



Two new species of *Macrolea* Samouelle (Coleoptera: Chrysomelidae: Donaciinae) from China, with a key to all known species

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Abstract

Two new species of the aquatic leaf beetle genus *Macrolea* Samouelle namely *M. ranina* Lou & Yu, **sp. nov.** and *M. huaxiensis* Lou & Liang, **sp. nov.** are described from China. *Macrolea appendiculata* (Panzer, 1794) is recorded for the first time from China and a key to all known species of *Macrolea* is provided.

Key words: Donaciinae, *Macrolea*, new species, new record, key, Palaearctic Region, China.

Introduction

Macrolea Samouelle, 1819, a Palaearctic leaf beetle genus of the aquatic subfamily Donaciinae, is represented by five species, namely *M. mutica* (Fabricius, 1792), *M. appendiculata* (Panzer, 1794), *M. pubipennis* (Reuter, 1875), *M. japana* (Jacoby, 1885), and *M. skomorokhovi* Medvedev, 2006. This genus is known to occur in Europe, Algeria, Middle Asia, Siberia, Far East, China and Japan (Monrós, 1959; Gressitt & Kimotto, 1961; Jolivet, 1970; Borowiec, 1984; Lopatin, 1984; Kimoto & Takizawa, 1994; Hayashi & Shiyake, 2001; Kölsch *et al.*, 2006; Mende *et al.*, 2010; Silfverberg, 2010).

A pair of donaciine specimens received from Jindong Zhang encountered in frog stomach during a food composition study in Zoigê county of Sichuan Province in 2005, has turned out to be that of a new species. In 2007, nine more specimens of this species were collected at the same locality.

In 2008 and 2009, Ye Liu found a number of donaciine specimens in Huaxi river of Guizhou Province. These specimens were initially determined as *M. japana* (Jacoby) by Zhang *et al.* (2010). However, subsequent careful study revealed that they represent yet another new species.

During a field expedition in 2009, Zhiliang Wang collected adults of *M. appendiculata* in a slow-flowing river in Altay, Xinjiang for the first time in China.

The new species of *Macrolea* from Guizhou and Sichuan are described here in with a key to all known species of the genus.

Material and methods

This study is based on 190 specimens of *Macrolea* and 17 specimens of *Neohaemonia* Székessy. All specimens examined are deposited in the National Zoological Museum of China, Institute of Zoology (Beijing), except as otherwise specified.

All measurements were made using a Nikon SMZ1500 stereoscopic dissecting microscope with ocular micrometer. Body length (BL) = the linear distance along the midline from the apex of the labrum to the inner apical angle of the elytra; and body width (BW) = elytra width (EW) = the linear distance at the widest point across elytra measured at 90° to the longitudinal axis. Pronotum length (PL) = the linear distance along the midline from

the anterior margin to the posterior margin; and pronotum width (PW) = the linear distance across the widest part of the pronotum measured at 90° to the longitudinal axis. Elytra length (EL) = the linear distance from elytral base to apex of sutural angle. Ratios cited in description are based on these measurements. Antennomere length = the linear distance along the midline from the apical margin to the basal margin. Size range was determined by selecting the largest and smallest specimens of each sex.

Dissected male genitalia was soaked in cold 10% KOH solution for 24–36 hours followed by washing in excess water, and then transferred to glycerin for examination and preservation.

Morphological terminology, including that for structures of the endophallus, generally follows Askevold (1988, 1990). The donaciine endophallus is bilaterally symmetrical and consists of the following sclerites in the ground-plan arrangement: one BSB (basal supporting block); two lateral sclerites or ELDs (endophallic lateral digit); paired or single dorsal sclerites or PDS (paired dorsal sclerites); and MEG (median ejaculatory guide), a membrane together with the sclerite complex medially which is basically an enlarged and modified ejaculatory duct. Members of Haemoniini and most Donaciini are characterized by fusion of two ELDs medially, and reduction of MEG, which is enclosed by ELDs (Figs 21, 22, 47–49, 74, 75, 77, 78, 81–83). In *Neohaemonia*, two lateral pELD (pseudo-ELD) are present, so named because they resemble the ELD typical of *Plateumaris* Thomson.

