

Japanese Sawflies of the Genus *Macrophya* (Hymenoptera, Tenthredinidae), Two New Species and a Revised Key to Species

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Abstract Two new species of tenthredinid sawfly, *Macrophya inomatai* Shinohara, n. sp., from Honshu, and *Macrophya katayamai* Shinohara, n. sp., from Hokkaido and Honshu, are described and illustrated. A revised key to 29 Japanese species of *Macrophya* is given. *Macrophya satoi* Shinohara and Li, 2015, is first recorded from Hokkaido and the male of *M. duodecimpunctata sodalitia* Mocsáry, 1909, is first recognized and diagnosed in the key.

Key words: *Macrophya*, new species, *Macrophya inomatai*, *Macrophya katayamai*, revised key, new distribution record, Japan.

Introduction

Macrophya Dahlbom, 1835, is the third largest genus of the sawfly family Tenthredinidae (Taeger *et al.*, 2018) and is represented by about 300 species worldwide (Liu *et al.*, 2019). In the catalogue of Japanese Symphyta, I (Shinohara, 2019) listed 27 species, which were included in my key to Japanese species (Shinohara, 2015). After the publication of the key, I detected existence of two new species in my previous concepts of *Macrophya marlatti* Zhelochovtsev, 1935, and *M. harai* Shinohara and Li, 2015, and noticed several errors in the key, which should cause misidentifications of certain species. The first specimen of *M. satoi* Shinohara and Li, 2015, from Hokkaido and the first male specimen of *M. duodecimpunctata sodalitia* Mocsáry, 1909, also have come to my attention. Here I describe the two new species and give a revised key to the Japanese species of *Macrophya* to include all new findings and corrections.

Materials and Methods

Specimens used in this work are housed in the National Museum of Nature and Science, Tsukuba (NSMT), except for those kept in E. Katayama collection, Otawara (EK), and H. Suda collection, Sakura (HS). A pair of German specimens of *M. sanguinolenta* (Gmelin, 1790) were used for comparative studies (both identified by A. Taeger, 2002): 1 ♀, “D: Rhld: Pfalz: Pommern a. Mosel: Malaisefalle, 25. 5.–24. 6. 1993, leg. S. Löser”; 1 ♂, “D: Eifel: Daun.: Gönnersdorf: Mäuerchenberg: Malaisefalle, 29. 6.–6. 7. 1991, leg. Cölln”.

Observations of morphology were made with Olympus SZX7 stereo binocular microscope. For the morphological terminology, I generally follow Viitasaari (2002) and for the usage of the “metepimeral appendage” I follow Gibson (1980). Photographs were taken with a digital camera, Olympus Stylus TG-4 Tough with Olympus SZX7 stereo binocular microscope and a Dino-Eye AM423X microscope camera attached to a Nikon Eclipse E100 light microscope. The digital images were processed and

arranged with Adobe Photoshop Elements® 9 and 15 software.

Results

Macrophya inomatai n. sp.

(Fig. 1A–D, F)

Macrophya sanguinolenta var. *poecilopus*: Takeuchi, 1937: 411 (in part). Not Aichinger, 1870.

Macrophya poecilopus: Inomata, 1989: 105, 119 (in part). Not Aichinger, 1870.

Macrophya marlatti: Shinohara, 2015: 230 (in part). Not Zhelochovtsev, 1935.

Female (holotype, Fig. 1A–D, F). Length 9.0mm. Black. Mandible with outer margin marked with creamy white. Legs black with following creamy white: apical part of dorsal surface of fore femur, fore tibia and tarsus except for posterior surface, small spot at dorsal margin of mid coxa, small elongate spot in anterior lateral part of mid femur, apex of mid tibia, base of mid tarsomere 5, very large oval spot on dorsal

