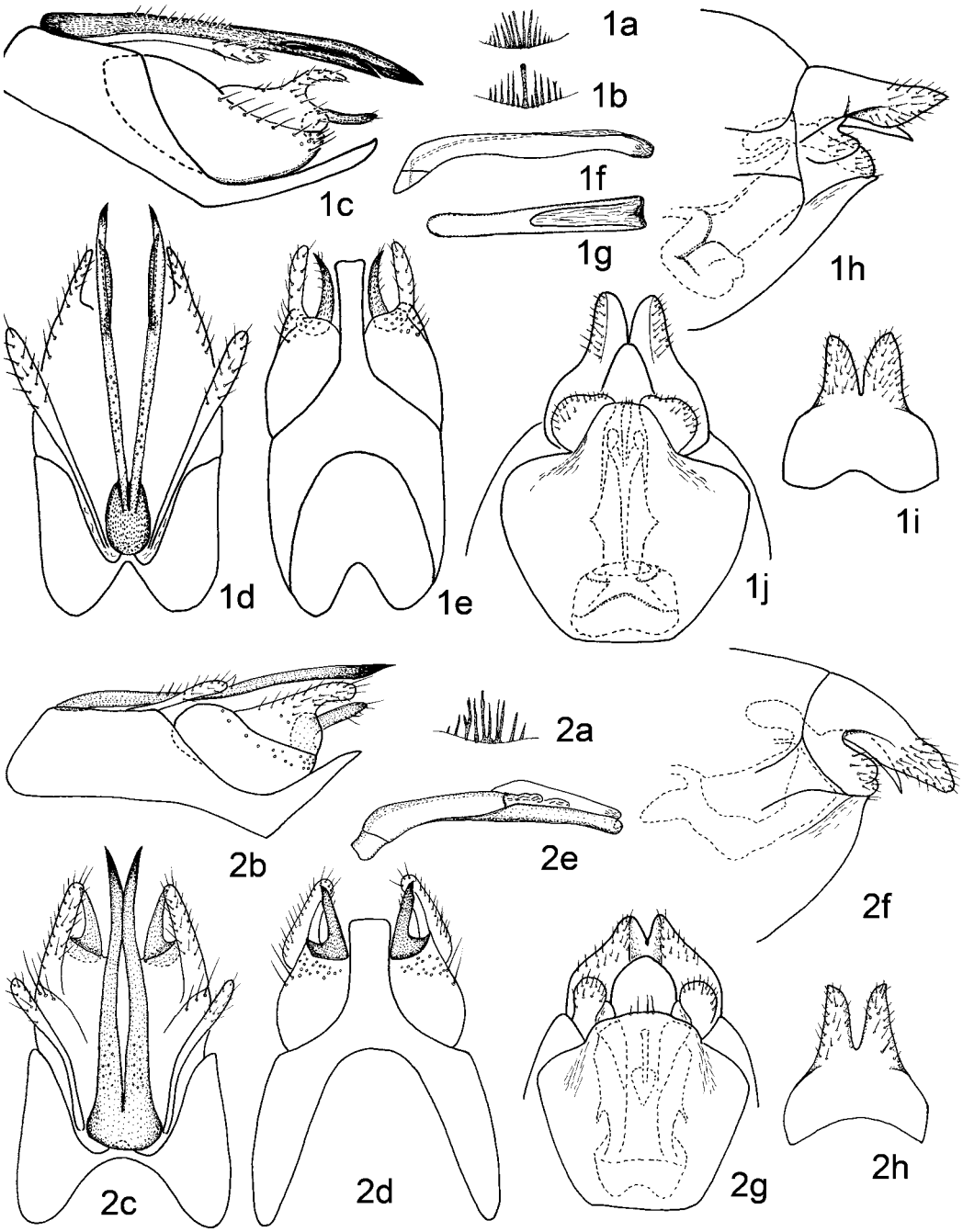
Female genitalia. Similar to *G. japonica*, but tergum X blunt at apex and directed posteroventrally. Spermathecal sclerite not so slender as in *G. japonica*.

Larva. Tomokuni and Sato (1978) described the larval stage for the first time.

Specimens examined. **Ogasawara:** Holotype and paratypes, 4 males and 2 females, Upper stream of Shigure Barrage, Chichi-jima, Bonin Island, 19.vi.1991, S. Miyano (CBM).

Distribution. Japan (Ogasawara).

Japanese name. Ogasawara-ningyo-tobikera.



FIGURES 1–2. 1, *Goera japonica*. Male sternite VI: a, b, ventral view. Male genitalia: c, lateral view; d, dorsal view; e, ventral view; f, phallus, lateral view; g, phallus, dorsal view. Female genitalia: h, lateral view; i, dorsal view; j, ventral view. 2, *Goera ogasawaraensis*. Male sternite VI: a, ventral view. Male genitalia: b, lateral view; c, dorsal view; d, ventral view; e, phallus, dorsolateral view. Female genitalia: f, lateral view; g, ventral view; h, dorsal view.

Goera sp. GC: Akagi 1974, 18–19, larva, case, male genitalia; Tanida 1985, 197, larva.

Diagnosis. This species and *G. uchina* **sp. nov.** are very closely related to each other in having a forked ventromesal lobe of segment IX and a pair of notched ventrolateral processes of tergum X, but easily distinguishable from the latter by the following characters. In male genitalia, ventromesal lobe of segment IX broad U-shaped, but rather slender V-shaped in *G. uchina*; and ventrolateral processes deeply notched in *G. akagiae*, but weakly in *G. uchina*. In female genitalia, *G. akagiae* has slender gonopod plate and spermathecal sclerite than those of *G. uchina*.

Adult. General morphology and coloration are very similar to those of *G. japonica*. Forewings 8.5–9.5 mm long in male, 9–10.5 mm long in female.

Male genitalia. Segment IX oblique in lateral aspect, posterior margin extended midway; ventromesal lobe present, bilobed posteriorly, broad U-shaped in ventral aspect. Dorsal process of tergum X absent. Paired ventrolateral processes of tergum X long, relatively broad in lateral aspect; apices branched, both acute, curved downward, inner one longer. Preanal appendages long, about 2/3 as long as ventrolateral processes. Inferior appendages large; basal segment oblique in lateral aspect; distal segment with long apicodorsal lobe, finger-like, mesal process curved laterad in ventral aspect. Phallus elongate, tubular, curved ventrad in lateral aspect, slightly swollen at apical third in lateral aspect; phallic apodema triangular in lateral aspect.

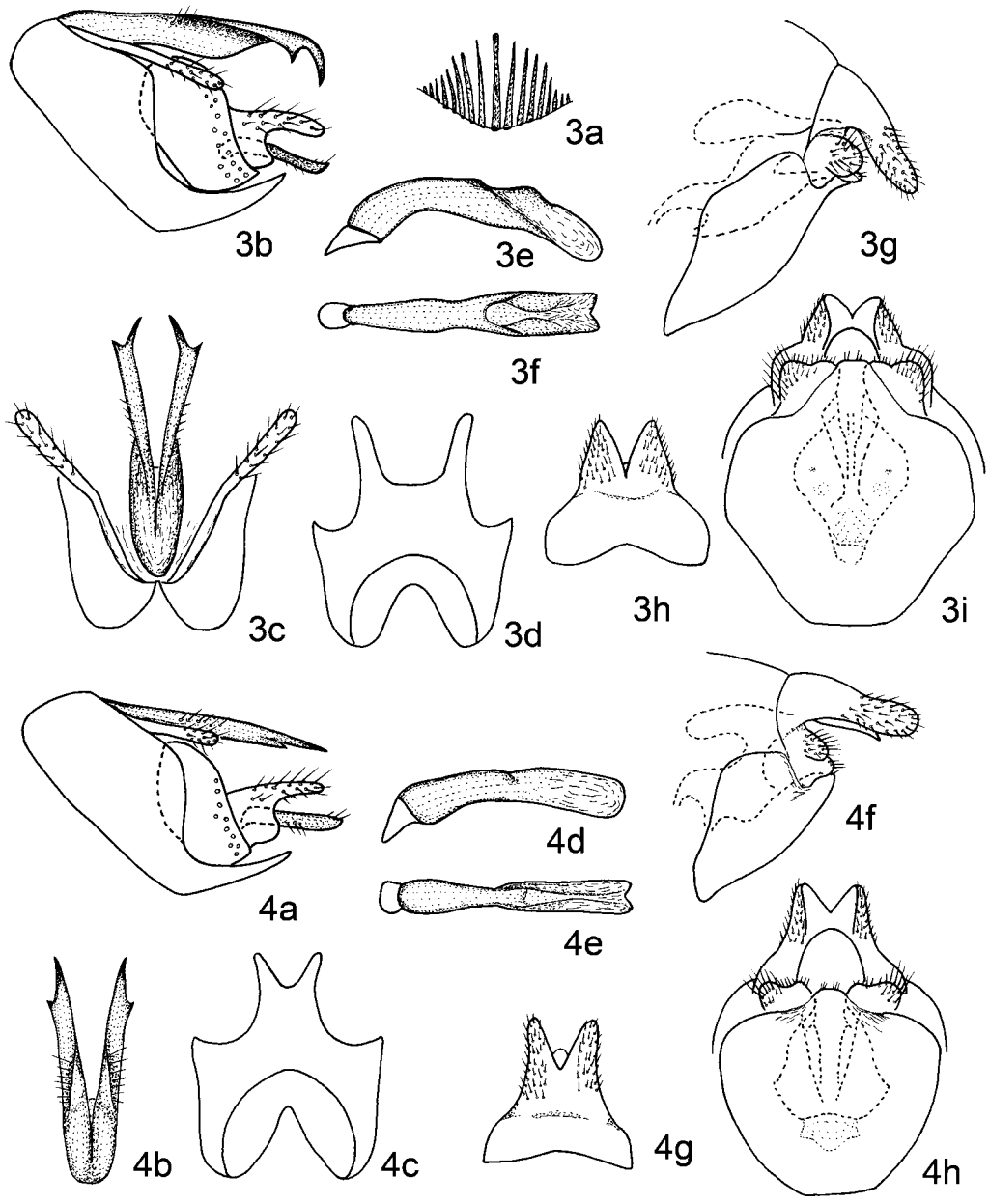
Female genitalia. Tergum X bilobed, each triangular in dorsal aspect, finger-like in lateral aspect. Supragenital plate long, apex rounded in ventral view. Lamellae slightly bilobed, rounded apically. Gonopod plate about as long as wide, apicomesal process trapezoid. Spermathecal sclerite about 2 times as long as wide with rounded lateral margin in ventral view.

