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A review of the Japanese Kateretidae fauna (Coleoptera: Cucujoidea)

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Abstract. The family Kateretidae of Japan is revised. Nine species belonging to 6 genera are recognized, including: *Kateretes japonicus* Hisamatsu, 1985, *K. takagii* S-T. Hisamatsu, 2006, *Platamartus jakowlewi* Reitter, 1892, *Heterhelus* (*Heterhelus*) *scutellaris* (Heer, 1841), *H.* (*Heterhelus*) *morio* (Reitter, 1878), *H.* (*Boreades*) *solani* (Heer, 1841), *Sibirhelus corpulentus* (Reitter, 1900), *Brachypterus urticae* (Fabricius, 1792), and *Brachypterolus pulicarius* (Linnaeus, 1758). *Heterhelus morio*, which was synonymized under *H. scutellaris* by Kirejtshuk (1989), is found to be a valid species, and is herein resurrected. *Platamartus jakowlewi* is newly recorded from Japan. *Brachypterolus shimoyamai* Hisamatsu, 1985, syn. nov., is synonymized under *Brachypterolus pulicarius*. Dorsal habitus images, illustrations of male and female genitalia, and other important diagnostic characters are provided for all species. A key for identification of all Japanese taxa is also provided.

Key words. Coleoptera, Kateretidae, taxonomy, new synonym, new record, key, Japan, Palaearctic Region

Introduction

The family Kateretidae, belonging to the superfamily Cucujoidea, is mainly distributed in the Holarctic Region, and comprises about 95 species within 14 genera worldwide (Jelínek & Cline 2010). Both larval and adult Kateretidae are anthophagous: the larvae are monophagous or oligophagous, while adults are more generalized feeders, occurring on true host plants only during mating and ovipositing periods; otherwise, they feed on a broader assortment of flowering plants (Jelínek & Cline 2010).

Adult kateretids are flower visiting insects, which are often used in population ecology studies or other ecological studies (Ishida 1996, Grubb et al. 2002). Moreover, some kateretid species are agricultural pests; for example, *Brachypterolus vestitus* Kiesenwetter, 1850 and

B. antirrhini Murray, 1864 are considered minor pests of *Antirrhinum* spp. (snap dragons) cultivation in Europe (Kirk-Spriggs 1996). However, correct identification of taxa is extremely important for ecological studies and pest control. The objectives of this study are to contribute to our taxonomic knowledge and develop techniques for correct identification of Japanese Kateretidae.

Materials and methods

The present study is mainly based on specimens from the Ehime University Museum, Japan (EUM) and the author's private collection. Lectotypes of *Heterhelus japonicus* (Reitter, 1878), and *H. morio* (Reitter, 1878) are deposited in Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (ZMHB).

External structures were observed using a Leica S8APO stereoscopic microscope with magnification 10× to 80×, and small body parts, such as tarsal claw or antenna were removed from the body with fine forceps and observed under an Olympus BH-2 optical microscope with magnification 40× to 400×. Intact adult specimens were placed in hot water for 1–2 hours for softening, subsequently male and female genitalia were removed with fine forceps, observed under the microscopes, and then photographed. Finally, the genitalia were mounted in Euparal on small cover glass slips (5×10 mm).

Dorsal habitus images were acquired with a Nikon Digital Sight DS-Fi1 CCD camera attached to a Leica S8APO stereoscopic microscope. Post-acquisition images were combined with Helicon Focus 4.80 Lite (Helicon Soft Limited) automontage software. Other small body parts, such as antennae, tarsal claws, abdominal sternite or male and female genitalia, were photographed with the CCD digital camera mentioned above, which was attached to an Olympus BH-2 optical microscope. These images were then combined as above. Line drawings were produced by tracing over the photographic images. Upon completion of the drawings, the images were scanned by CanoScan 4400F, and plates constructed using Adobe Photoshop 7.0.

All measurements were made with an ocular micrometer. The measurements include: pronotal length as measured along the midline; pronotal width as measured at greatest width; elytral length as measured at greatest length; elytral width as measured at combined greatest width; body length as measured from apex of mandibles to apex of abdominal tergite VII or VIII. Morphological terms follow Lawrence et al. (2010). The identity of genera mainly follows Kirejtshuk (1992). Plant names refer to Yonekura & Kajita (2003).

Abbreviations used in the descriptions are as follows:

HW greatest width of head, including eyes;
L7 greatest length of seventh abdominal sternite;
LP greatest length of paramere;
W7 greatest width of seventh abdominal sternite;
WP greatest width of paramere.

Exact label data are cited for holotypes. Label lines are separated by a slash (/), and different labels by a double slash (//).

Taxonomy

Kateretidae Erichson, 1846

Type genus. *Kateretes* Herbst, 1793 (subsequent designation by ICZN 1999).

Diagnosis. Length 1.3–6.0 mm. Head prognathous; subantennal grooves and subantennal ridges absent; frontoclypeal suture short or absent; maxilla with galea and lacinia; antennae 11-jointed, last 2 or 3 segments forming a loose club (without club in *Sibirhelus* Kirejtshuk,

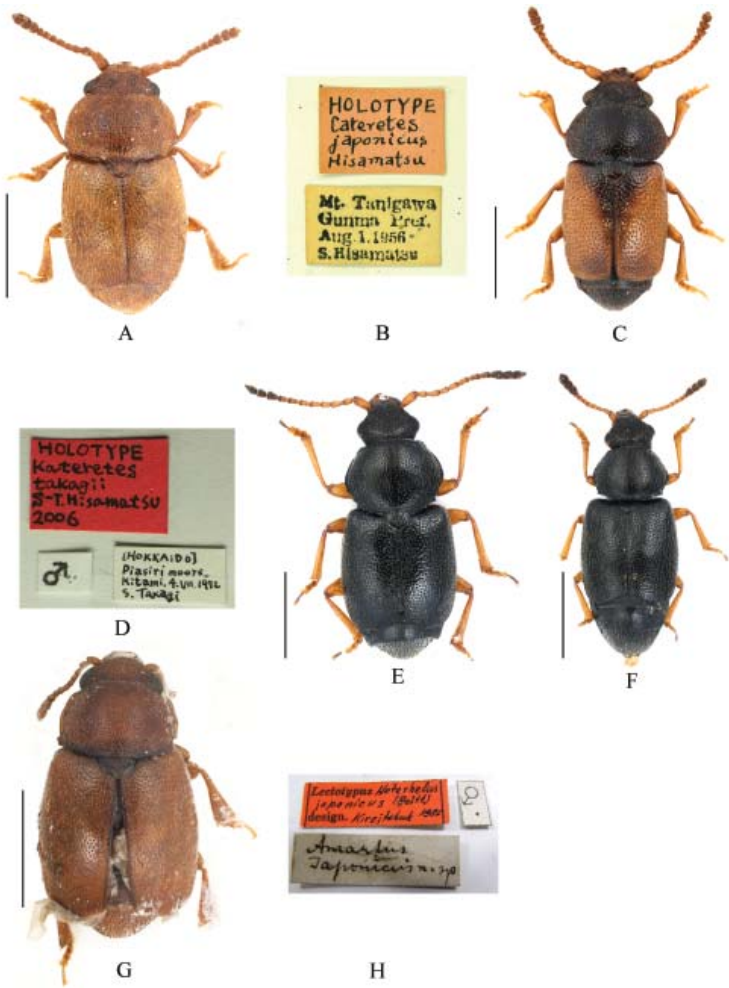

Fig. 1. Habitus and labels of Kateretidae spp. A–B – *Kateretes japonicus* Hisamatsu, 1985: A – holotype, male; B – ditto, labels; C–D – *Kateretes takagii* S-T. Hisamatsu, 2006: C – holotype, male; D – ditto, labels; E–F – *Platamartus jakowlewi* Reitter, 1892: E – male and F – female (both Tochigi Pref.); G–H – *Heterhelus* (*Heterhelus*) *japonicus* (Reitter, 1878): G – lectotype, male; H – ditto, labels. Scale bars = 1.0 mm.

1989). Procoxal cavities incompletely closed posteriorly. Male genitalia with separated parameres; aedeagus asymmetrical. Larvae without urogomphi and preogomphi (see Jelínek & Cline 2010 for detailed diagnostic features of adults and larvae).

Bionomics. Both larval and adult Kateretidae are anthophagous, developing in flowers of angiosperms (Jelínek & Cline 2010). Larvae are monophagous or oligophagous, typically requiring specific plants for their development.

Distribution. Kateretidae comprises about 95 species within 14 genera worldwide (Jelínek & Cline 2010). There are two described fossil genera, *Eoceniretes* Kirejtshuk & Nel, 2008 from Lowermost Eocene French amber and *Lebanoretes* Kirejtshuk & Azar, 2008 from

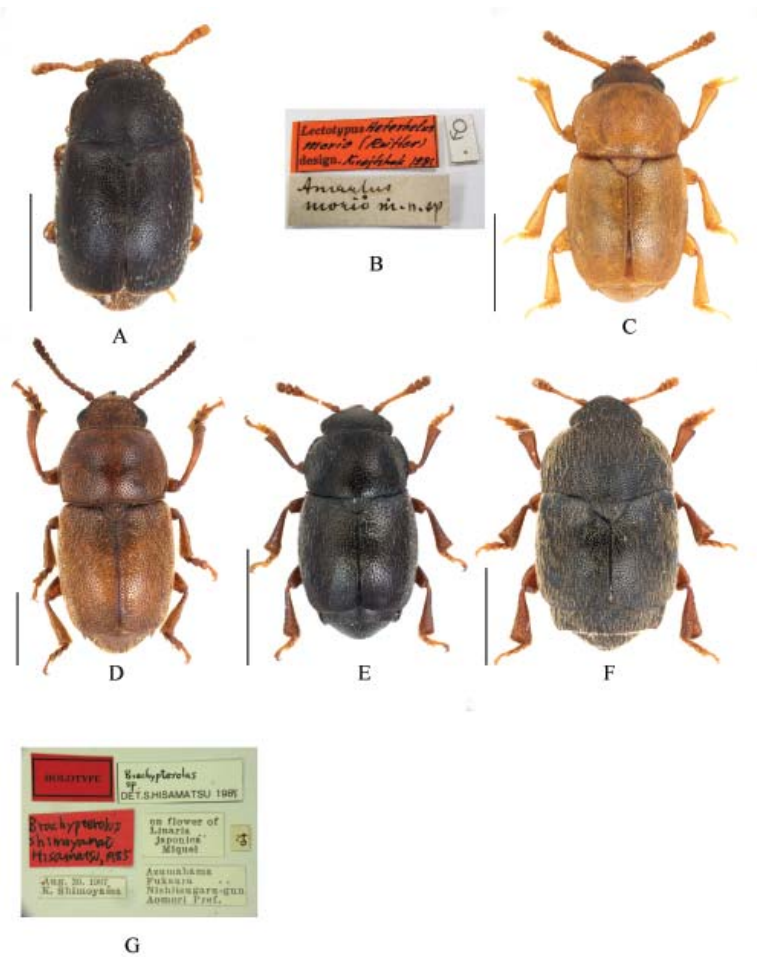

Fig. 2. Habitus and labels of Kateretidae spp. A–B – *Heterhelus* (*Heterhelus*) *morio* (Reitter, 1878): A – lectotype, male; B – ditto, labels; C – *Heterhelus* (*Boreades*) *solani* (Heer, 1841), male (Hokkaido); D – *Sibirhelus corpulentus* (Reitter, 1900), male (Iwate Pref.); E – *Brachypterus urticae* (Fabricius, 1792), male (Hokkaido); F–G – *Brachypterolus shimoyamai* Hisamatsu, 1985: F – holotype, male; G – ditto, labels. Scale bars = 1.0 mm.

Lower Cretaceous Lebanese amber (Kirejtshuk & Azar 2008, Kirejtshuk & Nel 2008). Members of Katereridae are mainly distributed in the Holarctic Region, but some taxa are distributed in other geographical regions – Neotropical Region: *Cercometes* Reitter, 1875 and *Neobrachypterus* Jelínek, 1979; Oriental Region: some species of *Brachypterus* Kugelann, 1794, *Heterhelus* Jacquelin du Val, 1858, and *Kateretes* Herbst, 1793 (*K. ornatus* Jelínek, 1978); and Australian Region: *Jelinekiella* Kirejtshuk, 2000 (*J. aterrima* Kirejtshuk, 1986) and *Notobrachypterus* Blackburn, 1892 (Jelínek & Cline 2010).

Note. Detailed descriptions of the family were recently provided (e.g., Kirejtshuk 1992, Audisio 1993, Jelínek & Cline 2010). There are some comprehensive studies on Palaearctic fauna (Kirk-Spriggs 1996, Spornraft 1967, Kirejtshuk 1992, Audisio 1993), and a comprehensive treatment of the New World fauna is currently underway (Cline & Audisio, pers. comm. 2010). Some larvae were illustrated by Böving & Craighead (1931), Hayashi (1978), and Cline & Audisio (unpubl.).

Key to Kateretidae genera of Japan

1 Tarsal claws not dentate or slightly dilated at base (Figs. 3J, 5E, 9E). Apical segment of maxillary palpus slender (Figs. 3I, 5F, 8G, 9F). Ovipositor with styli (Figs. 3D, 4G, 5D, 6F, 7G, 8D, 9D). 2

– Tarsal claws distinctly dentate at base (Figs. 10F, 11H). Apical segment of maxillary palpus enlarged (Figs. 10E, 11G). Ovipositor without styli (Figs. 10G, 11D). 5

2 Abdominal sternite III or III–V with tuft of setae in the middle in both sexes (Figs. 5H, 9K). Ovipositor with short styli (Figs. 5D, 9D). 3

– Abdominal sternite III or III–V without tuft of setae. Ovipositor with long styli (Figs. 3D, 4G, 6F, 7G, 8D). 4

3 Color reddish-yellow to dark brown. Lateral margins of pronotum smooth. Male protibia strongly arcuate (Figs. 2D, 9I). Abdominal sternite III with tuft of setae in middle (Fig. 9K). ..... ***Sibirhelus*** Kirejtshuk, 1989

– Color black. Lateral margins of pronotum distinctly serrate (Fig. 5G). Male protibia straight. Abdominal sternites III–V with tuft of setae in middle (Fig. 5H). .... ***Platamartus*** Reitter, 1892

4 Pronotum rounded at posterior angles (Fig. 3H). Dorsal pronotal disc surface with coarse, large punctures, larger than eye-facet. Abdominal tergite VIII in males concealed. .... ***Kateretes*** Herbst, 1793

– Pronotum angulate at posterior angles (Figs. 6H–N, 7I, 8F). Dorsal pronotal disc surface with dense, small punctures, smaller than eye-facet. Abdominal tergite VIII in males exposed. ..... ***Heterhelus*** Jacquelin du Val, 1858

5 Dorsal pronotal disc surface with sparse punctures, and sparsely covered with short setae (Fig. 2E). Pronotum narrower than elytra at base; posterior angles obtuse (Fig. 10H); hind margin straight. ..... ***Brachypterus*** Kugelann, 1794

– Dorsal pronotal disc surface with dense punctures, and densely covered with long setae (Fig. 2F). Pronotum as wide as elytra at base; posterior angles angulate (Fig. 11F); hind margin sinuate. ..... ***Brachypterolus*** Grouvelle, 1913

Genus *Kateretes* Herbst, 1793

Type species. *Dermestes pedicularius* Linnaeus, 1758, subsequent designation by Hope (1840).

