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

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Abstract Two larch sawflies, *Euura imperfecta* (Zaddach, 1876) and *E. itoi* (Okutani, 1955) (Tenthredinidae), are redescribed. New distribution records are: *Arge similis* (Snellen van Vollenhoven, 1860) (Argidae) from Amami-Oshima Island and *Phylloecus etorofensis* (Takeuchi, 1955) (Cephidae), *Apareophora nebuta* Togashi, 1964, *Ardis pallipes* (Serville, 1823), *Eriocampopsis subtruncata* Takeuchi, 1952, *Eutomostethus pumicosus* Seiyama, 1981, *Stethomostus babai* Togashi, 1984 and *Tomostethus nigritus* (Fabricius, 1804) (Tenthredinidae) from Hokkaido. Information on the distribution of *Phymatocera nipponica* Togashi, 1958 (Tenthredinidae) is given. New host records are *Rosa multiflora* Thunb. (Rosaceae) for *Sterictiphora nipponica* Takeuchi, 1939 (Argidae), *Alnus japonica* (Thunb.) Steud. (Betulaceae) and *Juglans mandshurica* Maxim. var. *sachalinensis* (Komatsu) Kitam. (Juglandaceae) for *Tremex apicalis* Matsumura, 1912 (Siricidae), *Actinidia polygama* (Siebold et Zucc.) Planch. ex Maxim. (Actinidiaceae), *Symplocarpus renifolius* Schott ex Tzvelev. (Araceae) and *Impatiens textorii* Miq. (Balsaminaceae) for *Aglaostigma albicinctum* (Takeuchi, 1953) (Tenthredinidae), *Sanguisorba officinalis* L. (Rosaceae) for *Allantus meridionalis* (Takeuchi, 1933) (Tenthredinidae), *Quercus serrata* Murray (Fagaceae) for *Apethymus kunugi* Togashi, 2005 (Tenthredinidae), *Sanguisorba officinalis* L. (Rosaceae) for *Corymbas nipponica* Takeuchi, 1936 (Tenthredinidae), *Alnus hirsuta* (Spach) Turcz. ex Rupr. var. *hirsuta* (Betulaceae) for *Masaakia longivaginata* Takeuchi, 1950 (Tenthredinidae), *Rubus hirsutus* Thunb. (Rosaceae) for *Metallus albipes* (Cameron, 1875) (Tenthredinidae), *Rubus microphyllus* L.f. (Rosaceae) for *Metallus pumilus* (Klug, 1816) (Tenthredinidae), *Rubus parvifolius* L. (Rosaceae) for *Monophadnoides montanus* Togashi, 1980 (Tenthredinidae) and *Corylus sieboldiana* Blume var. *sieboldiana* (Betulaceae) for *Pristiphora fulviceps* Takeuchi, 1933 (Tenthredinidae), *Actinidia polygama* (Siebold et Zucc.) Planch. ex Maxim. (Actinidiaceae) and *Glechoma hederacea* L. subsp. *grandis* (A. Gray) H. Hara (Lamiaceae) for *Siobla ferox* (Smith, 1874) (Tenthredinidae), *Impatiens textorii* Miq. (Balsaminaceae) and *Circaea mollis* Siebold et Zucc. (Onagraceae) for *Siobla japonica* Shinohara, Wei & Niu, 2013 (Tenthredinidae) and *Agrimonia pilosa* Ledeb. var. *japonica* (Miq.) Nakai (Rosaceae) for *Taxonus shinoharai* Togashi, 2009 (Tenthredinidae). Information on the host plants of *Strongylogaster moiwana* Matsumura, 1912 (Tenthredinidae) is given. The larvae of *Sterictiphora nipponica*, *Aglaostigma albicinctum*, *Allantus meridionalis*, *Apethymus kunugi*, *Corymbas nipponica*, *Masaakia longivaginata*, *Monophadnoides montanus*, *Siobla ferox*, *Siobla japonica*, *Strongylogaster moiwana* and *Taxonus shinoharai* are briefly described and their color photographs are given for the first time.

Key words: Argidae, Cephidae, Siricidae, Tenthredinidae, redescriptions, new distribution records, new host plant records.

Introduction

In the sixth paper of the series on Japanese sawflies and woodwasps, we treat 26 species of the families Argidae, Cephidae, Siricidae and Tenthredinidae. The redescriptions of *Euura imperfecta* (Zaddach, 1876) and *E. itoi* (Okutani, 1955), a well-known larch pest, are presented, because their previous descriptions are partly wrong and therefore it has been difficult to distinguish them correctly. These two species have been included in *Larinematus* Zhelochovtsev, 1988, the *E. imperfecta* group, etc. (*e.g.*, Zhelochovtsev and Zinovjev, 1988; Zinovjev, 1993; Lacourt, 2020). We make some comments on this group. Information on distribution, host plants and larvae is also given for two species of Argidae, one species each of Cephidae and Siricidae and 20 species of Tenthredinidae.

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 S95, Casio EX-ZR1000, Olympus TG-4, Olympus TG-5, Panasonic DMC-FZ28 and Ricoh GR DIGITAL 2 digital cameras and a Sony DSC-RX100 digital camera with a Leica MS5 microscope or an Olympus BH-2 light microscope. The digital images were processed and arranged with GIMP 2.10 and Adobe Photoshop Elements 9 and 12 software. Rearing was done in rooms in Bibai, Hokkaido, and Nakagawa, Tochigi Prefecture, where the temperature and day length were not controlled. For the morphological terminology, we generally follow Viitasaari (2002).

Results and Discussion

Argidae

Arge similis (Snellen van Vollenhoven, 1860)

Japanese name: Ruri-churenji

Material examined. KYUSHU: Kagoshima Pref.: 1 ♂, Amami-Oshima Island, Amami, Nesebu, 7. IV. 2019, M. Kimura.

Distribution. Japan: Southern Kuril Islands, Hokkaido, Honshu, Izu Islands, Oki Islands, Awaji Island, Shikoku, Kyushu, Tsushima Island, Tanegashima Island, Yakushima Island, Tokara Islands, Amami-Oshima Island (new record), Okinawa Island. East Palaearctic and Oriental regions.

Remarks. This species is widely distributed in the East Palaearctic and Oriental regions including various parts of Japan (*e.g.*, Hara, 2019), but it has not been recorded from Amami-Oshima Island until now.

Sterictiphora nipponica Takeuchi, 1939

Japanese name: Kuwagata-habachi

(Fig. 1A)

Material examined. HONSHU: Tochigi Pref.: 1 ♀, Nakagawa, Hanatate-toge, 36°47′N 140°12′E, coll. larva, on *Rosa multiflora*, 25. V. 2015, mat. 30. V., em. 28. III. 2016, S. Ibuki.

Larva. Late instar larva pale green (Fig. 1A); setae inconspicuous; spiracles dark green; thoracic legs apically brownish.

Host plants. Rosaceae: *Rosa luciae* Rochebr. et Franch. ex Crèp. (Okutani, 1967a), *R. multiflora* Thunb. (new record).

Life history. This species is univoltine. The larva is solitary and makes a cocoon in the soil. Hibernation is done in the cocoon.

Remarks. The previously unknown larva of *Sterictiphora nipponica* is very similar to the larvae of other congeners in appearance (*cf.* Macek *et al.*, 2020). The known host plants are only *Rosa*.

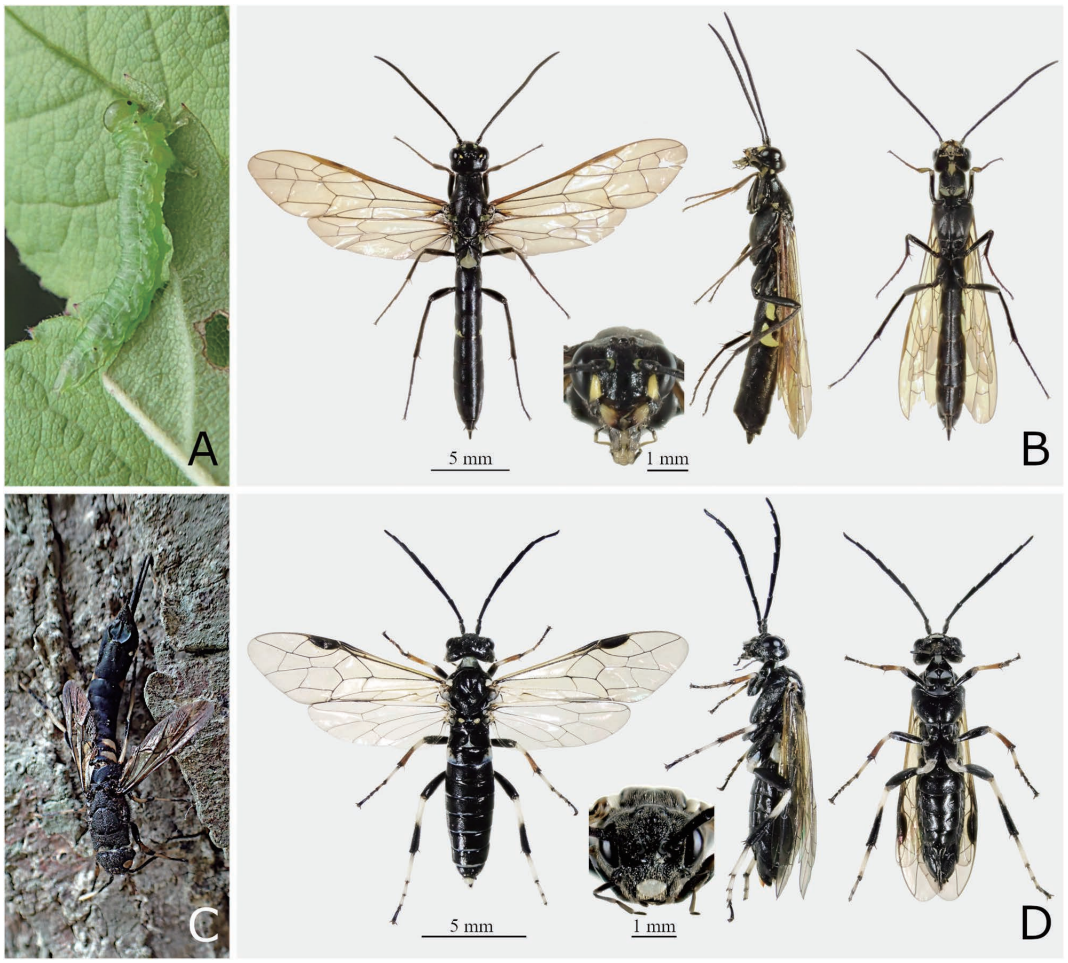

Fig. 1. A, Late instar larva of *Sterictiphora nipponica*, 25. V. 2015, photographed by Ibuki. B, *Phylloecus etorofensis*, female, photographed by Hara. C, Dead female of *Tremex apicalis* on trunk of *Alnus japonica*, 23. V. 2021, photographed by Shinohara. D, *Apethymus kunugi*, female, photographed by Hara.

Cephidae

Phylloecus etorofensis (Takeuchi, 1955)

Japanese name: Chishima-kiberi-kukibachi

(Fig. 1B)

Material examined. HOKKAIDO: 1♀, Fukagawa, Takadomari, 43°55′N 142°03′E, 25. VI. 2019, H. Hara.

Distribution. Japan: Hokkaido (new record), Etorofu Island (Takeuchi, 1955), Kunashiri Island (Sundukov, 2015). Russia: European part (Zhelochovtsev and Prochorova, 1976) to Siberia and southern Primorye (Verzhutskij, 1981). Finland (Taeger *et al.*, 2006).

Host plants. ?Rosaceae: *Rosa* spp. (Sundukov, 2015, 2017; see comments below).

Remarks. Takeuchi (1955) described this species from Etorofu Island, southern Kuriles, and it was later recorded from Moskva, Jakutsk and southern Primorye, Finland and Kunashiri Island, southern Kuriles (see references above). The specimen listed above represents the first distribution record from the main island of Hokkaido. This is a mainly black species, with characteristic yellow marks on the lower inner orbit, mandible, and each side of the abdominal terga 3 and 4 (Fig. 1B).

Sundukov (2015, 2017) just noted "Личинки в побегах розовых [Larvae in pink shoots] (Rosaceae)" (2015) and "Host plant: *Rosa* spp. (Rosaceae)" (2017) without giving source of information. This host record may need confirmation.