Larva. Akagi (1974) described *Goera* sp. GC based on larvae collected from Amami Island. She also provided figures of male genitalia of this species, which agree well with those of *G. akagiae* described here.

Holotype male: JAPAN: Amami-Ohshima: Chuo-rindo, Uken-son, Kagoshima, 28°17’N, 129°21’E, 6.iv.1996, T. Nakatani and T. Ueda (in alcohol, OMNH TI 213).

Paratypes: Amami-Ohshima: 1 male, 9 females, same data as the holotype (1 male, 2 females: OMNH, 7 females: KT); 3 males, Hatsune, Sumiyo-cho, Amami-shi, Kagoshima, 28°13’N, 129°22’E, 2.iv.1996, T. Nakatani and T. Ueda (KT).

Other specimens examined. **Kochi:** 2 females, near Ashizuri-misaki, Tosashimizu-shi, 21.v.1999, A. Ohkawa and T. Ito (TN); 1 male, Tsuro, Tosashimizu-shi, 2.iv.2005, M. Takai (TN); **Amami-Oshima:** 3 males, 12 females, Naze-kominato, Amami-shi, 4.xii.1991, S. Mukaiyama (KT); 3 females, Yagachi-gawa, Sumiyo-cho, Amami-shi, 11.iii.1975, S. Hashimoto (KT); 1 female, Hatsune, Sumiyo-cho, Amami-shi, 4–5.iv.1996,



FIGURES 3–4. 3, *Goera akagiae*. Male sternite VI: a, ventral view. Male genitalia: b, lateral view; c, dorsal view; d, ventral view; e, phallus, lateral view; f, phallus, dorsal view. Female genitalia: g, lateral view; h, dorsal view; i, ventral view. 4, *Goera uchina*. Male genitalia: a, lateral view; b, dorsal view; c, ventral view; d, phallus, lateral view; e, phallus, dorsal view. Female genitalia: f, lateral view; g, dorsal view; h, ventral view.

T. Ueda (MA); 2 males, 10 females, Uken-son; 1 male, a fall of Kokachi-gawa, Uken-son, 19.iii.1999, T. Ito and A. Ohkawa (TN); 1 larva, a tributary of Kawauchi-gawa, Uken-son, 19.iii.1999, T. Ito and A. Ohkawa (TN); 1 male, Materia-no-taki, Yamato-son, 2.xii.1997,

G. Ito (BJA); 1 male, 3 females, Toguchi-gawa, Tatsugo-cho, 18.iii.1999, T. Ito and A. Ohkawa (1 female: BJA; 1male, 2 females: TN); **Yaku-shima:** 1 female, Onoaida, Yaku-cho, 17.iv.2003, A. Ishizuka (TN); 1 male, Biwatsubo-bashi, Kuni-gawa, Miyanoura, Kamiyaku-cho, 8.v.2006, T. Ito (TN); 1 male, a tributary of Miyanoura-gawa, Kamiyaku-cho, 10.v.2006, T. Ito (TN).

Etymology. This species is named in honor of late Ms. Ikue Akagi, who intensively studied the Japanese Trichoptera larvae in 1960's and described the larva and male genitalia of this species for the first time.

Distribution. Japan (Shikoku, Amami-Oshima, Yaku-shima).

Japanese name. Amami-ningyo-tobikera

Goera uchina **Tanida and Nozaki sp. nov.**
Fig. 4

Goera sp. GD: Tanida 1997; Tanida 2003, 379, male, larva.

Diagnosis. This species is very similar to *G. akagiae* sp. nov., but the male differs from the latter by slender ventrolateral processes of tergum X. The female of this species can also be distinguished from *G. akagiae* by wider gonopod plate and spermathecal sclerite.

Adult. General morphology and coloration are similar to those of *G. japonica* and *G. akagiae*. Forewings 7–9 mm long in male, 7.5–10 mm long in female.

Male genitalia. Segment IX similar to that of *G. akagiae*, but in ventral aspect ventromesal lobe rather slender and V-shaped apically. Tergum X as in *G. akagiae* but ventrolateral processes slender in lateral aspect, apices acute with ventrolateral process. Inferior appendages similar to *G. akagiae*, but mesal process thicker than that of *G. akagiae*. Phallus simple, tubular.

Female genitalia. Tergum X similar to that of *G. akagiae*, but rather slender in dorsal aspect. Gonopod plate slightly wider than long, apple-shaped with rounded apicomesal process. Spermathecal sclerite about 1.5 time as long as wide, with paired lateral lip.

Larva. Indistinguishable from *G. akagiae*.

Holotype male: JAPAN: Okinawa: Yona, Kunigami-son, 11.iv.1996, T. Ueda (pinned, OMNH TI 214)

Paratypes: Okinawa: 8 males, 2 females, same data as the holotype (2 males, 2 females: OMNH, 6 males: KT); 5 males, 1 female, same locality as the holotype, pupae collected on 13.iv.1997, adults emerged 13.iv–7.v.1997 by M. Yoshio (KT); Benoki, Kunigami-son, Okinawa, 12.iv.1997, T. Ueda (KT); 3 males, 1 female, Okuma, Kunigami-son, Okinawa, 11.iv.1997, T. Ueda (KT); 1 female, Hiji Ohashi, Kunigami-son, Okinawa, 19.v.1998, T. Ueda (KT).

Other specimens examined. **Okinawa:** 4 males, 3 females, Yona, Kunigami-son, 11–12.iv.1996, T. Ueda (MA); 10 males, 2 females, ibid., 11–12.iv.1997, T. Ueda (MA); 5

males, 3 females, ibid., 13.iv.1997, M. Yoshio (MA); 3 males, 1 female, ibid., 13.v.1998, T. Ueda (MA); 1 male, 7 females, ibid., 21.iii.1999, T. Ito and A. Ohkawa (TN); 13 males, 13 females, ibid., 24–29.iii.1997, O. S. Flint Jr. (NMNH); 6 males, 6 females, upper Genka-gawa, Genka, Kunigami-gun, O. S. Flint Jr. (NMNH); **Ishigaki-jima:** 11 males, 4 females, Omoto-dake, 18–19.iii.2002, I. Oshima, K. Sugishima and T. Yoshida (2 males, 2 females: BJA; 9 males 2 females: TN).

Etymology. The species name means "Okinawa" in the Ryukyu dialect.

Distribution. Japan (Okinawa, Ishigaki-jima).

Japanese name. Okinawa-ningyo-tobikera.

Goera curvispina Martynov 1935

Fig. 5

Goera curvispina Martynov 1935, 367–370, male; Akagi 1975, 3–4, larva, case; Tani 1977, 205, male; Arefina 1997, 127–128, male; Choe *et al*. 1999, 46, male.
Goera gyotokui Kobayashi 1957, 276–278, male. **Syn. nov**.

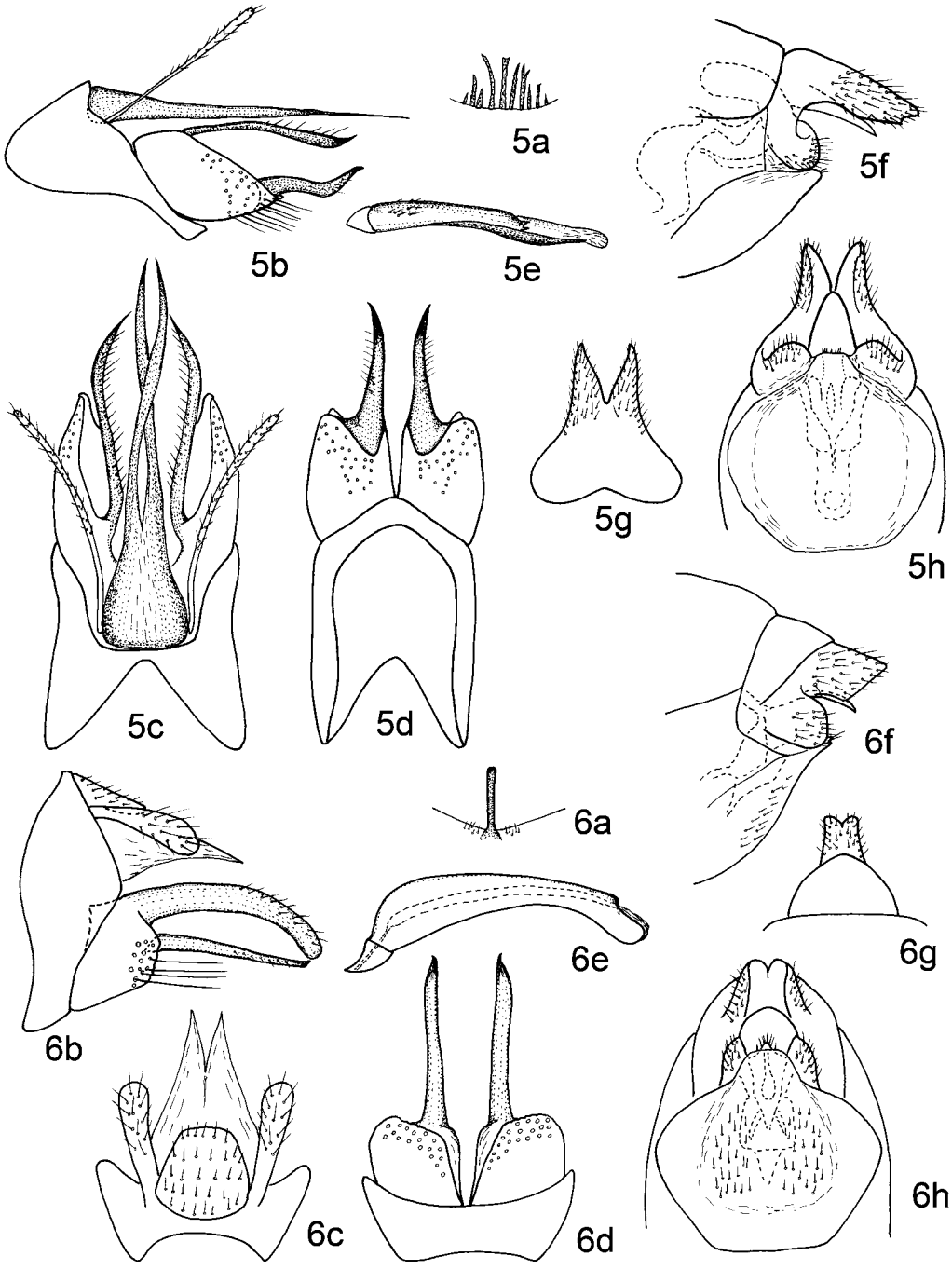
Adult. General morphology, color and size are similar to *G. japonica* except for the following characters. Distal segment of male maxillary palpi long oval; membranous and elastic, extended apical lobe short. In male, abdominal sternite VI with 9–15 long spines in comb-like arrangement, sternite V without spines. Female abdominal sternite VI bearing several tiny spines.