Genus *Macrolea* Samouelle, 1819

Macrolea Samouelle, 1819: 211 (Type species *Donacia zosteræ* Fabricius, 1801).

Apelma Billberg, 1820: 57 (Type species *Donacia zosteræ* Fabricius, 1801).

Haemonia Dejean, 1821: 114 (Type species *Donacia zosteræ* Fabricius, 1801).

Diagnosis. Dorsum and legs yellow or brown (Figs 1, 3, 24, 26, 50–53); vertex with dense pubescence (Figs 6, 29, 50–53); antenna long, extending beyond middle of elytron (Figs 1–4, 50, 52, 53), or short, not extending beyond middle of elytron (Figs 24–27); pronotum with setae at anterior angles (Figs 5, 28, 56–59); pronotum with distinct anterior and posterior beads (Figs 5, 28, 56–59); punctures along elytral striae arranged more or less in paired rows (Figs 1, 3, 50–53), or in single rows (Figs 24, 26); elytron with or without spine at outer apical angle (Figs 12, 35, 64–67); metafemur slender, without tooth (Figs 1–4, 24–27, 50–53); profemur with a short linearly arranged brush of setae basally on posterior surface (Figs 16, 36); metatarsus with markedly reduced pubescence, fifth tarsomere elongate, at least as long as basal three combined (Figs 10, 39, 68, 70, 71); endophallus with two ELDs fused, enclosing MEG, without pELD (Figs 21, 22, 47–49, 74, 75, 77, 78, 81–83).

Distribution. Europe, northern Africa (Algeria), Middle Asia, Siberia, Far East, China and Japan. Distribution in China: Heilongjiang, Hebei, Tianjin, Ningxia, Gansu, Xinjiang, Jiangsu, Hubei, Sichuan, Guizhou (Fig. 85).

Host plants. *Ranunculus* L. (Ranunculaceae), *Carex* L. (Cyperaceae), *Brasenia* Schreb. (Cabombaceae), *Potamogeton* L. (Potamogetonaceae), *Myriophyllum* L. (Haloragaceae), *Ruppia* L. (Zosteraceae), *Zostera* L. (Zosteraceae), *Sparganium* L. (Sparganiaceae) (Bieńkowski & Orlova-Bieńkowskaja, 2004), *Vallisneria* L. (Hydrocharitaceae), *Ottelia* Pers. (Hydrocharitaceae) and *Hippuris* L. (Hippuridaceae) (recorded in this paper).

Biology. *Macrolea* is a fully aquatic genus. They live in lentic or lotic water. Both *M. appendiculata* and *M. mutica* live in brackish as well as fresh water (Borowiec, 1984; Kölsch *et al.*, 2006; Saari, 2007; Mende *et al.*, 2010). According to Mende *et al.* (2010: 101), immobility (cannot swim or fly) is believed to be a specific feature of *M. mutica*. However, three specimens of *M. japana* examined in this study were collected by light trap.

Remarks. Identification of species of *Macrolea* is difficult, despite the genus being less speciose. Many workers have used external morphology, male genitalia, ecological features, and molecular data to delimit species of this genus (Freude *et al.*, 1966; Daccordi & Ruffo, 1978; Mohr, 1985; Beenen & Winkelman, 1989; Hayashi & Shiyake, 2001; Kölsch *et al.*, 2006). We have followed many of these workers to enhance the reliability of the key. Species of *Macrolea* can be separated from those of *Neohaemonia* Székessy in new world by the following characters: 1) vertex with dense pubescence (with a glabrous patch in *Neohaemonia*); 2) pronotum with setae at anterior angles (such setae absent in *Neohaemonia*); 3) pronotum with distinct anterior and posterior beads (such beads absent in *Neohaemonia*); 4) profemur with a short linearly arranged brush of setae basally on posterior surface (such brush of setae absent in *Neohaemonia*); 5) endophallus without pELD (pELD present in *Neohaemonia*).