Siricidae

Tremex apicalis Matsumura, 1912

Japanese name: Kuro-hiraashi-kibachi

(Fig. 1C)

Host plants. Betulaceae: *Alnus japonica* (Thunb.) Steud. (new record), *Betula* (Shinohara and Hara, 2020). Cornaceae: *Swida* (Kuramitsu *et al.*, 2019). Eupteleaceae: *Euptelea* (Kuramitsu *et al.*, 2019). Fagaceae: *Quercus* (Okutani, 1967a), *Lithocarpus* (Shinohara and Hara, 2020). Juglandaceae: *Juglans mandshurica* Maxim. var. *sachalinensis* (Komatsu) Kitam. (new record). Magnoliaceae: *Magnolia* (Kuramitsu *et al.*, 2019). Oleaceae: *Fraxinus* (Kuramitsu *et al.*, 2019). Rosaceae: *Cerasus* (Okutani, 1967a). Salicaceae: *Populus* (Okutani, 1967a). Sapindaceae: *Acer* (Okutani, 1967a).

Remarks. On May 23, 2021, Shinohara found several dead females of this species on the trunks at the height of 1.5–2.5 m of dead trees of the above two newly recorded species standing on the broad riverbed of the Tone River in Koya (about 7 m), Moriya City, Ibaraki Prefecture. Apparently, those females (one of them in Fig. 1C) died after oviposition as often observed for siricid females.

This is the first record of *Alnus japonica* (Betulaceae) and *Juglans mandshurica* var. *sachalinensis* (Juglandaceae) as hosts of *Tremex apicalis.* This woodwasp is now known to attack various broadleaved trees of eleven families.

Tenthredinidae

Aglaostigma albicinctum (Takeuchi, 1953)

Japanese name: Urashimasou-habachi

(Fig. 2A–F)

Material examined. HONSHU: Tochigi Pref.: 1 ♂, Wami, 36°45′N 140°09′E, Nakagawa, coll. larva, on *Arisaema serratum*, 10. VI. 2014, mat. 13. VI., em. 6. IV. 2015, S. Ibuki; 1 ♀, same locality, coll. larva (Fig. 2C), on *Actinidia polygama*, 22. VI. 2016, mat. 26. VI., em. 26. IV. 2017, S. Ibuki; 1 ♀, same locality, coll. larva (Fig. 2B, D, F), on *Impatiens textorii*, 28. V. 2016, mat. 10. VI., em. 24. IV. 2017, S. Ibuki; 1 ♂, same locality, coll. larva (Fig. 2A), on *Symplocarpus renifolius*, 31. V. 2018, mat. 13. VI., em. 21. IV. 2019, S. Ibuki.

Larva. Early or middle instar (Fig. 2A–B): head pale grayish brown (Fig. 2A, probably earlier instar) or gray (Fig. 2B, probably later instar); trunk and legs creamy white. Late instar (Fig. 2C–E): head blackish; trunk and legs creamy white, most of dorsal region brown with paired whitish lines dorsally, and supraspiracular, epipleural and hypopleural regions of each segment and two or three terminal segments blackish. Mature larva (Fig. 2F): entirely vivid pale green.

Host plants. Actinidiaceae: *Actinidia polygama* (Siebold et Zucc.) Planch. ex Maxim. (new record). Araceae: *Arisaema* spp. (Okutani, 1967b), *Symplocarpus renifolius* Schott ex Tzvelev. (new record). Balsaminaceae: *Impatiens textorii* Miq. (new record).

Life history. This species has one generation a year. In lower mountains in central Honshu, the adults emerge in late April to May and the larval feeding stages are in May to June. The larva is solitary and has an extra molt on maturity before entering the soil.

Remarks. Okutani (1967b) recorded *Arisaema* spp. (Araceae) as hosts of *Aglaostigma albicinctum* and here we newly recognize three species of three different plant families as hosts of this sawfly based on rearing. This is a polyphagous species. See Okutani and Takeuchi (1953) and Okutani (1959) for a detailed description of the larva and life history.

Allantus meridionalis (Takeuchi, 1933)

Japanese name: O-shiroobi-kuro-habachi

(Fig. 2G–J)

Material examined. HONSHU: Tochigi Pref.:

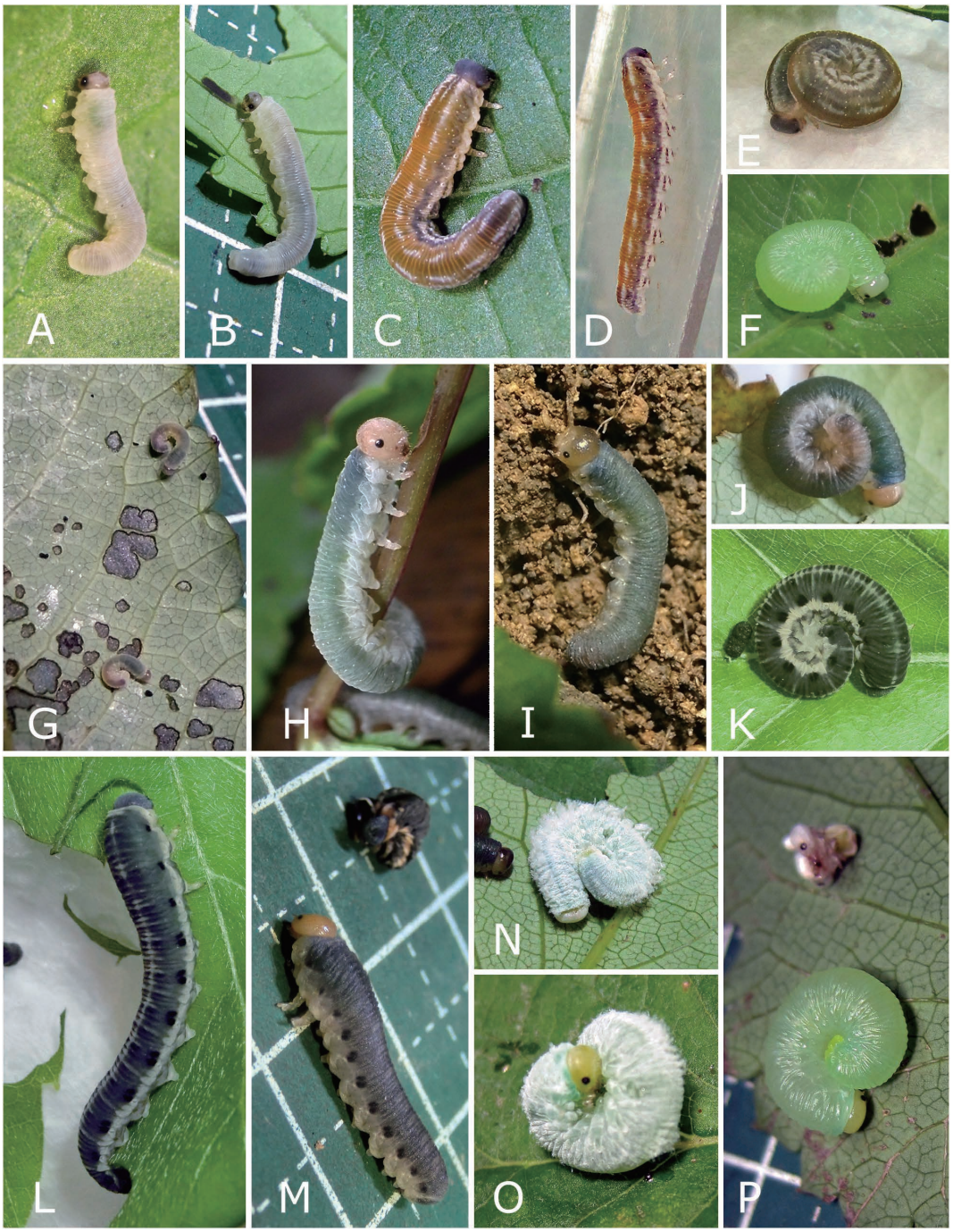

Fig. 2. A–F, *Aglaostigma albicinctum*: A, early or middle instar larva on *Symplocarpus renifolius*, 31. V. 2018; B, early or middle instar larva on *Impatiens textorii*, 29. V. 2016; C, late instar larva on *Actinidia polygama*, 25. VI. 2016; D, late instar larva on *I. textorii*, 30. V. 2016; E, late instar larva on *A. polygama*, 1. VII. 2016; F, mature larva, 10. VI. 2016. G–J, *Allantus meridionalis*: G, early instar, 20. IX. 2015; H, J, middle or late instar larva, 12. X. 2015; I, mature larva, 13. X. 2015. K–M, *Apethymus kunugi*: K, probably late instar larva, 10. V. 2019; L, same larva, 12. V. 2019; M, same larva, matured, and cast skin above, 17. V. 2019. N–P, *Corymbas nipponica*: N, middle instar larva, 17. VI. 2016; O, same larva, late instar, 26. VI. 2016; P, same larva, matured, and cast skin above, 29. VI. 2016. All photographed by Ibuki.

1 ♀, Nakagawa, Wami, 33°46′N 140°10′E, coll. larva (Fig. 2G), on *Sanguisorba officinalis*, 20. IX. 2015, mat. 21. X., em. 16. XII. 2015, S. Ibuki; 1 ♀, same data but coll. larva, 25. IX. 2015, mat. 14. X., em. 16. XI. 2015.

Larva. Early or middle instar (Fig. 2G): head pale gray; trunk and legs creamy white. Late instar (Fig. 2H, J): head pale pink; trunk and legs pale creamy white, with dorsal region pale greenish gray; thoracic legs tinted with pink. Mature larva (Fig. 2I): similar to late instar; head more yellowish.

Host plants. Rosaceae: *Rosa* spp. (Okutani, 1967b), *Fragaria* × *ananassa* (Weston) Duchesne ex Rozier (Okutani, 1967b), *Sanguisorba officinalis* L. (new record).

Life history. This is a multivoltine species. The larva is solitary, though a few larvae may occur on the same leaf (Fig. 2G). The larva has an extra molt on maturation and enters a rotten wood, not soil, to make a cell for diapause (Kondo, 1969).

Remarks. Okutani (1959) described the larva of this species as *Emphytus albicinctus* Matsumura and Kondo (1969) published his observations on the life history of this species.

Apareophora nebuta Togashi, 1964

New Japanese name: Hime-shimotsuke-maru-habachi

Material examined. HOKKAIDO: 1 ♂, Fukagawa, Takadomari, 26. V.–6. VI. 2007, by Malaise trap, H. Hara; 1 ♀, Fukagawa, Takadomari, 43°55′N 142°03′E, 2. VI. 2018, H. Hara; 1 ♀, same data but 29. V. 2019.

Distribution. Japan: Hokkaido (new record), Honshu (Togashi, 1964).

Remarks. This species has been only known from Honshu, Japan (Hara and Shinohara, 2017). It is here recorded from Hokkaido for the first time.

Apethymus kunugi Togashi, 2005

New Japanese name: Kunugi-habachi

(Figs. 1D, 2K–M)

Material examined. HONSHU: Tochigi Pref.: 1 ♀ (Fig. 1D), Koisago, 36°46′N 140°08′E, Nakagawa, coll. larva (Fig. 2K–L), on *Quercus serrata*, 10. V. 2019, mat. 17. V. (Fig. 2M), em. 18. X. 2019, S. Ibuki.

Larva. Late instar (Fig. 2K–L): head dark opaque gray; trunk and legs creamy white, dorsal region dark gray with creamy white line along middorsal line and each thoracic and abdominal segment with blackish spot in laterodorsal region. Mature larva (Fig. 2M): head pale orange; trunk and legs yellowish white, dorsal region dark gray, each segment with blackish spot in laterodorsal region.

Host plants. Fagaceae: *Quercus acutissima* Carruth. (Togashi, 2005), *Q. serrata* Murray (new record).

Life history. This is a univoltine species with the adult emergence in autumn, hibernation in the egg stage, and the larval feeding stages in spring. The larva is a solitary external feeder of the host leaves (Fig. 2L). On maturity, the reared larva had an extra molt (Fig. 2M) and went into the soil.

Remarks. Togashi (2005) described this species from the holotype which was reared from a larva feeding on *Q. acutissima* (Togashi, 2005), but he did not give any further information about the larva and life history. Here we newly record *Q. serrata* as a host of *A. kunugi*. Other species of *Quercus* may also serve as the host of this sawfly.

Ardis pallipes (Serville, 1823)

Japanese name: Bara-kuki-habachi

Material examined. HOKKAIDO: 1 ♂, Fukagawa, Takadomari, 26. V.–6. VI. 2007, by Malaise trap, H. Hara; 1 ♀, same locality and collector, 9. VI. 2010; 1 ♀, same data but, 43°55′N 142°03′E, 31. V. 2020.

