Revision of Molobratia from Japan and Taiwan
(Insecta, Diptera, Asilidae)¹

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ABSTRACT—Six species of Molobratia are now known from Japan (4 species) and Taiwan (2 species). M. takasagense is synonymized with M. japonica and one new species is added from Taiwan. It is found that aedeagus, horizontal branch of dorsodistal process in gonocoxite, male sternum 10, female tergum 8 and female sternum 8 vary in shape with species.

INTRODUCTION

Hull [1] erected the genus Molobratia and designated Asilus teutonus Linnaeus, 1767 as the type species, because the true type species of Dasypogon Meigen, 1803 is not teutonus, but Asilus diadema Fabricius, 1781, by the designation of Latreille, 1810. Selidopogon Bezzi, 1902, whose type species is diadema, became a synonym of Dasypogon.

From Japan, five described species of Molobratia were recorded (Bigot [2]; Matsumura [3]; Hradský [4]). One of them, takasagense, is here treated as a junior synonym of japonica. At present only one female specimen of Molobratia from Taiwan is on hand and this seems to represent a new species. The original description is copied as to M. purpuripennis (Matsumura) from Taiwan. Thus, four species from Japan and two species from Taiwan are now recorded as Molobratia.

Iwata and Nagatomi [5] treated Molobratia japonica and M. sapporensis as Dasypogon, and recorded their prey: “The delicate wasps such as Ichneumonidae were principally seized” by sapporensis, and “The bees were mainly struck” by japonica.

Richter (1968) and Weinberg (1970) put egregia Loew, 1869 from Transcaucasia and Caucasus into Molobratia (after Ionescu and Weinberg [6], p. 137). Weinberg [7] redescribed and illustrated pekinensis Bigot, 1878, whose type locality is northern China as Molobratia, based on the specimens from Kuantum, Fukien, China. Oldroyd [8] put inopinata Walker, 1860 and inopportuna Walker, 1860, both from Burma, into Molobratia. Unfortunately we have no specimens of inopinata and inopportuna and cannot compare them with the species from Japan and Taiwan.

PHYLLOGENETICALLY RELATED GENERA OF MOLOBRATIA

What is the phyllogenetically related genus or genus of Molobratia? According to Hull [9], it is Leptarthrus Stephens, 1829 (=Isopogon Loew, 1847), having two species from Europe. In the female tergum 9 +10 of Molobratia and Leptarthrus, a circlet of rod-like spines are absent. On the basis of this character, Hull [9] put these two genera into the tribe Dioctriini. On the other hand, Theodor [10] (p. 27) mentioned that “The tribe Dioctriini of Hull is based on the absence of spines on tergite 9 (=tergum 9+10 or tergum 10 in our interpretation) of the female; however, spines are also absent in some species of other tribes which

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belong to these tribes according to some very distinct characters, while other species have spines on tergite 9. *Dioctria* is here included in the Stenopogoni, as this character does not seem to justify the establishment of a separate tribe." This statement may be correct, and the absence of the spines in question may occur secondarily within the same natural group, as pointed out already by Papavero [11, 12] and Theodor [13].

Lehr [14] still put *Molobratia* into the tribe Dioctrinini of the subfamily Stenopogoninae. However, *Molobratia* may belong to the tribe Dasypogonini (of the subfamily Dasypogoninae) which is characterized by the presence of a large twisted or sigmoid spine at the apex of fore tibia, although this spine rarely disappears individually or specifically (after Wood [15], p. 554). Theodor [10] (p. 171) mentioned that "This [= Dasypogonini] is probably an artificial group as the genera differ markedly in other characters and the spine on the fore tibiae also differs markedly in form and size and probably developed independently in different groups."

For separation of *Molobratia* from the related genera, see key to the genera by Engel [16] (pp. 437–438) ["Dasypogon" (= *Molobratia*); "Selidopogon" (= Dasypogon)]. Theodor [10] diagnosed the genera Dasypogon, Saropogon and Paraphamartania. Theodor [13] also described and illustrated the male genitalia of several genera of Dasypogonini, that is, Dasypogon, Saropogon, Molobratia, Paraphamartania, Leptarthrus and Neolaparus.

*Molobratia* is apparently nearer to Dasypogon and Saropogon than to Leptarthrus. In Leptarthrus, spur on fore tibia is bristle-like and antennal style is 2-segmented (after Papavero [12]). Lehr [14] and Papavero [12] put Leptarthrus into the tribe Isopogonini (of the subfamily Dasypogoninae).

Genus *Molobratia* Hull


*Molobratia* includes the following 11 species: chuijoi (Taiwan), egregia (Transcaucasia and Caucasia), inopinata (Burma), inopportuna (Burma), japonica (Japan), kanoi (Japan), nipponi (Japan: Okinawa I. and Amami Oshima), pekinensis (China), purpuripennis (Taiwan), sapporensis (Japan) and teutonus (Europe and Turkey).

*Molobratia* differs from *Dasypogon* by having the following characters: (1) antennal style conical, tapering apically and with a terminal spine, (2) antennal segment 3 with many stout hairs dorsally, (3) 4th posterior cell (= cell M4) open, (4) fore basitarsus longer than mid or hind basitarsus, and (5) female tegum 9+10 without a circlet of rod-like spines. In *Dasypogon*, (1) antennal style cylindrical, not tapering apically and its apical concavity with a spine, (2) antennal segment 3 bare or practically so dorsally, (3) 4th posterior cell closed, (4) fore basitarsus shorter than mid or hind basitarsus, and (5) female tegum 9+10 with a circlet of rod-like spines. (chiefly after Engel [16], p. 438).

Hull [9] (pp. 227–228) wrote that "Many species have been removed from the genus *Dasypogon* in recent years and it is probable that comparatively few species properly belong in *Dasypogon sensu stricto*. ….. The species known to properly belong to *Dasypogon* are found in southern Europe and northwestern Africa."