Male genitalia. Segment IX oblique, rounded anteriorly in lateral aspect. Dorsal process of tergum X absent. Paired ventrolateral processes of tergum X very long, strongly sclerotized, each tapering to acute point, and overlapped in dorsal aspect. Preanal appendages long, slender, ca. 2/3 as long as ventrolateral process. Basal segment of inferior appendage large, oval, oblique. Distal segment of inferior appendage with dorsal process strongly sclerotized, curved inward in dorsal aspect; inner mesal process strongly sclerotized, acute and curved upward in lateral aspect. Phallus slender scoop-like, membranous apically; dorsum of aedeagus with a pair of acute processes at 1/4 apically and with a pair of several thin setae at base.

Female genitalia. Preanal appendages fused with tergum X; each apex acute in dorsal aspect, concaved in lateral aspect. Supragenital plate long, relatively acute in ventral aspect. Lamellae rounded. Gonopod plate about as long as wide, apicomesal process trapezoidal. Spermathecal sclerite rectangular bearing slender anterior part in ventral aspect.

Larva. Akagi (1975) described the larval stage of this species for the first time.

Specimens examined. 1 male, holotype of *G. gyotokui* Kobayashi, Yoshii-machi, Ukiha-shi, Fukuoka, 17.x.1956, N. Gyotoku (MK). **Hyogo:** 1male, 1 female, Yasumuro-gawa, Takayama, Kamigori-cho, 29.x.2000, T. Murakami (TN); **Shimane:** 1 male,



FIGURES 5–6. 5, *Goera curvispina*. Male sternite VI: a, ventral view. Male genitalia: b, lateral view; c, dorsal view; d, ventral view; e, phallus, dorsolateral view. Female genitalia: f, lateral view; g, dorsal view; h, ventral view. 6, *Goera kawamotonis*. Male sternite VI: a, ventral view. Male genitalia: b, lateral view; c, dorsal view; d, ventral view; e, phallus, lateral view. Female genitalia: f, lateral view; g, dorsal view; h, ventral view.

Tsuwano-cho, 17.v.1993, N. Kuhara (NK); **Fukuoka:** 1 male, Yoshii-machi, Ukiha-shi, 16.x.1956, N. Gyotoku (CBM); 1 female, Kanagawa, Yoshii-machi, Ukiha-machi, 17.x.1956, N. Gyotoku (TN); 1 male, Shinmachi, Chikuzen-machi, 4.iv.1972, N. Gyotoku (TN); 1 male, 1 female, Terauchi-dam, Asakura-shi, 24.iv.1993, K. Hirahara (MA). **RUSSIA: Primorye:** 4 males, 4 females, Ussuri River, near Zabaikalskoye village, 23.vii.1996, T. I. Arefina (TN).

Distribution. Japan (central to western Honshu, Kyushu, Tsushima), Korea, Russia (Khabarovsk, Primorye).

Japanese name. Kurubisupina-ningyo-tobikera.

Remarks. This species was described by Martynov (1935) based on material collected from south Primorye (Ussuri R.), and recorded from Japan (Lake Biwa, central Honshu) by Tsuda and Akagi (1955) for the first time. Akagi (1975) associated the larval stage with the adult based on material collected from western Honshu and Kyushu (Yamaguchi, Fukuoka and Oita). We examined males and females of this species collected from Ussuri River provided by T. I. Arefina, and determined that the Japanese specimens belong to the same species. Kobayashi (1957) described a new species, *G. gyotokui*, from Fukuoka, Kyushu. We examined the holotype of *G. gyotokui* deposited in his collection, and determined it was identical to *G. curvispina*. Therefore, we consider *G. gyotokui* to be a junior subjective synonym of *G. curvispina*. Most of Kobayashi's collection is now preserved in CBM (Kuranishi 2002), but the type of this species has not yet moved to CBM (Kuranishi personal communication).

Goera kawamotonis Kobayashi 1987

Fig. 6

Goera kawamotonis Kobayashi 1987, 24, 34, male; Arefina 1997, 126, 128, male.
Goera sp. GA: Tsuda and Akagi 1956, 39–40, larva, case, male genitalia; Tsuda and Akagi 1962, 140, larva.

Adult. Body, wings, antennae yellowish brown. Head short; ocelli absent; anterior setal warts round; posterior setal warts large and round. Antennae 6–8.5 mm long; basal segment ca. 1 mm long, with long setae. In male maxillary palpi, distal segment banana-shape in lateral aspect, ca. 2 times as long as wide, membranous and elastic, bearing long pale setae on outer surface and dark brown scales on mesal surface. Male abdominal sternite VI with a single spine, 7–10 times as long as wide, often slightly broad at apex. Female abdominal sternite VI bearing usually 1 process but occasionally 2, 3–5 times as long as wide. Forewings 6.5–10 mm long, with relatively rounded apex in male.

Male genitalia. Segment IX narrow and posterior margin rounded in lateral aspect. Tergum X with dorsal plate, trapezoid; ventral portion semi-membranous, divided at apical third, each apices acute. Preanal appendage short, expanded at apex. Basal segment of inferior appendage rhomboid in lateral and ventral aspect. Distal segment of inferior

appendage with 2 processes; dorsal one long, arcuate in lateral aspect, bearing setae on outer surface at apical half; mesal process slender with acute apex curved dorsad, bearing minute setae on outer surface. Phallus simple, slightly arcuate in lateral aspect.

Female genitalia. Tergum IX triangular in lateral aspect, semicircular in dorsal aspect, delimited from tergum X. Tergum X rhombic in lateral aspect, excavated at apex in dorsal and ventral aspect. Lamellae relatively large with rounded apex in lateral aspect. Gonopod plate wider than length, apicomesal process trapezoidal, bearing many setae.

Larva. Tsuda and Akagi (1956) described the larval stage of this species for the first time as *Goera* sp. GA.

Specimens examined. **Aichi:** 10 males, Yahagi-gawa, Toyota-shi, 30.viii.1999, Mano (TN); **Hyogo:** 1 female, Yumesaki-gawa, Miyaoki, Yumesaki-cho, 15.x.1989, C. Kugo (TN); 15 males, 30 females, Terasaka, Izushi-cho, Toyooka-shi, 17–18.ix.1997, M. Aoyagi (TN); **Hiroshima:** 3 females, Minamikannoncho, Nishi-ku, Hiroshima-shi, 10.v.1999, S. Nakamura (TN); 1 female, Yagi, Asaminami-ku, Hiroshima-shi, 24.iv.1999, S. Nakamura (TN); 1 male, Yoshida, Yoshida-cho, Akitakata-shi, Hiroshima, 25.iv.1999, S. Nakamura (TN); 2 males, 1 female, ibid., 31.viii.1999, S. Nakamura (TN); 1 male, 4 females, Akimachi, Miyoshi-shi, Hiroshima, 30.vii.1999, S. Nakamura (TN); **Shimane:** 3 males, Kawagoe, Sakurae-cho, Gozu-shi, 2.v.1999, S. Nakamura (TN); **Yamaguchi:** 1 female pupa with larval exuviae, Nishiki-cho, Iwakuni-shi, 12.vi.1992, I. Yokota (TN); **Fukuoka:** 1 male, Nakamachi, Yoshii-machi, Ukiha-shi, 4.v.1988, N. Gyotoku (TN); 1 male, ibid., 23.vi.1988, N. Gyotoku (TN); 1 male, ibid., 6.v.1989, N. Gyotoku (TN); 1 female, ibid., 24.vi.1989, N. Gyotoku (TN).

Distribution. Japan (central to western Honshu, Shikoku, Kyushu), Russia (Khabarovsk, Primorye).

Japanese name. Kawamoto-ningyo-tobikera.

Remarks. Tsuda and Akagi (1956) described a larval specimen as *Goera* sp. GA from the River Yahagi, Aichi, central Japan. They also provided illustrations of the male genitalia, which suggested that *Goera* sp. GA is the larval stage of *G. kawamotonis* (Nishimoto and Morita 2001). We ascertained that *Goera* sp. GA is the larva of this species by the metamorphotype method.

Yang and Armitage (1996) described a similar species, *Goer morsei* Yang and Armitage from Sichuan, China, and provided the diagnostic characters of the male. At the same time, the male genitalia illustrated by Arefina (1997) as *G. kawamotonis* from continental Russia agrees with those redescribed here.

***Goera kyotonis* Tsuda 1942**

Fig. 7

Goera kyotonis Tsuda 1942, 324–325, male; Tsuda and Akagi 1955, 236–237, larva, case; Tsuda and Akagi 1962, 140, larva, case.

Adult. Body, wings, antennae yellowish brown. Head short, ocelli absent, anterior setal warts round in female, absent in male; posterior setal warts large and round. Antennae 6–8 mm long; basal segment ca. 1.2 mm long, with long setae. In male maxillary palpi, distal segment banana-shaped in lateral aspect, membranous and elastic, bearing long pale setae on outer surface and pale scales on mesal surface; second segment membranous, oval, with long dark setae densely. Male abdominal sternite VI with 7–12 long spines, number and shape variable but usually central one longest. Female abdominal sternite VI bearing minute spines. Fore wing 6.5–8.5 mm long; in male, wheatear-like setae arise basocaudally.

Male genitalia. Segment IX long, oblique in lateral aspect; sternite IX slightly produced posteriorly, triangular in ventral aspect. Dorsal process of tergum X club-like in dorsal aspect. Paired ventrolateral processes asymmetrical, left one ca. 3/4 length as right one; both strongly sclerotized, apices usually acute, curved ventromesad. Preanal appendage very long, about as long as right ventrolateral process. Basal segment of inferior appendage large, oval, oblique. Distal segment of inferior appendage with 2 processes: dorsolateral process tapering to rounded apex in lateral aspect, rectangular in dorsal aspect, with concave mesal face; mesal process strongly scrlotized, acute apex directed dorsad. Phallus simple, slightly arcuate in lateral aspect, distal end of ejaculatory duct open at apical fourth.