Distribution. Japan: Hokkaido (new record), Honshu (Okutani, 1959, as *A. brunniventris*) (Takeuchi, 1952 recorded this species from Japan for the first time, but he did not detail the locality). Palaearctic and Nearctic regions (Smith,

1969, as *A. brunniventris*; Sundukov, 2017).

Remarks. This species is here recorded from Hokkaido for the first time.

Corymbas nipponica Takeuchi, 1936

Japanese name: Huto-koshijiro-habachi

(Fig. 2N–P)

Material examined. HONSHU: Tochigi Pref.: 1 ♀, Nakagawa, Wami, 33°46′N 140°10′E, coll. larva (Fig. 2N), on *Sanguisorba officinalis*, 12. VI. 2016, mat. 29. VI. (Fig. 2P), em. 26. IV. 2017, S. Ibuki.

Larva. Middle instar (Fig. 2N): head creamy white; trunk pale, covered with snow-white woolly wax. Late instar (Fig. 2O): head dark yellow; trunk pale greenish, covered with snow-white woolly wax; thoracic legs dark yellow. Mature larva (Fig. 2P): head dark yellow; trunk pale green, without wax covering.

Host plants. Rosaceae: *Rubus* spp. (Okutani, 1967b), *Geum japonicum* Thunb. (Okutani, 1967b), *Sanguisorba officinalis* L. (new record).

Life history. This is a univoltine species with the adult emergence in April to May and the larval feeding stages in May to June in lowlands of central Honshu. The larva is a solitary external feeder of the host leaves (Fig. 2N–O). On maturity, the reared larva had an extra molt (Fig. 2P) and went into the soil.

Remarks. This is the first record of *Sanguisorba officinalis* as the host plant of *C. nipponica*. For a detailed description of the larva, see Okutani (1959).

Eriocampopsis subtruncata Takeuchi, 1952

Japanese name: Sarashinashoma-habachi

Material examined. HOKKAIDO: 1 ♀, Bibai, Tomei, 10. V. 2017, H. Hara.

Distribution. Japan: Hokkaido (new record), Honshu (Takeuchi, 1952). Korean Peninsula (Lee *et al.*, 2019). Russia: Primorye (Zhelochovtsev, 1968).

Remarks. This species is here recorded from Hokkaido for the first time.

Euura imperfecta (Zaddach, 1876)

Japanese name: Karamatsu-madara-habachi

(Figs. 3A–G, L–O, 4A–N, 5A–P, 6A–C, 7A–D)

Nematus imperfectus Zaddach, 1876: 80.
Pachynematus imperfectus: Jörgensen, 1906: 350; Benson, 1958: 233; Ito, 1959; Pschorn-Walcher and Eichhorn, 1963: 62; Verzhutskii, 1966: 138; Verzhutskii, 1981: 210.
Pachynematus ? *imperfectus*: Takizawa, 1957: 27.
[Unidentified species 2]: Hara and Kitagawa, 1986: 21.
Nematus (*Larinematus*) *imperfectus*: Zhelochovtsev and Zinovjev, 1988: 169.
Pikonema imperfectum: Zinovjev, 1993: 21.
Larinematus imperfectus: Lacourt, 1999: 151; Lacourt, 2020: 428.
Pachynematus (*Larinematus*) *imperfectus*: Taeger *et al.*, 2010: 438; Macek *et al.*, 2020: 532.
Euura imperfecta: Prous *et al.*, 2014: 46; Shinohara and Hara, 2015: 174; Hara, 2019: 73; Hara, 2020: 89, 349.
For more references, see Lacourt (1999).

Redescription (*female and male*). Length 5.5–6.5 mm in female, 5.5 mm in male. Female yellow, red yellow or brown and black (Fig. 3A–B, E–G); head capsule with peculiar black markings (Fig. 4A–D, L–N); antenna black; thorax partly black; mesepisternum black on epicnemium and often ventrally or ventrolaterally (Fig. 4B, F–G); legs with coxae basally black and tarsi and apex of hind tibia sometimes slightly darkened; abdomen dorsally or mostly black; valvula 3 always black. Male mostly black (Fig. 3C–D); legs yellow from apices of femora to tarsi but tibiae and tarsi slightly darkened apically; subgenital plate yellow. In both sexes, wings very slightly yellowish (Fig. 3A, F, C); stigma almost uniformly pale brown to brown, sometimes basally pale; veins mostly brown to black; vein C mostly or basally yellow.

Head in dorsal view with length behind eye 0.6–0.8 × eye length in female, 0.4–0.5 × in male (Fig. 4A, H, L); length behind lateral ocellus 2.0–2.8 × length of lateral ocellus in female, 1.7–1.8 × in male. Frontal area with lateral and

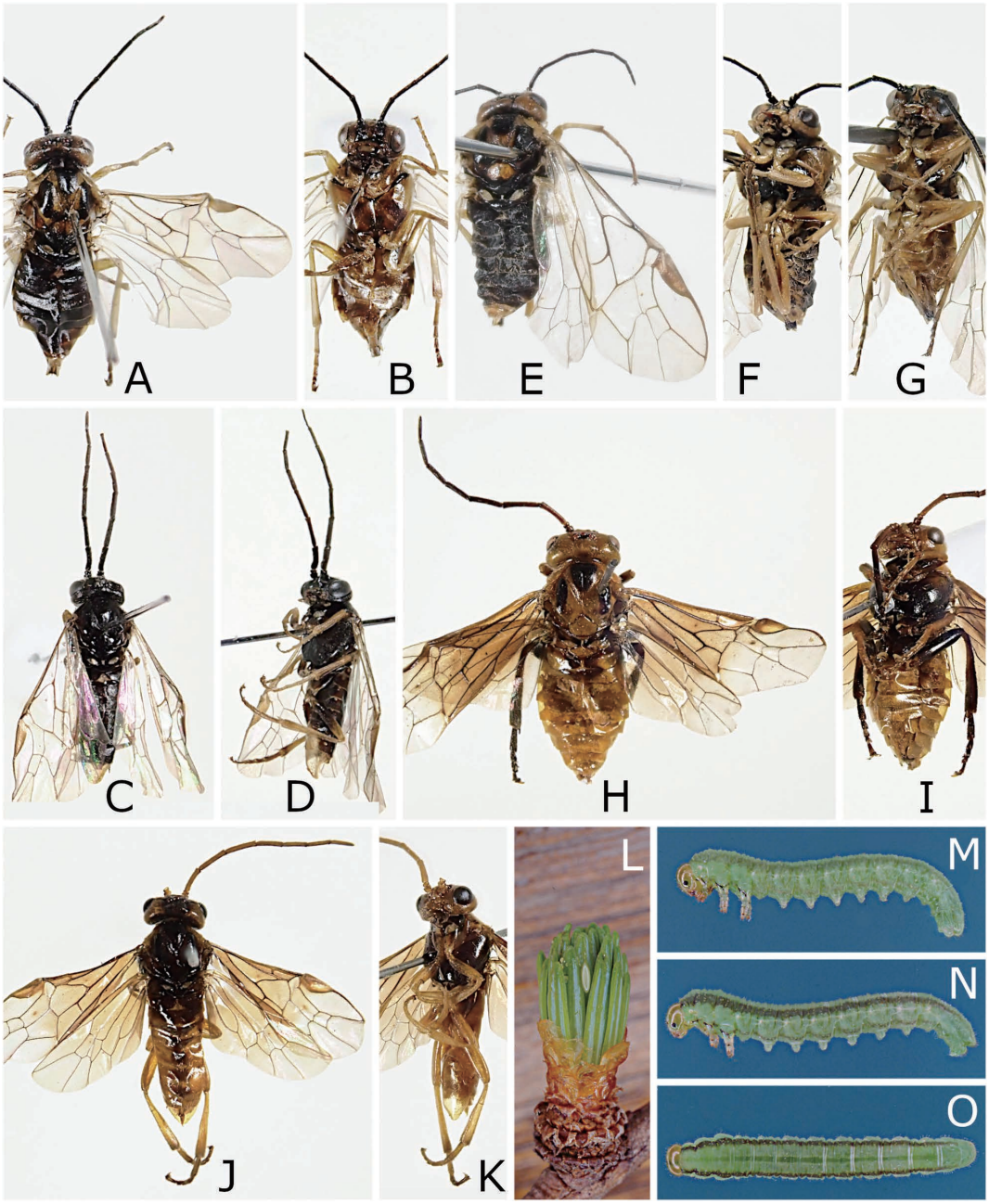

Fig. 3. A–G, L–O, *Euura imperfecta*: A–B, female, Hokkaido, dorsal and ventral views; C–D, male, Hokkaido, dorsal and ventrolateral views; E–F, female, Honshu, dorsal and ventrolateral views; G, female, Honshu, ventrolateral view; L, egg, Hokkaido; M, semifinal instar larva, lateral view; N–O, final instar larva, lateral and dorsal views; M–O, Hokkaido, Bibai, 1986. H–K, *Euura itoi*: H–I, female, dorsal and ventrolateral views; J–K, male, dorsal and ventrolateral views. All photographed by Hara.

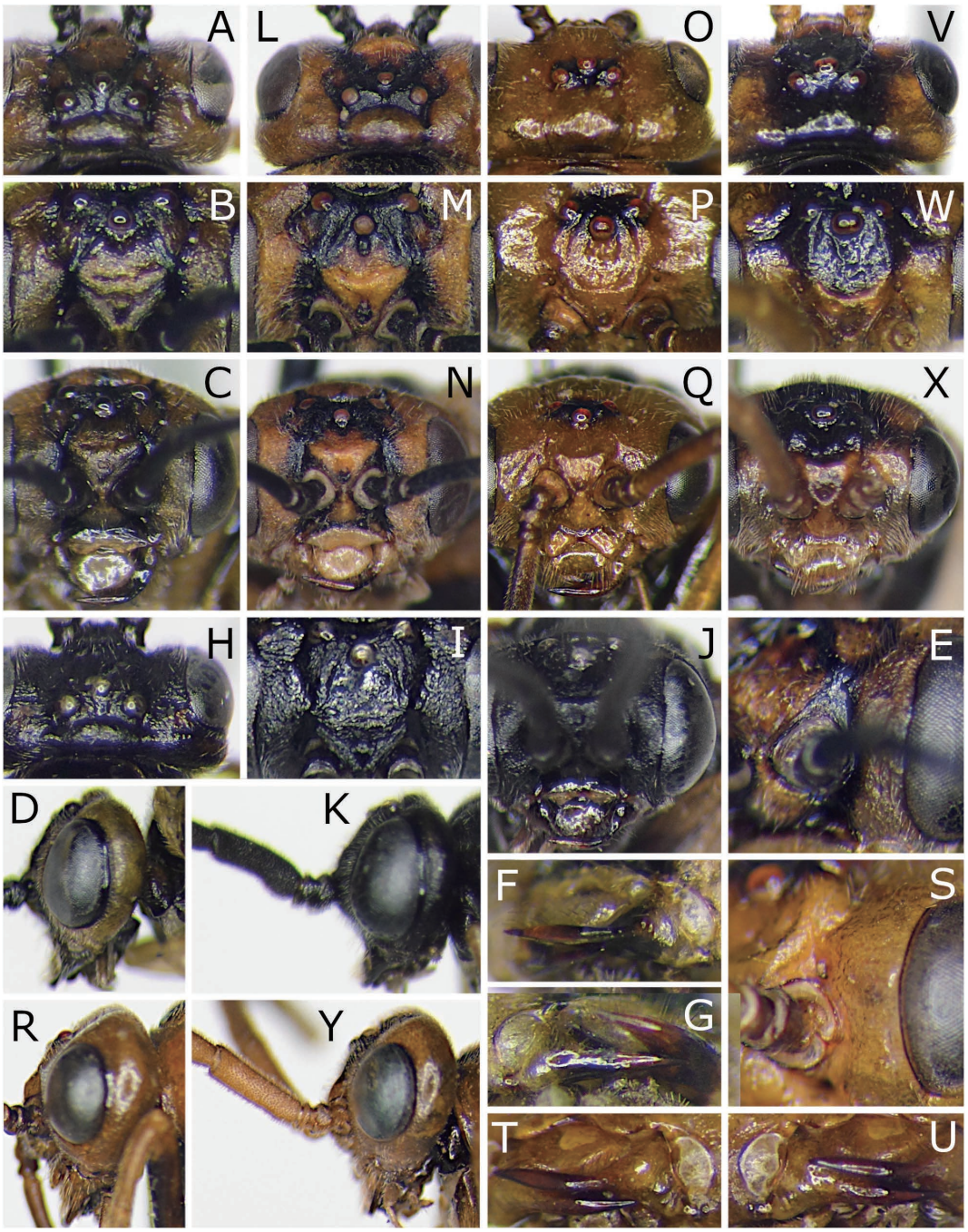

Fig. 4. A–N, *Euura imperfecta*: A–G, female, Hokkaido; H–K, male, Hokkaido; L–N, female, Honshu. O–X, *Euura itoi*: O–U, female; V–X, male. A, H, L, O, V, Head, dorsal view; B, I, M, P, W, dorsomedial part of head anterodorsal view; C, J, N, Q, X, head, anterior view; D, K, R, Y, head, lateral view; E, S, torulus and its surroundings, anterolateral view; F, T, left mandible, outer view; G, U, right mandible, outer view. All photographed by Hara.