Lehr [14] listed 15 species of *Dasypogon* which are distributed in Europe, North Africa and Asia (Israel, Turkey, and Iran). Weinberg [17–19] added 4 new species of *Dasypogon* from Yugoslavia, Greece, Transcaucasia and Mongolia respectively.

The diagnosis of *Molobratia* based on 5 species (from Japan and Taiwan) is given below. Head: Face without gibbosity, but more or less swollen especially near clypeus; hairs on face longer near clypeus, becoming shorter above and haired area nearly reaching to antennae; front with a tuft of hairs running longitudinally near each side; ocellar tubercle with 1 pair of longer and stouter hairs; antennal style conical or tapering apically and with a terminal spine; antennal segment 3 with many strong hairs dorsally.

Thorax: Prosternum widely separated from propleura by membranous area; hairs are absent
on median stripe (except mid vitta) and on lateral stripes; hm 0, npl 2–12, sa 1–12, pa 1–7, dc 2–9, sc (on one side) 0–4, according to individual or species; dc postsutural (in sapporensis, rarely pre-
sutural); antepronotum and propleura with strong hairs; metapleural fan weak and accompanied with
pile; hypopleura and side of pronotum pilose.

Wing: Fourth posterior cell wide open and anal cell narrowly open or nearly closed.

Legs: Long and not very robust; fore basitar-
sus longer than mid or hind basitarus; fore tibia with an apical process having a stout terminal spine
directed inward and fore basitarus with a knob, opposite fore tibial spine; fore tibial process with a row of strong hairs (which may become short in chui) along inner margin, and area at and before
knob in basitarus with denticles opposite process
and spine; each femur with two dorsal setae (which are very short in chui) near apex and with several
setae on other parts, but in kanoi dorsal setae near
apex 3 (or so) in number.

Abdomen: Elongate, more or less slender; bristles are confined to sides of tergum 1.

Male genitalia (based on 4 Japanese species): Paired gonoxites (excepting dorsodistal processes)
longer than long; in gonoxite, ventral surface
except inner part and outer part of dorsal surface
with strong long hairs; gonoxite with a long
dorsodistal process whose base has a vertical coni-
cal process directed upward, and with a flat distal inner ventral extension; ventral surface of gonoco-
xite more or less pointed at apex; in lateral view,
dorsodistal process of gonoxite bilobate and
horizontal branch longer and wider than the verti-
cal; gonostylus long, tapering apically, pointed
dorsally at apex, and with a row of vertical dorsal
hairs; gonocoxal apodeme rather long, but not
extending beyond anterior margin of sternum 9 (=
hypandrium); sternum 9 triangular, wider than
long but comparatively long, and with a transverse
row of hairs.

In aedeagus, dorsal and ventral plates form a
sigmoid conical tube, having a posteroventral fin
flattened laterally (in japonica, nipponi and sappo-
rensis), whose size and shape vary with species,
and apex of this tube is curved upward (in japoni-
ca, kanoi and sapporensis); in ventral or lateral
view, base of tube (on one side) consisting of
dorsal outer and ventral inner processes; in dorsal
view, paired dorsal outer processes forming a large
V or U shape; anterior bar of aedeagus is flattened
laterally and varies in size and shape with species.

Tergum 9 rather trapezoid, wider basally and
covered with strong hairs (except base), some of
which are bristle-like on outer margin; in japonica,
nipponi and sapporensis, cerci except apical por-
tions fused with each other; paired cerci rectangular
and the middle of apical margin with a deep
concavity; cerci with dorsal hairs; sternum 10 with
a pair of elongate anterior sclerites which are
widened and then pointed; apical (=posterior)
margin of sternum 10 rounded or nearly straight
and with hairs (except middle).

In the specimen of nipponi, the posteroventral
fin of aedeagal tube is vertically divided into a pair.
It is uncertain whether this separation is accidental
or not. This fin is absent in kanoi (Fig. 22) and
teutonus (see Fig. 216 in Theodor [13]).

Female terminalia (based on 4 Japanese spe-
cies): The ovipositor may be composed of the
segments 7–8 or 8. In Leptarthrus, the ovipositor
is long and composed of the segments 6–8 (see Fig.
273 in Engel [16] and Fig. 213 in Oldroyd [20]).
The tergum 9+10 is small and has no rod-like
spines. In Dasypogon, a circlet of rod-like spines
are present on tergum 9+10 (see Fig. 216 in
Oldroyd [20] and Fig. 34 in Theodor [10]).

A pair of sclerotized cerci are usually separated,
but sometimes fused with each other individually;
each cercus roughly elliptic (except basal portion),
longer than wide, and with strong hairs. Tergum 9
+10 (or tergum 10) membranous, rectangular,
and much wider than long. Sternum 10 composed
of posterior trapezoid part having strong hairs and
a pair of anterolateral bare darkened sclerites.
Tergum 8 trapezoid, semicircular or its anterior
margin with a wide and deep concavity according
to species; tergum 8 except anterior part with
dorsal hairs. Sternum 8 semicircular or roughly
pentagonal according to species and with ventral
hairs. Tergum 7 and sternum 7 rectangular,
haired, and wider than tergum 8 and sternum 8;
tergum 7 wider than sternum 7. Genital fork large
and U-shaped.
Key (a) to species of *Mobolbratia* from Japan and Taiwan based on external characters

