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Taxonomic Notes and New Distribution and Host Plant Records for Sawflies and Woodwasps (Hymenoptera, Symphyta) of Japan VII

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Abstract *Beleses eikoae* Togashi, 2004 is synonymized with *Beleses nigrifemoratus* Togashi, 1999. Additional descriptions are given for *Beleses nigrifemoratus*, *Caliroa vaccini* Okutani, 1965 and *Fagineura parva* Hara, 2022. The males of *Beleses nigrifemoratus* and *Euura damnacanti* (Takeuchi, 1922) are described for the first time. *Abia triangularis* (Takeuchi, 1931) is recorded from Hokkaido for the first time. New host plant records are given for *Aproceros leucopoda* Takeuchi, 1939, *Arge gracilicornis* (Klug, 1814), *Beleses nigrifemoratus*, *Euura damnacanti*, *Fagineura parva*, *Heterarthrus alnivorus* Togashi, 1992, *Mesoneura macroptera* Takeuchi, 1936, *Mesoneura mikagei* Togashi, 1998, *Tomostethus nigritus* (Fabricius, 1804) and *Monoxiphia harai* (Shinohara, 2019). Notes on life history, larvae or distribution are given for *Arge gracilicornis*, *Pamphilius kamikochensis* Takeuchi, 1930, *Ametastegia polygoni* Takeuchi, 1929, *Beleses nigrifemoratus*, *Caliroa vaccini*, *Euura damnacanti*, *Fagineura parva*, *Mesoneura macroptera*, *Mesoneura mikagei*, *Tomostethus nigritus*, *Xiphydria kanba* Shinohara, Hara and Smith, 2020, and *Xyelecia japonica* Togashi, 1972.

Key words: Argidae, Cimbicidae, Pamphiliidae, Tenthredinidae, Xiphydriidae, Xyelidae, new synonym, additional description, new distribution record, new host plant record.

Introduction

This is a seventh paper in a series of works under the present title (e.g. Shinohara and Hara, 2015, 2020; Hara *et al.*, 2018) and deals with various aspects of the 16 Japanese species of sawflies and woodwasps belonging to the families Argidae, Cimbicidae, Pamphiliidae, Tenthredinidae, Xiphydriidae and Xyelidae. Most of the new findings reported in this paper are based on the recently acquired material, particularly the specimens obtained as a result of rearings by Ibuki in Nakagawa, Tochigi Prefecture, in the last several years.

Materials and Methods

The material used in this study is kept in the National Museum of Nature and Science, Tsukuba. Morphological examination was undertaken with a Leica MS5 and an Olympus SZ60 stereo binocular microscopes and Olympus BH-2 light microscope. Photographs were taken with Canon PowerShot SX50 HS, CASIO EX-ZR1000, Olympus TG-4, Olympus TG-5, Panasonic DMC-FZ28, RICOH CX3, RICOH GR DIGITAL 2 and Sony DSC-HX1 digital cameras and a Sony DSC-RX100 digital camera with a Leica MS5 and an Olympus BH-2 light microscopes. The digital images were processed and arranged with GIMP 2.10 software. Rearing

was done in rooms in Bibai, Hokkaido, and Nakagawa, Tochigi Prefecture, and Tsukuba, Ibaraki Prefecture, Honshu. The temperature and day length were not controlled in the rearing rooms, but hibernating individuals were moved in March to air-conditioned rooms at 10–25℃ in Bibai. For the morphological terminology, we generally follow Viitasaari (2002).

Results and Discussion

Argidae

Aproceros leucopoda Takeuchi, 1939
Japanese name: Nire-kuwagata-habachi

Material examined. Hokkaido: 1 ♀, Kamishihoro, Kamiotofuke, 43°18′N 143°13′E, coll. larva (HH220627A) on *Ulmus laciniata*, 27. VI. 2022, coc. 30. VI., em. 5. VII. 2022, H. Hara.

Host plant. Ulmaceae: *Ulmus davidiana* Planch. var. *japonica* (Rehder) Nakai (Blank *et al.*, 2010), *U. laciniata* (Trautv.) Mayr ex Schwapp. (new record), *U. pumila* L. (Takeuchi, 1939; see also Blank *et al.*, 2010) in Japan. For the host plants outside Japan, see Blank *et al.* (2010) and Martel *et al.* (2021).

Remarks. This is a well-known east Asian sawfly associated with *Ulmus*, which was introduced to Europe (Blank *et al.*, 2010) and North America (Martel *et al.*, 2021). *Ulmus laciniata* is recorded as the host plant for the first time.

Arge gracilicornis (Klug, 1814)
Japanese name: Kogata-ruri-chûrenji
(Fig. 1)

Material examined. Hokkaido: 1 ♀, Haboro, coll. larva on *Rubus idaeus melanolasius*, 19. IX. 2007, em. 9. IV. 2008, H. Hara; 1 ♀, Higashikawa, Asahidake-onsen, coll. seven young larvae (HH070812C) on *Rubus idaeus*, 12. VIII. 2007, coc. 22–24. VIII., em. 26. IX. 2007, H. Hara (Fig. 1A, B). Honshu: Nagano Pref.: 1 ♂, Hakuba, Happô, coll. three larvae (AS070815A) on *Rubus crataegifolius*, 15. VIII. 2007, mat. 16–18. VIII., em. 22. X. 2007, A. Shinohara (Fig. 1D).

Host plant. Rosaceae: *Rubus idaeus* L. subsp. *melanolasius* Focke and *Rubus crataegifolius* Bunge in Japan (new record). In Europe, several species of *Rubus* including the nominotypical subspecies of *Rubus idaeus* and *Rosa canina* L. are known as the host plants (Taeger *et al.*, 1998).

Life history. This sawfly is probably multivoltine in Japan. Young larvae are gregarious. The hibernation is done in a cocoon.

Remarks. The host plant of this sawfly is recorded for the first time in Japan (see also Okutani, 1967a). The Japanese larva (Fig. 1) is similar to the European larva described by Lorenz and Kraus (1957) and figured by Lacourt (2020) and Macek *et al.* (2020). The head color pattern seems to vary in European specimens (compare figs. 2, 3, pl. 5 in Lacourt, 2020, with fig. 4, p. 79 in Macek *et al.*, 2020), while the known late instar larva from Japan has mostly black head (Fig. 1).

Cimbicidae

Abia triangularis (Takeuchi, 1931)
Japanese name: Futoobi-konbô-habachi

Material examined. Hokkaido, 1 ♀, Bibai, Minamibibai, 43°18′N 141°53′E, 30. V. 2022, H. Hara.

Distribution. Japan: Hokkaido (new record), Honshu (Takeuchi, 1931), Sado Island (Takeuchi, 1936), Shikoku (Takeuchi, 1931), Kyushu (Takeuchi, 1955).

Remarks. This sawfly is endemic to Japan, but it has been unknown from Hokkaido until now.

Pamphiliidae

Pamphilius kamikochensis Takeuchi, 1930
Japanese name: Ko-haraaka-hirata-habachi
(Fig. 2)

Larva. Middle instar (Fig. 2D, E): Head black with antennae creamy white; trunk including all appendages creamy white with most of prothoracic shield and part of cervical sclerite black. Final instar (Fig. 2F): Head black with antennae pale green; trunk including all appendages pale

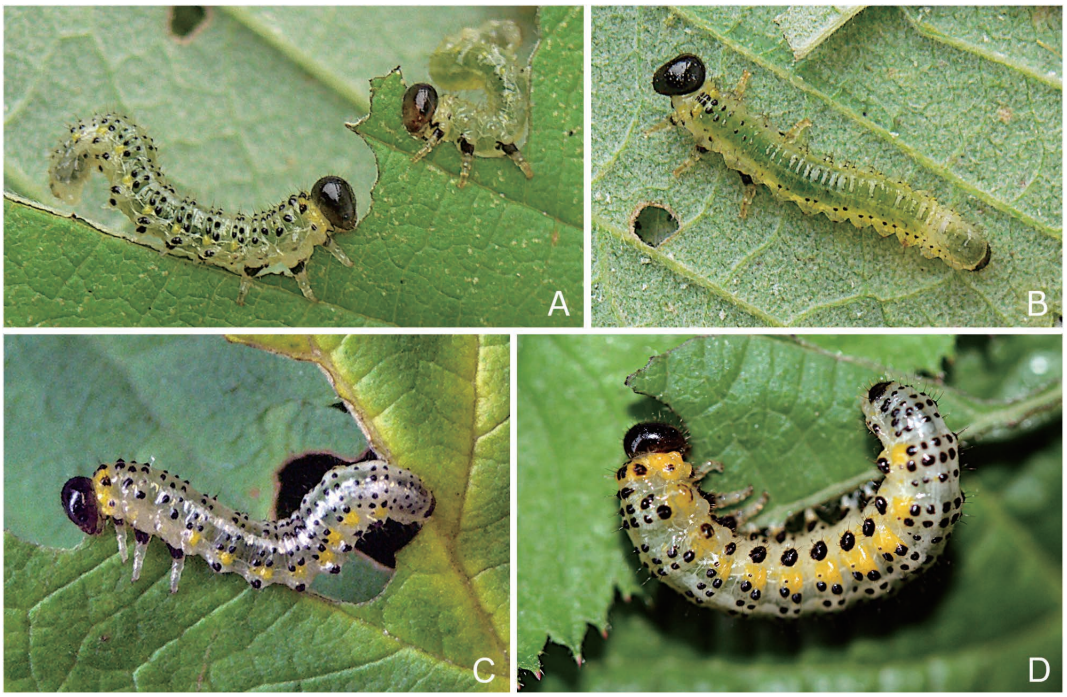

Fig. 1. *Arge gracilicornis*: A, B, Late instar larvae, Asahidake-onsen, 18. VIII. 2007; C, late instar larva, Shiga-kogen, 3. IX. 2006; D, final instar larva, Hakuba, 17. VIII. 2007. A, B, Photographed by Hara; C, D, photographed by Shinohara.

green with part of prothoracic shield and cervical sclerite black.

Host plant. Rosaceae: *Padus ssiori* (F.Schmidt) C.K.Schneid.