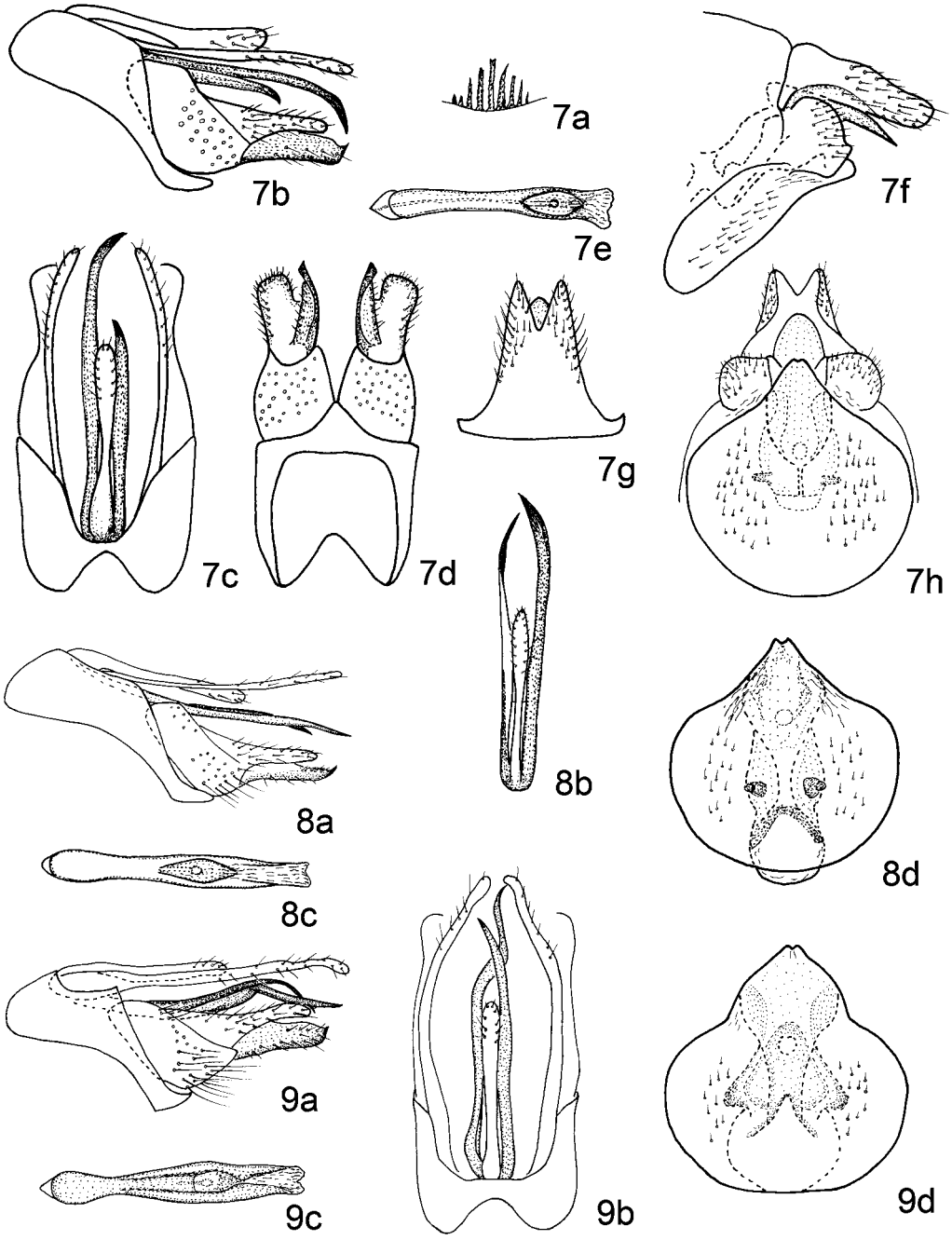
Female genitalia. Tergum X finger-like in lateral aspect; each apex triangular in dorsal aspect. Supragenital plate long. In lateral aspect, posterior margin of lamellae rounded dorsally, square ventrally. In ventral aspect, gonopod plate rounded, as long as wide, many setae on each side; apicomesal process triangular with a minute notch at apex. Spermathecal plate approximately half length of gonopod plate with pair of strongly sclerotized processes anterolaterally.

Larva. The larval stage of this species was described by Tsuda and Akagi (1955) for the first time.

Specimens examined. **Osaka:** 2 males, 1 female, Higashimakio-gawa, Izumi-shi, pupae collected on 1.vi.1994, adults emerged on 13–23.vi.1994 by M. Aoyagi (MA); 4 males, Chihaya-gawa, Chihayaakasaka-mura, larvae collected 19.xii.1996, adults emerged 14–17.v.1997 by M. Aoyagi (MA); 1 male, Ochiai-dani, Mino-shi, M. Aoyagi (MA); 12 males, 3 female, ibid., pupae collected 7.vi.1997, emerged on 7–19.vi.1997 by M. Aoyagi (MA and TN); **Hyogo:** 1 male, Iwazono, Asiya-shi, 14.vii.1995, H. Nishimoto (TN); **Wakayama:** 1 male, Kouyaguchi-cho, Hashimoto-shi, 11.vii.2002, S. Tsukaguchi (TN); 1 male, Botanical Garden of Kyoto Univ., 7.v.1989, M. Uenishi (TN); **Tottori:** 1 male, a spring at Hongu, Yodoe-cho, Yonago-shi, 1.v.1992, T. Shimizu (NK); **Fukuoka:** 1 male, Mt. Hiko, 650 m a.s.l., Soeda-cho, 10.ix.1996, T. Nozaki (TN).

Distribution. Japan (Central to western Honshu, Kyushu).

Japanese name. Kyoto-ningyo-tobikera.



FIGURES 7–9. 7, *Goera kyotonis*. Male sternite VI: a, ventral view. Male genitalia: b, lateral view; c, dorsal view; d, ventral view; e, phallus, dorsal view. Female genitalia: f, lateral view; g, dorsal view; h, ventral view. 8, *Goera lepidoptera*. Male genitalia: a, lateral view; b, dorsal view; c, phallus, dorsal view. Female genitalia: d, ventral view. 9, *Goera shikokuensis*. Male genitalia: a, lateral view; b, dorsal view; c, phallus, dorsal view. Female genitalia: d, ventral view.

***Goera lepidoptera* Schmid 1965**
Fig. 8

Goera lepidoptera Schmid 1965, 35, male.

Adult. General description as for *G. kyotonis*.

Male genitalia. Median dorsal process slender, club-like in dorsal aspect. Paired ventrolateral processes asymmetrical, with acute apices, curved inward in dorsal aspect; right process slightly shorter than left, mostly unpigmented except for apex. Inferior appendage similar to that of *G. kyotonis*, but processes of distal segment slightly slender than those of latter. Phallus similar to that of *G. kyotonis*, but distal end of ejaculatory duct open at apical 2/5.

Female genitalia. Spermathecal plate slender, approximately 3/4 length as gonopod plate, with rounded plate anteriorly; pair of strongly scrlotized area present at 2/3 anterolateral side with small swelling.

Larva. Indistinguishable from *G. kyotonis*.

Specimens examined. **Miyagi:** 2 males, 1 female, Yoko-kawa, 500 m a.s.l., Shichigashuku-machi, 5.vii.1998, T. Hattori (BJA); **Yamagata:** 1 male, 1 female, Oi-sawa, Nishikawa-machi, larvae collected on 23.v.1998, emerged in VI.1998, reared by T. Nozaki (TN); **Kanagawa:** 1 male, Sakai-gawa, Komatsu, Shiroyama-machi, pupa collected on 30.v.1983, emerged 1.vi.1983, reared by T. Nozaki (TN); 1 male, 3 females, Nizifuki, Kamimizo, Sagamihara-shi, H. Moriya (TN); 1 male, Kuzu-kawa, Kisawa, Hiratsuka-shi, larva collected on 24.iv.1984, emerged on 14.v.1984.

Distribution. Japan (central to northeastern Honshu)

Japanese name. Izumi-ningyo-tobikera.

Remarks. This species is very similar to *G. kyotonis*, but differs from the latter in median dorsal and ventrolateral processes of male and in spermathecal plate of female. The female of this species was described here for the first time.

***Goera shikokuensis* Nozaki and Tanida sp. nov.**
(Fig. 9)

Diagnosis. This species is very similar to *G. kyotonis* and *G. lepidoptera*, but distinguishable by the shape of processes of segment X in male and spermathecal plate in female.

Adult. General morphology and coloration very similar to those of *G. kyotonis* and *G. lepidoptera*, but size slightly smaller. Length of forewings 6–7 mm in both sexes.

Male genitalia. Median dorsal process slender, club-like in dorsal aspect. Paired ventrolateral processes asymmetrical, with acute apices; right one slightly longer than left one, twisted apically; left one curved inward. Inferior appendage similar to that of *G.*

kyotonis. In phallus, distal end of ejaculatory duct open at apical third, pair of longitudinal ridges present dorsally.

Female genitalia. Spermathecal plate approximately 2/3 length as gonopod plate, triangular in ventral aspect with large round plate anteriorly.

Larva. Unknown.

Holotype male: JAPAN: Ehime: Kawabe-gawa, Yamato-saka, Ohzu-shi, 33°31'N, 132°39'E, 8.x.2000, S. Tsukaguchi (in alcohol, CBM-ZI 130497).

Paratypes. 6 males, same data as the holotype (1 male: CBM-ZI 130498, 2 males: USNM, 3 males: TN); 1 male, Nanatsubuchi, Kochi-shi, Kochi, 16.v.1999, T. Befu (TN).

Other specimens examined. **Kochi:** 1 female, near Ashizuri cape, Tosashimizu-shi, 21.v.1999, A. Ohkawa and T. Ito (TN); 2 males, Kubotsu, Tosashimizu-shi, 16.x.2004, M. Takai (BJA); **Ehime:** 1 female, Oda, Uchiko-cho, 27.viii.2000, E. Yamamoto (USNM).

Etymology. Specific name refers to the name of the island where this species was collected.

Distribution. Japan (Shikoku).

Japanese name. Shikoku-ningyo-tobikera.