1. Legs and abdomen entirely dark brown to black ............................................... 2
   — Legs largely and abdomen partly yellowish (or reddish) brown.......................... 3
2. Face, cheek and base of proboscis with pale yellow hairs; legs with white and black hairs; sides of abdominal dorsum with long white hairs (after Matsumura [3]); (Taiwan)..............
   ........................................... *M. purpuripennis*
   — Hairs on head wholly black; legs without white hairs; hairs on abdomen (except cerci) wholly black; (Japan: Honshu)........... *M. kanoi*
3. Face at antenna much narrower than width of one eye (Figs. 21, 33); in fore and mid tibiae some setae longer than thicknesses of tibiae (as well as in hind tibia in *kanoi* and *sapporensis* [Figs. 43, 44]) .................. 4
   — Face at antenna about as wide as one eye; in fore and mid tibiae all setae shorter than thicknesses of tibiae as well as in hind tibia (Fig. 42); in sigmoid terminal spine of fore tibia, apical black part about 1/2 as long as basal yellowish brown part (Fig. 1) (as in *kanoi*); (Taiwan) ..................... *M. chuyoii*
4. In sigmoid terminal spine of fore tibia, apical black part over 1/2 as long as basal yellowish brown part (Fig. 34) ...................................... 5
   — In sigmoid terminal spine of fore tibia, apical black part less than 1/2 as long as basal yellowish brown part (Fig. 24); face wider than in *sapporensis* (Fig. 21); (Japan: Okinawa I. and Amami Oshima)............ *M. nipponi*
5. Face wider than in *sapporensis*; humeral and posterior calli and scutellum may be brown (as in *nipponi*); abdominal tergum 1 yellowish brown (as in *nipponi*); no pale yellowish gray spots at postero-lateral corners of abdominal terga 2–6 ; scutellum with many hairs (as in *nipponi*); (Japan: Honshu, Shikoku and Kyushu) ....................... *M. japonica*
   — Face narrower than in *japonica* (Fig. 33); humeral and posterior calli and scutellum dark brown to black; abdominal tergum 1 shining blue black; abdominal terga 2–6 with distinct pale yellowish gray pollinose spots at posterolateral corners (as in *nipponi*); scutellum with no or few hairs; (Japan: Hokkaido, Honshu, Shikoku and Kyushu) ..............
   ........................................... *M. sapporensis*

Key (b) to species of *Mobolbratia* from Japan based on male genitalia

1. Posteroventral fin of aedeagal tube present (Figs. 9, 26, 36); cerci fused (except their apical portions) (Fig. 6); horizontal branch (in dorsodistal process of gonocoxite) with a minute apical seta (Figs. 8, 26, 35) .......... 2
   — Posteroventral fin of aedeagal tube absent (Figs. 20); each cercus apparently separate; horizontal branch (in dorsodistal process of gonocoxite) with two thicker apical teeth, of which dorsal one is pointed (Fig. 19) ...................
   ........................................... *M. kanoi*
2. Apex of aedeagal tube curved upward (Figs. 9, 36); posteroventral fin of aedeagal tube longer than in *nipponi* (Figs. 9, 36); anterior bar of aedeagus much narrower than in *nipponi* and not circular (Figs. 9, 36); horizontal branch in dorsodistal process of gonocoxite narrower than in *nipponi* at apical portion and without a sclerotized oblique line (Figs. 8, 35) ................. 3
   — Apex of aedeagal tube directed forward (Fig. 27); posteroventral fin of aedeagal tube shorter than in *japonica* and *sapporensis* (Fig. 27); anterior bar of aedeagus much wider than in *japonica* and *sapporensis* and somewhat circular (Fig. 27); horizontal branch in dorsodistal process of gonocoxite wider than in *japonica* and *sapporensis* at apical portion and with an oblique sclerotized line (Fig. 26).............
   ........................................... *M. nipponi*
3. Posteroventral fin of aedeagal tube bluntly pointed at anterodistal corner (Fig. 9); anterior bar of aedeagus in lateral view wider apically and then narrowed (Fig. 9) .................... *M. japonica*
   — Apical part of posteroventral fin in aedeagal tube wider than in *japonica* (Fig. 36); anterior bar of aedeagus without narrowed anterior (= apical) portion (except dorsal corner) (Fig. 36) ........................................... *M. sapporensis*
Key (c) to species of *Molobratia* from Japan based on female terminalia

1. Tergum 8 much shorter than in *nipponi* and with anterior margin gently concave (Figs. 13, 39); sternum 8 rounded apically (Figs. 14, 40) ................................................................. 2
   - Tergum 8 much longer than in *japonica, kanoi* and *sapporensis* and with anterior margin deeply concave (Fig. 31); sternum 8 (not flattened out) in ventral view is rather pentagonal, although its narrow posterior margin may be straight (Fig. 32). ................................................................. *M. nipponi*

2. Sternum 8 wider and shorter than in *kanoi* and *sapporensis* and with a large and wide bare membranous posterior part (Fig. 14). ................................................................. *M. japonica*
   - Sternum 8 narrower and longer than in *japonica* and with a bare membranous posterior part small and narrow (Fig. 40). ................................................................. *M. kanoi* and *M. sapporensis*

*Molobratia chujoi* Nagatomi, Imaizumi et H. Nagatomi sp. n. (Figs. 1, 2, 42)

This species (♀) is similar to *japonica, nipponi* and *sapporensis*, but may easily be separated from them by having the external characters shown in the key (a) (couplet 3).

The following description is based on a single female specimen whose antennal segment 3 and hind tarsomeres 3–5 are lacking.

Female. Head: Dark brown to black, and pale yellowish gray tomentose; antenna yellowish brown; palpus, labellum, midventral part of theca, and ocellar triangle shining black; vestiture on head pale yellow, but that on ocellar triangle, area behind ocellar triangle, upper occiput, front, palpus (except base) and antennal segments 1–2 black; hairs behind ocellar triangle short; width of one eye at greatest point 0.5 times length (= height) of eye, 0.9 times width of face at antenna, and 2.4 times distance from antenna to median ocellus; width of front at median ocellus 0.9 times width of face at lowest portion from a direct frontal view, 4.2 times width of ocellar triangle, and 2.6 times distance from antenna to median ocellus; ocellar triangle as wide as long; distance from antenna to median ocellus 0.24 times distance from antenna to lower margin of eye, which is 1.4 times length of face (minus clypeus); when measured along midouter surface, relative lengths of antennal segments 1–2 [segment 3 lacking] 100:62 and their relative widths from the side 62:62.