Life history. This species has a univoltine life cycle as other *Pamphilius* species. The adults are on wing in spring (e.g., middle of May to middle of June in Shôbugahama, ca. 1280 m alt., Nikko, in central Honshu, Fig. 2A, B; see also National Museum of Nature and Science, 2022, for adult collection records). The female lays an egg along the main vein in the basal part of the underside of a leaf (Fig. 2C, G). The larval abode is a common simple leaf-roll on the underside of the leaf (Fig. 2G–H). The larva is solitary. The egg and larval period apparently takes about a month.

Remarks. Shinohara and Okutani (1983) first recorded *Padus ssiori* as the host plant of *Pamphilius kamikochensis*. They noted "On 5 June 1977, Shinohara encountered an outbreak of this species in Nikko-Yumoto, ca. 1700 m alt., Tochigi Pref., Honshu." Since 1977, Shinohara has occasionally seen a large number of the adults and larvae on *P. ssiori* (possibly described as "outbreak" in some cases) in Tochigi Prefecture and Nagano Prefecture, Honshu (for some collection data, see National Museum of Nature and Science, 2022). The larvae and leaf-rolls are described and illustrated here for the first time. The larvae are easily recognized by the host plant, the entirely black head capsule and the entirely pale abdomen.

This is one of the three species of the Pamphiliidae known to be associated with the rosaceous genus *Padus* (Shinohara and Wei, 2016). It is noteworthy that no larvae of this sawfly have been found on another species of *Padus*, *P. grayana* (Maxim.) C.K.Schneid., which sometimes grows near *P. ssiori*, even under the "outbreak" conditions. *Pamphilius kamikochensis* seems to be strictly monophagous.

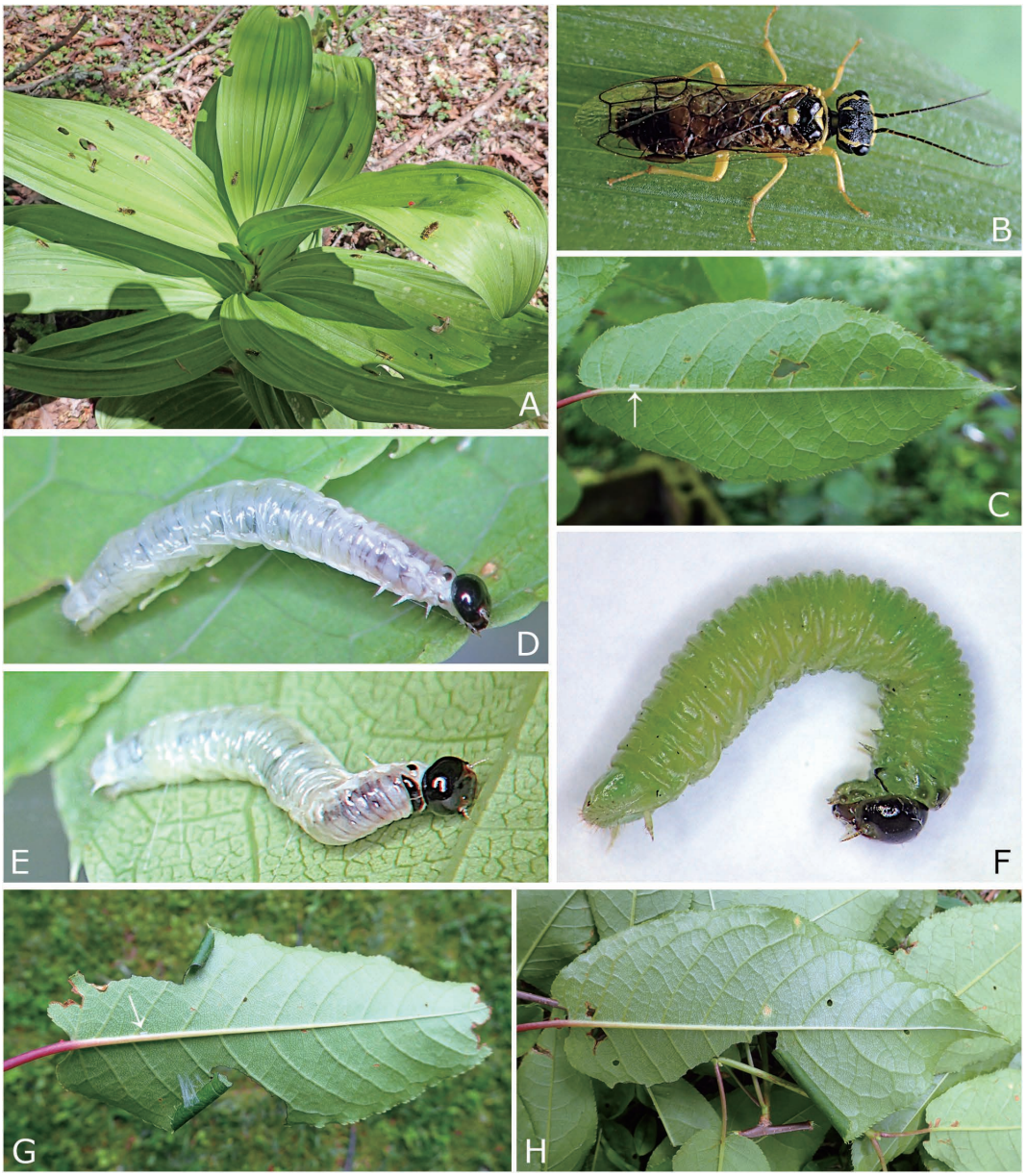

Fig. 2. *Pamphilius kamikochensis*: A, Adults on the leaves of *Veratrum* sp. under the host tree (13 individuals recognizable), 23. V. 2022; B, female, 1. VI. 2022; C, egg (arrowed) on a leaf, 1. VI. 2022; D, E, middle instar larva, 27. VI. 2022; F, mature larva, 10. VII. 2022; G, two leaf-rolls of probably middle instar larvae and remains of egg shell on a leaf, 26. VI. 2022; H, one leaf-roll of probably late instar larva on a leaf, 26. VI. 2022. A–C, G, H, Nikko; D–F, Tsukuba (indoors). Photographed by Shinohara.

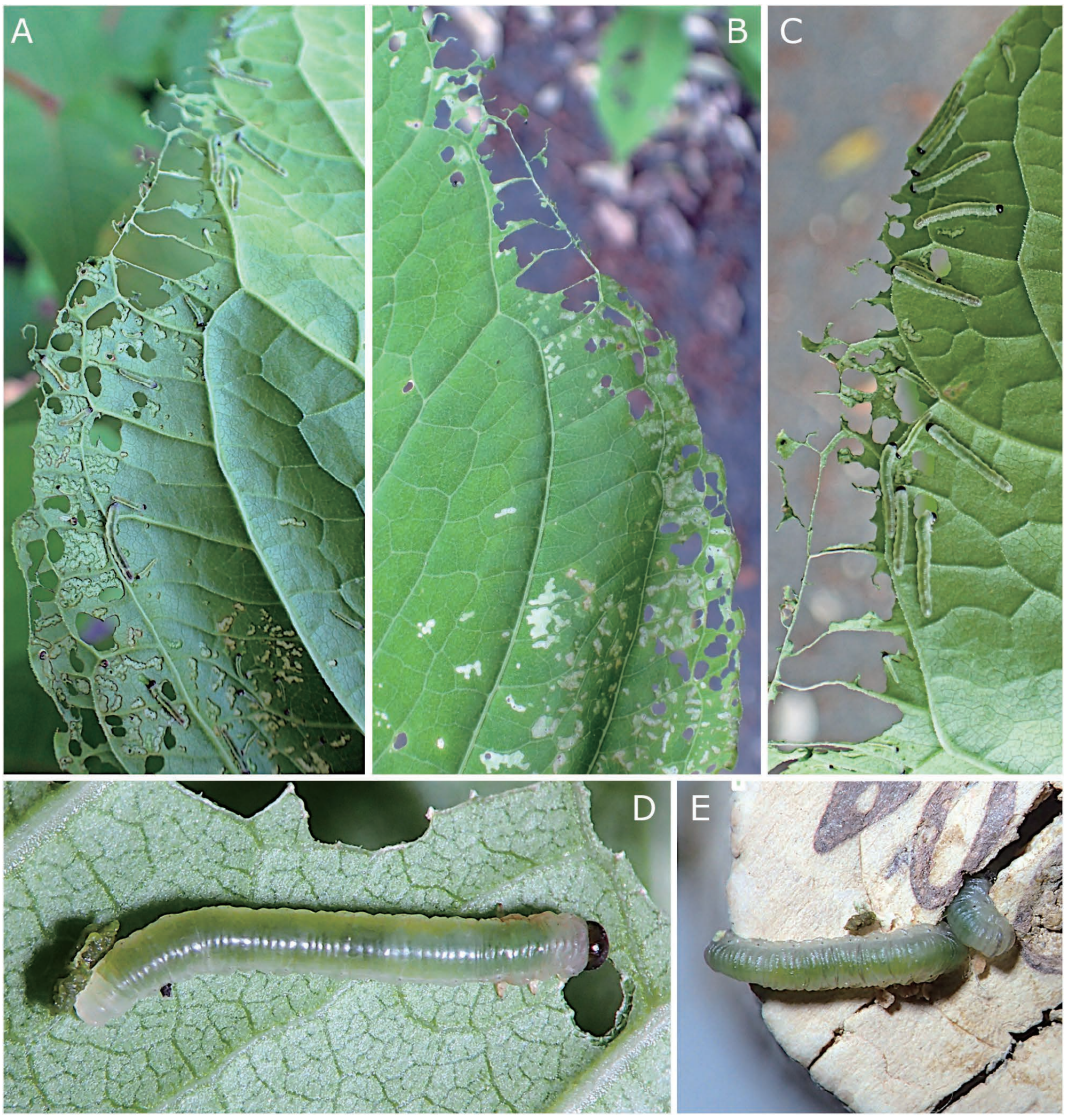

Fig. 3. *Ametastegia polygoni*: A, Leaf of *Fallopia japonica* var. *japonica*, infested with larvae of *A. polygoni*, under side, 5. V. 2022; B, same leaf, upper side; C, same leaf, under side, with a group of middle or late instar larvae; D, late instar larva, 13. V. 2022; E, mature larvae entering cork, 13. V. 2022. A–C, Sakuragawa; D, E, Tsukuba (indoors). Photographed by Shinohara.