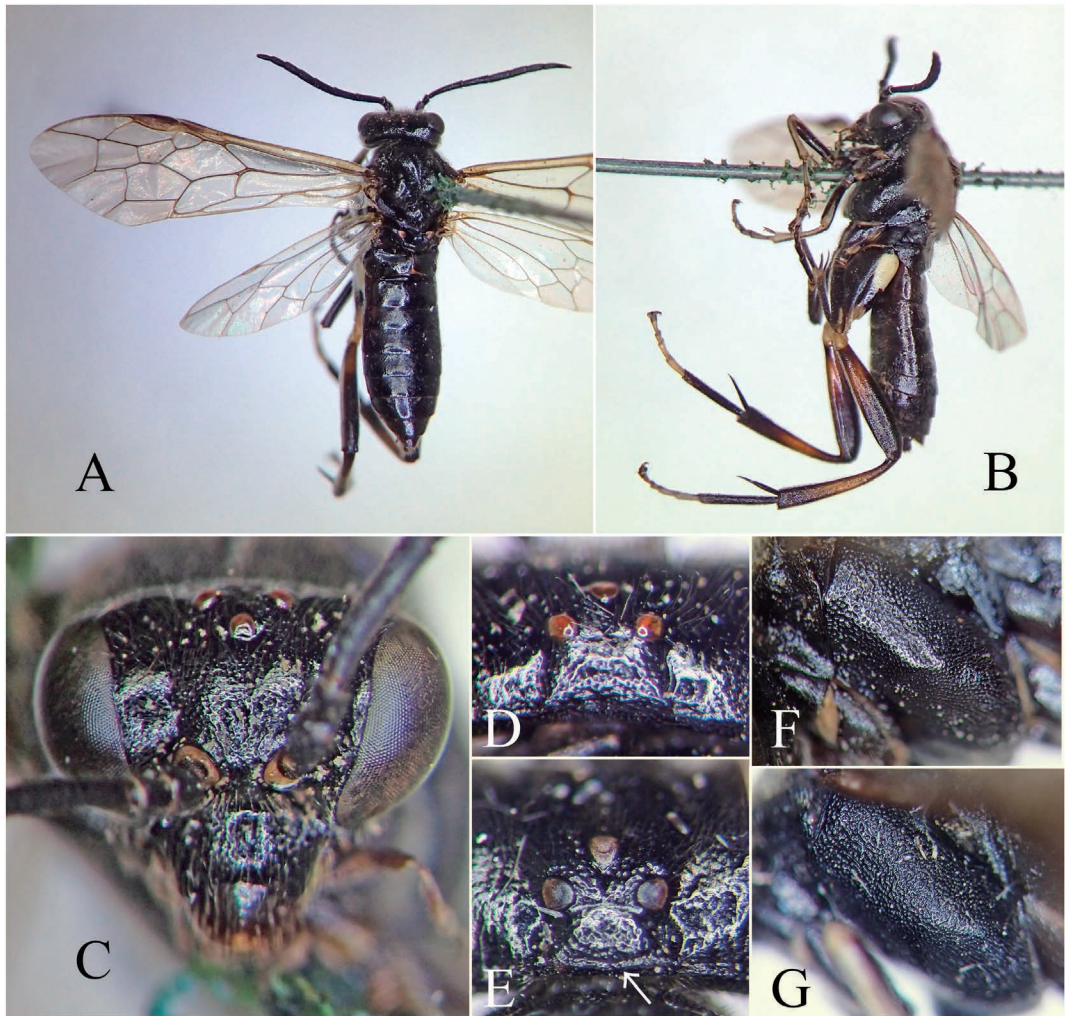


Fig. 1. *Macrophya inomatai*, female, holotype (A–D, F) and *M. sanguinolenta*, female, Germany (E, G).—A, Dorsal view; B, lateral view; C, head, frontal view; D, E, postocellar area, dorsal view (arrow showing carinate posterior margin of postocellar area); F, G, mesepisternum, lateral view.

lateral surface of hind coxa, hind trochanter (darkened on ventral surface), hind trochantellus and hind tarsomeres 2–5 (5 only basally); basal half and almost all ventral surface of hind femur (except for pale trochantellus and blackish area boarding on trochantellus), hind tibia (except for base and apex), small spot on apical dorsal part of hind tibia and small spot on apical dorsal part of hind tarsomere 1 reddish brown. Wings hyaline, apical 1/3 slightly infuscated, veins and stigma blackish brown to black.

Head in dorsal view distinctly narrowed behind eyes and frons about as high as line connecting anterior margins of eyes; occipital carina rather blunt, missing in postocellar area; postocellar area broad, length about $0.6 \times$ width; anterior margin of clypeus shallowly emarginated with weakly arcuated bottom (depth about 1/5 of clypeal length), lateral lobes short and broadly rounded at apex; malar space much narrower than diameter of median ocellus; labrum large, lateral margins nearly straight and convergent below and very broadly rounded at apex. Antenna rather short, length about $1.8 \times$ head width across eyes; antennomere lengths ratio about 28:15:55:38:33:28:25:21:22; thickest around flagellomere 4 and then tapering toward apex. Head very shallowly rugose, shiny, with indistinct irregular punctures and pale hairs. Mesonotum densely covered with small distinct punctures, interspaces shallowly coriaceous and shiny; mesoscutellum weakly convex in lateral view, mesoscutellar appendage with blunt longitudinal carina; mesepisternum very densely covered with rather regular, partly confluent punctures with shallowly coriaceous interspaces; metepimeral appendage subtriangular and rounded at apex, without basin, covered with irregular punctures and hairs with shiny interspaces. Abdomen with rather distinct surface microsculpture and minute punctures, weakly shiny. Fore wing with cell A widely constricted at middle, without crossvein; hind wing with crossvein a joining vein 1A basal to junction of crossvein cu-a with vein 1A, thus anal cell appearing petiolate. Ovipositor sheath rather

short, ventral margin rounded in lateral view.

Male unknown.

Variation. Length 8.5–9.0 mm. The paratype is slightly smaller (8.5 mm long) than the holotype, but otherwise quite similar to the holotype. The pale mark on the lateral surface of the mandible is almost missing in the paratype.

Holotype: ♀, Mt. Hakuba, Nagano Pref., 1. VIII. 1932, K. Takeuchi (NSMT). Paratype: 1 ♀, same data (NSMT).

Distribution. Japan (Honshu).

Etymology. This new species is named in honor of the late Dr. R. Inomata in recognition of his great contributions to the life history studies and systematics of Japanese sawflies (Shinohara *et al.*, 2015).

Host plant. Unknown.