Diagnosis. Body oval, rather flattened. Pronotum transverse; disc with coarse large punctures, larger than eye facet; posterior angles rounded; basal margin nearly straight or with slight curvature. Male abdominal tergite VIII concealed, narrowing at apex. Tarsal claws simple. Ovipositor with short styli.

Bionomics. Members are often attracted to the flowers of *Carex* (Cyperaceae) and *Juncus* (Juncaceae) (Jelínek & Cline 2010).

Distribution. Ten species belonging to this genus are distributed in the Palaearctic Region (see Hisamatsu 1985, S-T. Hisamatsu 2006, Jelínek & Audisio 2007), except *K. ornatus* Jelínek, 1978, which is distributed in the Oriental Region (India) (Jelínek 1978), and *K. scissus* Parsons, 1943 from the Nearctic region (Parsons 1943).

Note. Palaearctic species were treated by several authors (Kirk-Spriggs 1996, Spornraft 1967, Kirejtshuk 1992, Audisio 1993). Japanese species were studied by S-T. Hisamatsu (2006). The North American species is currently being revised, along with the other Kateretidae fauna of the region (Cline & Audisio, pers. comm.).

Key to Japanese *Kateretes* species

1. Scape of male antennae enlarged, robust (Fig. 4D). Body bicolored, black and ochreous. Distribution: Japan (Hokkaido). ..... ***K. takagii*** S-T. Hisamatsu, 2006
– Scape of male antennae elongate (Fig. 3G). Body unicolored, luteous. Distribution: Japan (Honshû). ..... ***K. japonicus*** Hisamatsu, 1985

Kateretes japonicus Hisamatsu, 1985

(Figs. 1A–B, 3)

Kateretes japonicus Hisamatsu, 1985: 177, pl. 28, f. 1. **Type locality:** Japan, Gunma Prefecture., Mt. Tanigawa.
Kateretes japonicus: S-T. Hisamatsu (2006: 243) [redescription]; Jelínek & Audisio (2007: 458) [catalogue].

Type material examined. Holotype (EUM): ♂, 'Mt. Tanigawa / Gunma Pref. / Aug. 1. 1956 / S. Hisamatsu // HOLOTYPE / Cateretes / japonicus / Hisamatsu'. Paratypes (EUM): 1 ♂, Mt. Tanigawa, Gunma Pref., 1.viii.1956, S. Hisamatsu leg.; 4 ♀♀, Mt. Tanigawa, Gunma Pref., 2.vii.1950, S. Hisamatsu leg.; 1 ♂, Towada, Hiraka-chô, 16.vii.1957, K. Shimoyama leg.; 1 ♂, Kuzukawa, Hiraka-chô, 5.vii.1957, K. Shimoyama leg.
Additional material examined. JAPAN: Nagano: 2 ♀♀, Kamikouchi~Tokugo, 31.vii.1959, M. Miyatake leg.; 41 ♂♂ 47 ♀♀, Tokugo Pass, 1.viii.1970, K. Hatta leg. (EUM).

Diagnosis. Body coloration uniformly reddish-yellow (Fig. 1A). Scape of male antennae strongly enlarged and elongate (Fig. 3G). Prosternal process subparallel-sided. Protibiae 2.40–2.79 times as long as wide (n = 11).

Redescription. Length 1.8–2.4 mm (2.4 mm in holotype).

Male. Body (Fig. 1A) oval, rather flattened, shining, covered with sparse yellowish setae. Coloration uniformly reddish-yellow.

Head densely punctate, punctures larger than eye-facet, separated by < 1 diameter; interspaces slightly reticulate or smooth. Frontoclypeal suture incomplete, short and deep. Front margin of clypeus with medial arcuate emargination. Mandibles strongly angled toward midli-

ne. Antennae (Fig. 3G) stout, 1.32–1.44 times as long as HW (n = 3); scape strongly enlarged and elongate; pedicel enlarged, pyriform to spherical; approximate ratio of each segment (n = 1) is 3.21 : 2.14 : 1.86 : 1.29 : 1.43 : 1.21 : 1.29 : 1.00 : 1.50 : 1.57 : 2.29.

Pronotum (Fig. 3H) convex, strongly transverse, 1.66–1.70 times as wide as long (n = 3); lateral margins feebly serrate, widest at basal 1/3 then converging both anteriorly and posteriorly; anterior angles not prominent; posterior angles broadly rounded; anterior margin nearly straight or with slight curvature, not bordered; basal margin bordered; punctures on disc about as large as those on head, densely distributed, separated by ≤ 1 diameter; interspaces slightly reticulate. Scutellum subtriangular, apex rounded.

Elytra conjointly 1.07–1.08 times as long as wide (n = 3), 1.87–1.94 times as long as pronotum (n = 3), subparallel-sided; punctures on disc dense, slightly larger and denser than those on pronotum; interspaces smooth. Abdominal tergite VI partially obscured by elytra. Abdominal tergite VII fully exposed, apex rounded. Abdominal tergite VIII not externally visible.

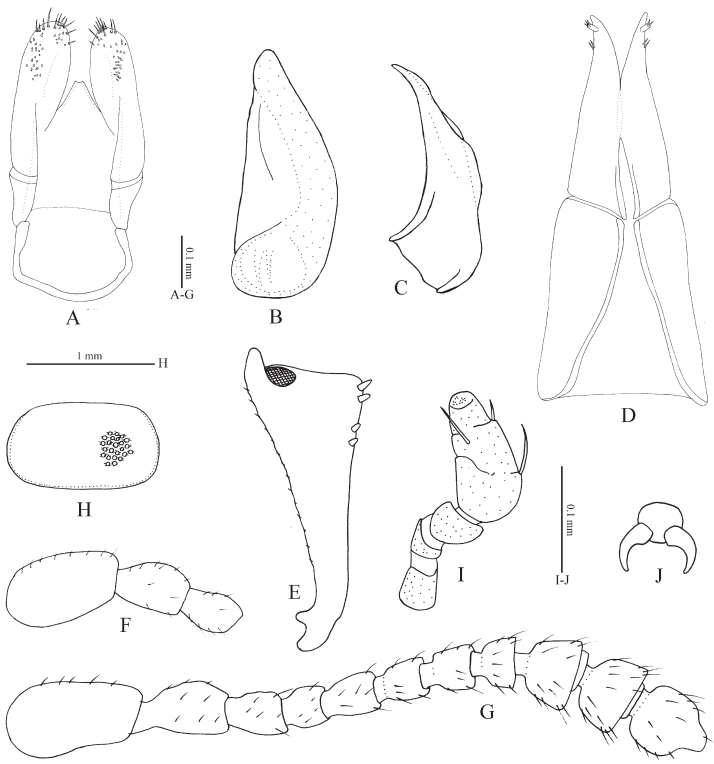

Fig. 3. *Kateretes japonicus* Hisamatsu, 1985. A – tegmen (ventral view); B – median lobe (ventral view); C – median lobe (lateral view); D – ovipositor; E – right protibia; F – right antenna of female (segments 1–3); G – right antenna of male; H – pronotum; I – left maxillary palpus; J – tarsal claw (right foreleg). A–J = Nagano Pref., Tokugo Pass.

Prosternum (excluding prosternal process) slightly shorter than greatest width of protibia, 0.41 times as long as mesoventrite, 0.29 times as long as metaventrite (n = 1); prosternal process slender, subparallel-sided. Metaventrite convex, metathoracic discrimen only in basal 1/3; disc densely punctate, punctures smaller than those on head. Inter-mesocoxal distance separated by 3.07 times width of inter-procoxal distance. Inter-metacoxal distance separated by 6.57 times width of inter-procoxal distance. Abdominal sternites shining; approximate ratio of length of abdominal sternites III–VII (n = 1) is 2.94 : 1.00 : 1.06 : 1.56 : 1.69. Legs flattened; protibiae (Fig. 3E) rather short, 2.40–2.79 times as long as wide (n = 11); claws (Fig. 3J) more or less expanded at base.

Male genitalia weakly sclerotized; tegmen with parameres (Fig. 3A) symmetrical, wide and long (L : W = 2.17); median lobe (Fig. 3B, 3C) slender, slightly arcuate inward in lateral aspect.

Female. First and second segment of antennae (Fig. 3F) not strongly enlarged. Ovipositor (Fig. 3D) with coxites deeply incised at apex with slightly outcurved lobes, styli short but distinct.

Bionomics. This species is associated with flowers of *Veratrum album* L. subsp. *oxysepalum* (Turcz.) Hultén (Melanthiaceae). According to the label data, 88 specimens were collected from flowers at the same time. In spite of that, I cannot hypothesize *Veratrum album* subsp. *oxysepalum* as the host plant, as the species may only be an adult feeding plant. Similar case is known for the European *Kateretes pedicularius* (Linnaeus, 1758) which larva develops in flowers of *Carex* (Cyperaceae) in the spring (April–May), but the adults feed on flowers of *Filipendula ulmaria* (L.) Maxim. (Rosaceae) in the high and late summer (July–September) (Jelínek, pers. comm.).

Distribution. Japan (Honshû) (Hisamatsu 1985).

Kateretes takagii S-T. Hisamatsu, 2006

(Figs. 1C–D, 4)

Kateretes takagii S-T. Hisamatsu, 2006: 245. Type locality: Japan, Hokkaido, Kitami, Piashiri moore.

Type material examined. Holotype (EUM): ♂, '♂ // [HOKKAIDO] / Piasiri moore / Kitami, 4.viii.1972 / S. Takagi // HOLOTYPE / Kateretes / takagii / S-T. Hisamatsu / 2006'. Paratypes (EUM): 9 ♂♂ 4 ♀♀, Piasiri moore, Kitami, Hokkaido, 4.vii.1972, S. Takagi leg.

Diagnosis. Body coloration black; antennae, mouthparts, clypeus, explanate lateral margins of pronotum, elytra (except for black obtriangular patches from humerus to basal 1/2 of suture), and legs reddish brown (Fig. 1C). Scape of male antennae strongly enlarged and widest at middle (Fig. 4D). Prosternal process narrowing to apex. Protibiae 2.83–3.02 times as long as wide (n = 4).

Redescription. Length 2.2–2.6 mm (2.6 mm in holotype).

Male. Body (Fig. 1C) oval, rather flattened, strongly shininging, sparsely covered with yellowish setae. Coloration black; antennae, mouthparts, clypeus, explanate lateral margins of pronotum, elytra (except for black obtriangular patches from humerus to basal 1/2 of suture), and legs reddish brown.

Head densely punctate, punctures larger than eye facet, separated by < 1 diameter; interspaces finely reticulate. Frontoclypeal suture incomplete, distinctly visible. Front margin of

clypeus with medial arcuate emargination. Labrum broadly notched at middle. Mandibles strongly bent inward. Antennae (Fig. 4D) stout, 1.56 times longer than HW (n = 1); scape strongly enlarged, widest at middle; pedicel moderately enlarged, pyriform to spherical; approximate ratio of each segment (n = 1) is 3.71 : 2.00 : 1.71 : 1.29 : 1.14 : 1.29 : 1.14 : 1.00 : 1.43 : 1.43 : 2.14.

Pronotum strongly transverse, 1.65–1.81 times as wide as long (n = 3); lateral margins narrowly explanate, weakly serrate, widest at basal 1/3; anterior angles not prominent; posterior angles broadly rounded; anterior margin nearly straight or with slight curvature, not bordered; basal margin bordered; punctures on disc about as large as those on head, separated by ≤ 1 diameter; interspaces finely reticulate.

Elytra conjointly 1.10–1.16 times as long as wide (n = 3), 1.97–2.09 times as long as pronotum (n = 3), subparallel-sided; punctures on disc larger and denser than those on pronotum; interspaces smooth. Abdominal tergite VI partially obscured by elytra. Abdominal tergite VII fully exposed, apex rounded. Abdominal tergite VIII not externally visible.

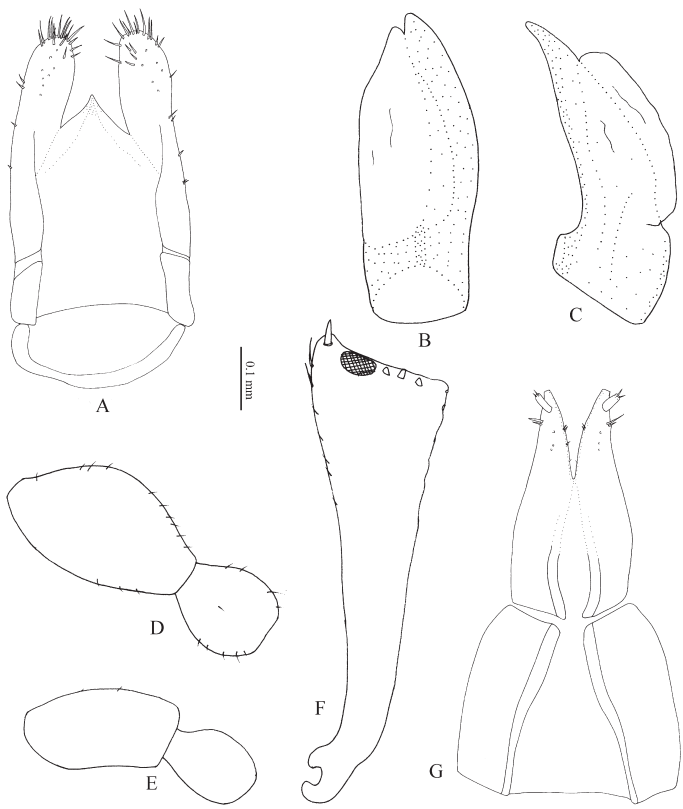

Fig. 4. *Kateretes takagii* S-T. Hisamatsu, 2006. A – tegmen (ventral view); B – median lobe (ventral view); C – median lobe (lateral view). D–E – antennal segments 1–2 (lateral view): D – male, E – female. F – right protibia; G – ovipositor. A–G = Hokkaido, Piasiri moore.