Thorax: Dark brown to black, and pale yellowish gray (or pale gray) tomentose; mesonotum with 3 broad darker stripes, of which median one is separated by mid vitta and the lateral ones may be obscure in demarcation; hairs and bristles on mesonotum and antepronotum black; hairs on mesonotum very short; hairs on sides of pronotum chiefly black; hairs on pleura pale yellow; *scutellum without hairs and bristles*.

Wing: Membrane yellowish brown to brown; veins yellowish brown to dark brown; halter yellowish (or reddish) brown.

Legs (Figs. 1, 42): Yellowish (or reddish) brown; claw except base black; coxae dark brown to black and pale yellowish gray tomentose; hind femur may have a darkened streak on posteroventral surface; fore and mid trochanters at ventral apices and hind trochanter at anterior part, each with a small shining black spot; apex of each femur with a pair of lateral shining black spots; coxae pale yellow pilose; femora with very short black

Figs. 1–2. *Molobratia chujoi*, female. 1, Fore basitar-sus and apical portion of fore tibia, anterior view; 2, abdomen (including scutellum, postcutellum and halteres), dorsal view.
hairs and short setae; all bristles on tibiae shorter than thicknesses of tibiae; in sigmoid terminal spine of fore tibia, apical black part about 1/2 as long as basal yellowish brown part; relative lengths of segments (excluding coxa and trochanter) of fore leg 205:200:100:35:28:23:30, of mid leg 213:220:65:30:25:23:30, of hind leg 230:233:80:33:

Abdomen (Fig. 2): Yellowish (or reddish) brown; tergum 1, anterior part (before sensory pits) of tergum 2, anterolateral spots on terga 2–6 dark brown to black; sternum 1 and sterna 4–6 (excepting posterior parts) darkened; anterolateral spots on terga 2–3 nearly extending to posterior margin; terga 2–5 with posterolateral yellowish (or pale) gray pollinose spots; dorsum with short recumbent pale yellow pile which becomes longer and bristle-like on sides of tergum 1; venter with recumbent pale yellow pile which is erect on sternum 1–3.

Genitalia: Not examined.
Length: Body 20.1 mm; wing 16.5 mm; fore basitarsus 2.53 mm.

Male. Unknown.

Distribution. Taiwan.

Japanese name: Chujo-ashinaga-mushihiki.
Holotype: ♀, Sozan, 30. iv. 1933, M. Chujo.
Holotype is deposited in National Institute of Agro-Environmental Sciences, Tsukuba.

This species is named in honour of Dr. Michio Chujo, a famous Coleopterist.

**Molobratia japonica** (Bigot)
(Figs. 3–14)


One of us (Nagatomi) examined the type (♀) of *takasagense* and no significant difference was found between *takasagense* and *japonica*. Hradský [4] separated *takasagense* from *japonica* by the blackened pattern on abdominal terga 2–7. However, this character is variable within species and not relied upon.

*M. japonica* was recorded from Taiwan [21] and Ryukyu Is. [22], but it is highly probable that *chujo* from Taiwan and *nippori* from Okinawa I. and Amami Oshima were misidentified as *japonica*.

Among the Japanese species having the yellowish brown legs, *japonica* is characterized as follows: in both sexes, face distinctly wider than in *sapporensis*, and abdominal terga 2–6 without distinct pale yellowish gray pollinose spots at posterolateral corners; posteroventral fin of aedeagal tube bluntly pointed at anterodistal corner, and anterior bar of aedeagus in lateral view wider apically and then narrowed; female sternum 8 with a large bare membranous posterior part.

Male. Head: Dark brown to black, and pale yellowish gray pollinose; antenna (except style) and hypopharynx yellowish brown; palpus, labium, midventral part of theca, and large part of ocellar triangle shining black; vestiture on head pale yellow but that on ocellar triangle, front opposite ocellar triangle, and antennal segments 2–3 black; in the specimens on hand from Kyushu, vestiture on cerebrum, some strong hairs on upper occiput, hairs on antennal segment 1 and dorso-proximal part of palpus black; width of one eye at greatest point 0.5–0.6 times length (= height) of eye, 1.6–1.9 times width of face at antenna, and 2.0–2.4 times distance from antenna to median ocellus; width of front at median ocellus 0.6–0.8 times width of face at lowest portion from a direct frontal view, 2.0–2.8 times width of ocellar triangle, and 1.1–1.5 times distance from antenna to median ocellus; width of ocellar triangle 0.9–1.0 times its length; distance from antenna to median ocellus 0.3–0.4 times that from antenna to lower margin of eye, which is 1.3–1.5 times length of face (minus clypeus); antenna 0.8–0.9 times length (= height) of eye and 3.0–3.4 times distance from antenna to median ocellus; when measured along midouter surface, relative lengths of antennal segments 1, 2, 3, and style (including spinule) 100: 83(71–91):251(233–273):97(83–108) and their relative widths from the side (except style) 56(50–67):61(57–67):54(43–67); data based on 10 specimens.
Thorax: Dark brown to black, and pale yellowish gray pollinose; humeral and posterior calli and scutellum may be yellowish brown to brown; mesonotum with 3 broad darker stripes, of which median one is separated by mid vitta and the lateral ones may be obscure in demarcation; hairs and bristles on mesonotum and scutellum chiefly or wholly black and those on pleura pale yellow; in the specimens on hand from Kyushu, hairs on antepronotum black.