Tenthredinidae

Ametastegia polygoni Takeuchi, 1929
Japanese name: Itadori-kuro-habachi
(Fig. 3)

Material examined. Honshu: Ibaraki Pref.: 3 ♀, Amabiki-kannon, Sakuragawa, coll. larvae on *Fallopia japonica* var. *japonica*, 5. V. 2022, mat. 12. V., em. 25. V. 2022, A. Shinohara.

Host plant. Polygonaceae: *Fallopia japonica* (Houtt.) Ronse Decr. var. *japonica* (Takeuchi, 1929).

Life history. On 5 May, 2022, a group of probably middle instar larvae were found on the underside of a leaf of the host plant in Sakuragawa, Ibaraki Prefecture. The larvae fed on the underside of the leaf, making large holes but usually leaving the thin upper surface tissue

(Fig. 3A–C). In middle of May, several larvae matured and went into cork (Fig. 3E), not in soil. After about two weeks, three female adults emerged. This species has two or more generations a year (Okutani *et al.*, 1959).

Remarks. As clearly indicated by the species epithet, the host plant of this species was already known when the species was described in 1929. Okutani (1954) gave a key to the larvae of four sawfly species feeding on *Polygonum cuspidatum* (= *Fallopia japonica* var. *japonica*), including *A. polygoni*. Okutani *et al.* (1959) described the larva with good line drawings and gave notes on the life history. Here we give the photographs of the larvae for the first time.

Okutani *et al.* (1959) noted that *A. polygoni* has two or more generations a year and the larvae occur in May to July. The published collection records of the adults (Shinohara, 2000, 2001, 2005, 2014; Naito *et al.*, 2004), mostly in April to June and none in mid-summer to autumn, and Shinohara's observation recorded above, agree well with Okutani *et al.*'s statement. Naito (2020) mentioned without giving references or supporting data that this species was multivoltine with adult emergence from spring to autumn.

Beleses nigrifemoratus Togashi, 1999

New Japanese name: Akaobi-sarunashi-habachi

(Figs. 4, 5)

Beleses nigrifemoratus Togashi, 1999: 569; Togashi, 2004: 53; Taeger *et al.*, 2010: 268; Naito, 2019: 51.
Beleses eikoae Togashi, 2004: 53. Syn. nov.

Additional description, *female*. Fig. 4A–D. Length 8.0–8.5 mm. Antenna black, yellow white on wide apex of flagellomere 3 and flagellomeres 4 or 4–5, sometimes also on ventrolateral parts of scape and flagellomeres 1–2 and 6–7. Abdomen dorsally black, red yellow to brown from wide posterior part of tergum 1 to tergum 5 except for anterior margin of tergum 2 or only on tergum 3 and wide part of tergum 4; laterotergites 2–6 or 3–6 yellow. Legs yellow white; coxae basally dark brown; fore and middle femora or middle femur yellow brown to dark brown except for bases and apices; hind femur black except for narrow base including trochantellus; hind tibia black, sometimes slightly pale at middle; hind tarsomere 1 black but yellowish on very narrow apex and sometimes also on very narrow ventral part.

Postocellar area with median ridge indistinct or anteriorly distinct (Fig. 4J–K). OOL: POL: OOCL = 1.3–1.5: 1.0: 1.2–1.5. Tarsal claws with inner tooth long or short. Mesoscutellar appendage with punctures indistinct or very small and shallow. Hind leg with tarsomere 1 as long as tarsomeres 2–5 combined. Ovipositor Fig. 5A, B; lancet with about 21–22 serrulae; middle ctenidia each about half as long as its corresponding annulus, with many setaceous teeth.

Male. Fig. 4E, F. Differing from female as follows except for usual sexual differences.

Length 7.0–8.0 mm. Antenna black, ventrolaterally white to brownish white from scape or pedicel to flagellomere 3 or 4. Narrow posterior part of mesoscutellum and mesoscutellar appendage often brown. Hind tarsus yellow white, black from tarsomere 1 to tarsomere 2 except for narrow apex or to basal half of tarsomere 3. Laterotergites 3–4 or 3–5 yellow Hind wing with marginal vein. Genitalia as in Fig. 5C–F; parapenis apically widely rounded; penis valve with one small apical spine.

Larva. Length 14–16 mm in final feeding (semifinal) and final instars. In middle to final feeding instar, head pale brown or grayish brown, trunk pale gray covered with white wax bloom and thoracic legs pale gray (Fig. 5I–J). In final instar, head and thoracic legs pale brown and trunk pale yellow (Fig. 5K). Abdominal terga 1–8 each with 6 annulets. Prolegs present on segments 2–8; anal proleg absent.

Material examined. Holotype of *Beleses nigrifemoratus* Togashi, 1999: ♀, "1300–1500 m, Mt. Hakusan, Ishikawa Pref., 5. V. 1998, I. Togashi", "NSMT-HYM 62262", "Holotype Beleses nigrifemoratus sp. nov." (Fig. 4A, B, G, J). Holotype of *Beleses eikoae* Togashi, 2004: ♀, "Mt. Rokuman, Siramine-mura, Ishikawa Pref., 3. VI. 2003, I. Togashi", "NSMT-HYM 62247", "Holotype,

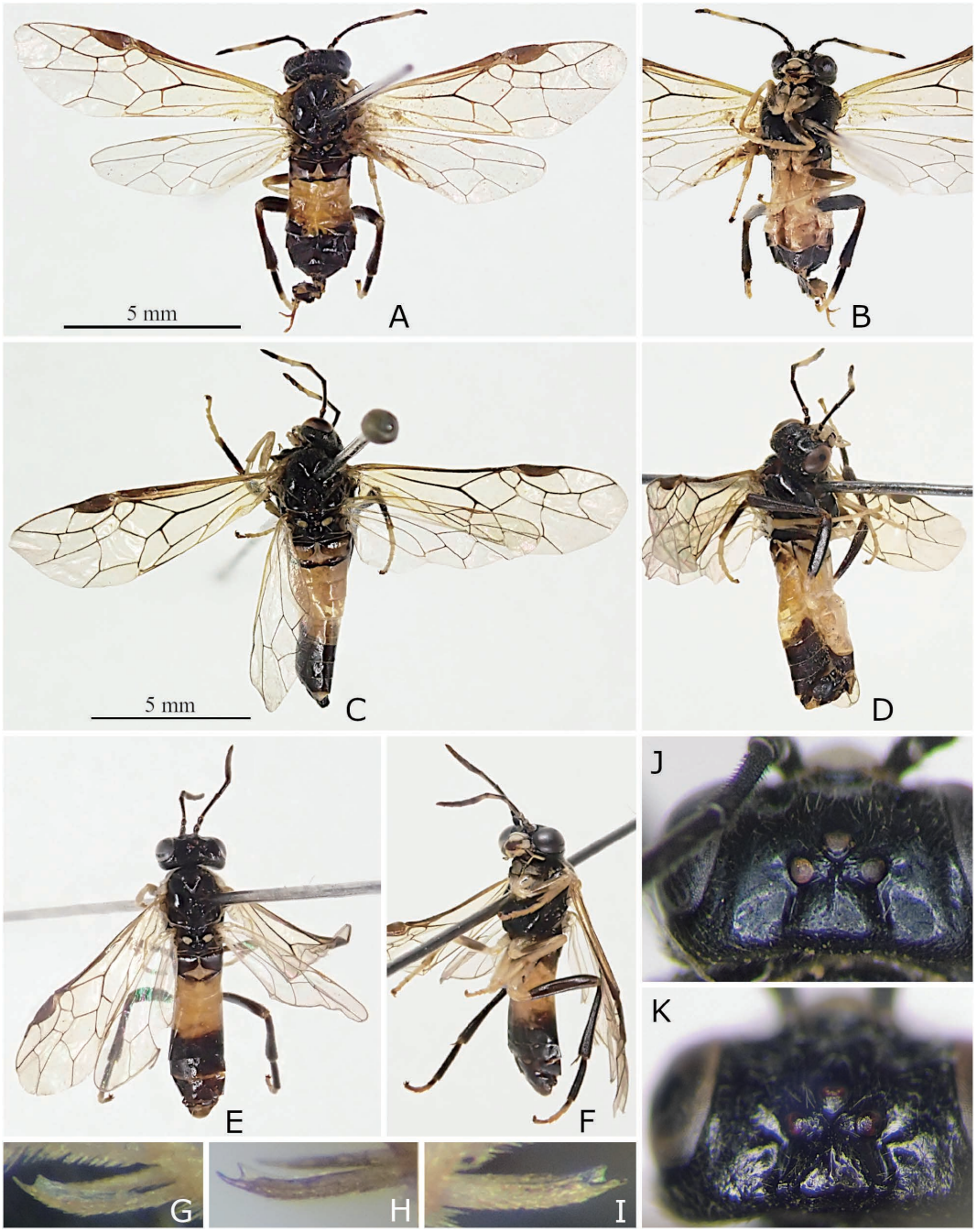

Fig. 4. *Beleses nigrifemoratus*: A, B, G, J, Holotype of *B. nigrifemoratus* Togashi, 1999, female; C, D, H, K, holotype of *B. eikoae* Togashi, 2004, female; E, F, I, paratype of *B. eikoae*, male. A, C, E, Dorsal views; B, D, F, ventral or lateral views; G–I, anterior spur of fore tibia; J, K, head, dorsal view. Photographed by Hara.

Beleses eikoae n. sp." (Fig. 4C, D, H, K). Paratype of *B. eikoae*: 1 ♂, "Mt. Rokuman, Siramine-mura, Ishikawa Pref., 3. VI. 2003, I. Togashi", "NSMT-HYM 62248", "Paratype, Beleses eikoae n. sp." (Fig. 4E, F, I).