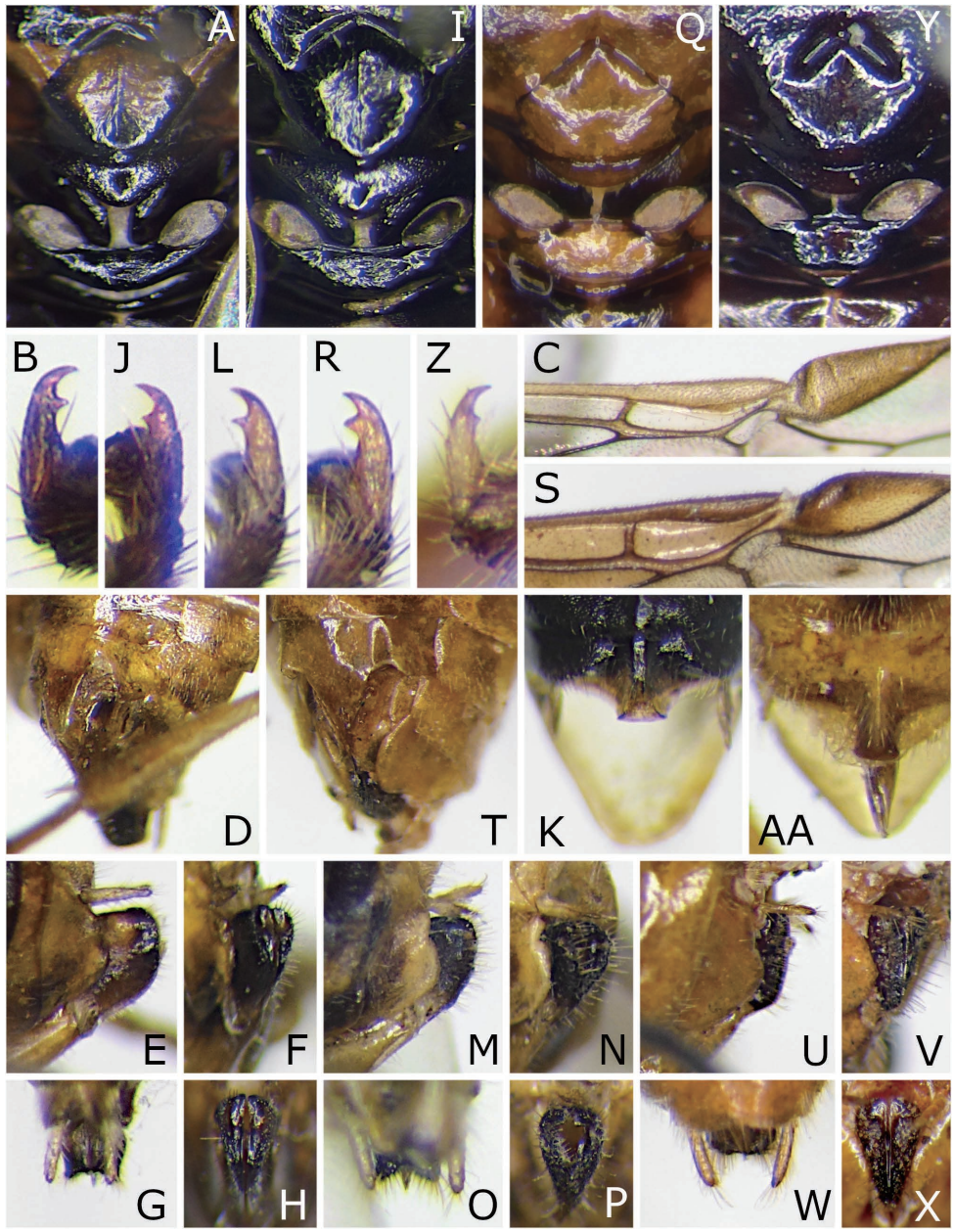

Fig. 5. A–P, *Euura imperfecta*: A–H, female, Hokkaido; I–K, male, Hokkaido; L–P, female, Honshu. Q–AA, *Euura itoi*: Q–X, female; Y–AA, male. A, I, Q, Y, Posteromedial part of thorax, dorsal view; B, J, L, R, Z, tarsal claw, anterior or posterior view; C, S, anteromedial part of fore wing; D, T, apical part of abdomen, ventrolateral view; E, M, U, abdomen apex, lateral view; F, N, V, ditto, posterolateral view; G, O, W, ditto, dorsal view; H, P, X, ditto, posterior view; K, AA, apical part of abdomen, dorsal view. M–N, P, Ovipositor removed; K, genitalia removed. All photographed by Hara.

anterior ridges usually distinct (Fig. 4B, I, M); anterior ridge not grooved medially. Distance between eyes at torulus 1.4–1.5 × eye height in female, 1.2 × in male (Fig. 4C, J, N). Area just above torulus almost flat and triangular, laterally with long straight furrow (Fig. 4E). Dorsal tentorial pit obscure. Narrow ridge around torulus dorsally widely vague or disappearing. Paraantennal field normal, covered with setae except for narrow medial margin. Clypeus distinctly concave roundly on ventral margin (Fig. 4C, J, N); depth of ventral emargination 0.3–0.7 × median height of clypeus; clypeus with width 3.3–3.9 × maximum height; maximum height 0.7–0.9 × torulus height. Malar space length 1.2–1.4 × median ocellus width in female, 0.8–0.9 × in male. Antenna length 2.1–2.5 × head width in female, 3.0 × in male (Fig. 3A, C, E); flagellomere 1 0.8–0.9 × as long as major axis of eye, simple in female, slightly convex basally on ventral margin in lateral view in male (Fig. 4K); flagellomere 2 1.1–1.3 × as long as flagellomere 1. Left mandible 1.1–1.2 × as long as right one, and in outer view sharply tapering basally, thin from middle to apex, with middle part same thickness or slightly thickening towards apex (Fig. 4F). Right mandible rather sharply tapering on basal half and gradually tapering on apical half (Fig. 4G). Basal outer surfaces of both mandibles not widely flattened or concave. Maxillary palpus rather short, with palpomere 2 0.7–0.8 × as long as palpomere 3 and palpomere 6 0.7–0.8 × as long as torulus height.

Mesoscutellar appendage with length 0.9–1.6 × minor axis of cenchrus (Fig. 5A, I). Metascutellum length 0.9–1.3 × minor axis of cenchrus. Mesepisternum with groove along anterior edge extending into epicnemium. Epicnemium with ventral edge distinctly grooved. Katepimeron entirely glabrous. Anterior fore tibial spur with velum. Hind tibia normal, 0.8 × as broad as hind femur in anterior view; posterior hind tibial spur 0.9–1.2 × as long as apical breadth of hind tibia, 0.4–0.5 × as long as hind tarsomere 1. Hind tarsus 0.8–1.0 × as long as hind tibia. Tarsal claws narrow, with small inner tooth (Fig. 5B, J, L); depth of concavity between apical and inner teeth 0.3–0.5 × distance between these teeth. Fore wing with cell Sc 0.2–0.6 × as wide as vein C at level of base of vein Rs + M (Fig. 5C). Hind wing with section of vein 1A between cell 1A and crossvein cu-a 1.9–2.1 × as long as crossvein cu-a.

In female abdomen, sternum 7 with posterior margin deeply concave beside median projection (Fig. 5D). Tergum 9 normal in size, in lateral view 0.8–1.6 × as long as tergum 8 at level of spiracle 8 (Fig. 5E, M). Cercus 3.0–5.0 × as long as wide, posteriorly extending to or slightly beyond apex of valvula 3 (Fig. 5E, G, M, O). Ovipositor sheath 0.3 × as long as abdomen (Fig. 3B, G), 0.6–0.7 × as long as hind tibia; valvula 3 in lateral view with apical edge nearly truncate or widely rounded (Fig. 4E, M); both valvulae 3 combined apically slightly or distinctly concave, with apicolateral ridge sharp (Fig. 5F–G, M–P). Lance in lateral view with dorsal margin slightly concave (Fig. 6A); radix with subdorsal carina; annuli distinctly oblique. Lancet with radix 1.2–1.3 × as long as lamnium (Fig. 6B, C); lamnium with 14–15 annuli; annuli arched; ctenidial setae absent on ventrobasal and dorsoapical parts of lamnium; annulus 1 usually without ctenidial setae; ctenidial setae about as long as length of annulus; ventral margin of lamnium not serrate, without distinct denticles.

In male abdomen, procidentia with sharply defined median area (Fig. 5K); tergal hollow with anterior edge distinctly ridged laterally. Subgenital plate 0.4–0.5 × as long as abdomen, 0.7–0.8 × as long as hind tibia (Fig. 3D), gradually tapering and narrowly rounded apically (Fig. 5K). Genitalia with harpe in ventral view about as long as wide (Fig. 7A); parapennis apically pointed; penis valve with paravalva apically protruding below valvispina (Fig. 7B–D); valvispina narrow and acute.

Head capsule mostly distinctly or slightly microsculptured and inconspicuously punctured; clypeus not microsculptured. Thorax predominantly microsculptured; medial part of mesopostnotum, whole metapostnotum, etc. not microscu-

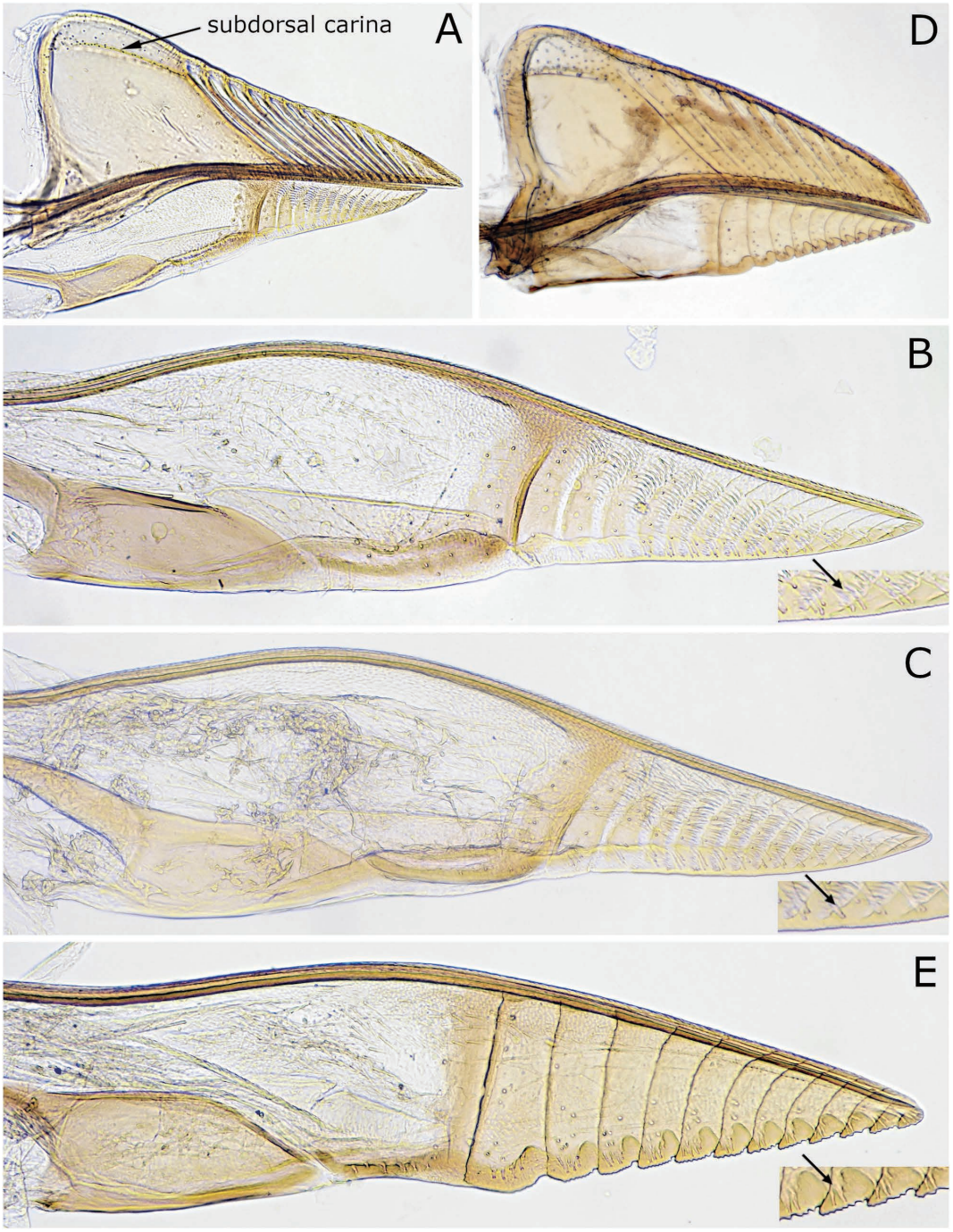

Fig. 6. Female ovipositor. A–C, *Euura imperfecta*: A–B, Hokkaido; C, Honshu. D–E, *Euura itoi*. A, D, Ovipositor; B–C, E, lancet. All photographed by Hara.