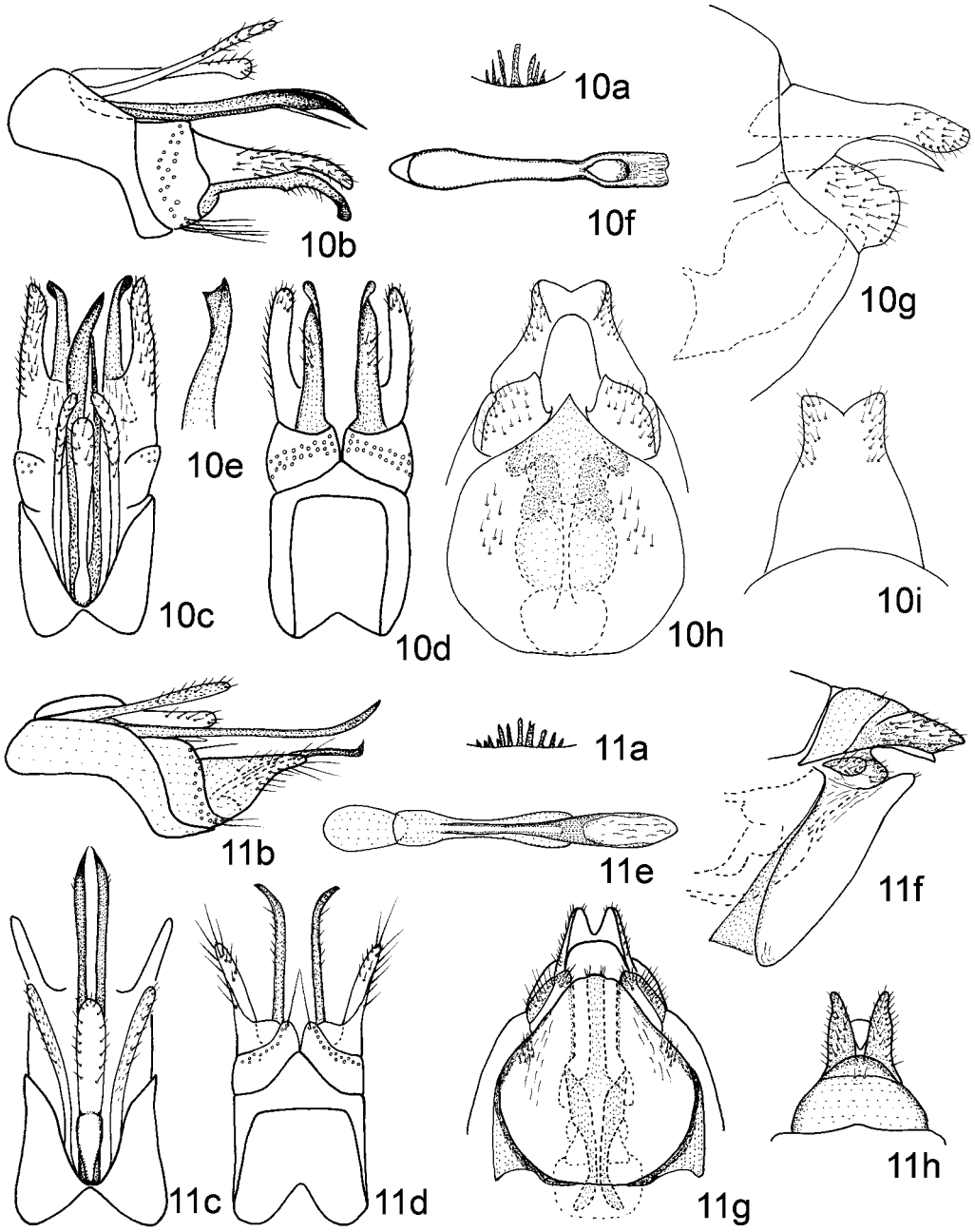
Goera tenuis Ulmer 1927

Fig. 10

Goera tenuis Ulmer 1927, 181, male.

Adult. Body, wings, antennae yellowish brown. Head trapezoidal; ocelli absent; anterior setal warts round, contact with each other; posterior setal warts large and round. Antennae 6–8 mm long; basal segment ca. 1 mm long with long setae. In male maxillary palpi, distal segment finger-like, membranous and elastic, bearing long setae; second segment small, membranous. Male abdominal sternite VI with 5–9 mm long spines, number and shape variable but usually central one longest. Female abdominal sternite VI bearing minute spines. Fore wing 5.5–7.0 mm long in male, 7.0–7.5 mm long in female.

Male genitalia. Segment IX oblique in lateral aspect; sternite IX slightly produced posteriorly, triangular in ventral aspect. Dorsal process of tergum X club-like in dorsal aspect, thickened at apex in lateral aspect. Paired ventrolateral processes asymmetrical; left one very slender, slightly shorter than right one, apical half unpigmented; right one relatively broad, curved ventrad at apex. Preanal appendage slender, slightly longer than dorsal process of tergum X. Basal segment of inferior appendage rectangular in lateral aspect. Distal segment of inferior appendage with 2 processes equal in length; apices of both rounded in lateral aspect; mesal one strongly screlotized. Phallus simple, narrow at apical 1/3 in dorsal aspect. In holotype male, mesal process of distal segment of inferior appendage is slightly narrower than in specimens collected from Yaeyama Islands.



FIGURES 10–11. 10, *Goera tenuis*. Male sternite VI: a, ventral view. Male genitalia: b, lateral view; c, dorsal view; d, ventral view; e, apex of right ventrolateral process of the holotype, dorsal view; f, phallus, dorsal view. Female genitalia: g, lateral view; h, ventral view; i, dorsal view. 11, *Goera tungusensis*. Male sternite VI: a, ventral view. Male genitalia: b, lateral view; c, dorsal view; d, ventral view; e, phallus, dorsal view. Female genitalia: f, lateral view; g, ventral view; h, dorsal view.

Female genitalia. Tergum X finger-like in lateral aspect, parallel sided apically in dorsal aspect. Supragenital plate long. In lateral aspect, posterior margin of lamella rounded dorsally, square ventrally. In ventral aspect, gonopod plate round, apicomesal process triangular with acute apex. Spermathecal plate approximately 3/4 length as gonopod plate with rounded palte anteriorly.

Larva. Unknown.

Specimens examined. **TAIWAN:** Holotype, male, Suisharyo, x.1911, H. Sauter (DEI). **Ishigaki-jima:** 3 males, Takeda, Ishigaki-shi, 12.x.1999, K. Konishi (BJA); 1 male, Nagura-gawa, Takeda, Ishigaki-shi, 19.x.1999, K. Konishi (TN); 1 male, Mt. Banna-dake, 4–7.iv.2001, T. Ueda (MA); 4 males, Omoto-dake, 18–19.iii.2002, I. Oshima, K. Sugishima and T. Yoshida (TN); 1 female, Yarabe-dake, 14.v.1999, Nakatani (BJA); **Iriomote-jima:** 1 male, 4 females, Urauchi-gawa, Taketomi-cho, larvae collected on 29.xi.1996, emerged on 6–19.iii.1997, by M. Aoyagi (1 male, 2 females: MA; 2 females: TN); 1 male, Nishifunatsuki-gawa, Taketomi-cho, 23.iii.1999, T. Ito and A. Ohkawa (TN); 4 males, ibid., 12.v.1999, K. Tojo (TN).

Distribution. Japan (Ishigaki-jima, Iriomote-jima), Taiwan.

Japanese name. Taiwan-ningyo-tobikera.

Remarks. We examined the holotype male deposited in DEI. Right ventrolateral process has spreading apex in dorsal aspect as described by Ulmer (1927, fig. 25), but we think it is a malformed (Fig. 10e). Other characteristics of the holotype mostly agree with those of male specimens examined in this study. This species is recorded from Japan for the first time.

Goera tungusensis Martynov 1909

Fig. 11

Goera tungusensis Martynov, 1909, 246–250, male, female.
Goera sp. 1: Ito *et al*. 2000, 23.

Adult. Body, wings, antennae mostly dark brown to black. Head short; ocelli absent; anterior setal warts round in female, very small in male; posterior setal warts large, round. Antennae 7–8 mm long; scape ca. 1 mm long, with long setae. In male maxillary palpi, distal segment long oval, membranous and elastic, with long setae on outer surface, brown scales on mesal surface and marginal frill. Forewing 8–10 mm lomg. Male abdominal sternite VI with 6–11 spines in comb-like arrangement, usually central ones longer and broader, but number, length and shape variable. Female abdominal sternite VI with several tiny spines.

Male genitalia. Segment IX long, oblique in lateral aspect; sternite IX slightly produced posteriorly, triangular in ventral aspect. Dorsal process of tergum X club-like in dorsal aspect, slightly swollen at basal 1/3 in dorsal and lateral aspect; lower semi-

membranous process present, deeply divided to pair of slender processes, unpigmented. Paired ventrolateral processes symmetrical, 2 times as long as dorsal process, strongly sclerotized, acute in apices, curved dorsomesad. Preanal appendage slender, longer than dorsal process of tergum X. Distal segment of inferior appendage with 2 processes; dorsolateral one large, triangular in lateral aspect, with slightly concave mesal face; mesal one strongly sclerotized, slender, acute in apex, curved dorsolaterad. Phallus long club-like in dorsal aspect with ventrolateral flange, simple in lateral aspect; phallic apodeme long, oval in dorsal aspect, acute anteriorly in lateral aspect.

Female genitalia. Tergum IX distinct, semicircular in dorsal aspect. Preanal appendages fused with tergum X ventrally, slightly concave dorsolaterally. Preanal appendage and tergum X rhombic. Lamella with dark pigmented plate. Gonopod plate rounded, protrudeed apicomesally; black sclerotized zone present at anterolateral corner. Spermathecal plate slender, slightly longer than gonopod plate

Larva. Lepneva (1966) described the larval stage of *G. sajanensis* Martynov 1924, which probably is a junior synonym of *G. tungusensis* (Levanidova 1982).

Specimens examined. **Hokkaido:** 1 male, Masuhoro-gawa, Wakkanai-shi, 25.viii.–1.ix.1998, K. Suzuki and T. Ito (TN); 1 female, ibid., 8–19.vi.1998, K. Suzuki and T. Ito (TN); 2 males, Iwanano-sawa, Kamitoikan, Horonobe-cho, Hokkaido, 26.vi–12.vii.1993, M. Inoue (NK); 1 male, ibid., 25.viii–14.ix.1993, M. Inoue (NK); 2 males, near Shinsen-numa, Kyowa-cho, Hokkaido, 28.vii.1994, Y. Sakamaki (NK); 1 female, Shumarinai, Horokanai-cho, 28.ix.1996, reared from pupa by M. Aoyagi (TN).

Distribution. Japan (Hokkaido), Russia (Siberia, Far East), Canada (Quebec), USA (Alaska).

Japanese name. Kita-kuro-ningyo-tobikera.

Remarks. Ito *et al*. (2000) recorded this species from Hokkaido as *Goera* sp. 1, and we determined their specimens as this species. This species is recorded from Japan for the first time.

Goera nigrosoma **Nozaki and Tanida sp. nov.**

Fig. 12

Goera sp. GB: Tsuda and Akagi 1962, 140, larva; Tanida 1985, 198, larva.

Diagnosis. This species is related to *G. tungusensis*, but easily distinguishable by mesal processes of distal segment of inferior appendage in male; the process triangular in lateral aspect in this species, but very slender in *G. tungusensis*. In female, spermathecal plate rather broad and about 2/3 length of gonopod plate in this species, but slender and slightly longer than gonopod palate in *G. tungusensis*.