Key to species of *Macrolepa*

- 1 Punctures along elytral striae coarse, not arranged in paired rows (Figs 24, 26, 31); antenna relatively short, not extending beyond middle of elytron (Figs 24–27); metatarsus with apical tarsomere as long as basal three combined (Fig. 39); hypomeron with an oblong supracoxal pubescent patch (Fig. 32); BL = 5.4–8.5 mm. China (Sichuan) *M. ranina* sp. nov.
- Punctures along elytral striae fine, arranged more or less in paired rows (Figs 1, 3, 50–53); antenna relatively long, extending beyond middle of elytron (Figs 1–3, 50, 52, 53); metatarsus with apical tarsomere more than 1.2 times as long as basal three combined (Figs 10, 68, 70, 71); hypomeron with at most a small triangular supracoxal pubescent patch (Figs 14, 54) 2
- 2 Pronotum and elytron pubescent, with conspicuous dense long hairs (Figs 57, 61); elytron without spine at outer apical angle (Fig. 65); pronotum without black spots or stripes on disc (Fig. 57); BL: 5.0–8.6 mm. China (Heilongjiang, Ningxia, Gansu, Xinjiang (Aksu)); Finland *M. pubipennis* (Reuter, 1875)
- Pronotum and elytron glabrous or with very sparse short hairs (Figs 5, 8, 56, 58, 59, 60, 62, 63); elytron with spine at outer apical angle (Figs 12, 64, 66, 67); pronotum with black spots or stripes on disc (Figs 5, 56, 58, 59) 3
- 3 Pronotum without coarse black punctures near apical and basal margin, medial longitudinal groove shallow, not black (Figs 58, 59); hypomeron without supracoxal pubescent patch; second metatarsomere longer than or equal to first (Figs 70, 71) 4
- Pronotum with coarse black punctures near apical and basal margin, medial longitudinal groove deep, black (Figs 5, 56); hypomeron with a small triangular supracoxal pubescent patch (Figs 14, 54); first metatarsomere much longer than second (Figs 10, 68) 5
- 4 Median lobe of aedeagus relatively robust, apex with a denticle (Figs 77, 78); elytral outer apical spine generally long, with base narrow (Fig. 66); second metatarsomere longer than first (Fig. 70); body relatively large, BL: 5.9–7.7 mm. China (Xinjiang (Altay)); Siberia; Middle Asia; Europe; Algeria *M. appendiculata* (Panzer, 1794)
- Median lobe of aedeagus relatively slender, apex gradually narrowed (Figs 79, 80); elytral outer apical spine generally short, with base broad (Fig. 67); second metatarsomere equal to or slightly longer than first (Fig. 71); body relatively small, BL: 5.3–6.6 mm. China (Heilongjiang, Tianjin); Japan; Siberia; Mongolia; Middle Asia; Europe *M. mutica* (Fabricius, 1792)
- 5 Pronotum and elytron smooth, without wrinkles (Figs 56, 60); lateral outline of elytra nearly parallel (Fig. 52); vertical tubercles distinctly convex (Figs 54, 55); black stripes on pronotal disc short (Fig. 56); body relatively small, BL: 3.5–4.5 mm. China (Heilongjiang, Hebei, Jiangsu, Hubei); Japan; East Siberia *M. japana* (Jacoby, 1885)
- Pronotum and elytron with wrinkles (Figs 5, 8); lateral outline of elytra not parallel, widest near middle (Figs 1, 3); vertical tubercles less convex (Figs 6, 7); black stripes on pronotal disc long (Fig. 5); body relatively large, BL: 5.1–6.4 mm. China (Guizhou) *M. huaxiensis* sp. nov.

New species accounts

Macrolepa huaxiensis Lou & Liang, sp. nov.

(Figs 1–23, 86, 87)

Type locality. Huaxi District, Guizhou Province, China, 26.43578°N, 106.65092°E, 1100 m.