Wing: Membrane yellowish brown to brown; veins brown to dark brown; halter yellowish brown to brown.

Legs: Yellowish brown, claw except base black; fore and mid trochanters at ventral apices, and hind trochanter at anterior part, each with a small shining black spot; apex of femur (except ventral part) shining black; coxae pale yellowish gray pollinose and pale yellow pilose; femora with short black hairs which become longer and chiefly pale yellow on ventral surfaces (excepting apical portions); some setae on fore and mid tibiae longer, and all setae on hind tibia not longer than thicknesses of tibiae; in sigmoid terminal spine of fore tibia, apical black part over 1/2 as long as basal yellowish brown part; relative lengths of segments (excluding coxa and trochanter) of fore leg 211(200-221):252(237-288):100:30(28-33); 24(21-26) : 21(19-22) : 27(26-29), of mid leg 224(216-238) : 247(235-257) : 68(65-71) : 27(26-28) : 23(21-25) : 19(18-21) : 28(26-29), of hind leg 234(223-246) : 255(238-264) : 80(77-83) : 31(27-33) : 25(22-26) : 22(21-23) : 30(28-31), and in hind leg from the side, relative widths of femur, tibia and tarsal segments 1–3, 26(24-28):25(23-28):19(18-21):17(15-19):16(15-18); (N=10).

Abdomen: Yellowish brown, but terga 5–6 shining black, sometimes as well as tergum 7 (except posterior part), anterior border and posterior margin of tergum 4, anterior border of tergum 1 and anterolateral parts of terga 2–3; dorsum with short black hairs which become pale yellow and partly bristle-like on sides of tergum 1 and wholly or partly pale yellow on lateral borders of terga 1–7 and posterior part of tergum 7; venter pale yellow pilose; hairs on genitalia either chiefly pale yellow or chiefly black; hairs on sterna 1–2, sides of terga 1–2 and genitalia longer; anterior parts of terga 1–6 (which are large on terga 2–3) and posterior parts of sterna 1–6 bare.

Genitalia (Figs. 3–10): In dorsodistal process of gonocoxite, horizontal branch narrower than in nipponi at apical portion and without an oblique sclerotized line; in aedeagus, apex of tube curved upward, apical part of posteroventral fin narrower than in sapporensis, anterior bar in lateral view wider apically (=anteriorly) and then narrowed and with a darkened inner patch which is longer than wide and rectangular; tube denticulate along lateral margin (except apical portion) and at ventral distal part; in each anterior sclerite of sternum 10, widened part and narrowed process are distinct or abrupt in gradation.

Specimens dissected: 2♂♂♂, Kagoshima City 22 & 27. v. 1961, A. Nagatomi.

Length: Body 19.9–24.4 mm; wing 15.3–19.0 mm; fore basitarsus 2.5–3.2 mm.

Female. Similar to male except as follows:

Head: In some specimens from Kyushu, hairs on antennal segment 1 and on dorsoproximal part of palpus pale yellow as in those from Honshu (this may be so in ♂); no significant structural differences are found between sexes; in 10 specimens measured, width of one eye at greatest point 2.0–2.6 times distance from antenna to median ocellus; width of front at median ocellus 1.2–1.7 times distance from antenna to median ocellus; ocellar triangle 1.0–1.1 times as wide as long; antenna 2.9–3.8 times distance from antenna to median ocellus; when measured along midouter surface, relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100:87(71–100):246(200–283):98(79–140) and their relative widths from the side (except style) 57(43–70):62(57–70):53(43–60).


Abdomen: Pile on tergum 8 (except sides) may
Figs. 3-7. Male genitalia of *Molobratia japonica*. 3-4, Dorsal view (in Fig. 4, aedeagus is excluded); 5, ventral view; 6, dorsal view; 7, ventral view. AA, anterior bar of aedeagus; AT, aedeagal tube; C, cercus; DP, dorsodistal process; ES, endophallic sclerite; GA, gonocoxal apodeme; GC, gonocoxite; GS, gonostylus; S9, Sternum 9; S10, sternum 10; T9, tergum 9; VE, inner ventral extension of gonocoxite.
be wholly black; pile on cercus pale yellow.

Genitalia (Figs. 11–14): Tergum 8 rather trapezoid, much wider than long, and with anterior margin gently concave; sternum 8 rounded apically and narrower apically than in tergum 8 and with a large bare membranous posterior part.


Length: Body 19.0–24.5 mm; wing 17.5–20.1 mm; fore basitarsus 2.7–3.4 mm.


Japanese name: Ashinaga-mushihiki.


SHIKOKU (1♀). Ehime Pref.: 1♀, Matsuyama, 16. v. 1951, T. Shiraki.

KYUSHU (10♂, 18♀). Kumamoto Pref.: 1♂, 1♀, Gokanosho, 21. vii. 1968, A. Nagatomi;
Figs. 11–14. Female terminalia of *Molobratia japonica*. 11–12, Cerci and tergum 9+10, dorsal and ventral views; 13, tergum 8, dorsal view; 14, sternum 8, ventral view. C, cercus; S10, sternum 10; T9+10, tergum 9+10.
Molobratia from Japan and Taiwan


LOCALTY UNKNOWN. 1♀, F. Ishitani; 1♀, no data.

Molobratia kanoi Hradský
(Figs. 15–20, 43)


This species is easily separated from other three Japanese species by having the legs and abdomen entirely dark brown to black and the face wide.

This species is similar to M. purpuripennis (Matsumura, 1916) known from Taiwan. Judging from the original description, purpuripennis may be distinguished from kanoi in the face, cheek, and base of proboscis with pale yellow hairs, legs with white and black hairs, and sides of abdominal dorsum with long white hairs.