Prosternum (excluding prosternal process) slightly shorter than greatest width of protibia, 0.46 times as long as mesoventrite, 0.33 times as long as metaventrite (n = 1); prosternal process slender, narrowing to apex. Mesoventrite depressed below the level of the metaventrite, rugose, unpunctate. Metaventrite convex, metathoracic discrimen only in basal 1/3; disc slightly rugose, covered with sparsely setae; punctures on disc sparse, apparently smaller than those on head, separated by 2 to 3 times a diameter. Inter-mesocoxal distance separated by 2.31 times width of inter-procoxal distance. Inter-metacoxal distance separated by 5.77 times width of inter-procoxal distance. Abdominal sternites shining; approximate (n = 1) of length of abdominal sternites III–VII (n = 1) is 2.88 : 1.13 : 1.00 : 1.63 : 2.38. Legs flattened; tibiae dilated apically; protibiae (Fig. 4F) 2.83–3.02 times as long as wide (n = 4); tarsal claws more or less expanded at base.

Male genitalia sclerotized; tegmen (Fig. 4A) with parameres symmetrical, wide and long (L : W = 2.12 (n = 1)), interparameral lobe sclerotized, sharply pointed; apex of median lobe (Fig. 4C) moderately curved inward in lateral aspect.

Female. Antennal segments I–II less strongly enlarged than those of male. Ovipositor similar in shape to *K. japonicus*, styli distinct.

Bionomics. Unknown.

Distribution. Japan (Hokkaido) (S-T. Hisamatsu 2006).

Genus *Platamartus* Reitter, 1892

Type species. *Platamartus jakowlewi* Reitter, 1892, by monotypy.

Diagnosis. Body elongate oval, flattened. Male antennae distinctly longer than those of female. Pronotum transverse, lateral margins distinctly serrate; disc with coarse and large punctures, larger than eye facet; posterior angles prominent; anterior angles not prominent; basal margin nearly straight or with slight curvature. Prosternum (excluding prosternal process) longer than mesoventrite. Male abdominal tergite VIII externally visible. Legs long and slender; tarsal claws simple. Ovipositor with short styli.

Bionomics. *Platamartus jakowlewi* was collected from flowers of *Carex dispalata* Boott (Cyperaceae) (see Bionomics under *P. jakowlewi*).

Distribution. Species are known from the Russian Far East and are represented by two species (Kirejtshuk 1992).

Note. Siberian species were studied by Kirejtshuk (1992).

Platamartus jakowlewi Reitter, 1892

(Figs. 1E–F, 5)

Platamartus jakowlewi Reitter, 1892: 151. **Type locality:** Ostsibirien [= East Siberia].
Platamartus jakowlewi: Jelínek & Audisio (2007: 458) [catalogue].

Material examined. JAPAN: Ibaraki: 1 ♀, Okami–Satomi, 28.v.1988, Y. Hirano leg. **Tochigi:** 2 ♂♂ 4 ♀♀, Watarase-yûsuichi, Fujioka-chô, 26.iv.2006, H. Ohkawa leg.; 2 ♂♂ 12 ♀♀, Watarase-yûsuichi, Fujioka-chô, 24.–25.iv. 2010, S-T. Hisamatsu leg.; 1 ♂ 2 ♀♀, Watarase-yûsuichi, Fujioka-chô, 24.iv.2010, T. Kurihara leg. **Gunma:** 1 ♀, Morinji-numa, Tatebayashi City, 22.–27.iv.2006, H. Ohkawa leg. (EUM).

Diagnosis. Body coloration black; mouthparts and legs reddish brown; in male, antennal segments 1–3 reddish-brown and segments 4–8 gradually becoming darker apicad, in female

antennal segments 1–8 reddish-brown; antennal club black in both sexes. Abdominal sternites III–V with tuft of setae in the middle.

Redescription. Length 2.5–3.5 mm.

Male. Body (Fig. 1E) elongate oval, rather flattened, strongly shining; dorsal disc with a long, grayish-yellow setae. Coloration black; mouthparts and legs reddish-brown; antennal segments 1 to 3 reddish-brown; segments 4–8 gradually becoming darker toward apical segments; segments 9–11 black.

Head densely punctate, punctures on disc larger than eye-facet, separated by < 1 diameter; interspaces finely reticulate. Frontoclypeal suture incomplete, faintly visible. Front margin of clypeus with medial arcuate emargination. Labrum broadly notched at middle. Mandibles slightly bent inward. Antennae elongate, 2.25 times as long as HW (n = 2); approximate ratio of each segment (n = 1) is 2.50 : 1.00 : 1.70 : 1.40 : 1.50 : 1.40 : 1.30 : 1.20 : 1.20 : 1.20 : 1.50.

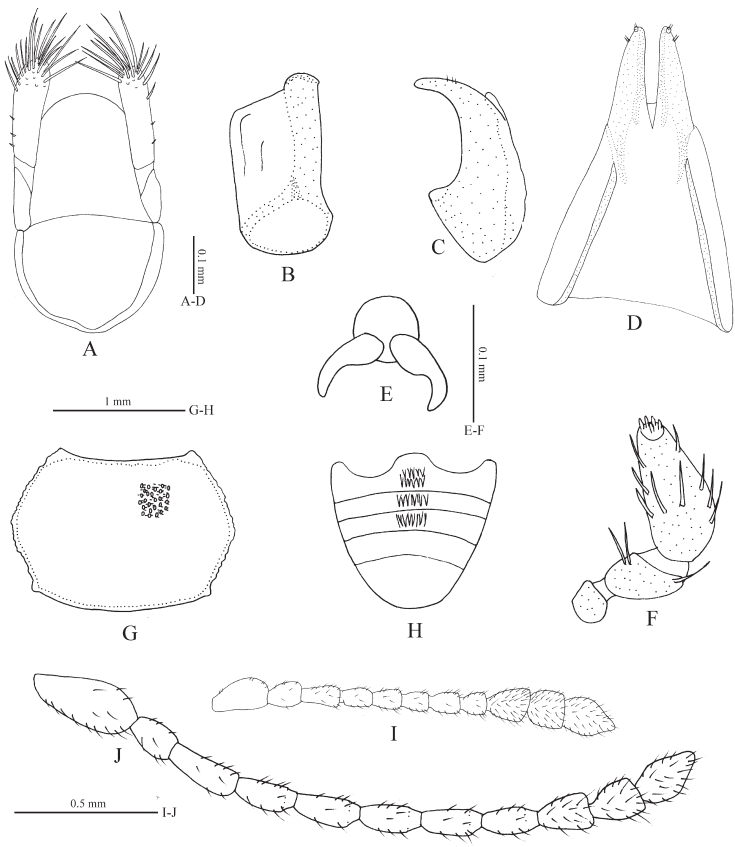

Fig. 5. *Platamartus jakowlewi* Reitter, 1892. A – tegmen (ventral view); B – median lobe (ventral view); C – median lobe (lateral view); D – ovipositor; E – tarsal claw of right foreleg; F – left maxillary palpus; G – pronotum; H – abdominal sternites; I – right antenna, female; J – ditto, male. A–J – Tochigi Pref., Watarase-yûsuichi.

Pronotum transverse, 1.40–1.41 times as wide as long (n = 2); lateral margins explanate, distinctly serrate, strongly projecting at mid-length, then abruptly converging both anteriorly and posteriorly; anterior corner rounded; posterior corner sharply prominent; anterior margin nearly straight or with slight curvature, clearly bordered; basal margin gently arcuate, distinctly bordered; punctures on disc about as large as those on head, separated by ≤1 diameter; interspaces reticulate.

Elytra conjointly 1.03–1.11 times as long as wide (n = 2), 1.60–1.72 times as long as pronotum (n = 2), widest at mid-length; punctures on disc larger and denser than those on pronotum, separated by <1 diameter; interspaces smooth. Abdominal tergite VI partially exposed. Abdominal tergite VII fully exposed, apex truncate. Abdominal tergite VIII externally visible.

Prosternum (excluding prosternal process) remarkably long, 1.20 times as long as mesoventrite (n = 1), 0.81 times as long as metaventrite (n = 1); prosternal process subparallel-sided. Mesoventrite feebly depressed below the level of the metaventrite, apical margin between inter-mesocoxa straight. Metaventrite convex, shining, metathoracic discrimen in basal 1/2; disc with sparse punctures, separated by 1-2 diameter at middle, punctures on disc becoming denser laterally. Inter-mesocoxal distance separated by 2.50 times width of inter-procoxal distance. Inter-metacoxal distance separated by 2.83 times width of inter-procoxal distance. Abdominal sternites III–V (Fig. 5H) with tuft of setae in middle; approximate ratio of length of abdominal sternites III–VII (n = 1) is 2.14 : 1.00 : 1.00 : 1.57 : 3.05. Legs long and slender; base of tarsal claws (Fig. 5E) more or less enlarged.

Male genitalia sclerotized; tegmen (Fig. 5A) with parameres asymmetrical, bearing long setae at apex; interparameral lobe broadly rounded; apex of median lobe (Fig. 5C) bluntly rounded in lateral aspect.

Female. Antennal flagella reddish-brown, club black; antennae (Fig. 5I) distinctly shorter than those of male, 1.25–1.40 times as long as HW (n = 3); approximate ratio of each segment (n = 1) is 2.30 : 1.40 : 1.60 : 1.40 : 1.10 : 1.10 : 1.10 : 1.00 : 1.70 : 1.60 : 2.10. Apical margin of abdominal tergite VII rounded. Ovipositor (Fig. 5D) deeply bifid, styli small.

Variability. Kirejtshuk (pers. comm.) notes that the tufts of setae on abdominal sternites III–V are frequently reduced in Siberian specimens.

Bionomics. This species was collected from the flowers of *Carex dispalata* Boott (Cyperaceae), and in syntopy with *Sibirhelus corpulentus* in spring.

Distribution. Japan (Honshû), new record; Russia (East Siberia) (Jelínek & Audisio 2007).

Genus *Heterhelus* Jacquelin du Val, 1858

Type species. *Cercus sambuci* Erichson, 1843 (= *Heterhelus scutellaris* (Heer, 1841)) (original designation).

Diagnosis. Body oval, convex dorsally. Pronotum transverse, projecting at mid-length or uniformly rounded lateral margins; disc with punctures smaller than eye facet; posterior angles obtusely angulate; basal margin nearly straight or with slight curvature. Male abdominal tergite VIII externally visible. Tarsal claws simple. Ovipositor with long or short styli.

Bionomics. Inclusive species are associated with *Sambucus* (Spornraft 1967, Kirk-Spriggs 1996, Audisio 1993, Jelínek & Cline 2010).

Distribution. Seven species are known worldwide. They are distributed in the Nearctic, Palaearctic, and Oriental Regions (S-T. Hisamatsu & Lee 2007, Jelínek & Cline 2010).
Note. Palaearctic species were treated by several authors (Spornraft 1967, Kirejtshuk 1992, Audisio 1993, Kirk-Spriggs 1996). Nearctic species were studied by Parsons (1943), and are currently under revision (Cline & Audisio, pers. comm.). *Boreades* Parsons, 1943 was synonymized under *Heterhelus* (Audisio 1993, Jelínek & Audisio 2007). S-T. Hisamatsu & Lee (2007) described *Taiwanoheterhelus* S-T. Hisamatsu & Lee, 2007 as a subgenus of *Heterhelus*, and treated *Boreades* as a valid subgenus of *Heterhelus* as well.

Key to subgenera and species of Japanese *Heterhelus*

1 Labrum shallowly notched. Antenna with distinct 3-segmented club (Fig. 8E). Pronotum strongly convex. Parameres of male genitalia abruptly bent inward at mid-length (Fig. 8A). Head dark brown, always darker than elytra. Subgenus ***Boreades*** Parsons, 1943. .. .. ***H. (B.) solani*** (Heer, 1841)
– Labrum deeply notched. Antenna with indistinct 3-segmented club (Figs. 6O, 7D). Pronotum feebly convex. Parameres of male genitalia regularly arcuate inwards (Figs. 6A, 6D, 7A, 7E). Head always the same color as elytra. Subgenus ***Heterhelus*** Jacquelin du Val, 1858 2
2 Body uniformly black; sides of pronotum regularly arcuate, never angulate; parameres of male genitalia short and wide (LP/WP = 2.1 (n = 1)) (Figs. 7A, 7E); apex of median lobe bluntly rounded in lateral aspect (Figs. 7C, 7F); base of ovipositor pigmented (Fig. 7G). ..... ***H. (H.) morio*** (Reitter, 1878)
– Body reddish-yellow to blackish; sides of pronotum regularly arcuate or strongly angulate; parameres of male genitalia long and slender (LP/WP = 3.1 (n = 1)) (Figs. 6A, 6D); apex of median lobe sharply acuminate in lateral aspect (Figs. 6C, 6E); base of ovipositor not pigmented (Fig. 6F). ..... ***H. (H.) scutellaris*** (Heer, 1841)

Subgenus *Heterhelus* Jacquelin du Val, 1858 sensu stricto

Heterhelus (*Heterhelus*) *scutellaris* (Heer, 1841)

(Figs. 1G–H, 6)

Cateretes scutellaris Heer, 1841: 412. **Type locality:** Martygni im Wallis [Switzerland].

Heterhelus scutellaris: Ganglbauer (1899: 451) [redescription]; Reitter (1911: 13) [in key]; Grouvelle (1913: 15) [catalogue]; Spornraft (1967: 23) [in key]; Audisio (1980: 20) [in key]; Audisio (1993: 814) [redescription, note]; Kirejtshuk (1992: 214) (partim) [in key]; Jelínek & Audisio (2007: 458) (partim) [catalogue].

Heterhelus (*Heterhelus*) *scutellaris*: S-T. Hisamatsu & Lee (2007: 384) [list].