Remarks. This new species has much in common with *M. marlatti*, and Shinohara (2015) treated it as a variant of that species. However, it now appears that *M. inomatai* can be consistently separated from *M. marlatti* by the characters given in the key. *Macrophya inomatai* resembles the Eurosiberian *M. sanguinolenta* (Gmelin, 1790), which shows large variation in color pattern (Enslin, 1913). The type material of *M. inomatai* was part of the material identified as "*M. sanguinolenta* var. *poecilopus*" by Takeuchi (1937) and as "*M. poecilopus*" by Inomata (1989). *Macrophya poecilopus* (Aichinger, 1870), currently treated as a synonym of *M. sanguinolenta* (Taeger *et al.*, 2018), has the mouthpart ("Mund") whitish yellow and the spot on the side of the abdominal segments 3 and 4 white (Aichinger, 1870). *Macrophya inomatai* generally agrees with the descriptions of *M. sanguinolenta* by Enslin (1913) and Muche (1968), but a comparison of the type material of *M. inomatai* with German specimens of *M. sanguinolenta* has revealed the following differences in structure: The occipital carina is entire and quite distinct at the posterior margin of the postocellar area (Fig. 1E) and the mesepisternum is very densely finely punctate without shiny interspaces between punctures (Fig. 1G) in *M. sanguinolenta*, whereas the occipital carina is missing on the

postocellar area (Fig. 1D) and the mesepisternum is finely punctate with distinct shiny interspaces between punctures (Fig. 1F) in *M. inomatai*.

Macrophya inomatai is similar to *M. longipetiolata* Wei and Zhong, 2013 from China (Li *et al.*, 2013, 2014), but the latter species has the postocellar area about $0.5\times$ as long as wide (about $0.6\times$ in *M. inomatai*), hind tarsomere 1 reddish brown (mostly black in *M. inomatai*) and the petiole of anal cell in the fore wing is exceptionally long (of normal length in *M. inomatai*).

Takeuchi (1937) recorded "*M. sanguinolenta* var. *poecilopus*" from Japan and Korea based on three females from Mt. Hakubadake (Honshu) and two females from Hakugan (= Baekam, North Korea). I have examined two females from Mt. Hakubadake and one female from Hakugan in Takeuchi's collection. The two Japanese females are now type material of *M. inomatai*, whereas the Korean female differs from *M. inomatai* in having a white labrum and a white-marked posterior edge of the postocellar area, which is bluntly carinate as a part of the occipital carina. *Macrophya inomatai* has a black labrum and a rounded and entirely black posterior edge of the postocellar area.

Inomata (1989) included "*M. poecilopus*" in his key to Japanese species. *Macrophya inomatai* agrees with "*M. poecilopus*" in Inomata's key, except that the clypeus has no whitish area medially. Inomata's concept of "*M. poecilopus*" should have included specimens of *M. marlatti*.

***Macrophya katayamai* n. sp.**
(Figs. 2, 3)

Macrophya harai: Shinohara, 2015: 228, 247 (in part [dark color variants]). Not Shinohara and Li, 2015.

Female (holotype, Fig. 2). Length 8.0 mm. Black, with following creamy white: narrow anterior margin of labrum, outer surface of mandible basally, elongate longitudinal spot on mesoscutellum, small fading spots on metepisternum, apical part of dorsal surface of fore femur,

fore tibia except for posterior surface, fore tarsus except for apex of each tarsomere, elongate spot in dorsal part of middle coxa, outer surface and very narrow both ends of middle trochanter, middle trochantellus (except for posterior surface), spot near apex of outer surface of middle tibia, middle tarsus except for base of tarsomere 1 and apex of each tarsomere, large oval spot on basal outer surface of hind coxa, narrow apex of hind coxa, hind trochanter and trochantellus, oblong spot along preapical dorsal surface of hind tibia, small spot on dorsal apical surface of tarsomere 1, dorsal surface of tarsomeres 2–4, rather broad lateral margin of abdominal tergum 1 and rather small spot on each of abdominal terga 3 and 4. Wings hyaline, with slight infuscation below stigma; veins and stigma blackish brown to black.

Head in dorsal view distinctly narrowed behind eyes and frons about as high as line connecting anterior margins of eyes; occipital carina entire, sharp all over; postocellar area broad, length about $0.6\times$ width; anterior margin of clypeus arcuately emarginate (depth about $1/3$ of clypeal length), lateral lobes long and obliquely truncate at apex; malar space much narrower than diameter of median ocellus; labrum large, transverse, very shallowly incised at apex. Antenna rather slender and long, length about $2.0\times$ head width across eyes; antennomere lengths ratio about 26:12:64:38:33:25:22:21:21. Head very shallowly rugose, shiny, with indistinct irregular punctures and pale hairs. Mesonotum densely covered with small distinct punctures, interspaces shallowly coriaceous, shiny; mesoscutellum weakly convex in lateral view, with few punctures, shiny; mesoscutellar appendage with high but blunt longitudinal carina; mesepisternum very densely covered with rather regular, small punctures with shallowly coriaceous interspaces; metepimeral appendage narrow and rounded, without basin, covered with irregular punctures and hairs with shiny interspaces. Abdomen with rather distinct surface microsculpture and minute punctures, weakly shiny. Fore wing with cell A widely constricted