Male. Head: Dark brown to black, somewhat velvety; face brownish grey tomentose; labellum shining; vestiture on head wholly black; width of one eye at greatest point 0.5 times length (= height) of eye, equal to width of face at antenna, and 2.5 times distance from antenna to median ocellus; width of front at median ocellus 0.8 times width of face at lowest portion from a direct frontal view, 3.8 times width of ocellar triangle, and 2.5 times distance from antenna to median ocellus; width of ocellar triangle equal to its length; distance from antenna to median ocellus 0.24 times that from antenna to lower margin of eye, which is 1.3 times length of face (minus clypeus); antenna 0.9 times length (=height) of eye and 4.4 times distance from antenna to median ocellus; when measured along midouter surface, relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100:67:233:42 and their relative widths from the side (except style) 58:50:58.

Thorax: Dark brown to black, somewhat velvety, and more or less brownish grey tomentose; mesonotum with 3 broad stripes where tomentum is denser; median stripe is divided by thin vitta, all hairs or bristles on thorax black; scutellum (on one side) with 3-4 bristles or bristle-like hairs.

Wing: Membrane tinged with dark brown to black; costal cell, subcostal cell, basal portion of marginal cell, etc. may be darker; veins dark brown to black; halter dark brown to black, brownish grey pollinose.

Legs (Fig. 16): Entirely black; pulvilli, empodium, and base of claw yellowish brown; coxae same as pleura and rest of legs with a blue luster; coxae and trochanters with black hairs; each femur

Figs. 15–16. Molobratia kanoi. 15. Female head, anterior view; 16, male fore basitarsus and apical portion of fore tibia, anterior view.
with 3 (or so) dorsal setae near apex and its ventral surface without setae and with black longer bristle-like hairs on basal portion; some bristles on fore and mid tibiae longer than the thicknesses of tibiae as in hind tibia; in sigmoid terminal spine of fore tibia, apical black part roughly 1/2 (0.6 times or so) as long as basal yellowish brown part; relative lengths of segments (excluding coxa and trochanter) of fore leg 207:217:100:40:33:27:30, of mid leg 240:250:77:37:30:27:30, of hind leg 253:267:90:37:33:27:30 and in hind leg from the side, relative widths of femur, tibia, and tarsal segments 1-3, 27:27:23:20:17.

Abdomen: Dark brown to black; dorsum with a blue luster; dorsum with shorter recumbent hairs which become longer on sides of tergum 1; venter with erect hairs which are longer on sternum 1; genitalia with longer erect hairs which become shorter on cerci; all hairs on abdomen black but pile on cerci pale.

Genitalia (Figs. 17–20): In dorsodistal process of gonocoxite, apex of horizontal branch with two thicker teeth, of which dorsal one is pointed; sternum 9 with a row of 4 (or 5) bristles in specimen on hand; in aedeagus, apex of tube curved upward, and posterodorsal fin entirely absent; apical portion of tube is denticulate on ventral and lateral surfaces, although denticles are minute; anterior bar of aedeagus in lateral view is rather rectangular (except for basal portion) in shape; each cercus apparently separate; in each anterior sclerite of sternum 10, widened part not much inflate outward.


Length: Body 15.1 mm; wing 12.5 mm; fore basitarsus 1.90 mm.

Female. Similar to male except as follows.

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Figs. 17–20. Parts of male genitalia of Molobratia kanoi. 17, Sternum 9, ventral view; 18, cerci, sternum 10 and tergum 9, ventral view; 19, dorsodistal process of gonocoxite, outer lateral view; 20, aedeagus, lateral view.
Head (Fig. 15): Tomentum on face (excepting lower part) pale gray (this may often be so in \( \delta \)); no significant structural differences are found between sexes; in 1 specimen measured, front at median ocellus 3.0 times width of ocellar triangle and 2.3 times distance from antenna to median ocellus; antenna 4.15 times distance from antenna to median ocellus; relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100: 67: 233: 50 and their relative widths from the side (except style) 67: 50: 58.


Genitalia: No significant difference is found between \( \text{kanoi} \) and \( \text{sapporensis} \).

Specimen dissected: 1 \( \varphi \), Mt. Tateshina, Nagano Pref., 23–25. vii. 1947, A. Aoki.

Length: Body 15.1 mm; wing 13.3 mm; fore basitarsus 1.9 mm.

Distribution. Japan (Honshu).

Japanese name: Kano-ashinaga-mushihiki.

Specimens examined: 1 \( \varphi \), 1 \( \varphi \), Mt. Tateshina (2,000 m), Nagano Pref., 23–25. vii. 1947, A. Aoki.

**Molobraita nipponi** Hradský

(Figs. 21–32)


Among the Japanese species having the yellowish brown legs, *nipponi* is characterized as follows: in sigmoid terminal spine of fore tibia, apical black part less than 1/2 as long as basal yellowish brown part; face wider than in *sapporensis*; abdominal terga 2–6 with distinct pale yellowish gray pollinose spots at posterolateral corners (as in *sapporensis*); apex of aedeagal tube not curved upward but directed forward; posteroventral fin of aedeagal tube shorter than in *japonica* and *sapporensis*; anterior bar of aedeagus much wider than in *japonica* and *sapporensis* and somewhat circular; female tergum 8 much longer than in *japonica* and *sapporensis* and with anterior margin deeply concave.

Male (here described for the first time). Similar to *japonica* except as follows. Head (Figs. 21–23): Often apex of segment 3 darkened (this may be the same in *japonica*); hairs on cerebrale, antennal segment 1, and dorsoproximal part of palpus, and often some strong hairs on upper occiput black (as in the specimens from Kyushu in *japonica*); hairs on face and strong hairs on cerebrale fewer than in *japonica*; width of one eye at greatest point 1.5–1.7 times width of face at antenna (in *japonica*, 1.6–1.9 times); width of front at median ocellus 2.8–3.3 times width of ocellar triangle (in *japonica*, 2.3–2.8 times) and 1.5–1.8 times distance from antenna to median ocellus (in *japonica*, 1.2–1.7 times); when measured along midouter surface, relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100: 82(73–89): 272(260–300): 79(67–89) and their relative widths from the side (except style) 62(55–67): 61(55–67): 61(50–70); data based on 10 specimens.