Cercus sambuci Erichson, 1843: 229. **Type locality:** Germany. Synonymized by Gangbauer (1889: 451) with *Cateretes scutellaris* Heer.

Cercus sambuci: Erichson (1845: 127) [redescription, note]; Sturm (1844: tab. CCLXXXIX, fig. c. C) [figure]; Sturm (1845: 9) [redescription, note]; Redtenbacher (1849: 162) [in key]; Redtenbacher (1858: 323) [in key].

Cercus (*Heterhelus*) *sambuci*: Murray (1864: 234) [redescription, note]; Marseul (1885: 24) [redescription].

Cercus (*Heterhelus*) *longipennis* Murray, 1864: 234. **Type locality:** Dauria meridionalis [= Russia, Transbaikalia]. Synonymized by Kirejtshuk (1989: 146) with *Cateretes scutellaris* Heer.

Cercus (*Heterhelus*) *longipennis*: Marseul (1885: 25) [redescription]; Kirejtshuk (1989: 146) [lectotype designation and synonymy].
Cercus longipennis: Gemminger & Harold (1868: 803) [catalogue].
Heterhelus longipennis: Grouvelle (1913: 15) [catalogue].
Amartus (*Heterhelus*) *japonicus* Reitter, 1878: 166. **Type locality:** Japonia [= Japan]. Synonymized by Kirejtshuk (1989: 146) with *Cateretes scutellaris* Heer.
Amartus (*Heterhelus*) *japonicus*: Kirejtshuk (1989: 146) [lectotype designation and synonymy].
Heterhelus japonicus: Reitter (1884: 258) [in key]; Reitter (1885: 104) [list]; Grouvelle (1913: 15) [catalogue]; Hayashi (1978: 4) [description of larva].
Amartus (*Heterhelus*) *angusticollis* Reitter, 1878: 167. **Type locality:** Japonia [= Japan]. Synonymized by Hisamatsu (1979: 247) with *Amartus* (*Heterhelus*) *japonicus* Reitter.
Amartus (*Heterhelus*) *angusticollis:* Hisamatsu (1979: 247) [synonymy].
Heterhelus angusticollis: Reitter (1884: 258) [in key]; Reitter (1885: 104) [list]; Grouvelle (1913: 15) [catalogue]; Jelínek & Audisio (2007: 458) [catalogue].

Type material examined. *Amartus* (*Heterhelus*) *japonicus*: Lectotype: ♂ (ZMHB): '♂ // Amartus / japonicus n. sp. // Lectotypus Heterhelus / japonicus (Reitt.) / design. Kirejtshuk 1986 // Heterhelus / solani Heer / A. G. Kirejtshuk det. 1999'. Paralectotypes (ZMHB): 2 ♂♂, no locality labels.
Additional material examined. CZECH REPUBLIC: Bohemia: 2 ♂♂ 4 ♀♀, Čelákovice, 9.v.1959, J. Jelínek leg. **AUSTRIA:** 1 ♂, Wolfsberg, vii.1911, Gustav Schaaff leg. **RUSSIA: Far East:** 1 ♂ 1 ♀, Vladivostok, Sib.[eria] or., Jureček and Hedviga Jurečková leg. **JAPAN: Hokkaido:** 4 ♂♂ 1 ♀, Hitsujigaoka, Sapporo, 11.v.1995, K. Ishida leg.; 1 ♂, Sôunkyo, 17.vii.1970, M. Sakai leg.; 1 ♀, Shakotan, 23.vi.1986, M. Sakai leg. **Aomori:** 110 ♂♂ 182 ♀♀, Nakasato, Kitatsugaru-gun, 30.v.1966, A. Abe leg.; 12 exs., Juniko, Nishitsugaru-gun, 22.vi.1966, A. Abe leg.; 1 ♂ 1 ♀, Towada, 9.vi.1958, K. Shimoyama leg. **Yamagata:** 2 exs., Sakata, 18.v.1936, K. Suzuki leg. **Miyagi:** 11 ♂♂ 5 ♀♀, Kamoshika spa, Mt. Zaô, 29.v.1971, H. Taguchi leg. **Niigata:** 4 exs., Kurokawa, 15.iv.1959, K. Baba leg.; 3 exs., Noo, 20.iv.1959, K. Baba leg. **Nagano:** 1 ex., Kamikôchi, 30.vii.1959, M. Miyatake leg. **Gunma:** 1 ex., Numata, 10.v.1950, T. Takei leg. **Yamanashi:** 1 ex., Fuji-rindô, 7.–8.vi.1980, Y. Notsu leg. **Tokyo:** 31 exs., Mt. Takao, 1.v.1960, S. Hisamatsu leg.; 2 exs., Asakawa, 4.v.1953, S. Hisamatsu leg.; 10 ♂♂ 8 ♀♀, Izu-ôshima, 3.–4.v.1979, Y. Notsu leg.; 16 ♂♂ 19 ♀♀, Izu-ôshima, 17.iv.1974, Y. Furuki leg. **Kanagawa:** 2 ♂♂ 1 ♀, Mt. Takatori, 14.iv.1951, H. Hattori leg.; 1 ex., Mt. Ôama, 2.v.1965, R. Kiryu leg. **Shiga:** 1 ♀, Mt. Hira, 3.vi.1957, T. Shibata leg. **Mie:** 1 ♂, Mt. Oike, 22.iv.1956, M. Satô leg. **Hyôgo:** 37 exs., Mt. Senzan, Sumoto, 15.iv.1971, M. Tomokuni leg. **Shimane:** 4 ♂♂ 5 ♀♀, Shimoyamasa, Hirose-chô, Nogi-gun, 8.viii.1980, Y. Seiyama leg. **Yamaguchi:** 36 ♂♂ 69 ♀♀, Mt. Shizukisan, Hagi, 23.iv.1970, S. Hisamatsu leg. **Ehime:** 33 ♂♂ 24 ♀♀, Mt. Akaboshi, 5.v.1966, S. Hisamatsu leg.; 3 ♂♂ 5 ♀♀, Komenono, 19.–24.iv.1977, A. Oda leg.; 9 ♂♂ 14 ♀♀, Omogokei, 23.iv.1972, S. Hisamatsu leg.; 6 exs., Uwajima, 23.iii.1958, F. Takechi leg. **Tokushima:** 40 ♂♂ 39 ♀♀, Mt. Tsurigi, 6.vi.1970, S. Hisamatsu leg. **Fukuoka:** 3 exs., Inunaki pass, 29.iv.1968, M. Iga leg. **Nagasaki:** 1 ♀, Sasuna-Shûshi, Tsushima, 14.iv.1941, T. Shirôzu leg.

Diagnosis. Body coloration fully reddish-yellow to dark brown except reddish brown mouthparts, antennae and legs. Antennae with almost 2-segmented club. Lateral margins of pronotum variable in shape; distinctly projecting at mid-length or uniformly rounded. Abdominal sternite VII rather long, W7/L7 = 2.29, n = 4). Parameres of male genitalia slender and long (LP/WP = 3.10 (n = 1)); apex of median lobe (Figs. 6C, 6E) sharply acuminate in lateral aspect. Ovipositor of female genitalia unpigmented in basal part, with long styli.
Redescription. Length 2.2–3.1 mm.

Male. Body (Fig. 1G) oval, convex, dully shining, covered with whitish or yellowish setae. Coloration variable, fully reddish-yellow to dark brown except reddish brown mouthparts, antennae and legs.

Head densely punctate, punctures on disc smaller than eye-facet, separated by < 1 diameter; interspaces finely reticulate. Frontoclypeal suture incomplete, distinctly visible. Front

margin of clypeus with medial arcuate emargination. Labrum broadly arcuate. Mandibles moderately bent inward. Antennae (Fig. 6O) 1.12–1.16 times longer than HW (n = 6), with club indistinctly 3-segmented (appearing 2-segmented); approximate ratio of each segment (n = 1) is 2.38 : 1.81 : 1.69 : 1.25 : 1.19 : 1.06 : 1.06 : 1.00 : 1.19 : 1.75 : 2.25.

Pronotum (Figs. 6H–N) convex, transverse, variable in shape (see 'Variability' section below), 1.41–1.54 times as wide as long (n = 10); anterior corner slightly prominent; anterior margin unbordered; basal margin indistinctly bordered, moderately sinuate before obtusely

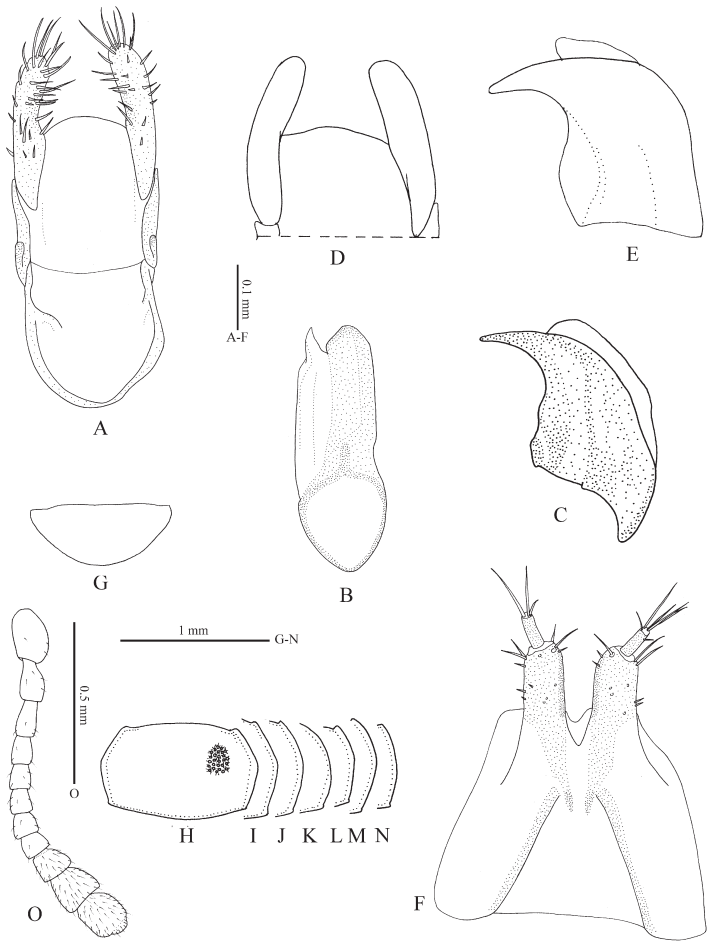

Fig. 6. *Heterhelus* (*Heterhelus*) *scutellaris* (Heer, 1841). A – tegmen (ventral view); B – median lobe (ventral view); C – median lobe (lateral view); D – parameres of the lectotype of *H. japonicus*; E – median lobe of the lectotype of *H. japonicus* (lateral view); F – ovipositor; G – male abdominal sternite VII; H–N – variation of pronotum (H – Hokkaido; I – Aomori; J – Niigata; K – Tokyo; L – Yamaguchi; M – Ehime; N – Fukuoka); O – male right antenna. A, B, C, G, O = Hokkaido, Hitsujigaoka; F = Ehime Pref., Omogokei.

angulate posterior corners; lateral margins narrowly explanate, feebly serrate; punctures on disc similar in size to those on head; interspaces finely reticulate.

Elytra conjointly 1.08–1.18 times as long as wide, 1.96–2.18 times as long as pronotum; punctures on disc larger and shallower than those on pronotum; interspaces smooth. Abdominal tergite VI partially obscured by elytra. Abdominal tergite VII fully exposed, apex truncate. Abdominal tergite VIII externally visible.

Prosternum (excluding prosternal process) 0.37 times as long as mesoventrite (n = 1) 0.28 times as long as metaventrite (n = 1); prosternal process slender, subparallel-sided. Metaventrite convex, shining, densely covered with whitish or yellowish setae; metathoracic discrimen in basal 1/2; punctures on disc distinctly smaller than those on head, separated by one diameter at middle, becoming denser laterally. Inter-mesocoxal distance separated by 1.45 times width of inter-procoxal distance. Inter-metacoxal distance separated by 2.52 times width of inter-procoxal distance. Abdominal sternites shining; approximate ratio of length of abdominal sternites III–VII (n = 1) is 2.64 : 1.00 : 1.00 : 1.79 : 2.21; abdominal sternite VII rather long (W7/L7 = 2.29, n = 4). Legs flattened; protibiae rather slender and short, shorter than HW; tarsal claws simple.

Male genitalia with parameres (Figs. 6A, 6D) asymmetrical, slender and long (LP/WP = 3.10 (n = 1)); parameres regularly arcuate inward, bearing long setae; apex of median lobe (Figs. 6C, 6E) sharply acuminate in lateral aspect; interparameral lobe broadly rounded.

Female. Coloration rarely becoming fully black (see 'Coloration' subsection below within 'Variability' section). Apical margin of abdominal tergite VII rounded. Ovipositor deeply notched at apex, with long styli.

Variability. This species expresses variation in body coloration and shape of pronotal sides. A total of 849 Japanese specimens were examined to verify species limits and phenotypic plasticity.

Coloration. Dorsal body surface of males (n = 361) appears reddish brown. Females (n = 488) appear largely reddish brown to rarely fully black.

Lateral margins of pronotum (Figs. 6H–N). Margins distinctly projecting at mid-length in specimens from northern Japan (Hokkaido and Tohoku regions), becoming more rounded in specimens from western Japan (western areas of Honshû, Shikoku, and Kyûshû regions).

Bionomics. This species is dependent on *Sambucus* (Caprifoliaceae) plants for larval development. Adults feed on pollen and petals, and larvae develop inside the ovaries where they feed on seeds. Adults also aggregate on flowers of *Spiraea* (Rosaceae), Fagaceae (Audisio 1993) and *Magnolia kobus* DC. var. *borealis* Sarg. (Magnoliaceae) in Japan (Ishida 1996).

Their life cycle was reported by Hayashi (1977). According to his observations in Kanagawa Prefecture, Japan, *H. scutellaris* was common in lowlands, while many populations of *H. morio* were observed in highland areas. In April, adults gather at flowers of *Sambucus racemosa* L. subsp. *sieboldiana* (Miq.) H. Hara (Caprifoliaceae) in synchrony with flowering events. Subsequently, they mate and lay eggs on the flowers. Hatching larvae burrow into the ovaries until seeds mature a few days later, and then they burrow into the seed. Larvae continue to grow until the last instar larvae (probably 3rd instar) within a seed. Although, *Sambucus racemosa* subsp. *sieboldiana* had three seeds in an ovary, the larva burrowed into only one seed, and never burrowed into the other two seeds. In mid May, when ovaries ripen into fruit, the larvae bore an

exit hole, drop to the ground, and burrow into the soil where they pupate. Adults eclose around mid June, but remain in earthen chambers until the following April. Of the three hundred fruits that were investigated, only forty-two possessed emerging larvae (Hayashi 1977).