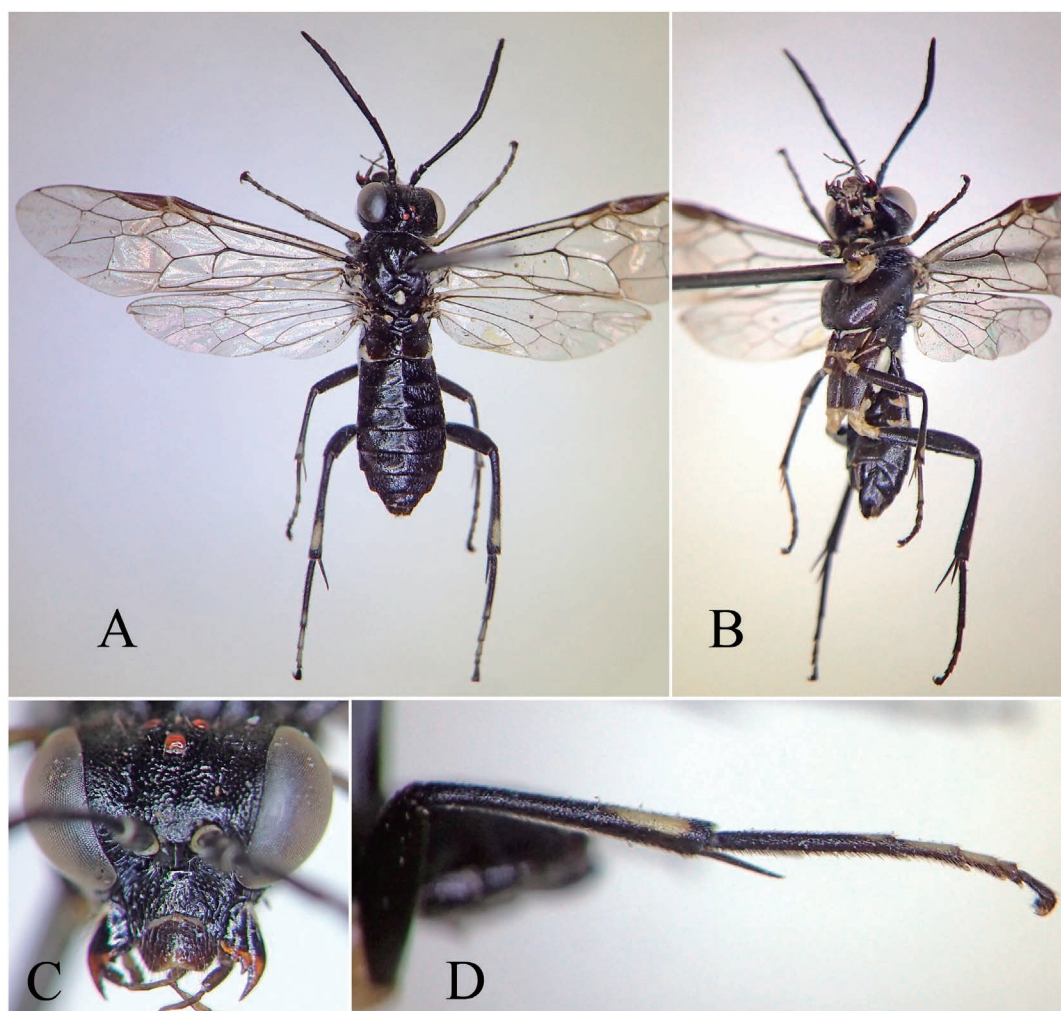


Fig. 2. *Macrophya katayamai*, female, holotype.—A, Dorsal view; B, ventrolateral view; C, head frontal view; D, hind leg, lateral view.

at middle, without crossvein; hind wing with crossvein a joining vein 1A basal to junction of crossvein cu-a with vein 1A, thus anal cell appearing petiolate. Ovipositor sheath rather short, ventral margin rounded in lateral view. Lancet (in a paratype) with about 20 annuli (Fig. 3), middle serrulae each with 6–8 denticles (Fig. 3C), basal serrulae shallowly separated and apical 5 narrowly separated by deep notch (Fig. 3C).

Male unknown.

Variation. Female: Length 8.0–10.5 mm. The color pattern is fairly stable. The pale spot on the

mesoscutellum is missing or nearly so in a few paratypes. The lateral pale spots on the abdominal tergum 4 are missing in one paratype, whereas small lateral pale spots are present on the tergum 5 in a few paratypes in addition to the similar pale spots on the terga 3 and 4.