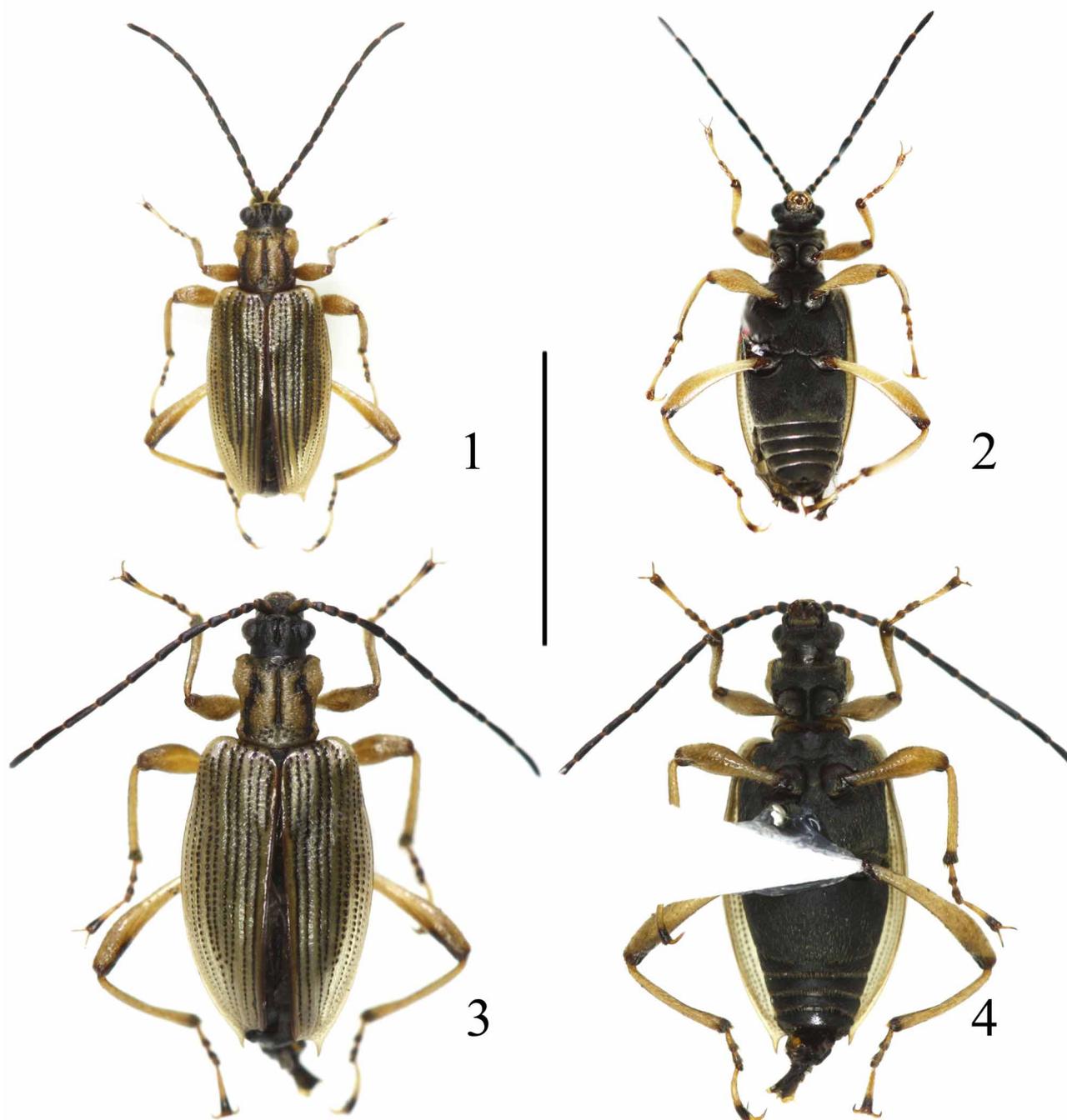
Types. Holotype: male, “CHINA, Guizhou Provin., Guiyang City, Huaxi Distr. Huaxi river. 26.43578°N, 106.65092°E”/ “1100 m, 2009.X.16 D. Ye Liu & Hongliang Shi coll. Institute of Zoology, Chinese Acad. Sci.”/ “*Macrolepa huaxiensis* NEW SPECIES, HOLOTYPE, designated by Lou and Liang, 2011” [red label]. Paratypes (total 18 specimens): 11 males and 3 females, one pair deposited in the Osaka Museum of Natural History, “CHINA, Guizhou Provin., Guiyang City, Huaxi Distr., Huaxi river. 26.43578°N, 106.65092°E”/ “1100 m, 2009.X.16 D. Larval host plants: *Vallisneria natans* and *Ottelia acuminata*. Ye Liu & Hongliang Shi coll. Institute of Zoology, Chinese Acad. Sci.”/ “*Macrolepa huaxiensis* NEW SPECIES, PARATYPE, designated by Lou and Liang, 2011” [yellow label]; 2 males and 2 females, “CHINA, Guizhou Provin., Guiyang City, Huaxi Distr., Huaxi river. 26.43578°N, 106.65092°E”/ “1100 m, 2008.I.06 D. Larval host plants: *Vallisneria natans* and *Ottelia acuminata*. Ye Liu coll. Institute of Zoology, Chinese Acad. Sci.”/ “*Macrolepa huaxiensis* NEW SPECIES, PARATYPE, designated by Lou and Liang, 2011” [yellow label].