Distribution. Japan (Hokkaido, Honshû, Shikoku, Kyûshû); Europe, Russia (East Siberia, Far East) and Mongolia (Hisamatsu 1985, Jelínek & Audisio 2007).

Note. The holotype of *Heterhelus scutellaris* was not examined, however, a series of Palaearctic specimens identified by European specialists was utilized for this revision. Herein, I follow Kirejtshuk's opinion that *Heterhelus japonicus* is a junior synonym of *Heterhelus scutellaris*.

Heterhelus angusticollis was synonymized with *H. scutellaris* by Hisamatsu (1979), but no reason for the synonomy was given. Jelínek & Audisio (2007) listed *Heterhelus angusticollis* in their catalogue as a valid species. The holotype of *H. angusticollis* could not be examined for this study, therefore the species remains enigmatic for the author. However, based on the original description, this species seems to be junior synonym of *H. scutellaris*. Location and study of the types for both species is needed to clarify the taxonomic position of *H. angusticollis*.

Heterhelus (*Heterhelus*) *morio* (Reitter, 1878)

(Figs. 2A–B, 7)

Amartus (*Heterhelus*) *morio* Reitter, 1878: 166. **Type locality:** Japonia [= Japan]. Lectotype designated by Kirejtshuk (1989: 146).

Heterhelus morio: Reitter (1884: 258) [in key]; Reitter (1885: 104) [list]; Grouvelle (1913: 15) [catalogue]; Hisamatsu (1985: 177, pl. 28, fig. 3) [note, photo].

Heterhelus scutellaris: Kirejtshuk (1989: 146) (partim) [note]; Kirejtshuk (1992: 214) (partim) [in key].

Type material examined. Lectotype: ♂, (ZMHB): '♂ // Amartus / morio m. m. sp // Lectotypus Heterhelus / morio (Reitter) / design. Kirejtshuk 1981'. Paralectoypes: 2 ♂♂ 3 ♀♀, no locality labels.

Additional material examined. JAPAN: Aomori: 1 ♂ 1 ♀, Juniko, Nishitsugaru-gun, 22.vi.1966, A. Abe leg. **Gunma:** 1 ex., Numata, 10.v.1949, T. Takei leg. **Tokyo:** 6 exs., Mt. Takao, 1.v.1960, S. Hisamatsu leg.; 1 ex., Asakawa, 4.v.1953, S. Hisamatsu leg. **Kanagawa:** 3 exs., Mt. Tanzawa, 7.v.1939, Hararaki leg. **Ôsaka:** 1 ex., Nose, 28.iv.1957, Y. Kimura leg. **Nara:** 1 ex., Hase-dera, 20.iv.1971, S. Kinoshita leg. **Tottori:** 1 ex., Mt. Hyo-no-sen, Wakasa-chô, 6.–9.viii.1968, I.H.B.C. **Yamaguchi:** 63 ♂♂ 65 ♀♀, Mt. Shizukisan, Hagi, 23.iv.1970, S. Hisamatsu leg. **Ehime:** 9 ♂♂ 5 ♀♀, Omogokei, 23.iv.1972, S. Hisamatsu leg.; 3 ♂♂ 4 ♀♀, Mt. Akaboshi, 5.v.1966, S. Hisamatsu leg. **Tokushima:** 4 ♂♂ 2 ♀♀, Mt. Tsurigi, 6.vi.1970, S. Hisamatsu leg. **Fukuoka:** 6 exs., Inunaki pass, 29.iv.1968, M. Iga leg. (EUM).

Diagnosis. Body coloration piceous black, except yellowish mouthparts, antennae, and legs. Antennae with almost 2-segmented club. Lateral margins of pronotum uniformly arcuate. Abdominal sternite VII short (W7/L7 = 2.74, n = 4), with median castaneous tuft of setae in male. Parameres of male genitalia rather short and wide (LP/WP = 2.10 (n = 1)). Apex of median lobe bluntly rounded in lateral aspect. Ovipositor of female pigmented in basal part, with long styli.

Redescription. Length 1.8–2.5 mm.

Male. Body (Fig. 2A) oval, convex dorsally, dully shining, covered with grayish setae. Coloration piceous black; mouthparts, antennae, and legs reddish-yellow; clypeus reddish brown.

Head densely punctate, punctures on disc separated by ≤ 1 diameter; interspaces finely reticulate. Frontoclypeal suture incomplete, distinctly visible. Front margin of clypeus with

slightly arcuate emargination in middle. Labrum deeply arcuate. Mandibles moderately bent inward. Antennae (Fig. 7D) about as wide as HW, 1.00–1.17 times longer than HW (n = 4), with indistinct 3-segmented (almost 2-segmented) club; approximate ratio of each segment (n = 1) is 2.13 : 2.00 : 1.67 : 1.20 : 1.13 : 1.20 : 1.20 : 1.00 : 1.20 : 1.73 : 2.60.

Pronotum (Fig. 7I) 1.47–1.56 times as wide as long (n = 4), narrower than elytra at base; sides narrowly explanate, slightly serrate, uniformly arcuate, widest at middle; anterior angles slightly prominent, posterior angles distinctly angulate; anterior margin unbordered; basal margin bordered, moderately sinuate before posterior angles; punctures on disc similar in size to those on head; interspaces finely reticulate.

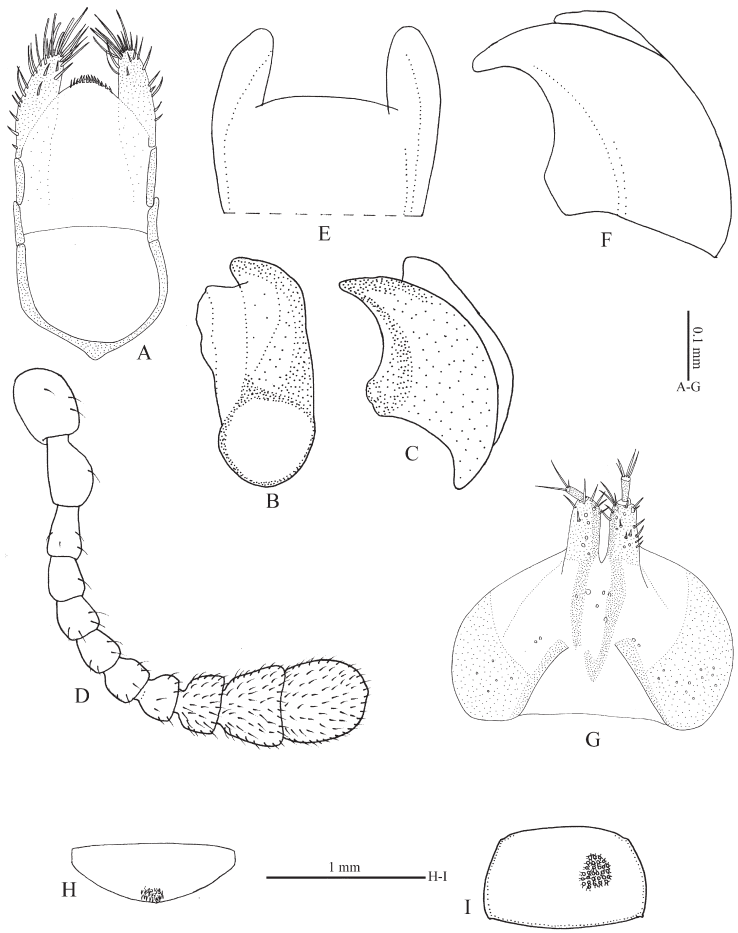

Fig. 7. *Heterhelus* (*Heterhelus*) *morio* (Reitter, 1878). A – tegmen (ventral view); B – median lobe (ventral view); C – median lobe (lateral view); D – male right antenna; E – parameres of the lectotype of *H. morio*; F – median lobe of the lectotype of *H. morio* (lateral view); G – ovipositor; H – male abdominal sternite VII; I – pronotum. A, B, C, D, G, H, I = Ehime Pref., Omogokei.

Elytra long, conjointly 1.08–1.20 times as long as wide (n = 4), 2.03–2.22 times as long as pronotum (n = 4); punctures on disc similar in size to those on pronotum; interspaces smooth. Abdominal tergite VI partially obscured by elytra. Abdominal tergite VII fully exposed, apex truncate. Abdominal tergite VIII externally visible.

Prosternum (excluding prosternal process) 0.37 times as long as mesoventrite (n = 1), 0.28 times as long as metaventrite (n = 1); prosternal process subparallel-sided. Mesoventrite depressed below the level of the metaventrite. Metaventrite convex, metathoracic discrimen in basal 1/2; disc densely punctate; punctures on disc smaller than those on head, separated by one diameter at middle, becoming denser laterally; interspaces finely reticulate. Inter-mesocoxal distance separated by 2.08 times width of inter-procoxal distance. Inter-metacoxal distance separated by 3.29 times width of inter-procoxal distance. Abdominal sternites shining; approximate ratio of length of abdominal sternites III–VII (n = 1) is 3.55 : 1.00 : 1.09 : 2.03 : 2.03; sternite VII short (W7/L7 = 2.74 (n = 4)), about as long as VI, with medial, castaneous tuft of setae. Legs flattened; protibiae rather short and slender, shorter than HW; tarsal claws simple.

Male genitalia with parameres (Figs. 7A, 7E) symmetrical, rather short and wide (LP/WP = 2.10 (n = 1)); apical region of parameres and interparameral lobe bearing long setae; median lobe bluntly rounded at apex in lateral aspect.

Female. Apical margin of abdominal tergite VII more rounded than those of male; seventh sternite without tuft of setae. Ovipositor (Fig. 7G) pigmented in basal part, with distinct styli.

Bionomics. According to Hayashi (1977), this species aggregates on flowers of *Sambucus racemosa* L. subsp. *sieboldiana* (Miq.) H. Hara (Caprifoliaceae) often in syntopy with *H. scutellaris*; see also Bionomics of *Heterhelus scutellaris* above.

Distribution. Japan (Honshû, Shikoku, Kyûshû) (Hisamatsu 1985).

Note. Kirejtshuk (1989) treated *Heterhelus morio* as a junior synonym of *H. scutellaris*. At the same time, he designated lectotypes for *H. morio* and *H. japonicus*. After my examination of the lectotypes and paralectotypes of *H. morio* and *H. japonicus*, it is apparent that *H. morio* is a valid species; whereas, *H. japonicus* is indeed a junior synonym of *H. scutellaris*. Characters which differentiate *H. scutellaris* from *H. morio* include the following: coloration piceous black in both sexes; pronotal sides uniformly arcuate; parameres slender and rather short; median lobe bluntly rounded at apex in lateral aspect; ovipositor pigmented at base; male abdominal sternite VII shorter, about 2.74 times as long as wide, with castaneous tuft of setae in middle.

Subgenus *Boreades* Parsons, 1943

Type species. *Cercus abdominalis* Erichson, 1843, by original designation.

Heterhelus (*Boreades*) *solani* (Heer, 1841)

(Figs. 2C, 8)

Cateretes solani Heer, 1841: 412. **Type locality:** Bern, auf dem Chasseral, Genf [Switzerland].

Amartus (*Heterhelus*) *solani*: Reitter (1875: 3) [note].

Heterhelus solani: Ganglbauer (1899: 452) [redescription]; Reitter (1911: 13) [in key]; Grouvelle (1913: 15) [catalogue]; Reitter (1919: 7) [in key]; Spornraft (1967: 23) [in key]; Audisio (1980: 21) [in key]; Audisio (1993: 816) [redescription, note]; Kirejtshuk (1992: 214) [in key]; Jelínek & Audisio (2007: 458) [catalogue].

Boreades solani: Audisio et al. (2000: 333) [list].
Heterhelus (*Boreades*) *solani*: S-T. Hisamatsu & Lee (2007: 384) [list].
Brachypterus rubiginosus Erichson, 1843: 232. **Type locality:** Cassel [= Kassel, Germany]. Synonymized by Gangl-bauer (1899: 452) with *Cateretes solani* Heer.
Brachypterus rubiginosus: Erichson (1845: 133) [redescription, note]; Sturm (1844: tab. CCXCI, fig. d, D) [figure]; Sturm (1845: 30) [redescription, note]; Redtenbacher (1849: 775) [redescription].
Cercus rubiginosus: Gemminger & Harold (1868: 803) [catalogue].
Cercus (*Heterhelus*) *rubiginosus*: Murray (1864: 234) [redescription, note]; Marseul (1885: 25) [redescription].
Cercus rhenanus Bach, 1866: 480. **Type locality:** Germania. Synonymized by Murray (1864: 234) with *Brachypterus rubiginosus* Erichson.
Cercus spiraeae Märkel, 1857: 177. **Type locality:** Germany. Synonymized by Murray (1864: 234) with *Brachypterus rubiginosus* Erichson.

Material examined. SLOVAKIA: 2 ♂♂ 2 ♀♀: Vys.[oké] Tatry Mts., Javorina (6786), 5.viii.1986, J. Jelínek leg. **JAPAN: Hokkaido:** 1 ♂, Piuka, Teshio, 18.vii.1952, T. Shirôzu leg.; 1 ♂, Piuka, Teshio, 21.vii.1952, T. Shirôzu leg.; 1 ♂, Jyôzankei, 7.viii.1952, S. Hisamatsu leg.; 2 ♂♂ 1 ♀, Maruyama, Sapporo, 18.vii.1956, M. Miyatake leg.; 2 ♂♂, Doyako, 8.vii.1958, F. Takechi leg.; 5 ♂♂ 2 ♀♀, Oshidomari, Rishiri Is., 10.vii.1958, M. Miyatake leg.; 40 ♂♂ 53 ♀♀, Kawayu, 22.vii.1970, M. Sakai leg.; 17 ♂♂ 7 ♀♀, Sôun-kyo, 17.vii.1970, M. Sakai leg. 1 ♂, Hitsujigaoka, Sapporo, 4.v.1995, K. Ishida leg., from the flower of *Magnolia kobus* Dc. var *borealis* Sarg. **Aomori:** 1 ♂ 1 ♀, Towada, Hiraka-chô, 16.vii.1957, K. Shimoyama leg.; 1 ♂, Kuzukawa, Hiraka-chô, 5.vii.1957, K. Shimoyama leg. (EUM).