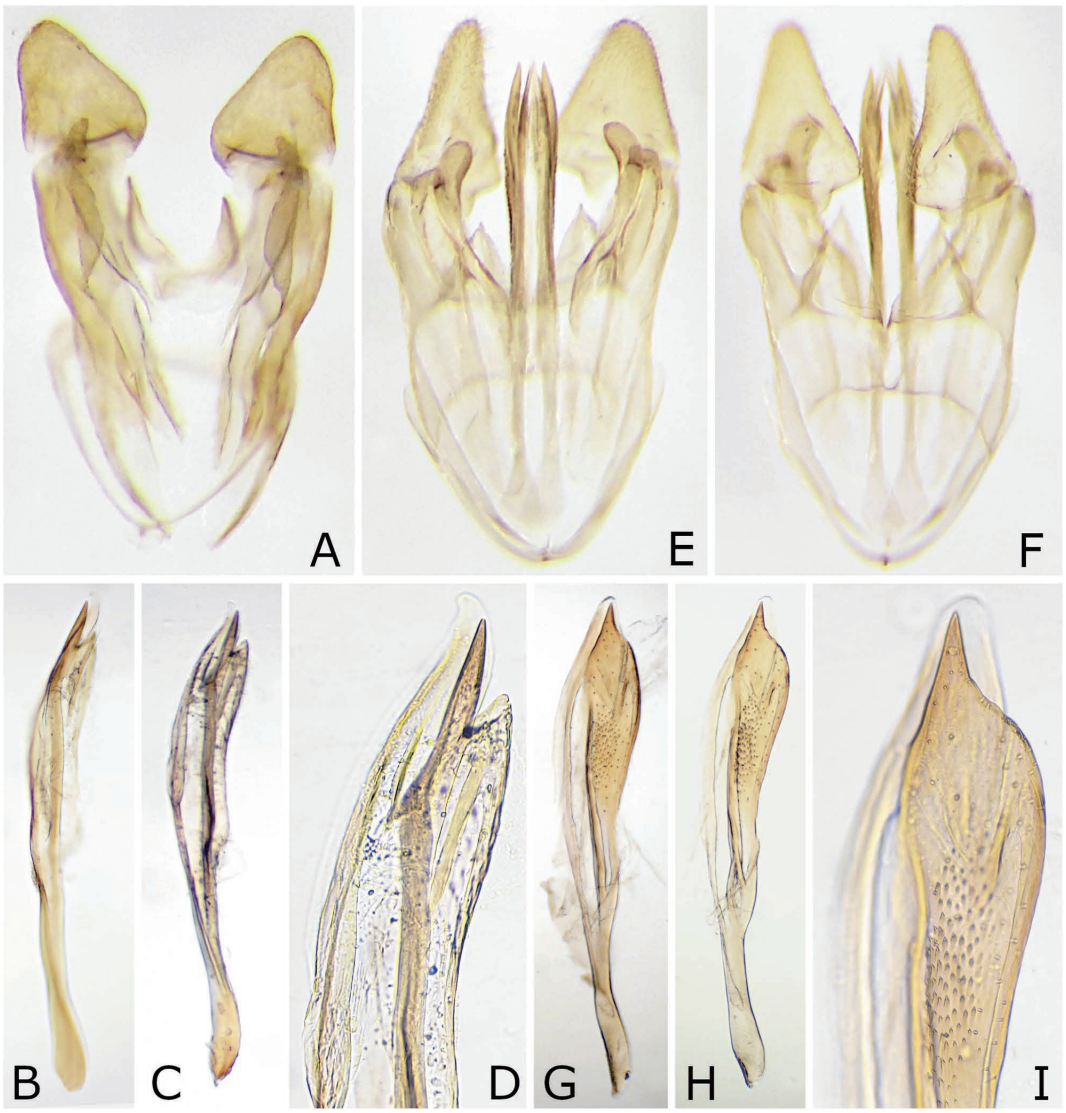

Fig. 7. Male genitalia. A–D, *Euura imperfecta*, Hokkaido; E–I, *E. itoi*. A, E–F, Genital capsule: A, ventral view (penis valve removed); E, F, dorsal and ventral views. B–D, G–I, Penis valve, lateral view (left dorsal). All photographed by Hara.

lptured; punctures generally inconspicuous; mesoscutum, propleuron and ventrolateral part of mesepisternum with small punctures. Abdomen microsculptured; sterna slightly or inconspicuously microsculptured.

Immature stages. Egg long oval (Fig. 3L). Semifinal instar larva (Fig. 3M): head and legs pale yellow brown; legs basally narrowly black; trunk pale green, with slightly blackish subdorsal stripe. Final instar larva (Fig. 3N–O): 15 mm long, as in semifinal larva, but trunk with distinct blackish green subdorsal stripe and narrow dark green pleural stripe. Cocoon: 8 mm long, brown, double walled; outer wall thin. For more information, see Jörgensen (1906), Verzhutskii (1966) and Macek *et al.* (2020).

Material examined. HOKKAIDO: 1 ♀ (Fig. 6A), Shintoku, Shintoku, 8. V. 2012, H. Hara

(cited by Hara, 2020); 1 ♀ (Figs. 5B, 6B), Bibai, 9. V. 1961, K. Kamijo; 1 ♀, same locality, 7. V. 1987, H. Hara; 1 ♀ (Figs. 5I, 7A, C–D), same data but 3. V. 1988; 1 ♂, same data but 6. V. 1988; 1 ♀, same data but 8. V. 1988; 1 ♂ (Figs. 3C–D, 4H–K, 5J–K, 7B), Hayakita, 13. V. 1986, H. Hara; 1 ♀, same data but 11. V. 1987; 1 ♀ (Fig. 5D), same locality, coll. cocoon in litter under *Larix kaempferi*, 30. IV. 1987, em. 25. V. 1987, H. Hara; 1 ♀, same locality but 19. V. 1987, H. Hara; 1 ♀ (Figs. 4D, F–G, 5A, C), same data but 6. V. 1988; 3 ♀ (Figs. 3A–B, 4A–C, E, 5E–H), same locality, coll. litter under *Larix kaempferi*, em. 28, 30. IV. 1992, H. Hara, and their progeny (Fig. 3L). — HONSHU: Nagano Pref.: 3 ♀, Ueda, Sanada-machi, Soehi, 30. IV. 1956, Takeuchi (probably reared); 1 ♀, Aoki-toge, coll. larva on *Larix kaempferi* 1956, em. 19. III. 1957, Ito (cited by Ito, 1959).

Distribution. Japan: Hokkaido (Shinohara and Hara, 2015), Honshu (Takizawa, 1957; Ito, 1959). Russia: European part, Siberia (Verzhutskii, 1981; Zhelochovtsev and Zinovjev, 1988). Europe (Zaddach, 1876; Benson, 1958; Taeger *et al.*, 2018).

Host plants. Pinaceae: *Larix decidua* Mill. (Jörgensen, 1906), *L. kaempferi* (Lamb.) Carrière (Takizawa, 1957; Ito, 1959), *L. sibirica* Ledeb. (Verzhutskii, 1966, as "лиственницы сибирской").

Life history. In our observation in Hokkaido, Japan, this sawfly has one generation a year; the adults were collected in May; under rearing condition, the female laid her eggs singly on needles (Fig. 3L); the cocoons were found within the litter in larch forests. For more information, see Jörgensen (1906), Pschorn-Walcher and Eichhorn (1963), Verzhutskii (1966) and Macek *et al.* (2020).

Remarks. *Euura imperfecta* is mainly characterized by the following features: area just above torulus almost flat and triangular and laterally with long straight furrow (Fig. 4E); female sternum 7 with posterior margin deeply concave beside median projection (Fig. 5D); male procidentia with median area sharply defined (Fig. 5K). The following character states are also useful to distinguish this species from other congeners of *Euura* and similar genera: tarsal claws with small inner tooth (Fig. 5B, J, L) and depth between apical and inner teeth about half or less of distance between apices of these teeth; narrow ridge around torulus widely vague or disappearing dorsally (Fig. 4E); mandibles asymmetrical, in outer view left mandible with middle part same thickness or slightly thickening towards apex (Fig. 3F), right mandible continuously tapering from base to apex (Fig. 4G); katepimeron entirely glabrous; in female, valvulae 3 not tapering and apically concave (Fig. 5F–H, N–P); in lancet, lamnium without serrulae and denticles on ventral margin; in male, tergal hollow of tergum 8 with anterior edge distinctly ridged laterally (Fig. 5K).

Zhelochovtsev in Zhelochovtsev and Zinovjev (1988) established *Larinematus* Zhelochovtsev, 1988 as a subgenus of *Nematus* Panzer, 1801 for three species, *E. imperfecta* (Fig. 3A–D), *E. itoi* (Fig. 3H–K) and one unstated species. Zinovjev (1993) considered this subgenus a species group of *Pikonema* Ross, 1937. Lacourt (1999, 2020) raised *Larinematus* to the rank of genus. Roller and Haris (2008) described a new species under "*Pachynematus* (*Larinematus*)". Taeger *et al.* (2010) and Macek *et al.* (2020) treated *Larinematus* as a subgenus of *Pachynematus* Konow, 1890. On the other hand, Prous *et al.* (2014) synonymized *Larinematus*, *Pachynematus* and *Pikonema* with *Euura* Newman, 1837. Actually, the features of *Larinematus* stated by previous authors are not stable or difficult to recognize, judging from Japanese specimens of these two species. Zhelochovtsev and Zinovjev (1988), Zinovjev (1993), Macek *et al.* (2020) and Lacourt (2020) distinguished *Larinematus* or the *E. imperfecta* group from other species of former *Pachynematus* mainly by the relative lengths of hind tibia and tarsus and the shape of the ovipositor sheath. Zhelochovtsev and Zinovjev (1988), Macek *et al.* (2020) and Lacourt (2020) stated that *Larinematus* has the hind tarsus as long as or longer than the hind tibia. Benson (1958) also characterized *E. imperfecta* by a long hind tarsus.

However, in the Japanese specimens of the two species, the hind tarsus is often distinctly shorter than the hind tibia in *E. imperfecta* (Fig. 3B) and always so in *E. itoi* (Fig. 3I) (the ratio is 0.83–0.97 : 1.0 in *E. imperfecta* and 0.78–0.86:1.0 in *E. itoi*). Zhelochovtsev and Zinovjev (1988) stated that the ovipositor sheath of *Larinematus* was with "опорной площадкой" (probably refers to a wide concavity at the apex; Fig. 5F, N) with a figure of the ovipositor sheath of *E. imperfecta*. Macek *et al.* (2020) also adopted this feature for *Pachynematus* (*Larinematus*). However, in *Euura itoi*, the apex of the ovipositor sheath is mostly flattened, dorsally narrowly elevated and with a median carina (Fig. 5V, X). Lacourt (2020) wrote that the ovipositor sheath was incised when viewed from above as a generic feature of *Larinematus*. The sheaths combined are apically incised in dorsal view in *E. imperfecta* (Fig. 5G, O) but truncate in *E. itoi* (Fig. 5W). It is impossible to separate *Larinematus* or the *E. imperfecta* group from other species of former *Pachynematus* except for the host plant. Furthermore, there are some significant differences between these two species apart from their morphological differences. The antenna of *E. imperfecta* shows distinct sexual difference. The male antenna is longer than that of the female (Fig. 3A, C), and the male flagellomere 1 is basally convex on the ventral margin (Fig. 4K) while the female flagellomere 1 is simple. On the other hand, there is no distinct structural difference between the female and male antennae of *E. itoi*. The life cycle of *E. imperfecta* is univoltine while that of *E. itoi* is multivoltine. These two species do not appear to be closely related.