Holotype: ♀, Kawamata, Nikko, Tochigi Pref., 6. VI. 1973, A. Shinohara (NSMT). **Paratypes:** HOKKAIDO: 1 ♀, Kurisawa, Manji, 23. VII.–7. VIII. 2003, Malaise trap (NSMT); 1 ♀, Tenguyama, Otaru, 28. VI. 1999, H. Suda (HS); 2 ♀, Nakayama-toge, 25. VI. 1995, A. Shinohara

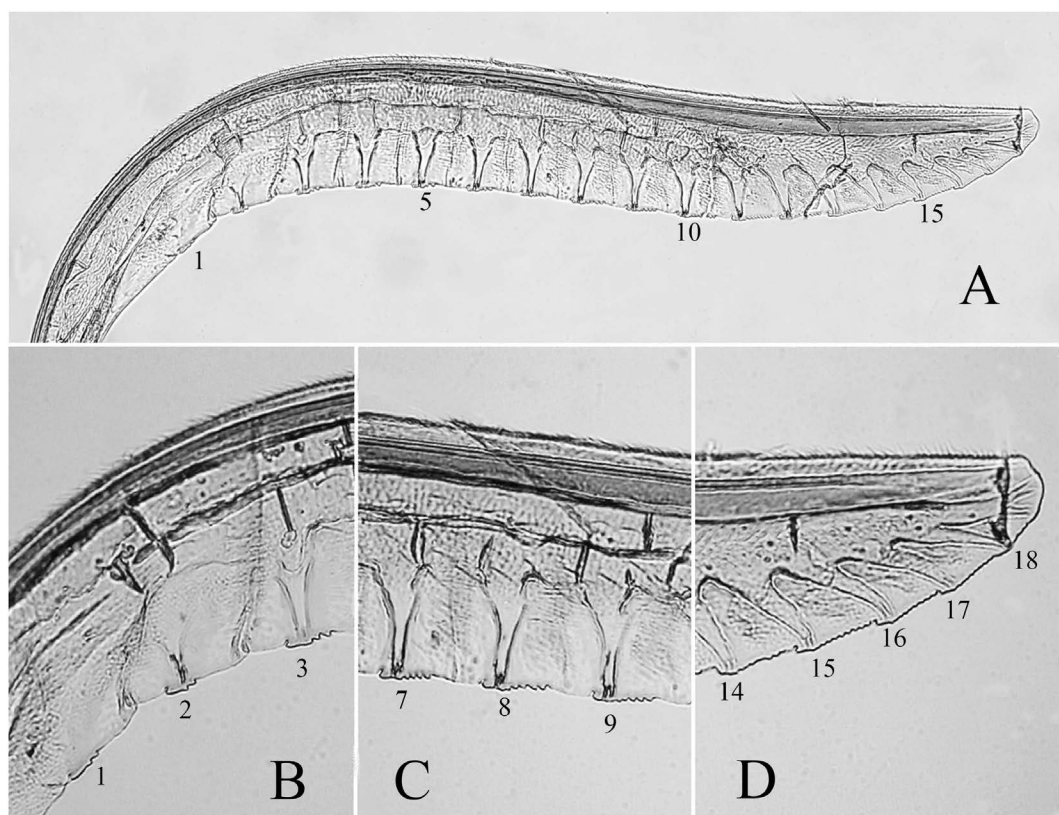


Fig. 3. *Macrophya katayamai*, lancet, paratype, no data.—A, Entire lancet; B, basal part, serrulae 1 to 3; C, middle part, serrulae 7 to 9; D, apical part, serrulae 14 to apex.

(NSMT); 3 ♀, Shikotsu-ko, Malaise trap, 4–18. VIII. 1996, Y. Nagayasu (NSMT). HONSHU: Tochigi Pref.: 1 ♀, Itamuro, Kuroiso, 1. VI. 2001, E. Katayama (EK); 1 ♀, Shobugahama, Nikko, 29. VI. 2013, T. Nakayama (EK). Kanagawa Pref.: 1 ♀, Mikuni-toge, 1100 m, Yamakita, 9. VI. 2002, H. Nagase (NSMT). Yamanashi Pref.: 1 ♀, Masutomi-onsen—Tokusa-toge-guchi, Sudama, Yamanashi, 18. VII. 1968, H. Suda (HS); 1 ♀, Kiyosato, Yatsugatake Mts., 17–19. VI. 1999, A. Shinohara (NSMT). Fukui Pref.: 1 ♀, Hatogayu, 7. VI. 1989, Y. Nishimoto (NSMT). Hyogo Pref.: 1 ♀, Ooginosen, Mikata-gun, 4. VII. 1992, T. Ikeda (NSMT). Locality unknown: 1 ♀, No label (NSMT).

Distribution. Japan (Hokkaido, Honshu).

Etymology. This new species is named in

honor of Dr. E. Katayama, Otawara. Besides his own special research field, bee ecology, he has also contributed greatly to the clarification of the hymenopteran fauna of Tochigi Prefecture, central Honshu.

Host plant. Unknown.

Remarks. Shinohara (2015) identified the specimens of this new species as “dark color variants” of *M. harai*. However, a revision of the material now available has convinced me that *M. katayamai* is different from *M. harai* in the stable color pattern differences of the clypeus, labrum and abdominal tergum 1, as shown in the key. The male of this new species is still unknown.