Diagnosis. Body coloration variable, reddish brown, except dark brownish head and/or pronotum. Antennal club distinctly 3-segmented. Pronotum (Fig. 8F) strongly convex; lateral margins uniformly arcuate. Parameres (Fig. 8A) of male genitalia abruptly, medially curved at mid-length. Median lobe (Fig. 8C) sharply acuminate at apex in lateral aspect. Ovipositor (Fig. 8D) with short styli.

Redescription. Length 1.7–2.7 mm.

Male. Body (Fig. 2C) oval, convex, shining; disc densely covered with whitish or yellowish setae. Coloration variable, reddish brown, except dark brownish head (sometimes also pronotum dark brown).

Head densely punctate, punctures smaller than eye-facet, separated by ≤ 1 diameter; interspaces finely reticulate. Front margin of clypeus with slightly medial arcuate emargination. Labrum moderately arcuate. Mandibles moderately bent inward. Antennae (Fig. 8E) about as wide as HW, 1.00–1.03 times longer than HW (n = 7); antennal club distinctly 3-segmented; approximate ratio of each segment (n = 1) is 2.18 : 1.53 : 1.47 : 1.18 : 1.18 : 1.06 : 1.06 : 1.00 : 1.71 : 1.65 : 2.59.

Pronotum (Fig. 8F) strongly convex, 1.36–1.44 times as wide as long (n = 7); sides narrowly explanate, slightly serrate, uniformly arcuate, widest at middle; anterior angles slightly prominent; posterior angles obtusely angulate; anterior margin unbordered; basal margin distinctly bordered; punctures on disc slightly smaller than those on head; interspaces finely reticulate.

Elytra conjointly 1.00–1.12 times as long as wide (n = 3), 1.67–1.85 times as long as pronotum (n = 3), subparallel-sided, widest at mid-length; punctures on disc larger than those on pronotum, separated by < 1 diameter; interspaces smooth. Abdominal tergite VI partially obscured by elytra. Abdominal tergite VII fully exposed, apex arcuately emarginate. Abdominal tergite VIII externally visible.

Prosternum (excluding prosternal process) 0.49 times as long as mesoventrite (n = 1), 0.46 times as long as metaventrite (n = 1); prosternal process subparallel-sided, apex rounded.

Mesoventrite depressed below the level of the metaventrite. Metaventrite convex, strongly shining, metathoracic discrimen in basal 3/4. Inter-mesocoxal distance separated by 1.47 times width of inter-procoxal distance. Inter-metacoxal distance separated by 2.80 times width of inter-procoxal distance. Abdominal sternites shining; approximate ratio of length of abdominal sternites III–VII (n = 1) is 2.63 : 1.00 : 1.00 : 1.13 : 1.56. Legs flattened; protibiae rather short and widened, shorter than HW; tarsal claws simple.

Male genitalia with median lobe (Fig. 8C) sharply acuminate at apex in lateral aspect; parameres (Fig. 8A) abruptly, medially curved at mid-length; apical margin of interparameral lobe projected at middle.

Female. Apical margin of abdominal tergite VII rounded. Ovipositor (Fig. 8D) with rather short styli.

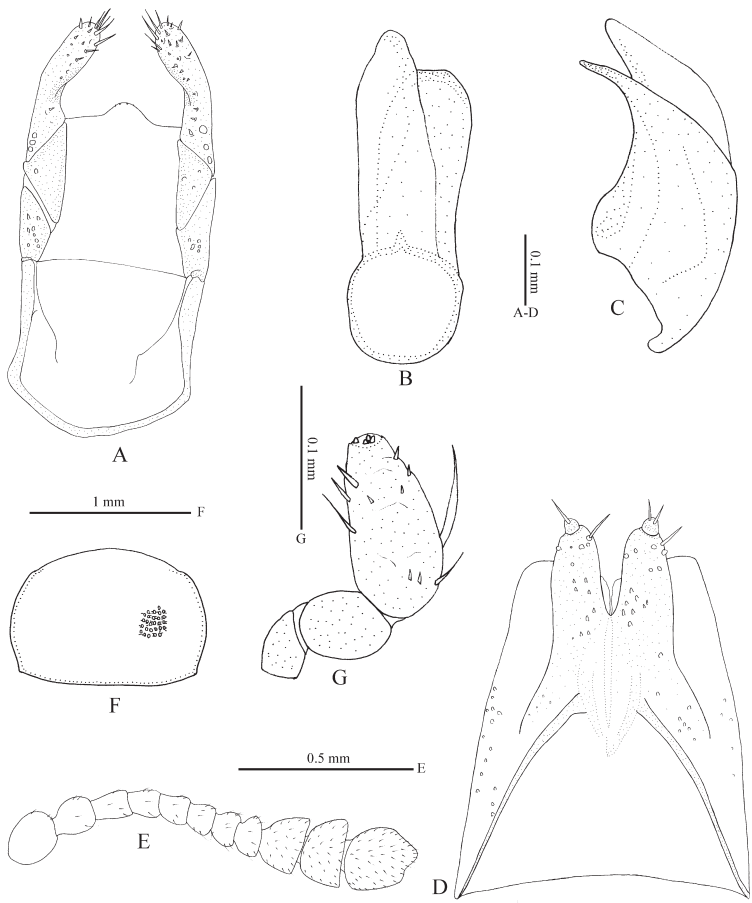

Fig. 8. *Heterhelus* (*Boreades*) *solani* (Heer, 1841). A – tegmen (ventral view); B – median lobe (ventral view); C – median lobe (lateral view); D – ovipositor; E – right antenna, male; F – pronotum; G – left maxillary palpus. A–G = Hokkaido, Kawayu.

Bionomics. The ecology of this species is similar to *H. scutellaris*, and both species may be found in sympatry throughout most of Europe (Audisio 1993). This species only occurs on Hokkaido and northern areas of Honshû in Japan.
Distribution. Japan (Hokkaido, Honshû); Europe, Russia (East Siberia, Far East), Mongolia and South Korea (Hisamatsu 1985, Jelínek & Audisio 2007).

Genus *Sibirhelus* Kirejtshuk, 1989

Type species. *Heterhelus corpulentus* Reitter, 1900, by original designation.

Diagnosis. Body elongate oval, strongly convex. Antennae moniliform. Pronotum with lateral margins uniformly rounded; punctures on disc larger than eye facet; posterior angles obtusely angulate; basal margin nearly straight or with slight curvature. Male abdominal tergite VIII externally visible. Tarsal claws more or less expanded at the base. Ovipositor with short styli.
Bionomics. *Sibirhelus corpulentus* was collected from flowers of *Carex dispalata* Boott (Cyperaceae) (see Bionomics of *S. corpulentus* below).
Distribution. Siberia and Japan (Jelínek & Audisio 2007).
Note. *Sibirhelus* is a monotypic genus with only one species, *S. corpulentus*, occurring from Siberia to Japan.

Sibirhelus corpulentus (Reitter, 1900)

(Figs. 2D, 9)

Heterhelus corpulentus Reitter, 1900: 231, tab. II, fig. 7. **Type locality:** [Russia:] Irkutsk.
Heterhelus corpulentus: Grouvelle (1913: 15) [catalogue].
Sibirhelus corpulentus: Kirejtshuk (1989: 147) [redescription]; Kirejtshuk (1992: 214) [in key]; Hisamatsu (2003: 14) [note]; Jelínek & Audisio (2007: 458) [catalogue].

Material examined. JAPAN: Iwate: 1 ♂ 1 ♀, Kouyanotutumi, Kanegasaki-chô, Iwasa-gun, 9.v.2007, Y. Takahashi leg. **Tochigi:** 2 ♂♂ 4 ♀♀, Watarase-yûsuichi, Fujioka-chô, 2.v.1992, H. Ohkawa leg., by sweeping of *Carex dispalata*; 10 ♂♂ 2 ♀♀, Watarase-yûsuichi, Fujioka-chô, 24.–25.iv.2010, S-T. Hisamatsu leg.; 4 ♂♂ 5 ♀♀, Watarase-yûsuichi, Fujioka-chô, 24.iv.2010, T. Kurihara leg. (EUM).

Diagnosis. Body coloration fully luteous to dark brown (Fig. 2D); antennae almost moniliform (Fig. 9G). Medial tuft of setae on abdominal sternites III (Fig. 9K) in Japanese specimens, on abdominal sternites III–V in Russian specimens. Male protibiae (Fig. 9I) strongly medially arcuate.
Redescription. Length 2.7–3.6 mm.

Male. Body (Fig. 2D) elongate oval, strongly convex, feebly shining; dorsal disc with a long, yellowish setae. Coloration fully luteous or rarely dark brown.

Head densely punctate, each puncture larger than eye-facet, separated by < 1 diameter; interspaces finely reticulate or smooth. Frontoclypeal suture incomplete, distinctly visible. Front margin of clypeus with medial arcuate emargination. Labrum broadly notched at middle. Mandibles slightly bent inward. Antennae (Fig. 9G) 1.16 times longer than HW (n = 2), appearing moniliform, without club; approximate ratio of each segment (n = 1) is 2.00 : 1.14 : 1.43 : 1.14 : 1.14 : 1.00 : 1.00 : 1.00 : 1.14 : 1.29 : 2.14.

Pronotum strongly convex, 1.35 times as wide as long (n =1); lateral margins narrowly explanate, arcuately rounded, widest at mid-length; anterior corner not prominent; posterior

corner obtusely angulate; anterior margin nearly straight or with slight curvature, clearly bordered; basal margin gently arcuated, slightly sinuated at mid-width, distinctly bordered; punctures on disc larger than those on head, separated by < 1 diameter; interspaces finely reticulate.

Elytra conjointly 1.03 times as long as wide (n = 1), 1.75 times as long as pronotum (n = 1), subparallel-sided; punctures on disc larger than those on pronotum, extremely dense, separated by < 1 diameter; interspaces smooth. Abdominal tergite VI partially obscured by elytra. Abdominal tergite VII fully exposed, apex arcuately emarginate. Abdominal tergite VIII externally visible.

Prosternum (excluding prosternal process) rather long, 0.56 times as long as mesoventrite (n = 1), 0.40 times as long as metaventrite (n = 1); prosternal process slightly converging towards apex. Mesoventrite depressed below the level of the metaventrite, apical margin between inter-mesocoxa straight. Metaventrite convex, strongly shining, metathoracic discrimen in basal 1/2; disc with sparse punctures, separated by 1 or 2 diameter(s) at the middle; punctures becoming denser laterally. Inter-mesocoxal distance separated by 1.67 times width

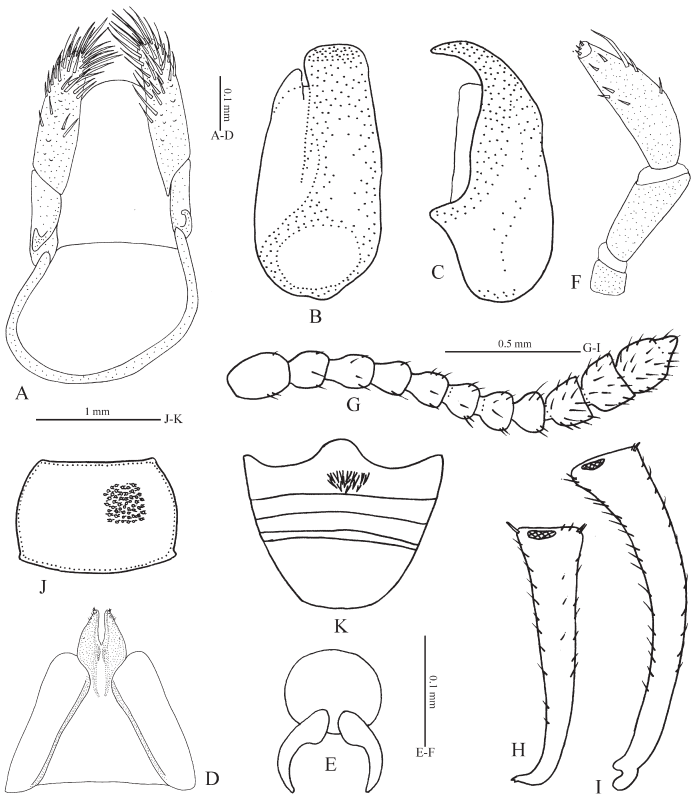

Fig. 9. *Sibirhelus corpulentus* (Reitter, 1900). A – tegmen (ventral view); B – median lobe (ventral view); C – median lobe (lateral view); D – ovipositor; E – tarsal claw of right foreleg; F – left maxillary palpus; G – male right antenna; H – female right protibia; I – male right protibia; J – pronotum; K – abdominal sternites. A–K = Tochigi Pref., Watarase-yûsuichi,

of inter-procoxal distance. Inter-metacoxal distance separated by 2.50 times width of inter-procoxal distance. Abdominal sternites III (Fig. 9K) with medial tuft of setae; approximate ratio of length of abdominal sternites III–VII (n = 1) is 3.00 : 1.00 : 1.00 : 1.90 : 3.00. Legs slender and long, protibiae (Fig. 9I) strongly medially arcuate; claws (Fig. 9E) more or less expanded at the base.

Male genitalia sclerotized; tegmen (Fig. 9A) with parameres asymmetrical, bearing long setae; interparameral lobe broadly rounded; median lobe (Fig. 9C) abruptly bent inward near apex in lateral aspect.

Female. Apical margin of abdominal tergite VII rounded. Ovipositor (Fig. 9D) deeply bifid, with extremely short styli.

Variability. Russian specimens have medial tuft of setae on abdominal sternites III–V (Kirejtshuk, pers. comm.), but Japanese specimens have these tufts on abdominal sternite III only. The tarsal claws were described as 'subdentatis' in the original description (Reitter 1900), and as 'dentate' in Kirejtshuk (1992). However, in the Japanese specimens examined so far, the base of the tarsal claws is more or less expanded at the base with no apparent tooth or denticle.

Bionomics. Twelve specimens of *S. corpulentus* were collected from flowers of *Carex dispalata* Boott (Cyperaceae), in Watarase-yûsuichi, Tochigi Pref. No additional information is available.

Distribution. Japan (Honshû) – first recorded by Hisamatsu (2003); Russia (Irkutsk and Primorsky Kray) (Kirejtshuk 1992).