Diagnosis. Pronotum and elytra glabrous (Figs 5, 8); ventral surface covered with dense flat pubescence, mixed with sparse long individually distinguishable setae (Figs 14, 16, 17, 19); antenna long, extending beyond middle of elytron (Figs 1–4); fourth antennomere about 1.4 times as long as third (Fig. 13); mentum with dense pubescence (Fig. 11); pronotum wrinkled, with three longitudinal black stripes on disc, coarsely punctate near apical and basal margins (Figs 5, 14); hypomeron with a small triangular supracoxal pubescent patch (Fig. 14); elytral apex truncate, with triangular spine at outer apical angle, sutural apex angulated (Fig. 12); punctures along striae arranged in paired rows (Figs 1, 3, 8); first metatarsomere longer than second (Fig. 10).

Description.

Size. Male: BL = 5.1–5.4 mm, BW = 1.9–2.1 mm; female: BL = 5.4–6.4 mm, BW = 1.9–2.8 mm.

Color. Head and antenna black (Figs 1–4); mouth parts brown to dark brown; pronotum yellow with three black stripes and black punctures (Fig. 5); scutellum black; elytra yellow with punctures along striae black and elytral suture brown (Figs 1, 3); underside black (Figs 2, 4); legs yellow, apices of femora, tibiae and tarsomeres black (Figs 1–4).