Apart from the relative lengths of hind tibia and tarsus, Japanese specimens of *E. imperfecta* well agree with the concept of this species by Benson (1958). He wrote "Underthorax with at least mesosternum black". In the Japanese specimens, the mesepisternum is often not darkened ventrally. The Japanese specimens also well agree with the description by Muche (1974) except for the color of the stigma. He wrote "Stigma braun mit breiter weißer Basis", but the Japanese specimens have the uniformly brown stigma (Fig. 3A, C, E).

The Hokkaido larva agrees with the description of the European larva by Jörgensen (1906). The trunks of these mature larvae are green with two dark longitudinal stripes (subdorsal and pleural stripes) (Fig. 3N–O; p. 533-fig. 3 in Macek *et al.*, 2020). However, according to Verzhutskii (1966), the Siberian larva has the trunk with only one dark longitudinal stripe (subdorsal stripe) and the ventral side is distinctly paler than the dorsal side (Рис. 34-8 and Рис. 43 in Verzhutskii, 1966). Furthermore, the Honshu larva quite differs from the Hokkaido, European and Siberian larvae. According to Ito (1959), the Honshu larva is wholly purplish black in the semifinal instar and younger larvae and has the head blackish brown and the trunk dark brown with a pale brown middorsal line in the final instar larva. Therefore, Ito (1959) questioned identifying the Honshu specimens with *E. imperfecta* and stated the identification was tentative. We have not found any difference between the Hokkaido and Honshu adults and so consider them conspecific. More material and genetical study will be needed to interpret the large larval color variation.

Euura itoi (Okutani, 1955)

Japanese name: Karamatsu-aka-habachi

(Figs. 3H–K, 4O–Y, 5Q–AA, 6D–E, 7E–I)

Pachynematus itoi Okutani, 1955: 98; Takizawa, 1957: 17; Pschorn-Walcher and Eichhorn, 1963: 59; Pschorn-Walcher and Zinnert, 1971: 348; Muche, 1974: 86; Verzhutskii, 1981: 211; Xiao *et al.*, 1992: 131; Takizawa, 1994: 341; Park *et al.*, 2007: 2.

"*Species ignorata*": Verzhutskii, 1966: 143 (see Pschorn-Walcher and Zinnert, 1971).

Nematus (*Pikonema*) *itoi*: Zhelochovtsev, 1976: 82.

Nematus (*Larinematus*) *itoi*: Zhelochovtsev and Zinovjev, 1988: 169.

Pikonema itoi: Zinovjev, 1993: 21.

Larinematus itoi: Lacourt, 1999: 152; Lacourt, 2020: 429.

Pachynematus (*Larinematus*) *itoi*: Taeger *et al.*, 2010: 438; Macek *et al.*, 2020: 532.

Euura itoi: Shinohara and Hara, 2015: 174; Hara, 2019: 73; Hara, 2020: 89, 350.

Redescription (*female and male*). Length 6.5–8.0 mm in female, 5.0–6.5 mm in male. Red yellow (Fig. 3H–K). Female: head capsule black only on ocellar area (Fig. 4O–R); antenna black, with flagellomere 1 red yellow ventrally or entirely; thorax dorsally with three large black spots, ventrally black except for narrow or wide dorsal part of mesepisternum (Fig. 3H–I); legs black from coxae to femora of fore and middle legs and on most of hind leg; abdomen only darkened on narrow anteromedial part of dorsum and valvula 3. Male: head capsule darkened on medial or most part of frons, medial part of vertex and most of occiput (Fig. 4V–Y); antenna red yellow; thorax black except for most of pronotum and tegula (Fig. 3J–K); legs darkened on bases of coxae, basal part of fore femur and apical part of hind tarsus, often also on all trochanters, basal parts of middle and hind femora and whole hind tarsus; abdomen dorsally darkened except for lateral and apical parts. Wings strongly tinged with brown on basal two thirds; veins brown to black; stigma yellow, darkened on wide base and narrow margins.

Head in dorsal view with length behind eye 0.8–0.9 × eye length in female, 0.6–0.7 × in male (Fig. 4O, V); length behind lateral ocellus 3.7–4.3 × length of lateral ocellus in female, 2.8–3.0 × in male. Frontal area with distinct lateral and anterior ridges (Fig. 4P, W); anterior ridge not grooved medially. Distance between eyes at torulus 1.6–1.7 × eye height in female, 1.4–1.5 × in male (Fig. 4Q, X). Area above torulus concave, often with small tubercle (Fig. 4S). Narrow ridge around torulus wholly distinct. Paraantennal field normal, covered with setae except for narrow medial margin (Fig. 3S). Clypeus very deeply concave angularly or roundly on ventral margin (Fig. 4Q, X); depth of ventral emargination 1.4–1.7 × median height of clypeus; clypeus with width 2.7–3.2 × maximum height; maximum height 1.0–1.3 × torulus height. Malar space length 0.8–1.4 × median ocellus width. Antenna length 2.7–3.1 × head width; flagellomere 1 1.0–1.2 × as long as major axis of eye, simple in both sexes (Figs. 3H–K, 4Y); flagellomere 2 1.0–1.2 × as long as flagellomere 1. Left mandible 1.1–1.2 × as long as right one, in outer view sharply tapering basally, thin from middle to apex, with middle part slightly thickening towards apex (Fig. 4T). Right mandible rather sharply tapering on basal half and gradually narrowing on apical half (Fig. 4U). Basal outer surfaces of both mandibles not widely flattened or concave. Maxillary palpus with palpomere 2 0.6–0.8 × as long as palpomere 3 and palpomere 6 0.6–0.9 × as long as torulus height.

Mesoscutellar appendage length 0.5–0.9 × minor axis of cenchrus (Fig. 5Q, Y). Metascutellum length 1.2–1.6 × minor axis of cenchrus. Mesepisternum with groove along anterior edge extending into epicnemium. Epicnemium with ventral edge distinctly grooved. Katepimeron glabrous, usually narrowly covered with setae posteriorly. Anterior fore tibial spur with velum. Hind tibia usual, 0.7–0.9 × as broad as hind femur in anterior view; posterior hind tibial spur 1.0–1.3 × as long as apical breadth of hind tibia, 0.5–0.7 × as long as hind tarsomere 1. Hind tarsus 0.8–0.9 × as long as hind tibia (Fig. 3I). Tarsal claws narrow, with small inner tooth (Fig. 5R, Z); depth of concavity between apical and inner teeth about 0.5 × or less distance between these teeth. Fore wing with cell Sc 0.7–1.2 × as wide as vein C at level of base of vein Rs + M (Fig. 5S). Hind wing with section of vein 1A between cell 1A and crossvein cu-a 1.1–1.4 × as long as crossvein cu-a.

In female abdomen, sternum 7 with posterior margin moderately concave beside median projection (Fig. 5T). Tergum 9 normal in size, in lateral view 1.0–1.7 × as long as tergum 8 at level of spiracle 8 (Fig. 5U). Cercus 4.0–7.0 × as long as wide, posteriorly extending far beyond valvula 3 (Fig. 5U, W). Ovipositor sheath 0.3–0.4 × as long as abdomen, 0.5 × as long as hind tibia (Fig. 3I); valvula 3 in lateral view short and wide, almost truncate apically (Fig. 5U), in dorsal view roundly convex laterally, truncate apically (Fig. 5W). Lance in lateral view with dorsal margin slightly rounded (Fig. 6D); radix with subdorsal carina; lamnium with annuli distinctly oblique.

Lancet with radix 0.9 × as long as lamnium (Fig. 6E); lamnium with 12–13 annuli; basal annuli straight; middle and apical annuli slightly arched; ctenidia absent; ventral margin of lamnium serrate; serrulae with minute denticles.

In male abdomen, tergum 8 with procidentia much protruding posteriorly, nearly rectangle (Fig. 5AA) and tergal hollow indistinctly defined. Subgenital plate 0.5 × as long as abdomen, 0.8–0.9 × as long as hind tibia, gradually narrowing towards apex, with apex narrowly rounded or narrowly truncate. Genitalia with harpe in ventral view longer than wide (Fig. 7F); valviceps with many spinules centrally (Fig. 7G–H); parapennis acute; valvispina tapering with pointed apex; paravalva not protruding apically.

Head, thorax and abdomen generally smooth and shiny, with punctures minute or inconspicuous. Frons, vertex, pronotum, median mesoscutal lobe and most of abdomen very slightly microsculptured. Mesoscutellar appendage laterally microsculptured. Mesopostnotum microsculptured, with narrow medial part not or slightly microsculptured. Metapostnotum not microsculptured.

Material examined. Holotype of *Pachynematus itoi* Okutani, 1955 (Figs. 3H–I, 4O–R, 5Q–V, X): ♀ with a label written as "Soehi-mura, Nagano-ken, 13-VIII-1955" and a piece of red paper with nothing written on it. Paratypes of *P. itoi*: 1 ♀ (Fig. 6E) and 1 ♂ (Fig. 7E–F, H–I) with the same label as the holotype; 1 ♀ (Fig. 6D) and 1 ♂, "Soehi-mura, Nagano-ken, 13-VIII-1955, [Karamatsu (in Japanese; = *Larix kaempferi*)]"; 2 ♀ (Fig. 5W), "Ueda, Nagano-ken, 15-VIII-1955"; 1 ♂ (Figs. 3J–K, 4V–Y, 5Y–AA) with a label written as "Ueda, Nagano-ken, 15-VIII-1955" and a piece of red paper with nothing written on it.

The type series of *P. itoi* mentioned by Okutani (1955) is "Holotype: 1 female, Soehi-mura, Nagano Prefecture, Aug. 13, 1955, T. Ito leg. Allotype: 1 male, Ueda, Nagano Prefecture, Aug. 15, 1955, T. Ito leg. Paratypes: 2 males and 3 females, same data as holotype; 2 females, same data as allotype". Although there are no specimens with the type label of *Pachynematus itoi* in Okutani's collection now kept in the National Museum of Nature and Science, Tsukuba, we have found the above five females and three males agreeing with the original description in the museum. The female and male with a piece of red paper are safely considered the holotype and the allotype stated by Okutani (1955), respectively, judging from the figures in the original description (compare Fig. 3H, J with figs. 6, 7 in Okutani, 1955, respectively).

Other material examined. JAPAN: HONSHU: Gunma Pref.: 4 ♀, Mt. Asama-yama, VIII. 1956, Takeuchi. —Nagano Pref.: 1 ♀, Ueda, em. 21. VI. 1956, K. Ozawa; 4 ♀, Ueda, Sanada-machi, Soehi, mid-VII–late VIII. 1955, host: *Larix kaempferi*; 5 ♀ 5 ♂ (Fig. 6G), same locality, V. 1956, Takeuchi (probably reared); 1 ♀, Chikuhoku, Aoki-toge, 29. VI. 1956, T. Ito; 4 ♀ (Fig. 3S–U), Utsukushigahara, 16–17. VIII. 1961, T. Naito; 2 ♀, Matsumoto, Shimashima, 7. VI. 1929, Takeuchi; 1 ♂, Kiso-machi, Shinkai, 7. VIII. 1956, T. Ito; 5 ♀, Kiso-machi, Fukushima, em. 28–30. VI. 1956, T. Ito.

Distribution. Japan: Honshu (Okutani, 1955). Korea (Park *et al.*, 2007). China (Xiao *et al.*, 1992). Russia: Magadan Oblast, Siberia, Ural (Zhelochovtsev, 1976; Verzhutskii, 1981). East Europe (Pschorn-Walcher and Eichhorn, 1963; Pschorn-Walcher and Zinnert, 1971).

Host plants. Pinaceae: *Larix decidua* Mill. (Pschorn-Walcher and Eichhorn, 1963), *L. gmelinii* (Rupr.) Rupr. (Xiao *et al.*, 1992), *L. kaempferi* (Lamb.) Carrière (Okutani, 1955), *L. olgensis* A. Henry (Xiao *et al.*, 1992).

Life history and immature stages. See Takizawa (1957, 1994), Pschorn-Walcher and Eichhorn (1963), Verzhutskii (1966, as "*Species ignorata*"), Pschorn-Walcher and Zinnert (1971) and Park *et al.* (2007).