Revised key to Japanese species

1. Antennal flagellum partly white.2
- Antennal flagellum entirely black.5
2. Antennal flagellum apically white (except for apex of terminal flagellomere).3
- Antennal flagellum medially white.4
3. Labrum and hind trochanter white; wings hardly infuscated. *M. apicalis* Smith, 1874 ♀
Distribution. Japan (Southern Kuriles, Hokkaido, Honshu, Shikoku, Kyushu, Sado-ga-shima Is., Awa-shima Is.). Korea. *Host plant.* Adoxaceae: *Sambucus racemosa* L. subsp. *sieboldiana* (Miq.) H. Hara.
- Most of labrum and hind trochanter black; wings distinctly infuscated.
..... *M. infumata* Rohwer, 1925 ♀ ♂
Distribution. Japan (Southern Kuriles, Hokkaido, Honshu). Russia (Siberia, Sakhalin), Korea, China. *Host plant.* Adoxaceae: *Sambucus racemosa* L. subsp. *sieboldiana* (Miq.) H. Hara.
4. Antenna very long; hind tibia and tarsus entirely black. *M. rohweri* Forsius, 1925 ♀
Distribution. Japan (Honshu, Shikoku, Kyushu). *Host plant.* Chloranthaceae: *Chloranthus serratus* (Thunb.) Roem. et Schult.
- Antenna not very long; hind tibia and tarsus dorsally with creamy white marks.
..... *M. enslini* Forsius, 1925 ♀ ♂
Distribution. Japan (Honshu, Shikoku). *Host plant.* Oleaceae: *Ligustrum obtusifolium* Sieb. et Zucc.
5. Supraclypeal area and lower margin of eye with creamy white marks. *M. rohweri* ♂
- Supraclypeal area and lower margin of eye without creamy white marks.6
6. Forewing with distinct dark band below stigma. *M. fascipennis* Takeuchi, 1933 ♀ ♂
Distribution. Japan (Honshu, Shikoku, Kyushu). *Host plant.* Rosaceae: *Rosa onoei* Makino var. *onoei*.
- Forewing without distinct dark band below stigma.7
7. Lateral side of thorax and abdomen with almost continuous creamy white marks from near anterior margin of mesepisternum to posterior margin of abdominal tergum 8.
..... *M. kisuji* Togashi, 1974 ♀
Distribution. Japan (Honshu). *Host plant.* Unknown.
- Lateral side of thorax and abdomen mostly or entirely black without continuous creamy white marks.8
8. Hind coxa black laterally, without creamy white mark except at apex (sometimes also with very small whitish spot in dorsal part.9
- Hind coxa laterally with large creamy white mark, sometimes lateral surface entirely creamy white.21
9. Hind trochanter black. *M. maculitibia* Takeuchi, 1933 ♀ ♂
Distribution. Japan (Southern Kuriles, Hokkaido, Honshu, Shikoku). Russia (Sakhalin), Korea. *Host plants.* Asteraceae: *Petasites japonicus* (Siebold et Zucc.) Maxim., *Parasenecio hastatus* (L.) H. Koyama subsp. *orientalis* (Kitam.) H. Koyama.
- Hind trochanter creamy white.10
10. Hind tibia entirely black.11
- Hind tibia black with dark reddish brown or creamy white ring medially or with creamy white mark dorsally.12
11. Clypeus almost entirely creamy white; hind tarsus partly creamy white.

-*M. marlatti* Zhelochovtsev, 1935 ♂ (part)
Distribution. Japan (Hokkaido, Honshu). *Host plant.* Orobanchaceae: *Pedicularis resupinata* L. subsp. *oppositifolia* (Miq.) T. Yamaz.
- Clypeus with only anterior margin creamy white; hind tarsus entirely black.*M. timida* Smith, 1874 ♂
Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu, Sado-ga-shima Is., Awaji-shima Is., Tsushima Is.). Korea. *Host plants.* Oleaceae: *Ligustrum obtusifolium* Sieb. et Zucc., *L. japonicum* Thunb., *Syringa vulgaris* L.
12. Anal cell in hindwing sessile (crossvein a joining vein 1A distal to junction of crossvein cu-a with vein 1A).13
- Anal cell in hindwing with petiole (crossvein a joining vein 1A basal to junction of crossvein cu-a with vein 1A).14
13. Hind tibia black with dark reddish brown ring medially. *M. sanguinitarsis* (Togashi, 1963) ♂
Distribution. Japan (Honshu). *Host plant.* Unknown.
- Hind tibia black with creamy white ring medially (sometimes reduced to dorsal spot).*M. annulitibia* Takeuchi, 1933 ♂ (part)
Distribution. Japan (Southern Kuriles, Hokkaido, Honshu, Shikoku, Kyushu). Russia (Sakhalin, Primorsky krai). Korea. China. *Host plant.* Unknown.
14. Labrum and clypeus black.15
- Labrum and clypeus creamy white.16
15. Robust, small species (length ca. 7 mm); posterior margin of pronotum creamy white.*M. crassuliformis* Forsius, 1925 ♂ (part)
Distribution. Japan (Honshu, Shikoku). Russia (Primorsky krai). Korea. *Host plant.* Oleaceae: ?*Ligustrum obtusifolium* Sieb. et Zucc.
- Slender, middle-sized species (length ca. 7.5–9.5 mm); posterior margin of pronotum entirely black. *M. imitator* Takeuchi, 1937 ♀ ♂
Distribution. Japan (Southern Kuriles, Hokkaido, Honshu). Russia (Sakhalin), Korea. *Host plant.* Asteraceae: *Aster scaber* Thunb. or *A. glehnii* F. Schmidt var. *glehnii*.
16. Hind tarsus partly creamy white.17
- Hind tarsus entirely black (tarsomere 1 sometimes marked with creamy white above).18
17. Hind femur with basal apex to 1/3 creamy white; hind tibia and usually tarsomere 2 black beneath, with creamy white marks only on dorsal surface. *M. harai* Shinohara and Li, 2015 ♂
Distribution. Japan (Hokkaido, Honshu). *Host plant.* Unknown.
- Hind femur with basal 1/2 creamy white; hind tibia and tarsomere 2 with creamy white marks covering both dorsal and ventral surfaces. *M. satoi* Shinohara and Li, 2015 ♂
Distribution. Japan (Hokkaido, Honshu). New record from Hokkaido (1 ♂, Yamada-onsen, 800 m, Tokachi, 23–24, VI. 2009, H. Hara [NSMT]). *Host plant.* Oleaceae: *Fraxinus japonica* Blume ex K. Koch.
18. Metepimeral appendage without basin.19
- Metepimeral appendage with distinct basin.20
19. Posterior margin of abdominal tergum 1 creamy white; hind femur usually marked with reddish brown (rarely all black). *M. forsiusi* Takeuchi, 1937 ♂ (part)
Distribution. Japan (Hokkaido, Honshu, Shikoku). *Host plant.* Oleaceae: *Ligustrum obtusifolium* Sieb. et Zucc.
- Posterior margin of abdominal tergum 1 black; hind femur not marked with reddish brown.*M. falsifica* Mocsáry, 1909 ♂ (part)