Other material examined: Honshu: Tochigi

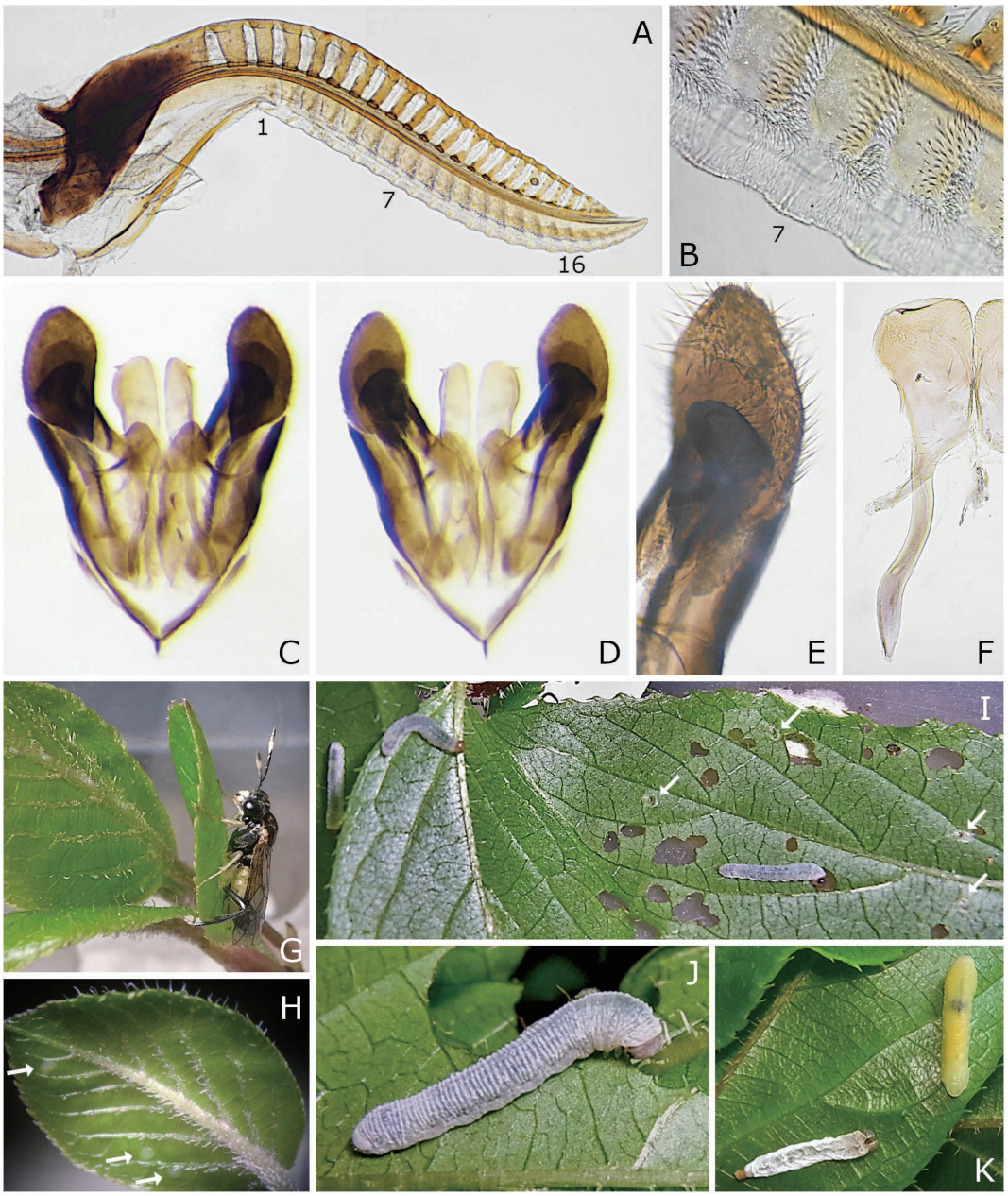

Fig. 5. *Beleses nigrifemoratus*: A, Female ovipositor; B, middle part of lancet; C, D, male genitalia, ventral and dorsal views; E, volsella, dorsal view; F, penis valve, left dorsal; G, female, 7. IV. 2016; H, eggs laid in leaf, 10. IV. 2016; I, early instar larvae and egg marks (arrowed), 8. V. 2015; J, semifinal (final feeding) instar larva, 12. V. 2015; K, final instar larva just after extra molt, 18. V. 2015. A–F, Photographed by Hara; G–K, photographed by Ibuki.

Pref.: 3 ♀1 ♂, Nakagawa, Koisago, 36°47′N 140°11′E, coll. larvae on *Actinidia arguta* var. *arguta*, 8. V. 2015, mat. 18. V., em. 4, 6, 8, 14. IV. 2016, S. Ibuki (Fig. 5A, B, G, I, K); 3 ♂, progeny of one of above 3 ♀ (em. 6. IV. 2016), eggs laid 10. IV. 2016, hatched 20. IV. 2016, mat.

8. V., em. 15, 18. IV. 2017 (Fig. 5C–F, H); 2 ♂, same locality and collector, coll. 6 gregarious larvae on *Actinidia arguta* var. *arguta*, 6. V. 2016, mat. 16–17. V., em. 17. IV. 2017.—Gunma Pref.: 1 ♂, Mt. Akagisan, 1000 m, 17–20. V. 2001, A, Shinohara.—Kanagawa Pref.: 1 ♀4 ♂, Zushi, Jinmu-ji, 21. IV. 1995, H. Nagase; 1 ♀, Minoge, 29. IV. 1972, T. Saito.—Yamanashi Pref.: 1 ♀, Sutama, Masutomi, 12. VI. 1987, S. Takeda.—Nagano Pref.: 1 ♀, Minamiaiki, Kuriu, Ogurayama, 25. V. 1987, T. Isozaki.—Kyoto Pref.: 3 ♀, Ukyo, Hozukyo, 1400 m, 35°02′N 135°38′E, 25. IV. 2014, H. Yoshida.—Osaka Pref.: 1 ♂, Kawachinagano, Takihata, 22. IV. 1981, A. Shinohara.—Tottori Pref.: 1 ♂, Mt. Daisen, Jadani, 20. V. 1981, A. Shinohara.

Distribution. Japan: Honshu (Togashi, 1999, 2004).

Host plant. Actinidiaceae: *Actinidia arguta* (Siebold et Zucc.) Planch. ex Miq. var. *arguta* (new record).

Life history. Young gregarious larvae were found in early May in Nakagawa, Tochigi Prefecture. There were several egg marks on the leaf which was infested by the larvae (Fig. 5I, arrowed). The egg marks were separated from each other and apart from the midvein. The young larvae ate the insides, not outer margins, of leaves. In the rearing room, the larvae executed the extra molt and matured in middle May (Fig. 5K). They made cocoons in the soil and overwintered. The adults emerged in the following spring. This species has one generation per year.

Remarks. Togashi (2004) wrote for his new species, *B. eikoae*, "This new species is very closely allied to *B. nigrifemoratus* Togashi, but it is easily distinguished from the latter by the mostly yellow 1st tergite (entirely black in *nigrifemoratus*), the yellow lateral sides of the 2nd tergite (black in *nigrifemoratus*), the entirely black hind basitarsus (apical portion milky white in *nigrifemoratus*), the bifurcate apex of the fore inner tibial spur (rather simple in *nigrifemoratus*), and having a distinct postocellar furrow (indistinct in *nigrifemoratus*)." Actually, the holotype of *B. nigrifemoratus* has the abdominal tergum 1 widely brown (Fig. 4A) and the holotype of *B. eikoae* has the abdominal tergum 2 laterally blackish (Fig. 4D) and the hind tarsomere 1 apically yellowish (Fig. 4D). The difference of the anterior fore tibial spur between the holotypes of *B. eikoae* (Fig. 4H) and *B. nigrifemoratus* (Fig. 4G) is slight, and the anterior fore tibial spur of the paratype of *B. eikoae* (Fig. 4I) is intermediate between the spurs of these holotypes. Both the postocellar furrows of these holotypes (Fig. 4J, K) are sharp and distinct. Therefore, we synonymize *B. eikoae* with *B. nigrifemoratus*.

Beleses nigrifemoratus is very similar to *B. zonalis* Togashi, 1972 described from Kyushu, Japan. They are distinguishable at least by the hind tibia color. The former has a black hind tibia, at most slightly pale at the middle (Fig. 4B, D), while the latter has a yellowish white hind tibia, darkened at the apex.

The host plant and larva of *B. nigrifemoratus* are recorded for the first time. *Beleses satonis* (Takeuchi, 1929) is also associated with *Actinidia arguta* (Hara *et al.*, 2015). Their larvae are very similar, but the former has a brown head while the latter has a black head. These two larvae will be distinguished from other sawfly larvae by a combination of the simple and almost semi-cylindrical body, the thin wax bloom covering the body, the abdominal terga 1–8 each with 6 annulets, the proleg present on each of the abdominal segments 2–8 and absent on the anal segment, and the host plant, *Actinidia*.

Caliroa vaccini Okutani, 1965

Japanese name: Natsuhaze-namekuji-habachi

(Fig. 6)

Caliroa vaccini Okutani, 1965: 30; Hara, 2019: 65; Hara and Ibuki, 2020: 316.

For more synonymy, see Hara and Ibuki (2020).

Additional description. The legs of the overwintering generation (Fig. 6A–C) are darker than those of the non-overwintering generation (Fig.