Remarks. *Euura itoi* is distinguished from other species of *Euura* and similar genera by the following features: head capsule and abdomen almost entirely red yellow in female, predominantly so in male (Fig. 3H, J); wings strongly tinged with brown on basal two thirds; stigma

yellow, widely darkened basally, narrowly darkened marginally; malar space length 0.8–1.4 × median ocellus width; left mandible longer than right mandible, in outer view with middle part slightly thickening towards apex (Fig. 4T); right mandible continuously tapering from base to apex (Fig. 4U); maxillary palpus not shortened, with palpomere 2 0.6–0.8 × as long as palpomere 3; mesoscutellar appendage 0.5–0.9 × as long as minor axis of cenchrus (Fig. 5Q, Y); in hind leg, tibia narrower than femur in anterior view and tarsus 0.8–0.9 × as long as tibia (Fig. 3I); tarsal claws with small inner tooth (Fig. 5R, Z); in female, cercus posteriorly extending far beyond valvula 3 and valvula 3 short and apically truncate in dorsal view (Fig. 5W); lancet without ctenidia (Fig. 6E); in male, procidentia nearly rectangular (Fig. 5AA); penis valve with many spinules on center of valviceps (Fig. 7G–I).

In the key to species of *Pachynematus* by Muche (1974), our specimens of *E. itoi* including the holotype do not go to this species, because all of them have the femora not entirely pale (at least the base of the fore femur is darkened) (Fig. 3I, K), the stigma yellow with the wide dark base (Fig. 3H, I) and the mesoscutellum widely flat (Fig. 5Q, Y). The keys by Zhelochovtsev and Zinovjev (1988), Macek *et al.* (2020) and Lacourt (2020) do not work either for the reasons stated under the remarks of *E. imperfecta* above.

Eutomostethus pumicosus Seiyama, 1981

Japanese name: Suge-ko-maru-habachi

Material examined. HOKKAIDO: 1 ♂, Fukagawa, Takadomari, 43°55′N 142°03′E, 9. VI. 2020, H. Hara.

Distribution. Japan: Hokkaido (new record); Honshu, Shikoku, Kyushu (Seiyama, 1981).

Remarks. This species is only known from Japan (Naito, 2019) but has not been recorded from Hokkaido up to now.

Masaakia longivaginata Takeuchi, 1950

Japanese name: Hime-yashabushi-habachi
(Fig. 8A)

Material examined. HONSHU: Tochigi Pref.: 1 ♂, Nakagawa, Yamata, 36°42′N 140°12′E, coll. larva (Fig. 8A), on *Alnus hirsuta* var. *hirsuta*, 16. V. 2019, em. 9. IV. 2020, S. Ibuki.

Larva. Late instar larva (Fig. 8A) pale green; trunk with semitransparent branched spines; thoracic spines apically brownish. Mature larva 12 mm long; head pale greenish yellow; trunk pale green, without spines; legs pale yellow green, with claws brownish.

Host plants. Betulaceae: *Alnus hirsuta* (Spach) Turcz. ex Rupr. var. *hirsuta* (new record), *A. pendula* Matsum. (Togashi, 1979).

Life history. The sawfly has one generation a year. The larva is solitary and has an extra larval molt. The final instar larva makes a cocoon in the soil. Hibernation is done in the cocoon.

Remarks. The larva has not been described so far. The known host plants are only *Alnus*.

Metallus albipes (Cameron, 1875)

Japanese name: Kiichigo-hamuguri-habachi

Material examined. HONSHU: Wakayama Pref.: 1 ♀, Wakayama, Okawa, coll. larva mining leaf of *Rubus hirsutus*, 14. XI. 2020, em. 19. III. 2021, M. Murase.

Host plant. Rosaceae: *Rubus crataegifolius* Bunge (Okutani, 1967b), *R. hirsutus* Thunb. (new record) in Japan; *R. fruticosus* L., *R. idaeus* L. in Europe (Taeger *et al.*, 1998).

Remarks. This sawfly feeds on various species of *Rubus*.

Metallus pumilus (Klug, 1816)

Japanese name: Kumaichigo-hamuguri-habachi

Material examined. HONSHU: Wakayama Pref.: 1 ♀, Wakayama, Okawa, coll. larva mining leaf of *Rubus microphyllus*, 14. XI. 2020, em.

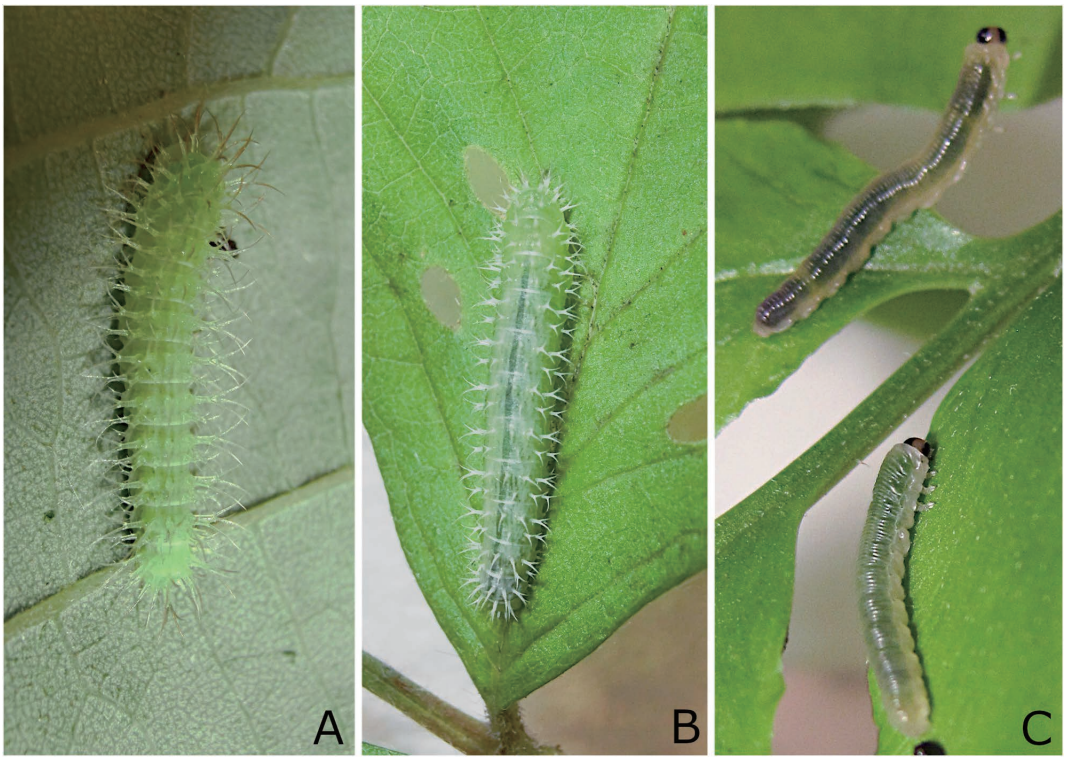

Fig. 8. A–C, Late instar larvae: A, *Masaakia longivaginata*, 21. V. 2019; B, *Monophadnoides montanus*, 18. VI. 2019; C, *Strongylogaster moiwana*, 30. V. 2017. All photographed by Ibuki.

25. XII. 2020, M. Murase.

Host plants. Rosaceae: *Rubus crataegifolius* Bunge (Okutani, 1970), *R. microphyllus* L.f. (new record) in Japan; *R. caesius* L., *R. fruticosus* L., *R. idaeus* L., *R. saxatilis* L. in Europe (Taeger *et al.*, 1998).

Remarks. This species feeds on various species of *Rubus*.

Monophadnoides montanus Togashi, 1980

New Japanese name: Nawashiro-ichigo-maru-habachi

(Fig. 8B)

Material examined. HONSHU: Tochigi Pref.: 1 ♂, Nakagawa, Wami, 36°45′N 140°9′E, coll. larva, on *Rubus parvifolius*, 16. VI. 2019, em. 9. IV. 2020, S. Ibuki; 1 ♂, same data but 36°46′N 140°10′E, coll. larva (Fig. 8B) on *Rubus parvifolius*, 16. VI. 2019, mat. 24. VI., em. 16. IV. 2020.

Larva. Late instar larva (Fig. 8B): head pale brownish green; trunk entirely pale green except for green middorsal stripe, with many branched spines; legs, spines and spiracles whitish. Mature larva: 12 mm long, pale green, without spines.

Host plant. Rosaceae: *Rubus parvifolius* L. (new record).

Life history. This species has one generation a year. The larva is solitary and eats the inside of leaves. The larva performs the extra larval molt and then makes a cocoon in the soil. Hibernation is done in the cocoon.

Remarks. The larva and host plant are recorded for the first time.

Phymatocera nipponica Togashi, 1958

Japanese name: Higenaga-kuro-habachi

Material examined. HOKKAIDO: 1 ♂, Bibai, Koshunai, 43°17′N 141°51′E, 24. V. 2015, H. Hara.

Distribution. Japan: Hokkaido (Matsumura, 1912, as "*Phymatocerus aterrimus* Klug", according to Togashi, 1958; Togashi, 1997; present study), Honshu (Yano, 1932, as *Phymatocera aterrima*, according to Togashi, 1958), Shikoku (Togashi, 1974), Kyushu (Togashi, 1972). Korea (Doi, 1938, as "*Phymatocera aterrima* KLUG [Higenaga-kuro-habachi (in Japanese)]"); Sakhalin (Haris, 2006); Kuril Islands (Sundukov, 2017).

Remarks. Although Naito (2019, 2020a) did not include Hokkaido in the distribution and Naito (2020a) questioned its occurrence in Hokkaido, Hara collected the above male in central Hokkaido. It agrees with the original description of Togashi (1958) and goes to this species in the key to the Japanese species of *Phymatocera* by Togashi (2004).

Pristiphora fulviceps Takeuchi, 1933

Japanese name: Kigao-higenaga-habachi

Material examined. HONSHU: Tochigi Pref.: 2 ♀, Nakagawa, Bato, 36°44′N 140°9′E, coll. larva, on *Corylus sieboldiana* var. *sieboldiana*, 17. V. 2019, mat. 18. V., em. 19. IV. 2020, S. Ibuki.

Host plants. Betulaceae: *Carpinus cordata* Blume (Hara *et al.*, 2018), *Corylus sieboldiana* Blume var. *sieboldiana* (new record).

Remarks. The host plants belong to the subfamily Coryloideae.

Siobla ferox (Smith, 1874)

Japanese name: O-koshiaka-habachi

(Fig. 9A–G)

Material examined. HONSHU: Tochigi Pref.: 1 ♂, Nakagawa, Oyamada, coll. larva, on *Actinidea polygama*, 14. VI. 2016, mat. 18. VII., em. 2. V. 2017, S. Ibuki; 1 ♂, Nakagawa, Bicchuzawa, coll. larva (Fig. 9A), on *Actinidea polygama*, 22. VI. 2016, diet changed to *Glechoma hederacea* subsp. *grandis* 27. VI., mat. 9. VIII. (Fig. 9D), em. 6. V. 2017, S. Ibuki; 1 ♀, Nasukarasuyama, coll. larva, on *Actinidea polygama*, 15. VI. 2016, mat. ?, em. 6. V. 2017, S. Ibuki.

Larva. Middle or late instar (Fig. 9A–C, E–F): head dark purplish gray to pale yellowish gray; trunk and legs creamy white, dorsal region pale gray or pale yellowish gray, sparsely covered with minute black spots, each segment with paired yellowish dorsolateral thorns. Mature larva (Fig. 9D, G): blackish, shiny; thoracic legs dark yellowish.

Host plants. Actinidiaceae: *Actinidia polygama* (Siebold et Zucc.) Planch. ex Maxim. (new record). Asteraceae: *Cirsium pendulum* Fisch. ex DC. (Okutani, 1967b). Balsaminaceae: *Impatiens* spp. (Okutani, 1967b). Lamiaceae: *Glechoma hederacea* L. subsp. *grandis* (A. Gray) H. Hara. (new record). Polygonaceae: *Polygonum cuspidatum* Siebold et Zucc. (Okutani, 1967b), *Rumex* sp. (Okutani, 1967b).

Life history. This is a univoltine species. The larva is a solitary external feeder on various plants. The larval period is very long, about 40 days (Okutani, 1959) or more than 48 days (see below). On maturity, the reared larva had an extra molt and went into the soil.