Thorax: Hairs on antepronotum chiefly black.

Wing (Fig. 25): Apical and posterior portions of wing may be more or less darker than rest of
Legs (Fig. 24): Femora have no pale yellow longer hairs; some setae on hind tibia longer than thickness of tibia (as in fore and mid tibiae); in sigmoid terminal spine of fore tibia, apical black part less than 1/2 as long as basal yellowish brown part; relative lengths of segments (excluding coxa and trochanter) of fore leg 193(186-200):205(200–211) : 100 : 35(33–37) : 28(27–29) : 21(19–23): 27(25–29), of mid leg 204(196–211) : 214(203–222) : 71(69–74) : 32(30–33) : 25(24–27) : 20(18–22): 26(25–27), of hind leg 214(207–221):

Fig. 25. Male wing of *Molobratia nipponi*.
Abdomen: Yellowish (or reddish) brown, but anterior borders of terga 4-6 blackened; terga 2-6 with distinct pale yellowish gray pollinose spots at posterolateral corners; hairs on sides of tergum 2 shorter than in japonica.

Genitalia (Figs. 26-30): In dorsodistal process of gonocoxite, horizontal branch wider than in japonica and sapporensis at apical portion and with an oblique sclerotized line; in aedeagus, apex of tube not curved upward but directed forward, posteroventral fin shorter than in japonica and sapporensis and its apical margin rounded, anterior bar in lateral view much wider than in japonica and sapporensis and somewhat circular and with darkened patch which is indistinct in demarcation; tube denticulate at ventral surface (except for basal portion) and at anterio-[toward base of abdomen] lateral part of ventral fin; in each anterior sclerite of sternum 10, widened part and narrowed part are not abrupt in gradation.

Specimen dissected: 1♂, Shinokawa, Amami Oshima, 15. v. 1953, T. Shiraki.

Length: Body 14.0-18.2 mm; wing 12.3-15.2 mm; fore basitarsus 2.3-2.8 mm.

Female. Similar to male except as follows. Head: Hairs on palpus sometimes wholly pale yellow (this may be the same in ♂); no significant structural differences are found between sexes but this species differs from japonica as follows: width of one eye at greatest point 1.4-1.6 times width of face at antenna (in japonica, 1.6-1.9 times), width of front at median ocellus 2.7-3.3 times width of ocellar triangle (in japonica, 2.3-2.8 times) and 1.6-1.8 times distance from antenna to median ocellus (in japonica, 1.2-1.7 times); relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100:80(73-83):273(250-300):74(67-80) and their relative thicknesses (except style) 57(50-60):58(50-60):58(50-64); data based on 10 specimens.

214(206-222) : 227(217-239) : 80(76-83) : 33(31-36) : 27(25-28) : 21(20-22) : 28(25-30) and in hind leg from the side, relative widths of femur, tibia, and tarsal segments 1-3, 26(24-28) : 23(22-24) : 18(16-19) : 16(14-17) : 15(14-16); (N = 10).

Abdomen: Sometimes anterior border of tergum 3 and a band along sensory pits on tergum 2 darkened and sometimes abdomen almost wholly yellowish brown (these may be the same in \( \delta \)); pile on tergum 8 and cercus pale yellow.

Genitalia (Figs. 31, 32): Tergum 8 much longer than in *japonica* and *sapporensis* and with anterior margin having a wide and deep concavity; sternum 8 (not flattened out) in ventral view is rather pentagonal, although its narrow posterior margin may be straight; posterior bare membranous part of sternum 8 is much smaller than in *japonica*.

Specimens dissected: 2 \( \varphi \varphi \), Shinokawa, Amami Oshima, 9 & 11. v. 1953, T. Shiraki.

Length: Body 13.6–18.0 mm; wing 12.0–14.7 mm; fore basitar tus 2.1–2.7 mm.


Japanese name: Uruma-ashinaga-mushihiki.

Specimens examined (9 \( \delta \delta \), 17 \( \varphi \varphi \)): *Amami Oshima* (9 \( \delta \delta \), 15 \( \varphi \varphi \): 7 \( \delta \delta \), 8 \( \varphi \varphi \), Shinokawa, 9–15. v. 1953, T. Shiraki; 1 \( \delta \), Yuwan, 30. iv. 1953, T. Shiraki; 1 \( \varphi \), Yuwan, 8. v. 1953, T. Shiraki; 1 \( \delta \), 2 \( \varphi \), Naze, 4. v. 1966, K. Kusigemati; 3 \( \varphi \), 5 & 10. v. 1966, K. Kusigemati; 1 \( \delta \), Asato, 12. vii. 1918, T. Shiraki. *Okinawa I.* (2 \( \varphi \varphi \): 1 \( \varphi \), Mt. Yonaha, 8. iv. 1953, T. Shiraki; 1 \( \delta \), Izumi, 29. iv. 1969, S. Yamauchi.

There is 1 \( \varphi \) from Okinawa I. (5. v. 1957, T. Takara) whose length is large and 23.4 mm in body, 19.2 mm in wing and 3.5 mm in fore basitar tus. This specimen apparently belongs to *nipponi*.