Adult. Body, wings, antennae mostly dark brown to black. Head short; ocelli absent; anterior setal warts round; posterior setal warts large, round. Antennae 7–8 mm long;

scape ca. 1 mm long, with long setae. In male, maxillary palpi, distal segment long oval, membranous and elastic, with long setae on outer surface and relatively long scales on mesal surface. Male abdominal sternite VI with 2 finger-like spines, usually bearing a few shorter spines at each side. Female abdominal sternite VI with a few tiny spines. Forewings 7–9 mm long in male, 8–10 mm long in female.

Male genitalia. Segment IX relatively short, oblique in lateral aspect, produced posteriorly, long triangular in ventral aspect. Dorsal process of tergum X club-like, sometimes concave at apex in dorsal aspect; having pair of unpigmented lower processes, slender, approximately same length as dorsal process, with a few setae at apices. Paired ventrolateral processes strongly sclerotized; slender, tapering to acute apices, slightly curved ventromesad (Fig. 12b1); or distal 2/5 broad with acute apices in lateral aspect, strongly curved ventromesad (Fig. 12b2). Preanal appendage club-like. Basal segment of inferior appendage short; distal segment with 2 processes, dorsal process triangular in lateral aspect, acute apex directed ventrad; mesal process finger-like, curved laterad, basal part usually with 1–3 short acute process or angulated in lateral aspect. Phallus arcuate in lateral aspect, flanged dorsolaterally in basal half and ventrolaterally at middle part, phallic apodeme triangular in lateral aspect.

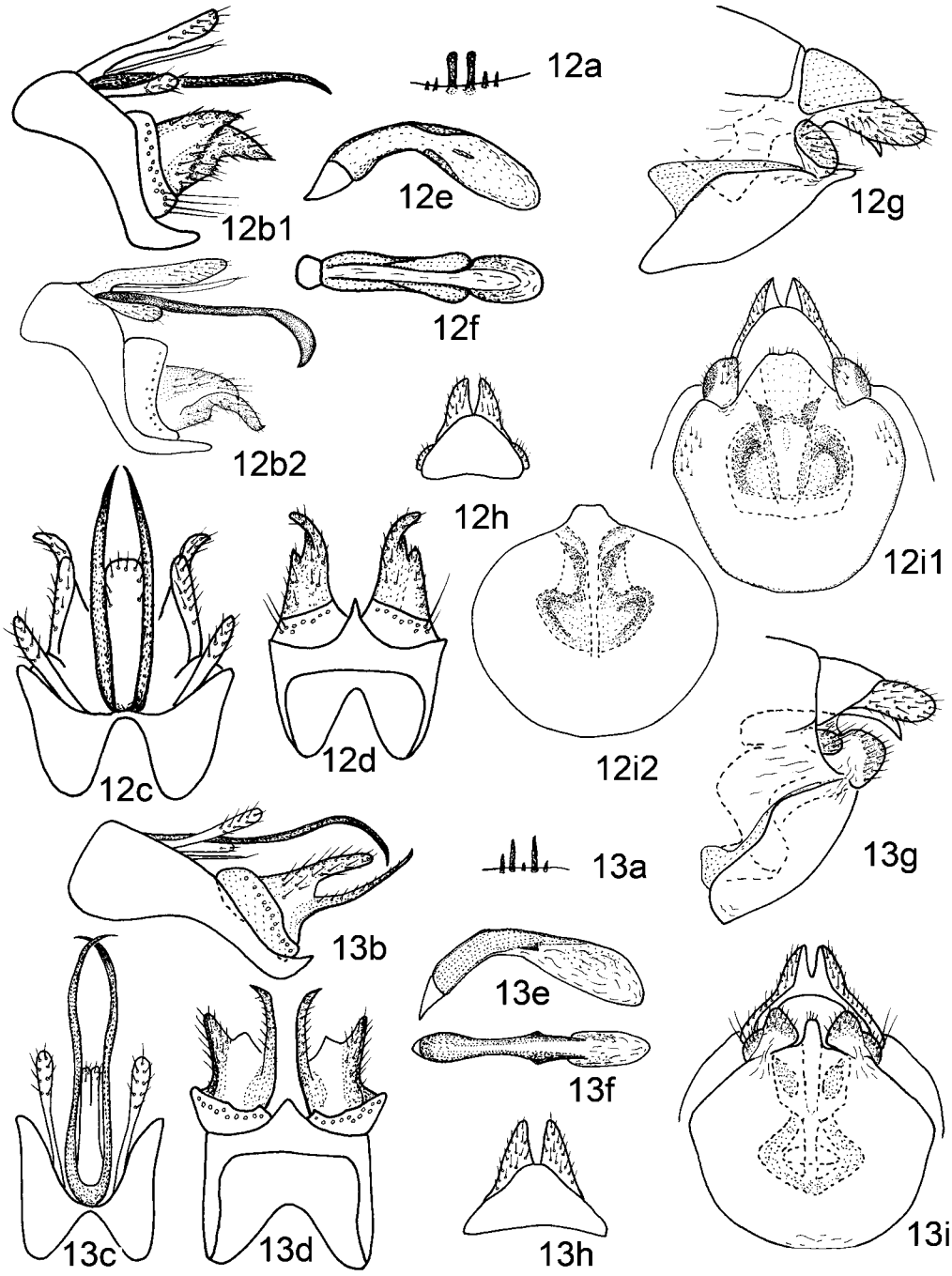
Female genitalia. Tergum IX distinct, semi-circular in dorsal aspect. Tergum X long oval in lateral aspect, sometimes apices with angular ventral margin. Lamellae oval, with dark pigmented plate dorsolaterally. Gonopod plate rounded, protruded apicomesally, lateral boundary distinct, bearing screlotized plate anterolaterally. Spermathecal plate 2/3 length of gonopod plate; anterior part wide rectangular or wide heart-shaped.

Larva. *Goera* sp. GB described by Tsuda and Akagi (1962) is the larval stage of this new species. The adult and larval association of this species was established by Kagaya *et al*. (1998).

Holotype male: JAPAN: Osaka: Chihaya-gawa, Chihayaakasaka-mura, 34°24’N, 135°40’E, larva collected on 19.xii.1996, adult emerged on 10.iv.1997, reared by M. Aoyagi (pinned, CBM-ZI 130495).

Paratypes. 1 female, same data as the holotype excepting emergence on 17.iv.1997 (CBM-ZI 130496); 4 males, 1 female, Yanogawa Rindo, Kumano-shi, Mie, 4.v.1989, H. Morita (1 male, 1 female: USNM; 3males: TN).

Other specimens examined. **Kanagawa:** 1 male, Kadotoguchi, Terayama, Hadano-shi, 28.iv.1983, T. Nozaki (TN); 1 male, Sawai-gawa, Wada, Fujino-machi, 30.iv.1989, T. Tashiro and T. Nozaki (TN); 1 male, Shiraishi-zawa, Yamakita-machi, 6.vii.1984; **Yamanashi:** 1 male and 1 female, Nagamata, Doshi-mura, Yamanashi, 15.v.1992, H. Moriya (TN); 2 pupae, Shiraito-no- sawa, 830 m a.s.l., Kosuge-gawa, Kosuge-mura; **Nagano:** 5 males, 1 female, a small stream, Okubo, Hase, Ina-shi, 2.vi.1993, N. Kuhara (NK); 5 females, Shiozawa, Sugishima, Hase, Ina-shi, 2.vi.1993, N. Kuhara (NK); **Gifu:** 1 male, 2 females, Hatsushika-dani, ca. 300m a.s.l., Neo-shimoosu, Motosu-shi, 4.v.1996, T. Hattori (TN); **Shizuoka:** 2 males, 1 females, Abe-toge, ca. 1400m a.s.l., Umegashima,



FIGURES 12–13. 12, *Goera nigrosoma*. Male sternite VI: a, ventral view. Male genitalia: b, lateral view (b1, Honshu, Osaka; b2, Shikoku, Ehime); c, dorsal view; d, ventral view; e, phallus, lateral view; f, phallus, dorsal view. Female genitalia: g, lateral view; h, dorsal view; i, ventral view (i1, Honshu; i2, Shikoku). 13, *Goera tajimaensis*. Male sternite VI: a, ventral view. Male genitalia: b, lateral view; c, dorsal view; d, ventral view; e, phallus, lateral view; f, phallus, dorsal view. Female genitalia: g, lateral view; h, dorsal view; i, ventral view.

Shizuoka-shi, 6.vi.1999, T. Hattori (BJA); 2 males, Nakazato, Fujieda-shi, 22.iv.2004, T. Torii and A. Yoshinari (TN); **Kyoto:** 1 male, Azo-dani, Kibune, Kyoto-shi, pupae collected on 15.iv.1984, adults emerged on 30.iv.1984 by K. Tanida (KT); **Wakayama:** 1 male, 1 female, Hirai, Kozagawa-cho, 3–4.v.1993, T. Ito (NK); **Okayama:** 1 male pupa, Hiruzen-kogen, Maniwa-shi, 25.iv.1989, N. Kobayashi (TN); **Kagawa:** 27 males, 6 females, Kojikawa, Shionoe-cho, Takamatsu-shi, 2.vi.2000, E. Yamamoto (TN); **Ehime:** 9 males, 10 females, Hondani, Odami-yama, Uchiko-cho, Ehime, 1005 m a.s.l., 10–21.v.2001, E. Yamamoto (TN); 1 female, a small stream, Sekimon, Wakayama, Kumakogen-cho, 23–25.v.1999, A. Ohkawa and T. Ito (TN); 1 female, Namakusa-dani, Odami-yama, Uchiko-cho, 29.v.1999, E. Yamamoto (TN); 1 female with larval and pupal exuviae, ibid., pupa collected on 21.iv.2004, emerged on 20.v.2004, by T. Ito and A Ohkawa (TN); 2 males, 15 females, Koya-yama, Uchiko-cho, 29.v.2000, E. Yamamoto and M. Doi (TN); **Kochi:** 1male, 1 female, Tengu-ike, Tsuno-cho, 8.v.2004, M. Takai (TN); 1 female, a headwater of Shimanto-gawa, Tsuno-cho, 8.v.2004, M. Takai (TN); 1 male, Befu-kyo, Kami-shi, 5.v.2002, M. Takai (TN).

Etymology. The specific name refers to the black wings and body of adults.

Distribution. Japan (central to western Honshu, Shikoku).

Japanese name. Kuro-ningyo-tobikera.

Remarks. Ventrolateral processes of males and spermathecal plates of females of specimens collected from Shikoku (Figs. 12b2, 12i2) are slightly different from those from Honshu (12b1, 12i1). We tentatively treat them as variations in the same species, but examination of additional specimens, especially collected from western Honshu and Kyushu, may be needed.