Genus *Brachypterus* Kugelann, 1794

Type species. *Dermestes urticae* Fabricius, 1792, subsequent designation by Thomson (1859).

Diagnosis. Body oval, strongly convex. Pronotum transverse, lateral margins uniformly rounded; disc with punctures larger than eye facet; posterior angles obtusely angulate; basal margin slightly sinuate before posterior angles. Antennae with distinct three-segmented club. Male abdominal tergite VIII externally visible. Tarsal claws strongly dentate at the base. Ovipositor without styli.

Bionomics. Larval stages have been found on flowers of *Gesnouinia* and *Urtica* (Urticaceae) (Jelínek & Cline 2010).

Distribution. Twenty-three species have been recorded. The species have wide distributional ranges in the Palaearctic, Oriental, Nearctic, and Afrotropical Regions (Jelínek & Cline 2010).

Brachypterus urticae (Fabricius, 1792)

(Figs. 2E, 10)

Dermestes urticae Fabricius, 1792: 235. **Type locality:** Germania [= Germany].
Cercus urticae: Latreille (1807): 16 (partim).
Catheretes urticae: Gyllenhall (1808): 247 [redescription]; Gyllenhall (1827: 305) [note].
Cateretes urticae: Stephens (1830: 52) [redescription].

Brachypterus urticae: Erichson (1843: 231) [note]; Erichson (1845: 132) [redescription, note]; Sturm (1844: tab. CCXCI, fig. c. C) [figure]; Sturm (1845: 28) [redescription, note]; Redtenbacher (1849: 162) [in key]; Redtenbacher (1858: 324) [in key]; Gemminger & Harold (1868: 804) [catalogue]; Horn (1879: 270) [redescription, note]; Ganglbauer (1899: 453) [redescription]; Blatchley (1910: 630) [redescription, note]; Reitter (1911: 13) [in key]; Reitter (1919: 8) [in key]; Grouvelle (1913: 18) [catalogue]; Hisamatsu (1959: 61); Spornraft (1967: 23) [in key]; Audisio (1980: 23) [in key]; Audisio (1993: 838) [redescription, note]; Hisamatsu (1985: 177, pl. 28, fig. 5) [note, photo]; Kirejtshuk (1992: 214) [in key]; Kirk-Spriggs (1996: 47) [note, illustration]; Jelínek & Audisio (2007: 458) [catalogue].

Brachypterus (*Brachypterus*) *urticae*: Murray (1864: 242) [redescription, note]; Marseul (1885: 31) [redescription]; Seidlitz (1887–1891: 208) [in key]; Seidlitz (1888–1891: 224) [in key].

Strongylus abbreviatus Herbst, 1792: 190, tab. 43, fig. 10. **Type locality:** Europa. Synonymized by Murray (1864: 242) with *Dermestes urticae* Fabricius.

Nitidula erythropa Marsham, 1802: 132. **Type locality:** Anglia [= England]. Synonymized by Gemminger & Harold (1868: 804) with *Dermestes urticae* Fabricius.

Cateretes affinis Heer, 1841: 411. **Type locality:** Urnerboden ob Lintthal [Switzerland]. Synonymized by Ganglbauer (1899: 453) with *Dermestes urticae* Fabricius.

Brachyptrerus (*Brachypterus*) *affinis*: Murray (1864: 242) [note].

Cercus pusillus Melsheimer, 1846: 105. **Type locality:** Pennsylvania [USA]. Synonymized by Gemminger & Harold (1868: 804) with *Dermestes urticae* Fabricius.

Brachypterus flavicornis Küster, 1848: 40. **Type locality:** Italia. Synonymized by Audisio (1993: 838) with *Dermestes urticae* Fabricius.

Brachypterus flavicornis: Gemminger & Harold (1868: 804) [catalogue].

Brachypterus (*Brachypterus*) *flavicornis*: Murray (1864: 246) [redescription, note]; Marseul (1885: 33) [redescription].

Brachypterus solaris Gistel, 1857: 577. **Type locality:** Austria, Styria, Hochschwab. Synonymized by Jelínek & Audisio (2009: 230) with *Dermestes urticae* Fabricius.

Brachypterus pelusius Gistel, 1857: 582. **Type locality:** Germania, Thüringen, Jena. Synonymized by Jelínek & Audisio (2009: 230) with *Dermestes urticae* Fabricius.

Material examined. SLOVAKIA: 2 ♂♂ 2 ♀♀, Slov. m.or. [= SE Slovakia], Král.[ovský] Chl'mec, 10.vi.1960, J. Jelínek leg. **CZECH REPUBLIC: Bohemia:** 1 ♂, Bohemia occ., Kundratice, 15.vi.1958, J. Jelínek leg. **JAPAN: Hokkaido:** 1 ♀, Aizankei, Mt. Daisetsu, 31.vii.1955, S. Kimoto leg.; 13 ♂♂ 21 ♀♀, Aizankei, 5.–9.ix.1977, A. Oda leg.; 2 ♂♂ 3 ♀♀, Yukomanbetsu, 1.vii.1958, F. Takechi leg.; 2 ♂♂ 1 ♀, Wakoto, Lake, Kutcharo, 5.vii.1958, M. Miyatake leg.; 1 ♂, Sounkyô, 3.vii.1958, F. Takechi leg.; 5 ♂♂ 5 ♀♀, Sounkyô, 17.–18.vii.1970, S. Kinoshita leg.; 3 ♀♀, Sounkyô, 18.vii.1970, M. Sakai leg.; 2 ♂♂ 1 ♀, Sounkyô, 4.ix.1977. A. Oda leg.; 1 ♀, Jozankei, 15.vii.1953, T. Ishihara leg.; 1 ♂, Jozankei, 2.ix.1977, S. Hisamatsu leg.; 2 ♀♀, Oshidomari, Rishiri Is., 10.vii.1958, M. Miyatake leg.; 1 ♂, Isl. Rishiri, 13.viii.1967, M. Tomokuni leg.; 1 ♀, Mt. Asahi, 15.viii.1967, M. Tomokuni leg.; 17 ♂♂ 15 ♀♀, Mt. Sapporo-dake, 5.viii.1970, M. Sakai leg.; 7 ♂♂ 16 ♀♀, Kawayu, 22.vii.1970, M. Sakai leg. **Niigata:** 1 ♀, Katamachi, 9.vi.1959, K. Baba leg. **Gunma:** 15 ♂♂ 18 ♀♀, Marunuma, 29.vii.1958, S. Hisamatsu leg. **Nagano:** 6 ♂♂ 3 ♀♀, Tobira spa, 30.vii.1973, S. Hisamatsu leg. **Gifu:** 1 ♂, Hirayu-Anbô, 29.vii.1959, M. Miyatake leg. **Tokyo:** 1 ♂ 4 ♀♀, Mt. Tenso-zan, Okutama, 23.ix.1976, M. Tomokuni leg.

Diagnosis. Body coloration piceous black. Lateral margins of pronotum weakly sinuated at basal 1/3. Ovipositor (Fig. 10G) triangular, with two small projections at apex.

Redescription. Length 1.6–2.2 mm.

Male. Body (Fig. 2E) oval, strongly convex and shining; dorsal disc with yellowish setae. Coloration piceous black; mouthparts, antennal flagella, and legs, reddish brown; antennal club dark reddish brown.

Head densely punctate, punctures separated by < 1 diameter; interspaces feebly reticulate. Frontoclypeal suture feebly visible. Front margin of clypeus with medial arcuate emargination. Labrum largely exposed, slightly arcuately notched at middle. Mandibles never strongly bent

inward. Antennae (Fig. 10D) slightly shorter than HW, 0.91–0.97 times longer than HW (n = 4), with club distinctly 3-segmented; approximate ratio of each segment (n = 1) is 2.38 : 2.13 : 1.63 : 1.00 : 1.25 : 1.25 : 1.25 : 1.13 : 2.00 : 1.88 : 2.50.

Pronotum (Fig. 10H) transverse, narrower than elytra at the base, 1.44–1.55 times as wide as long (n = 6); lateral margins arcuately rounded, narrowly explanate, weakly sinuated at basal 1/3; anterior angles slightly prominent, posterior angles obtuse; anterior margin nearly straight or with slight curvature, incompletely bordered; basal margin slightly sinuate before posterior angles, bordered; punctures on disc about as large as those on head, separated by < 1 diameter; interspaces smooth or feebly reticulate.

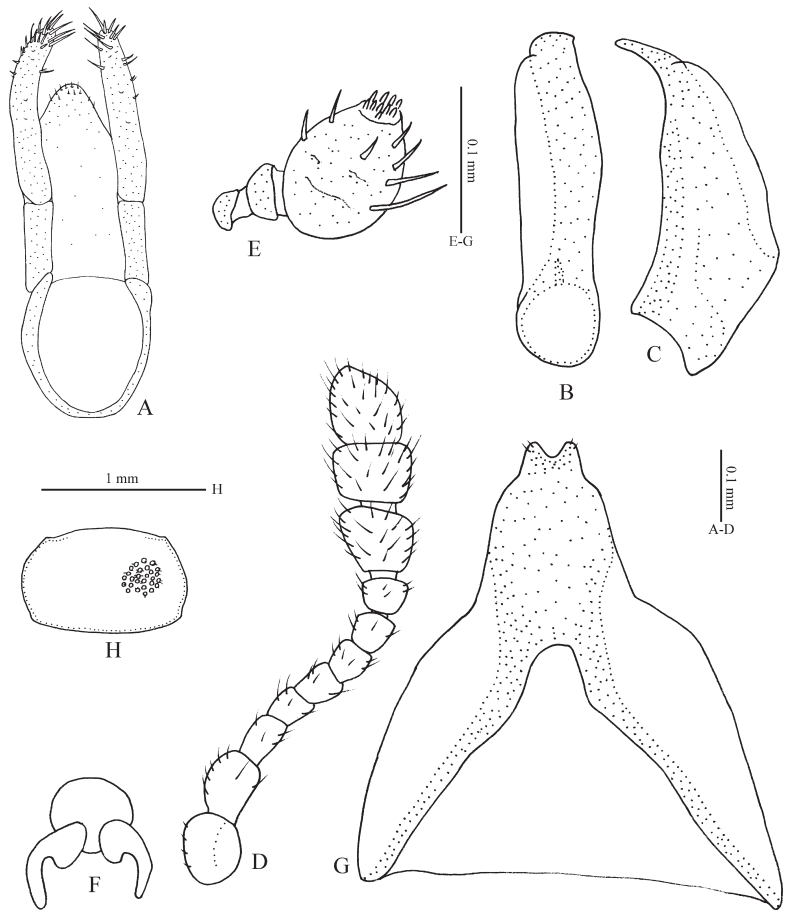

Fig. 10. *Brachypterus urticae* (Fabricius, 1792). A – tegmen (ventral view); B – median lobe (ventral view); C – median lobe (lateral view); D – male right antenna; E – left maxillary palpus; F – tarsal claw of right foreleg; G – ovipositor; H – pronotum.

Elytra conjointly 0.85–1.00 times as long as wide (n = 6), 1.55–1.72 times as long as pronotum (n = 6), widest at mid-length; punctures on disc larger than those on pronotum, separated by < 1 diameter; interspaces smooth. Abdominal tergite VI partially obscured by elytra. Abdominal tergite VII fully exposed, apex arcuately emarginate. Abdominal tergite VIII externally visible.

Prosternum (excluding prosternal process) short, 0.27 times as long as mesoventrite (n = 1), 0.26 times as long as metaventrite (n = 1); prosternal process subparallel-sided, apex rounded. Mesoventrite depressed below the level of the metaventrite. Metaventrite convex, strongly shining, without metathoracic discrimen; disc with sparse and small punctures, separated by 2 or 3 diameters. Inter-mesocoxal distance separated by 3.42 times width of inter-procoxal distance. Inter-metacoxal distance separated by 5.89 times width of inter-procoxal distance. Abdominal sternites shining; approximate ratio of length of abdominal sternites III–VII (n = 1) is 2.50 : 1.00 : 1.00 : 1.71 : 1.86. Legs slender; protibiae slightly wider than maximal width of the antennal club at apical margins; tarsal claws (Fig. 10F) strongly dentate at the base.

Male genitalia sclerotized; tegmen (Fig. 10A) with parameres slender and asymmetrical, bearing long setae at apex; in ventral view, left paramere bent inward at apical third, meanwhile right paramere nearly straight or with slight curvature; median lobe (Fig. 10C) slender, abruptly medially arcuate near apex in lateral aspect.

Female. Apical margin of abdominal tergite VII rounded. Ovpositor (Fig. 10G) triangular, with two small projections at apex, without styli.

Bionomics. This species is found on flowers of *Urtica* spp. (Urticaceae) (Audisio 1993, Kirk-Spriggs 1996). In Japan, *U. thunbergiana* Siebold et Zucc. is the known host plant (Hisamatsu 1985).

Distribution. Japan (Hokkaido, Honshû – first recorded by Hisamatsu (1959)); Europe, Turkey, Russia (East and West Siberia, Far East), Kyrgyzstan, Kazakhstan, China (Northern Territory), South Korea, and North America (Parsons 1943, Hisamatsu 1985, Jelínek & Audisio 2007).

Genus *Brachypterolus* Grouvelle, 1913

Type species: *Catheretes gravidus* Illiger, 1798 (= *Brachypterolus pulicarius* (Linnaeus, 1758)), subsequent designation by Jelínek & Steele (1966).

Diagnosis. Body oval, strongly convex, dorsal and ventral disc densely covered with long whitish setae. Antennae with distinct 3-segmented club. Pronotum transverse, lateral margins rounded; disc with punctures larger than eye facet; posterior angles distinctly angulate, more or less projecting posteriorly; basal margin strongly sinuate before posterior angles. Male abdominal tergite VIII externally visible. Tarsal claws strongly dentate at base. Ovipositor without styli.

Bionomics. Larval stages occur on flowers of *Antirrinum* and *Linaria* (Scrophulariaceae) (Jelínek & Cline 2010).

Distribution. Eleven species are included in the genus, all of them from the Palaearctic region, and one Holarctic (Parsons 1943, Jelínek & Cline 2010).