*Molobratia sapporensis* (Matsumura) (Figs. 33–41, 44)


Among the Japanese species having the yellowish brown legs, *sapporensis* is characterized as follows: in both sexes, face distinctly narrower than in *nipponi* and *japonica*, abdominal tergum 1 shining blue black, abdominal terga 2-6 with distinct pale yellowish gray pollinose spots at posterolateral corners (as in *nipponi*), and scutellum with no or few hairs; apical part of posteroventral fin in aedeagal tube wider than in *japonica*, and anterior bar of aedeagus without narrowed anterior (= apical) portion (except dorsal corner); bare mem-

Molobratia purpuripennis (Matsumura) comb. n.


This species will be redescribed, when new material from Taiwan comes to hand. It is apparently similar to *kanoi* from Japan but may be separated from the latter by having the characters shown in the key (a) (couplet 2).

The original description by Matsumura is as follows. Male: "Fuscous. Head black pubescented, face with pale yellowish hairs. Proboscis at the extreme apex fulvous, at the base and on the cheeks pale yellowish pubescented, tempora and occiput with black hairs. Antennae black, the first 2 joints with black hairs. Thorax short black pubescented, in the middle with 2 longitudinal grayish stripes, humeri and pleurae grayish yellow pruinose. Wing subhyaline, somewhat infuscated, the second basal cell and the middle part being hyaline, in a certain light reflecting a beautiful purple, veins fuscous. Halteres fuscous, the stems fulvous. Abdomen black, with a purple luster, short black pubescented, on the sides with long white hairs, hypopygium with long black hairs. The upper genital plate of the male on each side inflated in an oval form and each sending backwards a long fuscous hook-like projection, the lower plate broad, nearly quadrate, with fulvous hairs. Legs black, with white and black hairs, tibiae mingling some short fulvous hairs.

Length-22.5 mm, exp. 36 mm.

Hab.-Formosa (Horisha); collected by the author."

Female. Unknown.

Japanese name: Murasaki-ashinaga-mushihiki.
branous posterior part in female sternum 8 small and indistinct.

Male: Similar to japonica except as follows: Head (Fig. 33): Apical portion of antennal segment 3 darkened; hairs on antennal segment 1 and cerebrum black and some hairs on upper occiput and palpus black in the specimens from Hokkaido and Honshu as well as those from Kyushu; width of one eye at greatest point 2.3–2.8 times width of face at antenna (in japonaca, 1.6–1.9 times); no significant differences are found in other structural characters between sapporensis and japonica; in 10 specimens measured, width of one eye at greatest point 1.8–2.6 times distance from antenna to median ocellus; distance from antenna to lower margin of eye 1.5–1.7 times length of face (minus clypeus); antenna 2.7–3.4 times distance from antenna to median ocellus; relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100:79(67–90):248(220–280):96(75–111) and their relative widths from the side (except style) 57(40–67):59(50–67):54(40–67).

Thorax: Humeral and posterior calli and scutellum are the same as rest of thorax in ground colour; scutellum with no or few hairs; hairs on antepenotum often black in the specimens from Honshu (this may be so in japonica).

Wing: Apical portion and posterior border of wing and apical portions of costal and subcostal cells more or less darker than rest of membrane.


Abdomen: Terga 2–6 with distinct pale yellowish gray pollinose spots at posterolateral corners; tergum 1 shining blue black; in each of terga 2–4, posterior part (except sides) which is variable in extent, and a band along sensory pits shining blue black, as well as anterior border of tergum 2; terga 5–6 (or 5–7) shining blue black as in japonica.

Genitalia (Figs. 35–37): In dorsodistal process of gonocoxite, horizontal branch as in japonica; in aedeagus, apex of tube curved upward as in japonica, apical part of posteroverentral fin wider than in japonica, anterior bar wider apically (= anteriorly), then not narrowed and with a darker inner patch as in japonica; tube denticulate as in japonica; in each anterior sclerite of sternum 10, widened part and narrowed process distinct or abrupt in gradation.


Length: Body 14.0–19.8 mm; wing 11.5–15.1 mm; fore basitarsus 2.2–2.9 mm.

Female. Similar to male except as follows. Head: structural differences are not found between sexes; this species differs from japonica as follows: width of one eye at greatest point 2.2–2.7 times width of face at antenna (in japonica, 1.6–1.9 times); in 10 specimens measured, width of front at median ocellus 1.1–1.4 times distance

Figs. 33–34. Molobratia sapporensis, male. 33, Head, anterior view; 34, fore basitarsus and apical portion of fore tibia, anterior view.
from antenna to median ocellus; width of ocellar triangle 0.8–1.0 times its length; distance from antenna to median ocellus 0.3–0.4 times distance from antenna to lower margin of eye; antenna 2.7–3.4 times distance from antenna to median ocellus; relative lengths of antennal segments 1, 2, 3 and style (including spinule) 100:79(67–100): 249(217–300):95(73–113) and their relative widths from the side (except style) 59(55–67): 61(55–75): 55(45–75).


Abdomen: In the specimens from Honshu (probably as well as those from Hokkaido), shining blue black parts of terga 2–4 markedly reduced in extent (bands along sensory pits usually disappear on terga 2–3 or 2–4) and often terga 5-6 largely or partly yellowish brown; pile on tergum 8, cercus and often tergum 7 pale yellow.

Genitalia (Figs. 38–41): Sternum 8 narrower and longer than in *japonica* and its bare membranous posterior part small and indistinct.


Length: Body 14.9–19.4 mm; wing 12.2–15.7 mm; fore basitarsus 2.2–2.8 mm.

Distribution: Japan (Hokkaido, Honshu, Shikoku and Kyushu).

Japanese name: Sapporo-ashinaga-mushihiki.


Figs. 38-41. Female terminalia of *Molobratia sapporensis*. 38, Dorsal view; 39, tergum 8, dorsal view; 40, sternum 8, ventral view; 41, genital fork, ventral view. C, cercus; T7, tergum 7; T8, tergum 8; T9+10, tergum 9+10.


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