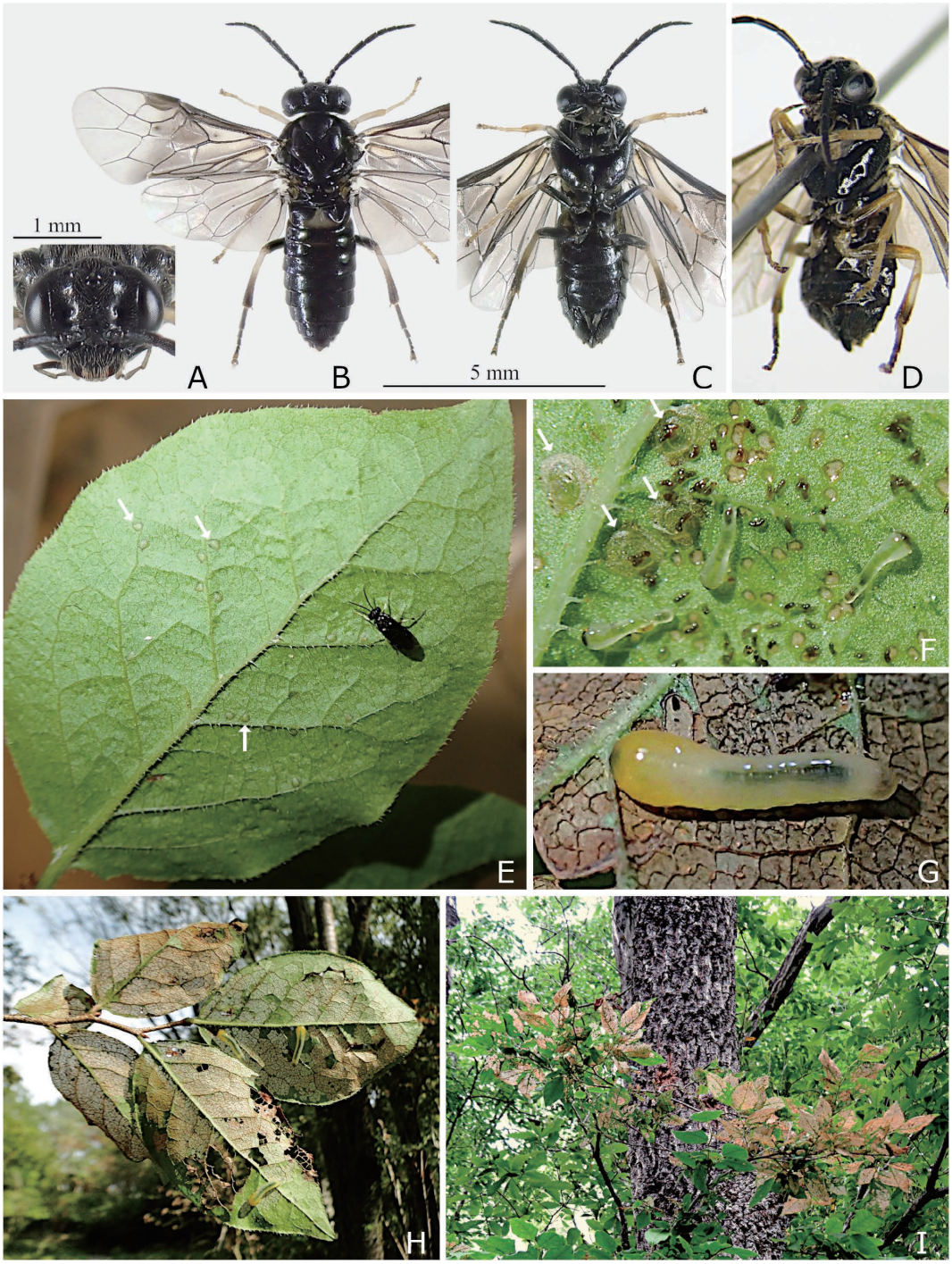

Fig. 6. *Caliroa vaccini*: A–C, Female, overwintering generation, head in anterior view, whole body in dorsal and ventral views; D, female, non-overwintering generation, ventral view; E, female and her eggs (in leaf tissues, some arrowed), 18. VI. 2021; F, first instar larvae and egg marks (arrowed), 22. VI. 2021; G, H, final feeding instar larvae and leaves eaten by larvae, 5–6. X. 2020; I, leaves eaten by larvae, 2. VI. 2021. A–D, Photographed by Hara; E–I, photographed by Ibuki.

6D; see also Hara and Ibuki, 2020) and are as follows: black; fore and middle legs brown on narrow apices of femora, yellow on tibiae and tarsus except for their apices slightly brownish; hind tibia yellow except apical 1/3–1/2 dark brown; hind tarsus dark brown, often basally brown yellow narrowly.

In specimens from Nakagawa, clypeus with depth of ventral emargination 0.14–0.29× median height of clypeus, and mesoscutellar appendage often widely covered with setae posterolaterally.

Larva. First instar (Fig. 6F): head black; trunk pale green. Semifinal (final feeding instar) (Fig. 6G, H): head black; trunk pale yellowish white, with thorax mostly yellow; slime transparent. Final instar: almost entirely yellow.

Material examined. Honshu: Tochigi Pref.: 4 ♀, Nakagawa, Wami, 36°47′N 140°10′E, coll. larvae on *Vaccinium oldhamii*, 5. X. 2020, mat. 6. X., em. 17, 24. IV. 2021, S. Ibuki (Fig. 6A–C, E, G, H); 19 ♀2 ♂, same data but coll. larvae 2. VI. 2021, mat. 3. VI., em. 17. VI. 2021; 20 ♂, progeny of 1 ♀ em. 17. VI. 2021, eggs laid 18. VI., larvae hatch. 25. VI., mat. 5–7. VII., em. 16–18. VII. 2021 (Fig. 6E, F); 42 ♀12 ♂, same locality and collector but coll. eggs 18. VI. 2021, larvae hatch. 22. VI., mat. 3. VII., em. 14–15, 17. VII, 2021; 5 ♀2 ♂, same data but coll. larvae 11. VII. 2021, mat. 13, 16. VII., em. 23, 28. VII. 2021; 3 ♀, same data but, 36°47′N 140°11′E, coll. larvae 8. VII. 2021, mat. 11–12. VII., em. 21, 25. VII. 2021. For more material, see Hara and Ibuki (2020).

Host plant. Ericaceae: *Vaccinium oldhamii* Miq. (Okutani, 1965, see also Hara and Ibuki, 2020).

Host range test. *Caliroa vaccini* is very similar to *C. annulipes* (Klug, 1816) from the Russian Far East to Europe and Canada and *C. ouensis* Hara, 2020 from northern Honshu. The morphological differences of these three species are slight as detailed under the remarks below. *Caliroa annulipes* is known to be polyphagous (Schönrogge, 1991). *Caliroa ouensis* is a rare species and its host plant is unknown. *Caliroa vaccini* does not appear to be polyphagous, because Ibuki has not found the larva on any plants other than *Vaccinium oldhamii* in Nakagawa, where he has been enthusiastically investigating sawfly larvae for over 10 years.

To confirm the host range of *C. vaccini*, we conducted the following experiment: a total of 45 eggs of *C. vaccini* laid in one leaf of *Vaccinium oldhamii* collected at Nakagawa on 18 June 2021 were used. In the rearing room in Nakagawa, they hatched on 23 June, were reared on *V. oldhamii* until 30 June, and then sent alive to Bibai. On 2 July in the rearing room in Bibai, 36 semifinal feeding instar larvae, 4–5 mm long, were selected for the test. Each larva was placed in a transparent polyethylene container with one test plant. The test plants were six species, *Vaccinium oldhamii* (host), *Quercus crispula* Blume var. *crispula*, *Tilia japonica* (Miq.) Simonk., *Populus tremula* L. var. *davidiana* (Dode) C.K.Schneid., *Betula ermanii* Cham. and *Rosa* × *centifolia* L. Those plants except for the host plant were selected from the host plant genera or species of *C. annulipes* studied by Schönrogge (1991). Six larvae were tested for one plant species, and for each of the larvae, the approximate feeding area and the presence or absence of the exuvia were daily recorded until the larva reached maturity (= the final molt) or died.

The results of the experiment are as in Table 1. Larval feeding was observed in all the six plant species. However, some larvae did not feed on four plant species, *Quercus crispula*, *Tilia japonica*, *Betula ermanii* and *Rosa* × *centifolia*. In the five plant species other than the host, the feeding areas were very small even if the larva ate the leaves and finally all the larvae died before maturity. These results indicate that *C. vaccini* is not polyphagous.

Life history. Larvae were found from early June to early October in the field. In the rearing room in Nakagawa, a female laid 20 or more eggs in one leaf, the egg period was seven days, the larval period 10–12 days and the cocoon period (non-overwintering individual) about 11 days. The mature larvae entered the soil and

Table 1. Results of feeding test for the larvae of *Caliroa vaccini*

plant species	number of larvae					
	examined	fed on	feeding area $< 25\,mm^2$	feeding area $> 100\,mm^2$	reached next instar	reached maturity
Vaccinium oldhamii (host)	6	6	0	6	6	6
Quercus crispula var. *crispula*	6	2	2	0	2	0
Tilia japonica	6	3	3	0	2	0
Populus tremula var. *davidiana*	6	6	6	0	0	0
Betula ermanii	6	4	4	0	4	0
Rosa × *centifolia*	6	3	3	0	1	0

made cocoons. This sawfly is multivoltine. Eggs are laid within the leaf near main or lateral veins (Fig. 6E). Larvae are gregarious but they are not in contact with each other (Fig. 6F, H). They feed on the under surfaces of leaves (Fig. 6E–H). Larvae have an extra molt before maturity. They overwinter in the cocoon.

Remarks. Hara and Ibuki (2020) distinguished *C. vaccini* from *C. annulipes* and *C. ouensis* mainly by the hind leg predominantly pale, the clypeus with the ventral edge shallowly emarginated and the middle serrulae of a lancet shallower than and more widely separated from each other than those of the latter two species. The additional specimens from Nakagawa show that the overwintering generation has the widely black hind leg (Fig. 6C), which is different from the widely pale hind leg of the non-overwintering generation (Fig. 6D) and is very similar to those of *C. annulipes* (see images in Taeger *et al.*, 2018) and *C. ouensis* (see fig. 2D in Hara and Ibuki, 2020). The ventral edge of the clypeus is sometimes rather deeply concave in *C. vaccini*; the ratio of the depth of the emargination to the medial height of the clypeus partly overlaps between *C. vaccini* (0.1–0.3) and the latter two species (0.3–0.5). Some specimens of the overwintering generation of *C. vaccini* may be indistinguishable from the latter two species in color and external form. However, those will be separated from *C. annulipes* and *C. ouensis* by the middle serrulae of the lancet more widely separated from each other than those of the latter two (compare fig. 8D with fig. 8F, H, I in Hara and Ibuki, 2020) and the harpe of the male genitalia with the lateral margin almost straight or slightly concave (compare fig. 11J in Hara and Ibuki, 2020 with fig. 11M in Hara and Ibuki, 2020 and fig. 5D in Hara, 2011).