Distribution. Japan (Honshu, Shikoku). *Host plants.* Oleaceae: *Ligustrum obtusifolium* Sieb. et Zucc., *L. ovalifolium* Hassk.

20. Head and thorax dorsally mat, covered with distinct surface microsculpture; posterior margin of pronotum in male very narrowly creamy white (sometimes entirely black). *M. kisuji* ♂
 — Head and thorax dorsally punctate but with shiny interspaces; posterior margin of pronotum in male broadly creamy white. *M. coxalis* Motschulsky, 1866 ♀ ♂
Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu, Sado-ga-shima Is., Awaji-shima Is., Oki Isls.). Korea, China. *Host plants.* Rosaceae: *Rosa multiflora* Thunb., *R. onoei* Makino var. *onoei*.
21. Abdominal tergum 1 medially with large rectangular creamy white mark occupying posterior 1/2–1/3 of its whole length and laterally black to its posterior margin.
 *M. liukiwana* Takeuchi, 1926 ♀ ♂
Distribution. Japan (Okinawa-honto Island). *Host plant.* Unknown.
- Abdominal tergum 1 not as above. 22
22. Metepimeral appendage with well-defined setiferous area or basin. 23
 — Metepimeral appendage without setiferous area or basin. 25
23. Mesoscutellum marked with creamy white. *M. duodecimpunctata sodalitia* Mocsáry, 1909 ♀ ♂
Distribution. Japan (Hokkaido, Honshu). Russia (Sakhalin, Primorsky krai), Korea. *Host plant.* Unknown. Male first recorded here (1 ♂, Niyama, Nanae, Kameda Dist., Hokkaido, 12. VI. 2013, H. Suda [HS])
- Mesoscutellum entirely black. 24
24. Clypeus and posterior margin of pronotum creamy white; abdomen with creamy white marks laterally and on dorsum of terminal segment. *M. minutifossa* Wei and Nie, in Wei *et al.*, 2003 ♀
Distribution. Japan (Okinawa-honto Island). China. *Host plant.* Unknown.
- Clypeus, posterior margin of pronotum and all abdomen black. *M. apicalis* ♂
25. Posterior margin of abdominal tergum 1 creamy white (usually continuous all over and becoming broader laterally). 26
 — Posterior margin of abdominal tergum 1 black or very narrowly creamy white (laterally sometimes creamy white). 29
26. Posterior margin of pronotum black; entire hind tarsus and often part of hind tibia reddish brown in female; hind leg without reddish brown areas in male; abdomen in female without creamy white dorsal spot apically. 27
 — Posterior margin of pronotum creamy white; hind tibia and tarsus usually without reddish brown areas (sometimes marked with reddish brown); abdomen in female usually with creamy white dorsal spot apically. 28
27. Creamy white spot on lateral surface of hind coxa oval in shape and situated anteriorly, not extending to posterior coxal margin; hind tibia reddish brown except for both apices. Male unknown. *M. koreana* Takeuchi, 1937 ♀
Distribution. Japan (Honshu). Russia (Amur Oblast, Primorsky Krai), Korea, China. *Host plant.* Lamiaceae: *Isodon effusus* (Maxim.) H. Hara.
- Creamy white spot on lateral surface of hind coxa usually extending to posterior coxal margin; hind tibia black, dorsally often reddish brown, with creamy white dorsal mark in apical half; in male, creamy white mark on lateral surface of hind coxa small and situated near base and hind tibia and tarsus black except for creamy white dorsal mark in apical half of tibia.
 *M. togashii* Yoshida and Shinohara, in Shinohara and Yoshida, 2015 ♀ ♂
Distribution. Japan (Honshu). *Host plant.* Unknown.