Remarks. This is the first record of *Actinidia polygama* (Actinidiaceae) and *Glechoma hederacea* subsp. *grandis* (Lamiaceae) as the hosts of *S. ferox*. The known hosts of this species now include more than six species of five families of plants. For a detailed description of the larva, see Okutani (1959). Okutani (1959) noted that the larval period of this species was about 40 days. However, one of our cases of rearing indicated that the period may be much longer. The larva collected on June 22, 2016 (Fig. 9A, probably middle instar) and reared indoors matured on August 9 (Fig. D). The rearing period from middle instar to maturity in this case lasted 48 days. The full larval period of this individual is estimated at 60 days at least.

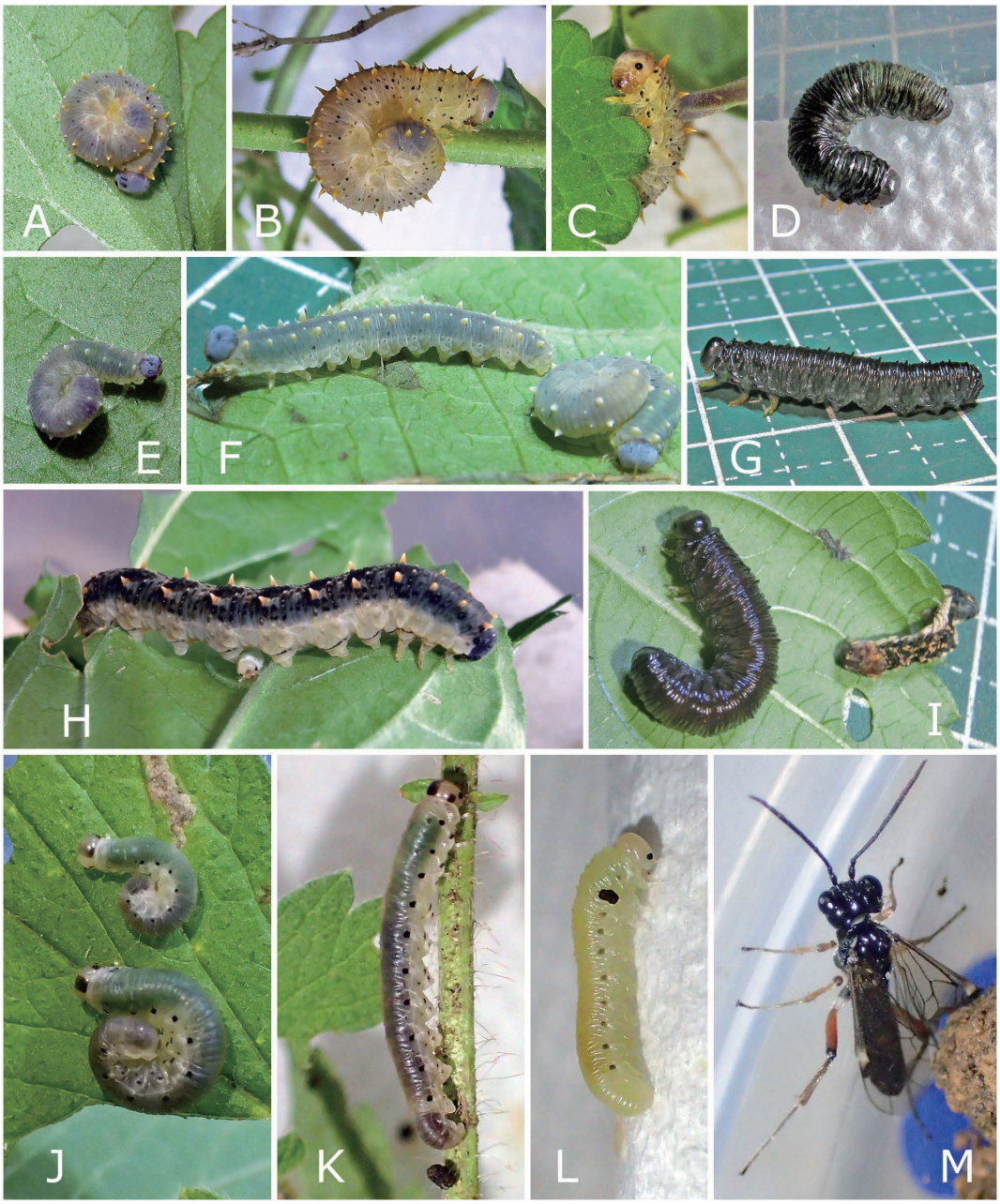

Fig. 9. A–G, *Siobla ferox*: A, probably middle instar larva on *Glechoma hederacea* subsp. *grandis*, 27. VI. 2016; B, same larva, probably late instar, 12. VII. 2016; C, same larva, 16. VII. 2016; D, same larva, matured, 9. VIII. 2016; E. probably middle instar larva on *Actinidia polygama*, 14. VI. 2016; F. probably middle instar larvae on *A. polygama*, 19. VI. 2016; G. same larva, 15. VII. 2016. H–I, *Siobla japonica*: H, last instar larva, 5. VI. 2019; I, mature larva and cast skin above, 9. VI. 2019; J–M, *Taxonus shinoharai*: J, middle and late instar larvae on *Agrimonia pilosa* var. *japonica*, 29. IX. 2019; K, late instar, 29. IX. 2019; L, same larva, matured, 30. IX. 2019; M, male adult, just emerged, 26. X. 2019. All photographed by Ibuki.

Siobla japonica Shinohara, Wei and Niu, 2013

Japanese name: Nihon-koshiaka-habachi

(Fig. 9H–I)

Material examined. HONSHU: Tochigi Pref.: 1 ♀, Nakagawa, Wami, 33°45′N 140°09′E, coll. larva, on *Impatiens textorii* or *Circaea mollis*, 5. VI. 2019, mat. 8. VI., em. 8. IV. 2020, S. Ibuki; 1 ♂, Nakagawa, Wami, 33°45′N 140°09′E, coll. larva, on *Impatiens textorii or Circaea mollis*, 5. VI. 2019, mat. 9. VI. (Fig. 9I), em. 11. IV. 2020, S. Ibuki.

Larva. Late instar (Fig. 9H): head purplish black; trunk and legs creamy white, dorsal region dark gray, sparsely covered with irregular black spots, each segment with paired yellowish dorsolateral thorns, and black line along ventral margin of pleural region. Mature larva (Fig. 9I): blackish, shiny; thoracic legs creamy white.

Host plants. Balsaminaceae: *Impatiens textorii* Miq. (new record). Onagraceae: *Circaea mollis* Siebold et Zucc. (new record).

Life history. This is a univoltine species. The larva is a solitary external feeder and, when matured, it has an extra molt before entering the soil.

Remarks. This species is fairly common in central Honshu (Shinohara *et al.*, 2013), but its immature stages and host plants were totally unknown. Like the preceding species, *S. ferox*, *S. japonica* seems to be a polyphagous species with long larval feeding period. The larva of this species may be distinguished from that of *S. ferox* by the dark color pattern of the head and dorsal region of the trunk in the feeding stages (compare A–C, E–F with H in Fig. 9) and the creamy white thoracic legs of the mature larva (compare D, G with I in Fig. 9).

Stethomostus babai Togashi, 1984

Japanese name: Baba-maru-habachi

Material examined. HOKKAIDO: 1 ♀, Bibai, Tomei, 43°20′N 141°54′E, 10. V. 2017, H. Hara; 1 ♀, same data but 11. V. 2019, H. Hara; 1 ♂, same data but 15. V. 2019; 1 ♂, same data but 8. V. 2020.

Distribution. Japan: Hokkaido (new record), Honshu (Togashi, 1984), Shikoku (Naito, 2019). China (Nie and Wei, 1999).

Remarks. This species is here recorded from Hokkaido for the first time.

Strongylogaster moiwana Matsumura, 1912

Japanese name: Iwagane-zenmai-habachi

(Fig. 8C)

Material examined. HONSHU: Tochigi Pref.: 1 ♂, Nakagawa, Oyamada, coll. larva, on *Coniogramme japonica*, 30. V. 2017, mat. 7. VI., em. 30. III. 2018, S. Ibuki.

Larva. Late instar larva (Fig. 8C): head pale brown, black on vertex and lateral part; trunk and legs pale yellowish green.

Host plants. Onocleaceae: *Onoclea sensibilis* L. var. *interrupta* Maxim. (Naito, 2020a). Pteridaceae: *Coniogramme intermedia* Hieron. (Naito, 2002, 2004, 2020a), *C. japonica* (Thunb.) Diels (Okutani, 1967b; Naito, 1980, 1996; present study).

Remarks. As the host, Okutani (1967b) and Naito (1980, 1996) recorded *Coniogramme japonica*, but Naito (2002, 2020a) and Naito *et al.* (2004) mentioned *C. intermedia* instead of *C. japonica* without any comment. We confirmed *C. japonica* as the host by rearing the larva.

Taxonus shinoharai Togashi, 2009

New Japanese name: Kinmizuhiki-habachi

(Fig. 9J–M)

Material examined. HONSHU: Tochigi Pref.: 1 ♂, Nasukarasuyama, Ogane, 36°39′N 140°06′E, coll. larva, on *Agrimonia pilosa* var. *japonica*, 24. IX. 2019, mat. 6. X., em. 13. I. 2020, S. Ibuki; 1 ♂, Nakagawa, Wami, 36°45′N 140°09′E, coll. larva, on *Agrimonia pilosa* var. *japonica*, 26. IX. 2019 (Fig. 9J[larger larva], K), mat. 30. IX. (Fig. 9L), em. 26. X. 2019 (Fig. 9M), S. Ibuki; 1 ♀, same locality, coll. larva, on *Agrimonia pilosa* var. *japonica*, 26. IX. 2019

(Fig. 9J[smaller larva]), mat. 11. X., em. 23. I. 2020, S. Ibuki.

Larva. Middle instar (Fig. 9J[smaller larva]): head brownish white, with large median spot and smaller lateral spot on vertex black; trunk and legs creamy white, dorsal region pale greenish, each segment with small black spot laterally. Late instar (Fig. 9J[larger larva], K): similar to middle instar. Mature larva (Fig. 9L): yellowish white, shiny, with small blackish lateral spots on each segment of trunk.

Host plants. Rosaceae: *Agrimonia pilosa* Ledeb. var. *japonica* (Miq.) Nakai (new record).

Life history. This is a multivoltine species. In our rearing indoors, one larva that matured on September 30, 2019, emerged as a male adult on October 26, 2019, another larva that matured on October 6, 2019, emerged as a male adult on January 13, 2020, and another larva that matured on October 11, 2019, emerged as a female adult on January 23, 2020. The larva is a solitary external feeder and, when matured, it has an extra molt before entering the soil.

Remarks. This species was first described as *Taxonus fulvipes* Togashi, 2000, but a new name was given to it in Blank *et al.* (2009) because *Taxonus fulvipes* Togashi, 2000, is a junior primary homonym of *Taxonus fulvipes* Cameron, 1899.

The female specimen listed above agrees with the holotype of *Taxonus fulvipes* Togashi, 2000, but does not run to this species in the keys by Togashi (2000) and Naito (2020) beause of the erroneous statement in the keys. *Taxonus shinoharai* runs to the couplet 7 in Togashi's (2000) key and the couplet 11 in Naito's (2020) key, both of which read "Mesoscutellum black with a small milky white macula; last abdominal tergite milky white" (leading to couplet 8 in Togashi's key and couplet 12 in Naito's key) in the first line and "Mesoscutellum and last abdominal tergite black" (leading to couplet 9 in Togashi's key and couplet 12 in Naito's key) in the second line. In *T. shinoharai*, the mesoscutellum is entirely black and the last abdominal tergite is milky white, thus agreeing neither of the two lines of the couplet in both keys. *Taxonus shinoharai* is in the second line in the couplet 9 in Togashi's key and in the couplet 13 in Naito's key, where the last abdominal tergite is correctly described as milky white.

This species was described from a pair of specimens collected in Tokyo in 1990 and Togashi (2002) recorded it from Tochigi Prefecture.

Tomostethus nigritus (Fabricius, 1804)

Japanese name: Yachidamo-habachi

Material examined. HOKKAIDO: 1 ♀, Abira, Oiwake, 42°52′N 141°48′E, 12. V. 2020, H. Hara.

Distribution. Japan: Hokkaido (new record), Honshu (Abe and Togashi, 1989). Palaearctic and Oriental regions.

Remarks. The first record of this species from Japan is Takeuchi (1952), but he did not state the details of the distribution. This speccies is here recorded from Hokkaido for the first time.

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