Euura damnacanti (Takeuchi, 1922)

Japanese name: Aridôshi-habachi

(Figs. 7, 8)

Pteronidea damnacanti Takeuchi, 1922: 77, 80.

Euura damnacanti: Shinohara and Hara, 2015: 173; Shinohara and Hara, 2020: 186.

For more synonymy, see Shinohara and Hara (2020).

Additional description. The females (Fig. 7A–C) reared from larvae on *Berberis thunbergii* slightly differ from the type series described by Shinohara and Hara (2020) as follows: mesoscutum entirely black; mesepisternum black entirely or with brown spot posterocentrally; postspiracular sclerite dark yellow, anteriorly black; wing with veins and stigma mostly dark brown; paraantennal field glabrous on medial half; katepimeron entirely glabrous; fore wing with cell Sc 0.5× as wide as vein C at level of base of vein Rs + M.

Male (previously undescribed). The differences except for usual sexual differences are as follows.

Length 5.5–6.0 mm. Thorax black except posterodorsal part of pronotum and tegula yellow (Fig. 7D–F). Abdomen ventrally brown yellow to brown. Postocellar area with anterior groove dull or indistinct. Frontal area with anterior ridge medially furrowed or not furrowed. Frontal pit long oval or longitudinal groove. Tergum 8 with procidentia barely developed and posterior edge hardly protruding posteriorly (Fig. 7K); tergal

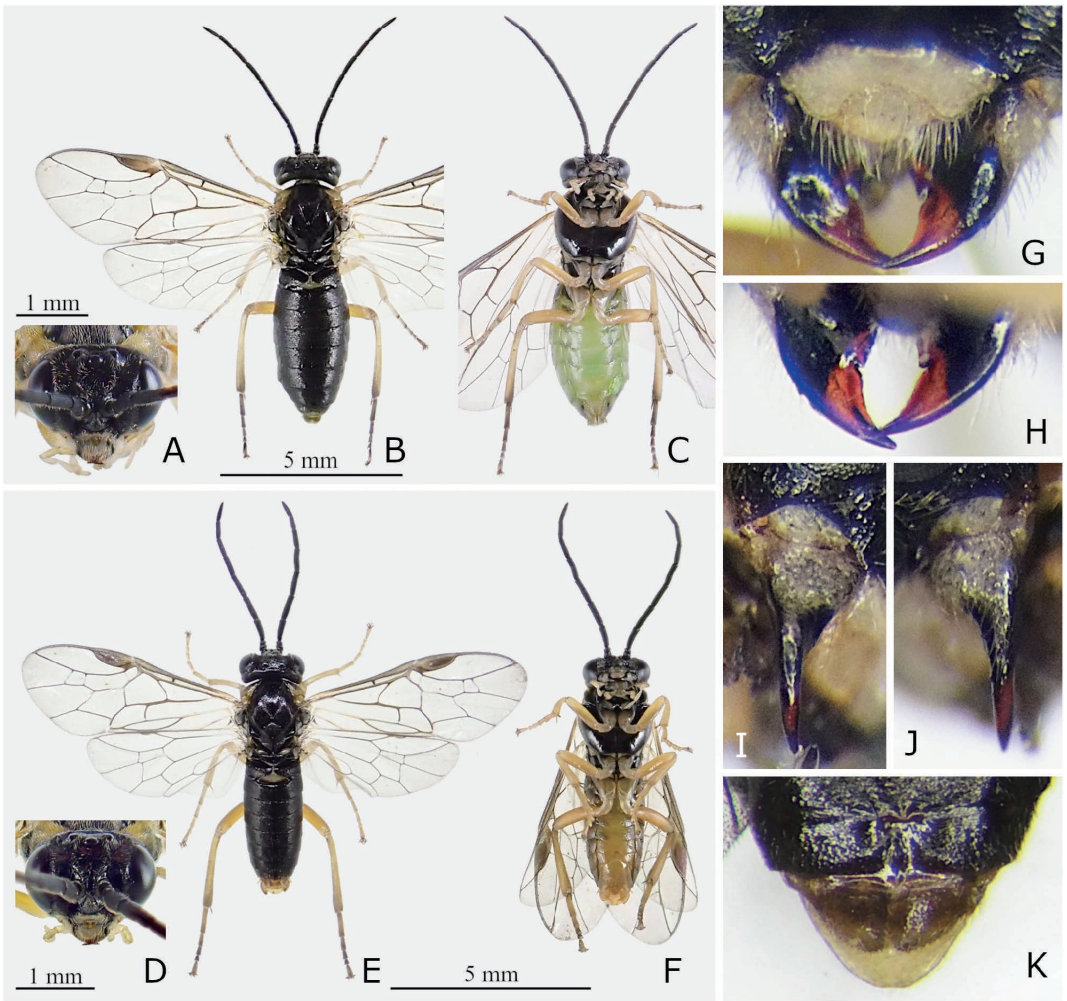

Fig. 7. *Euura damnacanti*: A–C, Female, head in anterior view, whole body in dorsal and ventral views; D–F, male, head in anterior view, whole body in dorsal and ventral views; G, H, mandibles, anterior and posterior views; I, J, right and left mandibles in outer view; K, apex of male abdomen in dorsal view. Photographed by Hara.

hollow slightly indicated. Subgenital plate 0.5–0.6× as long as hind tibia; apical edge rounded in dorsal or ventral view (Fig. 7K). Male genitalia Fig. 8E–G; parapenis long, with medial edge convex at middle in ventral view; harpe longer than wide, with lateral margin gently rounded, medial margin straight and apex narrowly rounded.

Larva. First to semifinal instars (Fig. 8H, I(left)): head and thoracic legs mostly black; trunk pale green. Final instar (Fig. 8I, J): head brown yellow; trunk pale green; thoracic legs pale yellow, basally partly black.

Material examined. Honshu: Tochigi Pref.: 2 ♀, Sakura, coll. larvae on *Berberis thunbergii*, 28. IV. 2019, mat. 11. V., em. 28. III., 2. IV. 2020, S. Ibuki (Fig. 8A–C); 2 ♀4 ♂, Nakagawa, Bato, 36°47′N 140°10′E, coll. larvae on *Berberis thunbergii*, 17. IV. 2021, mat. 28, 30. IV., 1. V., em. 20, 21, 24, 25. III. 2022, S. Ibuki (Figs. 7A–K, 8D–H, J). For more material, see Shinohara and Hara (2020).

Host plants. Rubiaceae: *Damnacanthus indicus* C.F.Gaertn. var. *indicus* (Takeuchi, 1922).

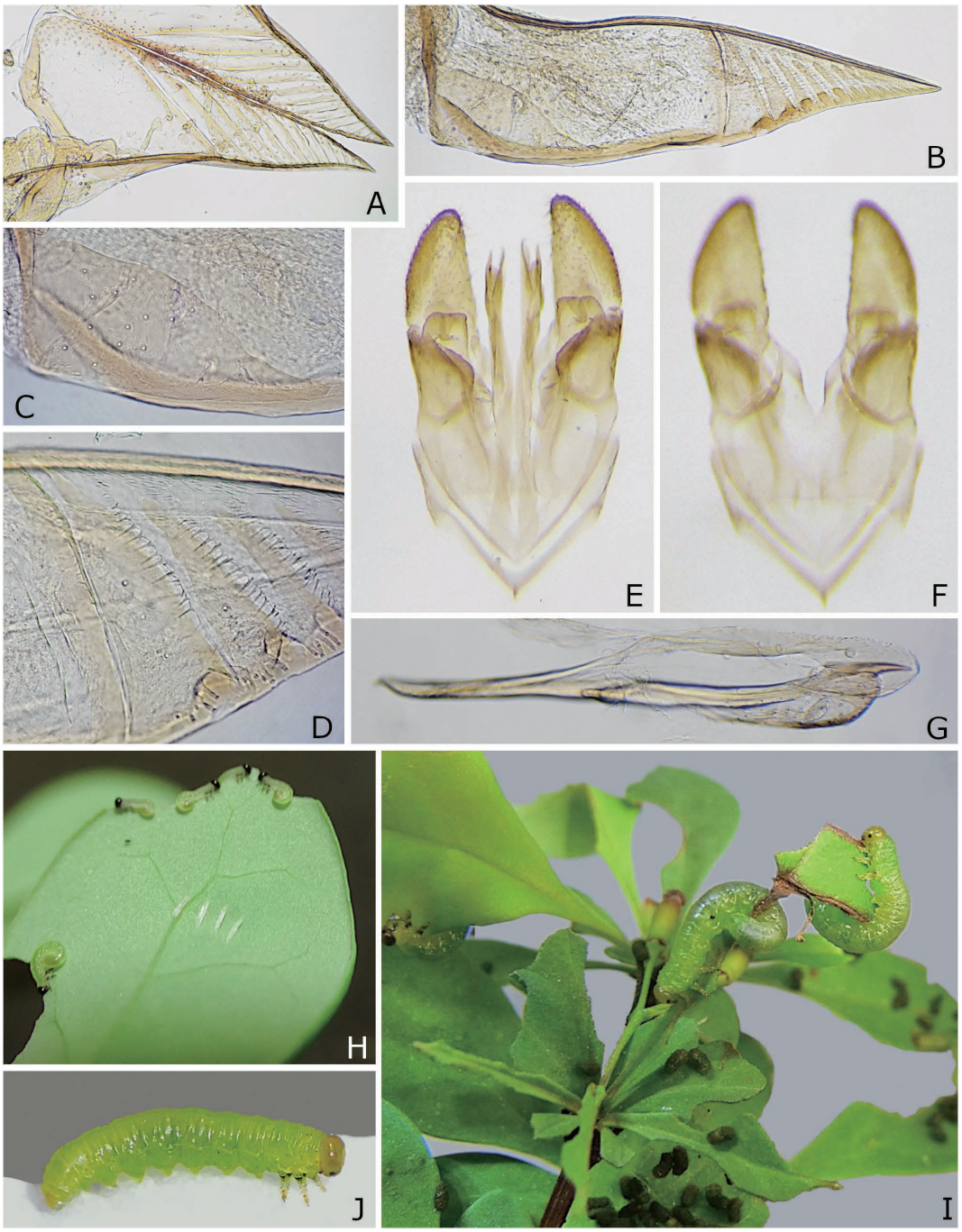

Fig. 8. *Euura damnacanti*: A, Lance; B, lancet; C, tangium of lancet; D, basal half of lamnium of lancet; E, F, male genitalia in dorsal and ventral views (penis valve removed in F); G, penis valve; H, first instar larvae and egg shells, 17. IV. 2021; I, final and semifinal instar larvae, Nakagawa, 7. V. 2015; J, mature larva, 30. IV. 2021. A–G, Photographed by Hara; H–J, photographed by Ibuki.