28. Hind femur usually with reddish brown areas (sometimes entirely black); in female, clypeus usually entirely black and abdomen black except for white-marked terga 1 and 10 (tergum 10 sometimes all black). *M. forsiusi* ♀ ♂ (part)
- Hind femur without reddish brown areas; in female, clypeus with broad anterior margin creamy white and abdomen usually with tergum 2 and more posterior terga laterally and tergum 6 and more posterior terga dorsally marked with creamy white.
..... *M. malaisei* Takeuchi, 1937 ♀ ♂ (part)
- Distribution.* Japan (Hokkaido, Honshu, Shikoku, Kyushu, Awaji-shima Is.). China. *Host plants.* Oleaceae: *Ligustrum obtusifolium* Sieb. et Zucc., *Syringa vulgaris* L.
29. Hind tarsus partly creamy white.30
- Hind tarsus entirely black (terminal tarsomere often basally pale).37
30. Anal cell in hindwing sessile; fore and mid trochanters creamy white in both sexes.31
- Anal cell in hindwing with long petiole; fore and mid trochanters creamy white or mostly black in ♀, creamy white in ♂.32
31. Hind tibia and tarsomere 1 with dark reddish brown area; in female, mid femur with whitish line along anterior surface and posterior margin of tergum 10 whitish. *M. sanguinitarsis* ♀
- Hind tibia and tarsomere 1 without dark reddish brown area; in female, mid femur without whitish line along anterior surface and tergum 10 all black. *M. annulitibia* ♀ ♂ (part)
32. Anterior margin of head seen from above distinctly concave between large and slightly protruding eyes; fore and mid trochanters mostly black in ♀, creamy white in ♂; hind coxa usually with lateral surface mostly and sometimes also ventral surface whitish.
..... *M. esakii* (Takeuchi, 1923) ♀ ♂
- Distribution.* Japan (Hokkaido, Honshu, Shikoku, Kyushu). Russia (Sakhalin), Korea. *Host plant.* Unknown.
- Anterior margin of head seen from above not distinctly concave between normal-sized eyes; fore and mid trochanters creamy white or mostly black; hind coxa with large spot at base of lateral surface and narrow apical margin whitish.33
33. Hind tibia entirely black or partly dark reddish brown and without creamy white mark.34
- Hind tibia black with creamy white mark.35
34. Clypeus usually with obscure whitish spot at middle (rarely entirely black); labrum entirely creamy white. *M. marlatti* ♀ ♂ (part)
- Clypeus entirely black; labrum black (anteromedian margin sometimes slightly pale).
..... *M. inomatai* Shinohara, n. sp. ♀
- Distribution.* Japan (Honshu). *Host plant.* Unknown.
35. Robust species; posterior margin of pronotum broadly yellowish creamy white; mesepisternum and metepisternum with creamy white marks; fore and mid trochanters entirely creamy white; creamy white mark on hind tibia ring-like, covering also ventral part. *M. satoi* ♀
- Slender species; posterior margin of pronotum usually black (sometimes creamy white), mesepisternum and metepisternum entirely black; fore and mid trochanters mostly or partly black; creamy white mark on hind tibia restricted to dorsal part.36
36. Clypeus and labrum entirely creamy white; abdominal tergum 1 without creamy white spot laterally. *M. harai* ♀
- Clypeus and labrum mostly black; abdominal tergum 1 with large creamy white spot laterally.
..... *M. katayamai* Shinohara, n. sp. ♀
- Distribution.* Japan (Hokkaido, Honshu). *Host plant.* Unknown.
37. Posterior margin of pronotum creamy white.38

- Posterior margin of pronotum black.....41
- 38. Clypeus black..... *M. crassuliformis* ♀ ♂ (part)
- Clypeus creamy white.....39
- 39. Anal cell in hindwing sessile.....*M. annulitibia* ♂ (part)
- Anal cell in hindwing with petiole.....40
- 40. Dorsal surface of head generally smooth and shiny; female length 9–12 mm, antennal scape and often mesoscutellum and its appendage with creamy white marks; male length 8–9.5 mm, lateral side of abdomen often with creamy white marks.....*M. falsifica* ♀ ♂ (part)
- Dorsal side of head densely punctate, only weakly shiny; female length 7.5–9.5 mm, antennal scape, mesoscutellum and its appendage entirely black; male length 6.5–8 mm, abdomen usually entirely black.....*M. malaisei* ♀ ♂ (part)
- 41. Mesoscutellum creamy white.....*M. obesa* Takeuchi, 1933 ♀ ♂
Distribution. Japan (Hokkaido, Honshu). Korea. *Host plant.* Unknown.
- Mesoscutellum black.....42
- 42. Mesonotum with smooth interspaces between punctures and shiny; hind trochanter black.....
M. carbonaria Smith, 1874 ♀ ♂
Distribution. Japan (Southern Kuriles, Hokkaido, Honshu, Shikoku, Kyushu, Awa-shima Is., Awaji-shima Is., Tsushima Is.). Russia (Sakhalin), Korea, China. *Host plant.* Adoxaceae: *Sambucus racemosa* L. subsp. *sieboldiana* (Miq.) H. Hara.
- Mesonotum densely punctate, mat or very weakly shiny; hind trochanter usually creamy white.....43
- 43. Clypeus and dorsal surface of hind tibia with creamy white marks; anal cell in hindwing sessile.....
M. annulitibia ♀ (part)
- Clypeus and hind tibia entirely black; anal cell in hindwing with long petiole.....*M. timida* ♀

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