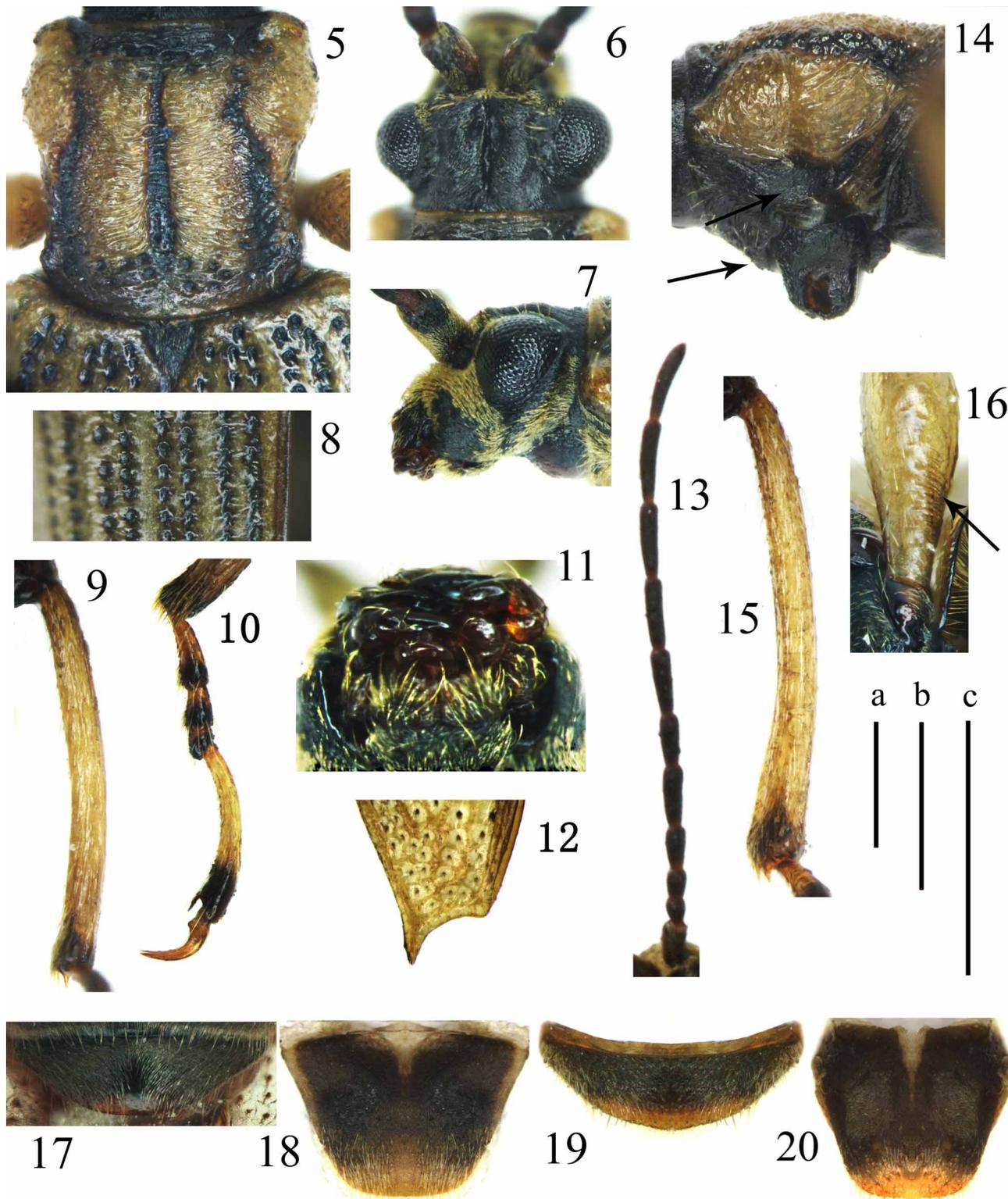
FIGURES 1–4. *Macroplea huaxiensis* sp. nov. 1. Holotype, male, dorsal view; 2. Paratype, male, ventral view; 3. Paratype, female, dorsal view; 4. Paratype, female, ventral view. Scale line = 5.0 mm.

Head. Eyes prominent, supraocular furrow distinct (Fig. 6); vertex with distinct tubercles along medial groove, with dense, flat, individually indistinguishable pubescence extending over tubercles (Figs 6, 7); transverse carina behind antennal base as high as vertex, covered with long yellow setae (Fig. 6); frontoclypeus with long yellowish setae (Figs 6, 7); anteclypeus exposed or enclosed; labrum broad, apical margin slightly protruding, with a row of punctures at base and a few punctures at lateral sides; mentum with dense long setae, apex emarginated (Fig. 11);

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apical labial palpomere flattened, short, broad; labial and maxillary palpi with setae restricted to mesal surface; antenna long, extending beyond middle of elytron (Figs 1–4); scape (antennomere 1) with mesal surface flat, smooth, glabrous, rest of scape and antennomeres 2–11 with dense, flat pubescence, most setae individually indistinguishable (Figs 6, 13); length ratio of scape and antennomeres 2–4 equals 31:16:19:26.



FIGURES 5–20. *Macrolepta huaxiensis* sp. nov. 5–13, 17, 18. Male; 14–16, 19, 20. Female. 5. Pronotum, dorsal view; 6. Head, dorsal view; 7. Head, lateral view; 8. Left elytron, middle part; 9. Right metatibia, lateral view; 10. Right metatarsus, lateral view; 11. Mouth parts, ventral view; 12. Apex of left elytron; 13. Antenna; 14. Pronotum, left lateral view; 15. Right metatibia, lateral view; 16. Left profemur, ventral view; 17, 19. Apical abdominal sternum; 18, 20. Pygidium. Scale lines: a = 0.5 mm. (Figs 5–10, 12, 14–20); b = 1.0 mm. (Fig. 13); c = 0.5 mm. (Fig. 11).