Berberidaceae: *Berberis thunbergii* DC. (new record).

Additional notes on life history. Three or four eggs were found on the surface of the underside of a leaf, and they were lined up neatly in a transverse row (Fig. 8H). Several young larvae were found on one leaf, but they were separated from each other (Fig. 8H). The larvae were collected in middle and late April in Nakagawa, Tochigi Prefecture. In the rearing room, larvae matured from late April to middle May. The extra molt was not observed before maturity. The mature larvae entered in the soil and became adults in the following spring. This sawfly is univoltine.

Remarks. This sawfly is peculiar and easily identifiable by the medially widely glabrous and laterally ridged paraantennal field, the strongly swollen supraclypeal area, the distinctly furrowed genal orbit, the symmetric mandibles each with one small notch at the middle of the inner edge and the anterior and posterior apical ridges both low (Fig. 7G–J), the short ovipositor sheath (Fig. 7C) and ovipositor, the tangium of the lancet with sensilla (＝pores) (Fig. 8C) and the barely developed procidentia of the male abdomen (Fig. 7K). The adult specimens reared from *B. thunbergii* are quite similar to the type specimens reared from *D. indicus*. These two plants are very distantly related and it is strange that the larvae of this "polyphagous" sawfly have never been found on other plants in Nakagawa, where Ibuki has been investigating sawfly larvae. It may be necessary to confirm whether *D. indicus* is a real host plant.

Shinohara and Hara (2020) wrote "tangium without sensilla" for this species, based on the lectotype and the paratype, but the sensilla are distinct in the newly obtained female specimens (Fig. 8C). Probably because the lancets of the type specimens were not in good condition (fig. 2N, P in Shinohara and Hara, 2020), they failed to find the sensilla. The tangium has no sensilla in *Euura* Newman, 1837, but has sensilla in *Pristiphora* Latreille, 1810 and some species of *Fagineura* Vikberg and Zinovjev, 2000 (see Prous *et al.*, 2014, 2017, 2019 and Hara and Ibuki, 2022). Therefore, this species may better be placed in *Pristiphora* or *Fagineura* than in *Euura*. A genetic study may be needed to test this hypothesis.

Fagineura parva Hara, 2020

New Japanese name: Hime-buna-habachi

(Fig. 9)

Fagineura parva Hara, 2022, in Hara and Ibuki, 2022: 231.

Additional description. This species was known only from one female (holotype) and one male (Hara and Ibuki, 2022). The additional female (Fig. 9A–C) slightly differs from the holotype as follows: mesepisternum black, ventrally dark brown; head with length behind lateral ocellus 2.7× length of lateral ocellus; OOL : POL : OOCL 1.1 : 1.0 : 1.0; malar space 0.5× as long as median ocellus width; flagellomere 2 1.2× as long as flagellomere 1; hind tibia with posterior spur 1.2× as long as apical breadth of tibia in lateral view.

Larva. Final feeding (semifinal) instar (Fig. 9D): length 12 mm; head pale brown, slightly darkened laterally and on mouth part; trunk pale green; thorax with small dark green spots; thoracic legs pale yellow white; proleg present on abdominal segments 2–8 and 10; anal tergum without caudal protuberance. Final instar (Fig. 9E): head brown yellow; trunk and thoracic legs pale yellow.

Material examined. Honshu: Tochigi Pref.: 1♀, Nakagawa, Bato, 36°45′N 140°10′E, coll. larva on *Fagus japonica*, 14. V. 2021, mat. 15. V., em. 19. IV. 2022, S. Ibuki (Fig. 9).

Host plant. Fagaceae: *Fagus japonica* Maxim. (new record).

Life history. A solitary larva was collected in middle May in Nakagawa, Tochigi Prefecture. The larva had an extra molt before maturity. The mature larva entered the soil and the adult emerged the next year. This sawfly has one generation per year.

Remarks. The host plant of this species is recorded for the first time. The final feeding

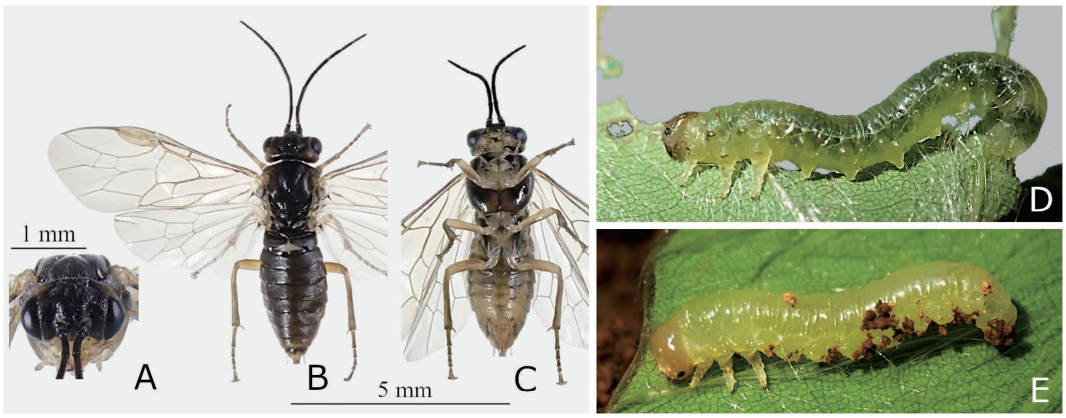

Fig. 9. *Fagineura parva*: A–C, Female, head in anterior view, whole body in dorsal and ventral views; D, final feeding instar larva, 14. V. 2021; E, final instar larva, 15. V. 2021. A–C, Photographed by Hara; D, E, photographed by Ibuki.

instar larva of this species may be distinguished from that of *Fagineura crenativora* Vikberg and Zinovjev, 2000, another congener associated with *Fagus*, by the paler color (compare Fig. 9D with fig. 4F, G in Shinohara *et al.*, 2000).

Heterarthrus alnivorus Togashi, 1992
Japanese name: Hannoki-enban-habachi

Material examined. Honshu: Hyogo Pref., 1 ♀, Shiso, Yamasaki, Host: *Alnus inokumae*, em. 2. VII. 1962, T. Okutani.—Wakayama Pref.: 1 ♂, Wakayama, Okawa, coll. larva leaf-mining *Alnus japonica*, 12. IX. 2020, coc. 16. IX., em. 29. IX. 2020, M. Murase; 1 ♂, same data but coll. larva 14. XI. 2020, em. 7. III. 2021.

Host plant. Betulaceae: *Alnus hirsuta* (Spach) Turcz. ex Rupr. var. *hirsuta* (Shinohara and Hara, 2015), *A. inokumae* Murai et Kusaka (new record), *A. japonica* (Thunb.) Steud. (new record), *A. matsumurae* Callier (Togashi, 1992).

Remarks. Two *Alnus* species are here added as the host plants. This sawfly is probably multivoltine in the lower altitudes in Honshu.

Mesoneura macroptera Takeuchi, 1936
Japanese name: Hanebiro-habachi
(Fig. 10A, B)

Larva. Final feeding instar (probably final instar): Length about 20 mm; pale green (Fig. 10A, B); head with black markings; spiracles dark green; anal abdominal tergum without caudal protuberance.

Material examined. Honshu: Tochigi Pref.: 1 ♀, Nakagawa, Yamata, 36°42′N 140°12′E, coll. larva on *Acer* sp., 8. VI. 2018, mat. 12. VI., em. 21. IV. 2019, S. Ibuki (Fig. 10A, B).

Host plant. Sapindaceae: *Acer* sp. (new record).

Life history. A solitary larva was found in early June in Nakagawa, Tochigi Prefecture. In the rearing room, it matured in middle June and became an adult in the following spring. This sawfly has one generation per year.

Remarks. The host plant of this species is recorded and the larva is recognized here for the first time. *Mesoneura mikagei* Togashi, 1998 is also known to be associated with *Acer*. Both belong to the *M. macroptera* group. Other groups of the genus are associated with *Quercus* and occasionally with *Larix* (Liston, 2012; Wei *et al.*, 2013).

Mesoneura mikagei Togashi, 1998
Japanese name: Ô-kuro-hanebiro-habachi
(Fig. 10C, D)

Larva. Early to semifinal instars: head and legs black (Fig. 10C); trunk pale green, with subspi-

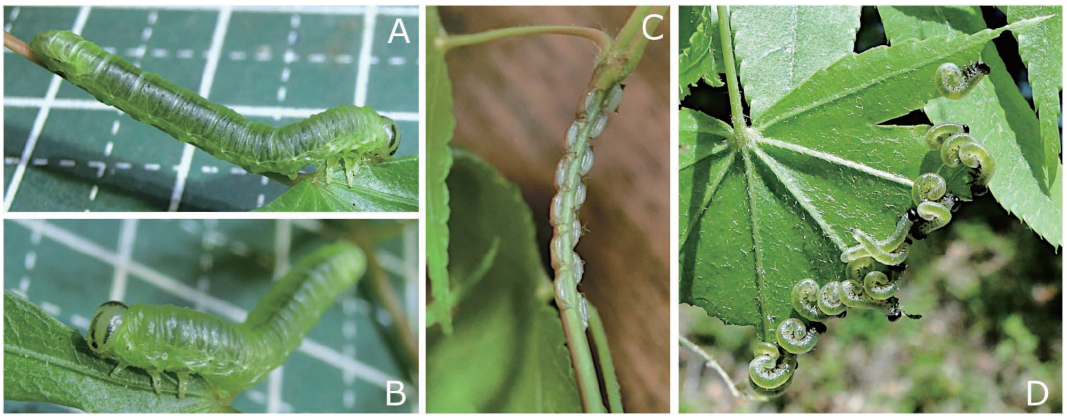

Fig. 10. A, B, *Mesoneura macroptera*, final feeding instar larva, 8. VI. 2018. C, D, *Mesoneura mikagei*: C, Eggs, 12. V. 2019; D, early instar larvae, 11. V. 2018. Photographed by Ibuki.

racular lobes black. For final instar, see Hara *et al.* (2018).