Brachypterolus pulicarius (Linnaeus, 1758)

(Figs. 2F–G, 11)

Dermestes pulicarius Linnaeus, 1758: 357. **Type locality:** not given, probably Europe.
Dermestes pulicarius: Linnaeus (1767: 564) [redescription].
Sphaeridium pulicarium: Fabricius (1775: 68) [redescription].
Antribus pulicarius: Fourcroy (1785: 137) [redescription].
Nitidula pulicaria: Olivier (1790: 20) [redescription].
Cercus pulicarius: Latreille (1807: 15) [redescription].
Catheretes pulicarius: Gyllenhal (1808: 245) [redescription, note]; Gyllenhal (1827: 305) [note].
Cateretes pulicarius: Heer (1841: 410) [redescription].
Heterostomus pulicarius: Ganglbauer (1899: 455) [redescription]; Reitter (1911: 14) [in key]; Böving & Craighead (1931: 158, pl. 36, J–P) [larval illustration].
Brachypterolus pulicarius: Grouvelle (1913: 22) [catalogue]; Spornraft (1967: 23) [in key]; Audisio (1980: 29) [in key]; Audisio (1993: 859) [redescription, note]; Kirejtshuk (1992: 216) [in key]; Kirk-Spriggs (1996: 46) [note, illustration]; Jelínek & Audisio (2007: 456) [catalogue].
Proteinus pulicarius: Blackwelder (1952) [designated as the type species of the genus *Proteinus* Latreille, 1790 (Staphylinidae)]; ICZN (1969: 14) [as invalid combination].
Dermestes lepturoides Scopoli, 1763: 17. **Type locality:** Carniola [in Slovenia]. Synonymized by Gemminger & Harold (1868: 804) with *Catheretes gravidus* Illiger.
Scaphidium agaricium Herbst, 1793: 134. **Type locality:** Germania [= Germany]. Synonymized by Murray (1864: 247) with *Catheretes gravidus* Illiger.
Scaphidium scutellatum Panzer, 1792: 11. **Type locality:** Gallia [= France]. Synonymized by Grouvelle (1913: 22) with *Dermestes pulicarius* Linnaeus.
Catheretes gravidus Illiger, 1798: 395. **Type locality:** Preussens [= Prussia]. Synonymized by Ganglbauer (1899: 455) with *Dermestes pulicarius* Linnaeus.
Catheretes gravidus: Jelínek & Steele (1966: 239) [designated as the type species of the genus *Brachypterolus* Grouvelle, 1913].
Dermestes gravidus: Paykull (1800: 448) [redescription].
Brachypterus gravidus: Erichson (1843: 230) [list]; Erichson (1845: 130) [redescription, note]; Sturm (1844: tab. CCXC, fig. b. B) [figure]; Sturm (1845: 22) [redescription, note]; Redtenbacher (1849: 162) [in key]; Redtenbacher (1858: 324) [in key]; Gemminger & Harold (1868: 804) [catalogue].
Brachypterus (*Heterostomus*) *gravidus*: Murray (1864: 247, pl. XXXII, fig. 7); Marseul (1885: 26) [redescription]; Seidlitz (1887–1891: 209) [in key]; Seidlitz (1888–1891: 224) [in key].
Brachypterus gravidus var. *flaviclavis* Rey, 1889: 31. **Type locality:** Corse [= Corsica Is., France]. Synonymized by Grouvelle (1913: 22) with *Dermestes pulicarius* Linnaeus.
Brachypterolus villager var. *fuscopubens* Reitter, 1919: 15. **Type locality:** Turkestan. Synonymized by Audisio (1993: 859) with *Dermestes pulicarius* Linnaeus.
Brachypterus laticollis Küster, 1848: 35. **Type locality:** Dalmatia [in Croatia]. Synonymized by Ganglbauer (1899: 455) with *Dermestes pulicarius* Linnaeus.
Brachypterus laticollis: Gemminger & Harold (1868: 804) [catalogue].
Brachypterus (*Heterostomus*) *laticollis*: Murray (1864: 247) [note]; Marseul (1885: 7) [redescription].
Heterostomus mordelloides Notman, 1920: 29. **Type locality:** Keene Valley, Essex Co., N. Y. [USA]. Synonymized by Parsons (1943: 146).
Brachypterolus shimoyamai Hisamatsu, 1985: 177, pl. 28, f. 6, **syn. nov. Type locality:** Japan, Aomori Pref., Nishitsugaru-gun, Fukaura, Azumahama.

Type material examined. *Brachypterolus shimoyamai*: Holotype: ♂ (EUM): '♂ // Azumahama / Fukaura / Nishitsugaru-gun / Aomori Pref. // Aug. 20. 1967 / K. Shimoyama // on flower of Linaria japonica Miquel // Brachypterolus sp. / DET. S. Hisamatsu 1985 // HOLOTYPE // Brachypterolus shimoyamai Hisamatsu, 1985'. Paratypes (EUM): 49 ♂♂ 35 ♀♀, Azumahama, Fukaura, Nishitsugaru-gun, Aomori Pref., 20.viii.1967, K. Shimoyama leg., on flower of Linaria japonica Miquel; 3 ♂♂ 1 ♀, Wakasakinai, Sarobetsu, Hokkaido, 24.viii.1977, M. Tomokuni leg.; 1 ♂,

Miyami, Sakata, Yamagata Pref., 28.v.1960, K. Shirahata leg.; 1 ♀, Kominato, Sakata, Yamagata Pref., 18.vi.1966, K. Shirahata leg.; 58 exs., Sakaeura, alt. ca. 5 m, Hokkaido, 15.viii.2010, Ta. & To. Kurihara leg.

Additional material examined. CZECH REPUBLIC: Bohemia: 1 ex., Boh. Or. [= E Bohemia], 23.v.1978, J. Jelínek leg. **Moravia:** 1 ex., Mor. merid. [= S Moravia], vi.1949, Kouřil leg.; 1 ex., Vracov, Mor., 3.viii.1940, Kouřil leg. **JAPAN: Hokkaido:** 57 exs., Sakaeura, alt. ca. 5 m, Tokoro-chô, Kitami City, 15.viii.2010, Ta. & To. Kurihara leg., on *Linaria japonica* Miq. (EUM).

Diagnosis. Body coloration piceous black. Dorsal disc with dense and deep punctures. Posterior angles of pronotum distinctly angulate.

Redescription. Length 2.4–2.9 mm.

Male. Body (Fig. 2F) oval, strongly convex; densely covered with whitish long setae on dorsum and venter. Coloration piceous black; mouthparts (excluding reddish-yellow maxillary palpus), basal 1/2 of mesoventrite, and legs, reddish brown; antennae reddish-yellow.

Head without frontoclypeal suture; disc with dense and deep punctures; punctures on disc larger than eye-facet, separated by < 1 diameter; interspaces smooth. Front margin of clypeus with medial arcuate emargination. Labrum slightly arcuately notched at middle. Mandibles strongly bent toward the midline. Antennae (Fig. 11E) shorter than HW, 0.82–0.89 times longer than HW (n = 2); club distinctly 3-segmented; approximate ratio of each segment (n = 1) is 2.73 : 2.49 : 2.13 : 1.65 : 1.47 : 1.44 : 1.40 : 1.00 : 1.95 : 1.89 : 2.75.

Pronotum (Fig. 11F) strongly convex, transverse, 1.51–1.56 times as wide as long (n = 4); lateral margins not explanate, subparallel sided at basal 2/3; anterior angles feebly prominent; posterior angles distinctly angulate, strongly projecting posteriorly in European specimens, weakly projecting in Japanese specimens; anterior margin bordered; basal margin indistinctly bordered, strongly sinuate before posterior angles; disc densely and deeply punctate, each puncture closely approximating the next and often appearing connected; interspaces smooth.

Elytra wider than long, conjointly 0.71–0.79 times as long as wide (n = 4), 1.11–1.29 times as long as pronotum (n = 4), subparallel-sided; punctures on disc slightly larger than those on pronotum, separated by < 1 diameter; interspaces smooth. Abdominal tergite VI fully exposed. Abdominal tergite VII also fully exposed, apex truncate or slightly arcuately emarginate. Abdominal tergite VIII externally visible.

Prosternum (excluding prosternal process) 0.33 times as long as mesoventrite (n = 1), 0.23 times as long as metaventrite (n = 1); disc densely punctate; prosternal process slender, narrowing to apex. Mesoventrite depressed below the level of the metaventrite. Metaventrite convex, with close punctures, each puncture separated by < 1 diameter; metathoracic discrimen in basal 1/2. Inter-mesocoxal distance separated by 2.96 times width of inter-procoxal distance. Inter-metacoxal distance separated by 5.29 times width of inter-procoxal distance. Abdominal sternites shining; approximate ratio of length of abdominal sternites III–VII (n = 1) is 3.20 : 1.00 : 1.00 : 3.30 : 4.50. Legs with protibiae short, shorter than antennal length; tarsal claws (Fig. 11H) strongly dentate at the base.

Male genitalia with parameres (Fig. 11A) slender and asymmetrical, bearing long setae at apex; in ventral view, left lobe slightly wider than right lobe; median lobe (Fig. 11B–C) elongate and flat.

Female. Apical margin of abdominal tergite VII rounded. Ovpositor (Fig. 11D) triangular, without styli.

Variability. The Japanese specimens have the following differences as compared with European specimens: pronotum with denser punctures, posterior angles more weakly projecting posteriorly; coloration of metafemora always reddish.

Bionomics. This species has been collected from flowers of *Linaria japonica* Miq. (Scrophulariaceae) in Japan. Likewise European individuals have been collected from *Linaria* spp. (Kirk-Spriggs 1996). Larval stages were illustrated by Böving & Craighead (1931).

Distribution. Japan (Hokkaido, Honshû); Europe, Turkey, Russia (East and West Siberia, Far East), Kazakhstan, Mongolia, China (Northwest Territory), South Korea, (Hisamatsu 1985, Jelínek & Audisio 2007).

Taxonomy. There is some variation between European and Japanese specimens (see Variability above). However, male and female genitalia are of the same size and shape. Therefore, I treat

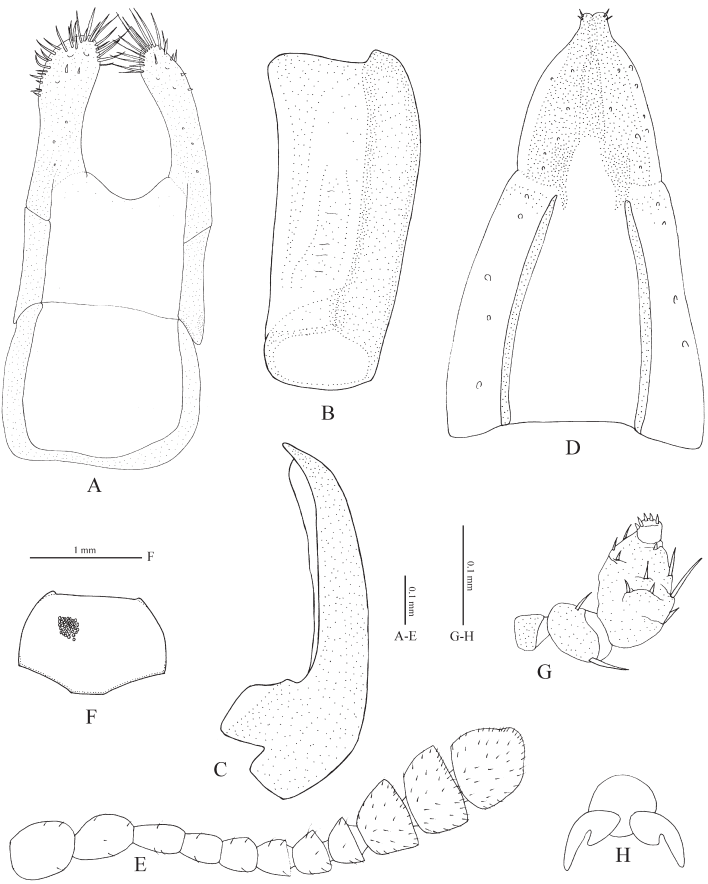

Fig. 11. *Brachypterolus pulicarius* (Linnaeus, 1758). A – tegmen (ventral view); B – median lobe (ventral view); C – median lobe (lateral view); D – ovipositor; E – male right antenna; F – pronotum; G – left maxillary palpus; H – tarsal claw of right foreleg. A–H = Aomori Pref., Azumahama.

Table 1. Host plants of Kateretidae.

Genus	Jelínek & Cline (2010)	Present study
Kateretes	*Carex* spp. (Cyperaceae) *Juncus* spp. (Juncaceae)	–
Platamartus	Unknown	*Carex dispalata* (Cyperaceae)
Heterhelus	*Sambucus* spp. (Caprifoliaceae)	*Sambucus racemosa* subsp. *sieboldiana* (Caprifoliaceae)
Sibirhelus	Unknown	*Carex dispalata* (Cyperaceae)
Brachypterus	*Gesnouinia* spp., *Urtica* spp. (Urticaceae)	*Urtica thunbergiana* (Urticaceae)
Brachypterolus	*Antirrinum* spp., *Linaria* spp. (Scrophulariaceae)	*Linaria japonica* (Scrophulariaceae)

Brachypterolus shimoyamai Hisamatsu as a junior synonym of *B. pulicarius* (Linnaeus).
Note. Reitter (1884, 1885) recorded *Brachypterus* (*Heterostomus*) *linariae* (Stephens, 1830) (= *Brachypterolus linariae*) from Sapporo, Hokkaido, however this record is dubious and concerns more likely *B. pulicarius*.

Discussion

New host plant records of *Sibirhelus* and *Platamartus* were recorded in the present study (Table 1). *Carex dispalata* (Cyperaceae) was recorded as a host plant for these two genera for the first time.

According to the current understanding of the plant phylogeny and systematics (Angiosperm Phylogeny Group 2009), the genera *Carex* (Cyperaceae) and *Juncus* (Juncaceae) which are host plants of *Kateretes*, *Platamartus*, and *Sibirhelus* belong to 'Commelinids'. In contrast, the genus *Sambucus* (Caprifoliaceae) which is the host plants of *Heterhelus* belongs to 'Campanulids'. Genera *Gesnouinia* and *Urtica* (Urticaceae) which are host plants of *Brachypterus* belong to 'Fabids', and *Antirrinum* and *Linaria* (Scrophulariaceae) which are the host plants of *Brachypterolus* belong to 'Lamiids'.

Molecular and phylogenetic analysis would be helpful in this context to analyze the phylogenetic relationships between the genera of Kateretidae and compare them to the phylogeny of their host plants.

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