***Goera tajimaensis* Tanida and Nozaki sp. nov.**

Fig. 13

Diagnosis. This species may relate to *G. tungusensis* and *G. nigrosoma* in having a pair of ventral processes of tergum X, but bilobed dorsal process of tergum X is unique among Japanese species in male. In female, long apicomesal process of gonopod palte is also distinctive.

Adult. Specimens available for this study are all teneral. Body, wings, antennae mostly brown, but probably darker. Head short; ocelli absent; anterior setal warts round; posterior setal warts large, oval. Antennae about 8 mm long; scape ca. 0.7 mm long, with long setae. In male maxillary palpi, distal segment long oval, membranous and elastic, with long setae on outer and mesal surfaces, setae on mesal surface with swollen apices. Male abdominal segment VI with 5 spines. Female abdominal segment VI with 3–5 minute spines. Forewings ca. 9 mm long in both sexes.

Male genitalia. Segment IX long, oblique in lateral aspect; slightly produced posteroventrally, triangular in ventral aspect. Dorsal process of tergum X weakly

sclerotized, unpigmented, bilobed at apex in dorsal aspect; bearing a pair of ventral processes, slender, unpigmented, single seta at each apex. Paired ventrolateral processes slender, strongly sclerotized, acute apices curved ventromesad. Preanal appendage club-like. Basal segment of inferior appendage short; distal segment with 2 processes, dorsal process shorter than mesal one, blunt apically, mesal process slender, curved laterad. Phallus arcuate in lateral aspect, with a process at midway in each lateral side, phallic apodeme triangular in lateral aspect.

Female genitalia. Tergum IX distinct, triangular in dorsal aspect. Preanal appendages fused with tergum X, rounded in lateral aspect. Lamellae large, protrudeed posteriorly. Gonopod plate slightly wider than long, with prominent apicomesal process; spermathecal plate diamond-shape in ventral aspect.

Larva. Unknown.

Holotype male: JAPAN: Hyogo: R. Nakama, a tributary of Ohya-gawa, 39º19'N, 134º36'E, 27.v.1992, K. Tanida (in alcohol, OMNH TI 215).

Paratypes. 3 females: same data as the holotype (OMNH).

Etymology. The specific name refers to the traditional name of the area where the type series were collected.

Distribution. Known only from the type locality. Japan (central Honshu).

Japanese name. Tajima-ningyo-tobikera.

Goera spicata Schmid 1965

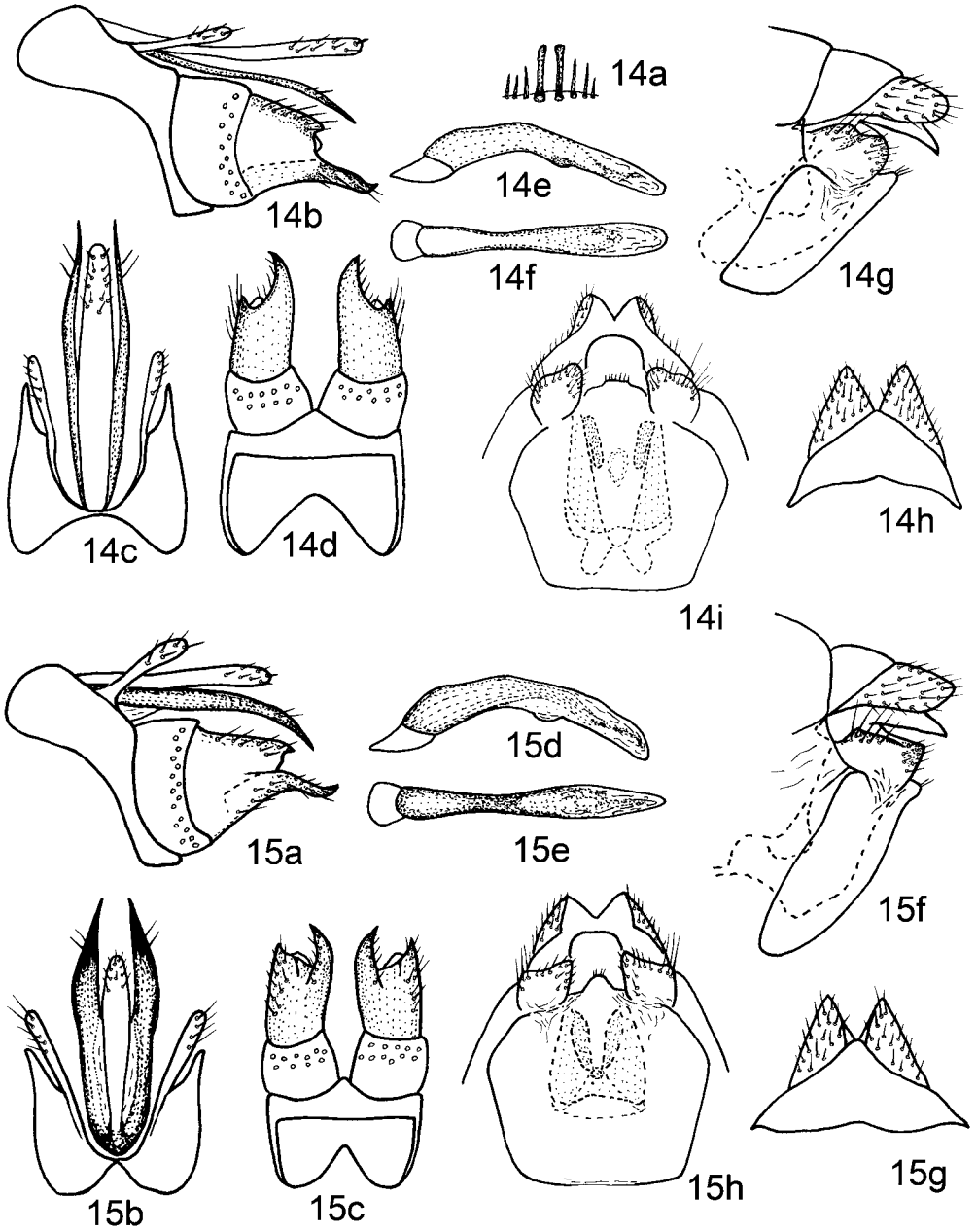
Fig. 14

Goera spicata Schmid 1965, 35, male.

Adult. Body, wings, antennae yellowish brown. Head short; ocelli absent; anterior setal warts contact with each other, forming single, bell-shaped wart; posterior setal warts large, oval. Antennae 5–7 mm long; basal segment ca. 0.8 mm long, with long setae. In male maxillary palpi, distal segment oval, membranous and elastic, with long setae on outer surface and dark scales on mesal surface, apical tube-like lobe present, finger-like, membranous and elastic. Male abdominal sternite VI with comb-like spines, usually central two long and finger-like. Female abdominal sternite VI with several minute spines, sternite VII with dark pigmented band on posterior margin. Forewings 6–8 mm long in both sexes.

Male genitalia. Segment IX oblique in lateral aspect; posteroventral part slightly produced, triangular in ventral aspect. Dorsal process of tergum X elongated, somewhat broad, setose apicodorsally, with pair of spine-like setae near apex. Paired ventrolateral processes slender, strongly sclerotized, slightly longer than dorsal process, usually with 2 subapical setae laterally, acute apices directed ventrally. Preanal appendage club-like. Basal segment of inferior appendage large. Distal segment of inferior appendage with 2

processes; dorsal process short, acute apically; mesal process long, curved dorsolaterad with apex acute. Phallus simple tube-like, slightly arcuate in lateral aspect, with a midventral protuberance; phallic apodeme triangular in lateral aspect.



FIGURES 14–15. 14, *Goera spicata*. Male sternite VI: a, ventral view. Male genitalia: b, lateral view; c, dorsal view; d, ventral view; e, phallus, lateral view; f, phallus, dorsal view. Female genitalia: g, lateral view; h, dorsal view; i, ventral view. 15, *Goera dilatata*. Male genitalia: a, lateral view; b, dorsal view; c, ventral view; d, phallus, lateral view; e, phallus, dorsal view. Female genitalia: f, lateral view; g, dorsal view; h, ventral view.

Female genitalia. Tergum IX distinct, triangular in dorsal aspect. Preanal appendages fused with tergum X, rounded in lateral aspect. Lamellae large, slightly bilobed in lateral and ventral aspect. Gonopod plate slightly wider than long, slightly projected laterally at midway in ventral aspect, with relatively wide apicomesal process. Spermathecal plate rectangular, approximately 4/5 length of gonopod plate, with 2 finger-like transparent lobes anteriorly.

Larva. Larval stage of this species was associated with adult and pupal stages by Kagaya *et al*. (1998), but the morphology was not described. The immature stages of this species and those of other Japanese species will be described in a future work.

Specimens examined. Holotype male, Japan, Honshu, Karuizawa, 28.viii.1952, R. Ishikawa (CNC). **Tokyo:** 1 male, Yazawa, Hinohara-mura, 8.vi.1992, T. Nozaki and T. Ito (NK); **Kanagawa:** 1 female, a headwater, Haragoya-sawa, Tsukui-cho, Sagamihara-shi, larvae collected on 10.v.1995, emerged on 13.vi.1995 by T. Nozaki (TN); **Yamanashi:** 6 males, 4 females, 2 pupae, Ichinose, Enzan-shi, 1.viii.1989, T. Nozaki and T. Kagaya (TN): 2 males, 1 female, ibid., 19.vii.1990, T. Nozaki, T. Kagaya and R. B. Kuranishi (TN); 1 female, ibid., 10.vii.1991, T. Nozaki and T. Kagaya (TN); **Shizuoka:** 3 males, 20 females, Abe-toge, ca. 1400m a.s.l., Umegashima, Shizuoka-shi, 28.viii.1997, T. Hattori (TN).

Distribution. Japan (central Honshu).

Japanese name. Hime-ningyo-tobikera.

***Goera dilatata* Nozaki and Tanida sp. nov.**
Fig. 15

Diagnosis. This species is closely related to *G. spicata*, but can be easily distinguished from the latter by broadened, paired ventrolateral processes of tergum X in male, and shorter spermathecal plate in female.

Adult. General morphology and coloration are very similar to those of *G. spicata*, and distinguished only by genitalic characters. Forewing 5.5–7 mm long in both sexes.

Male genitalia. Segment IX similar to that of *G. spicata* but dorsal part shorter and anterior margin gently concaved in lateral aspect. Dorsal process of tergum X slender club-like. Paired ventrolateral processes strongly screlotized, about 1.3 times as long as dorsal process, middle to apical 1/4 part broadened, with acute apices directed ventromesally, usually with 2 setae near apices laterally. Preanal appendages club-like. Inferior appendages similar to those of *G. spicata*, but mesal process of distal segment more slender and twisted. Phallus similar to that of *G. spicata*.