Material examined. Honshu: Tochigi Pref.: 15 ♀7 ♂, Nakagawa, Bato, 36°44′N 140°09′E, coll. larvae on *Acer amoenum* var. *amoenum*, 11. V. 2018, mat. 14–20. V., em. 17–20. IV. 2019, S. Ibuki (Fig. 10D).

Host plants. Sapindaceae: *Acer amoenum* Carrière var. *amoenum* (new record), *A. amoenum* Carrière var. *matsumurae* (Koidz.) K.Ogata (Hara *et al.*, 2018).

Additional notes on life history. In the spring of 2018 and 2019, many young larvae (Fig. 10D) and eggs were found on the same tree of *Acer amoenum* var. *amoenum* in Nakagawa, Tochigi Prefecture. Eggs were laid in a young shoot in rows (Fig. 10C). The extra molt was not observed before maturity.

Tomostethus nigritus (Fabricius, 1804)

Japanese name: Yachidamo-habachi

(Fig. 11)

Larva. Early instar (Fig. 11D): pale gray, with thoracic legs gray. Final instar (Fig. 11E, F): head brown with black markings; thorax and abdominal segment 1 pale yellow; thoracic legs black; abdominal segments 2–10 pale gray, pale yellow on tergum 8.

Material examined. Honshu: Tochigi Pref.: 2 ♀, Nakagawa, Wami, 36°47′N 140°10′E, coll. larvae on *Fraxinus sieboldiana*, 24. IV. 2021, mat. 5, 7. V., em. 11, 12. IV. 2022, S. Ibuki (Fig. 11).

Host plant. Oleaceae: *Fraxinus sieboldiana* Blume in Japan (new record); *F. excelsior* L. and *F. mandshurica* Rupr. in Korea (Okutani, 1967b); *F. excelsior* in Europe (Lorenz and Kraus, 1957).

Remarks. In the paper entitled "Food plants of Japanese Symphyta", Okutani (1967b) listed *Fraxinus excelsior* and *F. mandshurica* as the hosts of this sawfly, but he stated that those hosts were recorded in Korea. This is the first report of a host record for the Japanese population.

The above two Japanese females agree with the European specimens of *Tomostethus nigritus*, judging from Verheyde and Sioen (2019) and Lacourt (2020) (compare Fig. 11A–C with images in Taeger *et al.*, 2018 and fig. 1 in Verheyde and Sioen, 2019). However, the Japanese larva is quite different from the European larva in color. According to Lorenz and Kraus (1957) and Verheyde and Sioen (2019), the European late instar larva has light green head, trunk and thoracic legs and a pair of whitish dorsal stripes under the cuticle on the trunk (fig. 3 in Verheyde and Sioen, 2019; fig. 1, p. 353 in Macek *et al.*, 2020). Conversely, the Japanese late instar larva has a dark head, black legs and a pale yellow and pale gray trunk (Fig. 11E, F).

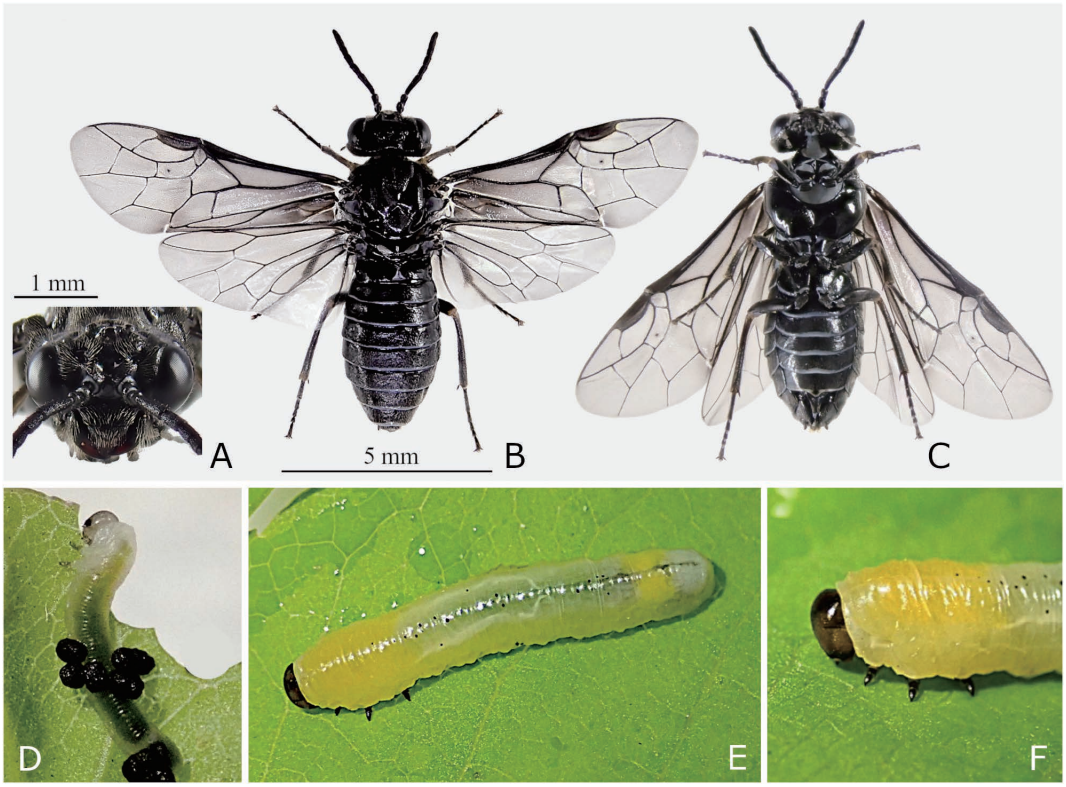

Fig. 11. *Tomostethus nigritus*: A–C, Female, head in anterior view, whole body in dorsal and ventral views; D, early instar larva, 25. IV. 2021; E, F, final or final feeding instar larva, 1. V. 2021. A–C, Photographed by Hara; D–F, photographed by Ibuki.

Xiphydriidae

Monoxiphia harai (Shinohara, 2019)
Japanese name: Kurozu-kubinaga-kibachi

Material examined. Hokkaido: 1 ♀, Kamishihoro, Kamiotofuke, Naitai, 15. VI. 2022, H. Hara. Honshu: Tochigi Pref.: 1 ♀, Nikko, Shôbugahama, nr. Chûzenji-ko, 11. VI. 2005, S. Maehara; 1 ♂, same locality, 26. VI. 2019, S. Maehara; 1 ♀, same locality, 23. V. 2022, A. Shinohara; 1 ♂, same locality, em. 18. VI. 2022 from dead and fallen branch (2–3 cm thick) of *Acer* sp. coll. 1. VI. 2022, A. Shinohara; 1 ♀1 ♂, Nikko, Senjugahama, nr. Chûzenji-ko, 19. VI. 2017, S. Maehara. See Shinohara (2019) and Shinohara and Hara (2021) for more collection records.

Host plant. Sapindaceae: *Acer* sp. (new record).

Remarks. Shinohara (2019) mentioned, "A series of paratypes from Mt. Maruyama, Sapporo, were found on a limb or branch of maple tree (*Acer* sp.) (K. Kuroda, personal communication), which is a likely host plant." The emergence of a male adult from a dead and fallen branch of *Acer* sp., as recorded above, has confirmed this host plant relationship.

Xiphydria kanba Shinohara, Hara and Smith, 2020
New Japanese name: Kanba-kubinaga-kibachi

Specimens examined. Honshu: Tochigi Pref.: 1 ♂, Nikko, Yumoto, 20. VIII. 2012, S. Maehara; 2 ♂, Nikko, Chûgûshi, nr. Chûzenji-ko, from dead fallen branch (3–5 cm thick) of *Betula platyphylla* var. *japonica*, coll. 19. V. 2022, em. 13 and 17. VI. 2022 (indoors in Tsukuba), A. Shinohara; 1 ♂, Yaita, Happôgahara, 4. VIII. 2015, S. Maehara. See Shinohara *et al.* (2020)

and Shinohara and Hara (2020) for more collection records.

Remarks. In Honshu, this species has been recorded from a few specimens collected only in two localities, Marunuma, Gunma Prefecture and Chûgûshi, Tochigi Prefecture, only 16 km apart, both about 1300–1400 m alt. (Shinohara *et al.*, 2020; Shinohara and Hara, 2020). Of the four newly acquired specimens (see above), three are from the already known habitat (Chûgûshi and nearby Yumoto, Nikko) and one is from Happôgahara (1000–1150 m alt.), Yaita, which is 40 km away from the previously known localities. The currently known distribution range of this species in Honshu is thus quite narrow. The real distribution range of this species should be confirmed by further collecting.

In 2022, two males emerged on 13 and 17 June from a dead and fallen branch of *Betula platyphylla* var. *japonica* obtained in Chûgûshi on 19 May. At the same locality and from the same plant species, one female emerged on 10 August, 2019 (branches collected on 7 August, 2019) and two females emerged on 2 and 20 July, 2020 (branches collected on 10 June, 2020). All the dead branches were collected in the same site, meaning that the adults occur in this area for fairly a long period from the middle of June to the middle of August.

Xyelidae

Xyelecia japonica Togashi, 1972
Japanese name: Chairo-naginata-habachi

Material examined. Honshu: Tochigi Pref.: 1♀, Nikko, Shôbugahama, nr. Chûzenji-ko, 23. V. 2022, A. Shinohara. See Togashi (1972), Shinohara (1998, 2020), Togashi and Yamamoto (2000) and Nagase (2008) for more collection records.

Remarks. This is a rare sawfly with published collection records of only seven specimens from Honshu (Kanagawa Prefecture, Nagano Prefecture and Nara Prefecture) and Shikoku (Ehime Prefecture). The specimen listed above is the eighth specimen to be recorded and represents the first distribution record from Tochigi Prefecture.

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