Thorax. Pronotum (Figs 5, 14) quadrate, PL/PW = 0.99 (0.92–1.03); pronotal angles projecting, each bearing a seta (two or three setae at a single angle in a few specimens); apex slightly wider than base; apical margin convex; basal margin flat; anterolateral tubercles protruded distinctly; lateral margin gradually narrowing backwards from anterolateral tubercle; lateral margin narrowed in middle; no ridge or carina anterior to basal angle; disc slightly shiny, glabrous, with fine transverse wrinkles and fine punctures outside median groove, with scattered coarse punctures near apical and basal margins; median groove deep, wide, with fine transverse wrinkles and fine punctures at bottom; longitudinal black stripes long, exceeding anterior and posterior transverse grooves. Hypomerone (Fig. 14) with wrinkles and a small triangular supracoxal pubescent patch. Prosternum (Fig. 14) covered with dense flat pubescence, mixed with sparse long individually distinguishable setae, prosternum slightly convex in central area before procoxae. Scutellum (Fig. 5) triangular, with sharp apex.

Elytra. EL/EW = 1.85 (1.64–1.94), widest near middle, narrowed backwards; apex truncate with triangular spine at outer angle (Figs 1, 3, 12); spine slightly longer than its width at base; punctures along striae relatively fine, arranged in paired rows; surface of intervals shiny, alternating intervals 2, 4, 6, 8 wider and convex (Figs 1, 3, 8), elytral suture convex with shallow transverse wrinkles; sutural apex with obtuse angulation (Fig. 12); epipleuron as wide as outermost interval, convex, extending over spine at outer angle (Fig. 4); groove at shoulder shallow, basal depression shallow, medial depression inconspicuous (Figs 1, 3).

Abdomen. Sterna with dense, flat pubescence, mixed with sparse long individually distinguishable setae (Figs 17, 19).

Legs. Profemur with a short linearly arranged brush of setae basally on posterior surface (Fig. 16); pro- and meso-tibial spurs short, inconspicuous, metatibia slightly curved in both sex (Figs 9, 15); metatarsus (Fig. 10) with markedly reduced pubescence, fifth tarsomere elongate, 1.2–1.4 times as long as basal three combined, first tarsomere longer than second, second longer than third, third tarsomere cylindrical, slightly bilobed in dorsal view; tarsal claw simple, elongate, with a small tooth at base.

Male genitalia. Median lobe of aedeagus stout, slightly truncate at apex in dorsal view (Fig. 21); cap of tegmen slender, more sclerotized at apical half, with several long setae at apex (Fig. 23); endophallus with apex of MEG turned dorsal, two ELDs fused, enclosing MEG, PDS paired, with apex broadly expanded in dorsal view, without pELD (Figs 21, 22).

Sexual dimorphism. Male generally smaller than female (Figs 1–4); apical abdominal sternum with a medial depression of variable depth in male (Fig. 17), such a depression is absent in female (Fig. 19); hind margin of pygidium slightly rounded in male (Fig. 18), truncate in female (Fig. 20).

Distribution. China (Guizhou) (Fig. 85).