Female genitalia. Terga IX and X similar to those of *G. spicata*. Lamellae large, triangular in lateral aspect, with angular ventroposterior corner in lateral and ventral aspects. Spermathecal plate similar to that of *G. spicata*, but about 2/3 length of gonopod plate and without lobes anteriorly.

Larva. Unknown.

Holotype male: JAPAN: Akita: Umaarai-shimizu, Yashikida, Yarida, Misato-cho, 39º25'59''N, 140º32'34"E, 9.vi.1998, H. Nishimoto (in alcohol, CBM-ZI 130499).

Paratypes. 5 males, 2 females, same data as the holotype (1 male, 1 female: CBM-ZI 130500; 2 males, 1 female: USNM; 2 males: TN).

Other specimens examined. **Hokkaido:** 2 males, 10 females, Oshironai-gawa, Shirakawa, Mori-machi, 8.vi–25.vii.1994, M. Nakajima (TN); 1 male, 9 females, ibid., 13.vi.–3.viii.1995, M. Nakajima (TN); **Iwate:** 1 male, Okawa, Komagasawa, Iwaizumi-cho, 12.vii.1997, N. Kuhara (NK); 1 male, Kanazawa-shimizu, Matsuo, Hachimantai-shi, 10.vi.1998, H. Nishimoto (TN); **Miyagi:** 4 males, 3 females, Yokokawa, 500 m a. s. l., Shichigashuku-machi, 5.vii.1998, T. Hattori (2 males, 2 females: BJA; 2 males, 1 female: TN); **Akita:** 2males, Kaminoguchi, Shimizu, Daisen-shi, 30.vi.1993, K. Aoya (NK); **Niigata:** 4 females, Kaminoguchi, Arakawa-machi, 3.vi.1984, S. Togashi (TN); 1 male, 1female, ibid., 5.vi.1984, S. Togashi (TN).

Etymology. The specific name refers to broadened, ventrolateral processes of tergum X in male genitalia.

Distribution. Japan (southern Hokkaido, central to northeastern Honshu)

Japanese name. Futoo-hime-ningyo-tobikera.

Acknowledgements

We express our cordial thanks to B. J. Armitage (Midwest Biodiversity Institute, Columbus, Ohio) for critical reading of the manuscript. T. I. Arefina-Armitage (Russian Academy of Science, Institute of Biology and Soil Science, Vladivostok) provided specimens and valuable information for Russian taxa. We are also grateful to the following persons for the loan of the type specimens: J. J. Huber (CNC), M. Kobayashi (Yokohama); R. B. Kuranishi (CBM) and W. Mey (DEI). Many persons mentioned in the specimen lists kindly provided valuable materials.

References

Akagi, I. (1974) A larva of *Goera* from Amami-ohshima Island. *Annals of Kansai Natural Science Association*, 26, 18–19 [in Japanese].

Akagi, I. (1975) On the larvae of *Goera curvispina* MARTYNOV (Goerinae, Goeridae) and key to larvae of Goeridae. *Tansui-Seibutsu*, 13, 3–4 [in Japanese].

Arefina, T.I. (1997) Goeridae. In Lehr, P. A. (Senior editor), *Key to the insects of Russian Far East, Vol. 5, Trichoptera and Lepidoptera*, Dal'nauka, Vladivostok, pp. 126–128 [in Russian].

Armitage, B.J. & Arefina, T.I. (2003) The genera *Goera* Stephens and *Gastrocentrella* Ulmer (Trichoptera: Goeridae) in Vietnam. *Pan-Pacific Entomologist*, 79, 100–111.

Banks, N. (1906) New Trichoptera from Japan. *Proceedings of the Entomological Society of Washington*, 7, 106–113.

Botosaneanu, L. (1970) Trichoptères de la Republique Democratique-Populaire de la Corée. *Annales Zoologici*, 15, 1–85.

Chihara, A. (1956) Drei japanische Sericostomatiden-Puppen. *Kontyû, Tokyo*, 24, 81–86.

Choe, H-J., Kumanski, K.& Woo, K-S. (1999) Taxonomic notes on Limnephilidae and Goeridae (Trichoptera: Limnophiloidea) of Korea. *The Korean Journal of Systematic Zoology*, 15, 27–49.

Ito, T., Suzuki, K.& Ohkawa, A. (2000) Caddisfly fauna of northernmost part of Japan. *Biology of Inland Waters*, 15, 20–31 [in Japanese with English abstract].

Kagaya, T., Nozaki, T. & Kuranishi, R.B. (1998) Fauna and distribution of Trichoptera in the Tama-River system. In Katagiri, K. (Ed.) *Fauna and distribution of Trichoptera in the Tama-River system*. Tokyu Foundation for better Environment, Tokyo, pp. 1–266 [in Japanese].

Kobayashi, M. (1957) On a new species of *Goera* from Kyushu, Japan (Trichoptera). *Bulletin of the National Science Museum (Tokyo)*, 3, 276–278 + pl. 44.

Kobayashi, M. (1971) Studies on the fauna and classification of aquatic insects (Trichoptera) in the Kanagawa Prefecture. *Research Report of the Kanagawa prefectural Museum, Natural History*, 3, 1–49 + pls. 1–24 [in Japanese].

Kobayashi, M. (1984) On the Trichoptera from the Oshima Peninsula, Hokkaido, Japan (Insecta). *Bulletin of the Kanagawa prefectural Museum (Natural Science)*, 15, 15–36 [in Japanese with English abstract].

Kobayashi, M. (1987) Caddisflies or Trichoptera from Shimane Prefecture in Japan. *Bulletin of the Kanagawa prefectural Museum (Natural Science)*, 17, 13–35.

Kumanski, K. (1991) Studies on Trichoptera (Insecta) of Korea (North). V. Superfamily of Limnephiloidea, except Lepidostomatidae and Leptoceridae. *Insecta Koreana*, 8, 15–29.

Kuranishi, R.B. (2002) Bibliography of Mineo Kobayashi, with a list of Trichoptera species described by him. *Braueria*, 30, 35–36.

Lepneva, S.G. (1966) Fauna of the U.S.S.R.: Trichoptera, vol. 2, no. 2. *Larvae and Pupae of Integripalpia*, 560 pp., [Israel Program for Scientific Translations, 1971].

Levanidova, I.M. (1982) *Amphibiotic insects of mountainous regions of Far East of the USSR*. Nauka, Leningrad, 215 pp [in Russian].

Martynov A.V. (1909) Les Trichoptères de la Sibérie et des régions adjacentes. Part 1. Les familles des Phryganeidae et des Sericostomatidae. *Zoologicheskii Musei, Akademiia Nauk SSSR*, 14, 223–255 [in Russian with English description of new species].

Martynov, A.V. (1924) Sur les Trichoptéres de la province de Minoussinsk. 2. Sur la collection du lac Boujba. *Ezheg. Gosud. Muz. N. M. Martjanova [Jahrbuch Martjanovischen Staatsmuseums in Minoussinsk]*, 2(3), 99–107 [in Russian].

Martynov, A.V. (1935) Trichoptera of the Amur region. Part I. *Travaux l'Institut Zoologique Académie des Sciences de l'URSS*, 2–3, 205–395.

Navás, L. (1933) Insecta Orientalia. *Memorie della Pontificia della Academia Scienze Nuovi Lincei*, 17, 75–108.

Nishimoto, H. & Morita, H. (2001) Insects in the researches along the riverside of the Yahagigawa in urban blocks of Toyota City from 1995 through 1999, 4 Caddisflies living around the riverside in urban blocks. *Report of Yahagi River Institute*, 5, 71–78 [in Japanese.].

Nozaki, T., Tanida, K. & Ito, T. (2000) Checklists of Trichoptera in Japan. 4. Goeridae, Uenoidae and Limnephilidae. *Limnology*, 1, 197–208.

Satake, K., Kuranishi, R.B. & Ueno, R. (2005) Caddisflies (Insecta: Trichoptera) collected from the Bonin Islands and the Izu Archipelago, Japan. In Tanida, K. and A. Rossiter (Eds.) *Proceedings of the 11th International Symposium on Trichoptera*, Tokai University Press, Hadano, pp. 371–381.

Schmid, F. (1965) Quelques Trichoptères Asiatiques II. *Entomologisk Tidsrift*, 86, 28–35.

Tani, K. (1977) Trichoptera. In S. Ito *et al*. (Eds.), *Colored Illustrations of the Insects of Japan 2*,

Hoikusha, Osaka, pp. 184–206 [in Japanese].
Stephens, J.F. (1829) *A systematic Catalogue of British Insects. Pt. 1*. London, 416 pp.
Tanida, K. (1985) Trichoptera. In T. Kawai (Ed.), *An Illustrated Book of Aquatic Insects of Japan*, Tokai University Press, Tokyo, pp. 167–215 [in Japanese].
Tanida, K. (1997) Trichoptera fauna of the Ryukyu Islands: taxonomic and ecological prospects. *In:* Holzenthal, R.W. & Flint O.S. Jr. (Eds.), *Proceedings of the 8th International Symposium on Trichoptera*, Ohio Biological Survey, Columbus, Ohio, pp. 445–451.
Tanida, K. (2003) Trichoptera. *In:* Nishida, M. *et al*. (Eds.), *The Flora and Fauna of Inland Waters in the Ryukyu Islands*, Tokai University Press, Hadano, pp. 370–392 [in Japanese].
Tomokuni, M. & Sato, M. (1978) Aquatic and semiaquatic insects of the Bonin Islands (including the Volcano islands). *Memoirs of the National Science Museum* (11), 107–121 [in Japanese].
Tsuda, M. (1942) Japanische Trichopteren I. Systematik. *Memoirs of the College of Science, Kyoto Imperial University, Series B.*, 17, 239–339.
Tsuda, M. & Akagi, I. (1955) On the Japanese species of genus *Goera*. *Bulletin of the Biogeographical Society of Japan*, 16, 235–238 [in Japanese].
Tsuda, M. & Akagi, I. (1956) Two new caddis-fly larvae from Yahagi-River, Aichi Prefecture. *Journal of Nagoya Jogakuin Junior College*, 3, 37–40 [in Japanese].
Tsuda, M. & Akagi, I. (1962) Trichoptera. In M. Tsuda (Ed.), *Aquatic Entomology.* Hokuryukan, Tokyo, pp. 112–148 [in Japanese].
Ulmer, G. (1927) Einige neue Trichopteren aus Asien. *Entomologisch Mittelungen*, 16, 172–182+ 2 pls.
Yang, L. & Armitage, B.J. (1996) The genus *Goera* (Trichoptera: Goeridae) in China. *Proceedings of the Entomological Society of Washington*, 98, 551–569.