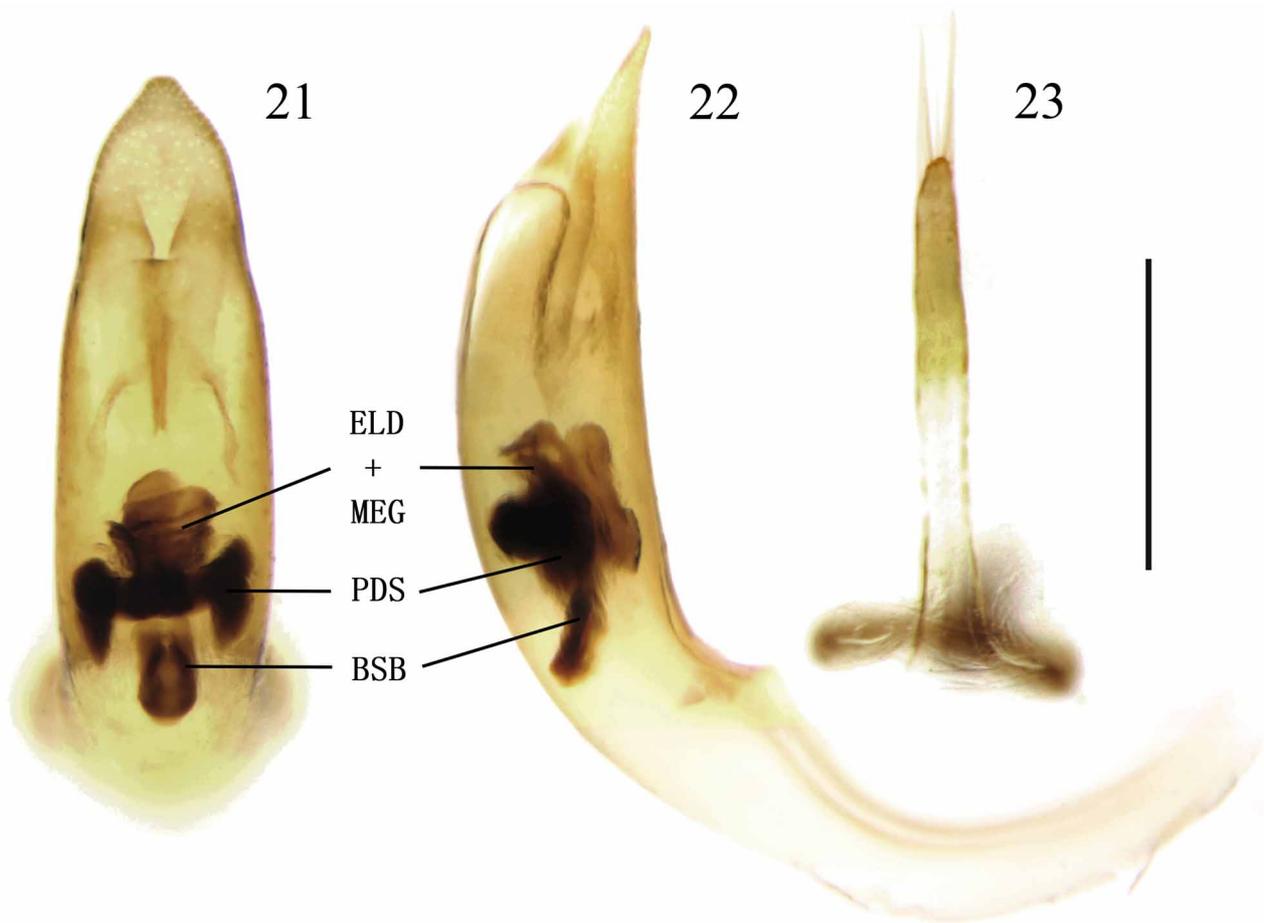
Host plants. *Vallisneria natans* (Lour.) Hara and *Ottelia acuminata* (Gagnep.) Dandy (both Hydrocharitaceae) are recorded as larval host plants, with the former being the major host.

Biology. The type locality of this new species is a clean river running at a moderate speed while harbouring a variety of aquatic vegetation (Fig. 87). We observed larvae and cocoons (with larvae, pupae or adults inside) adhering to the roots of host plant (Fig. 86). In the laboratory, adults were never observed flying, although they can walk slowly out of water for a long time (more than two hours).

Etymology. The species name *huaxiensis* refers to the type locality, Huaxi river.

Remarks. This new species was wrongly identified as *M. japonica* by Zhang *et al.* (2010). It resembles *M. japonica* in many characters (see the key), among which three black stripes on pronotal disc (Figs 5, 56) and a triangular supracoxal pubescent patch on hypomerone (Figs 14, 54) are shared only by these two species in *Macrolea*. However, *M. huaxiensis* can be easily separated from *M. japonica* by the characters listed in the key. Other characters useful in separating these two species are the following: mentum is densely pubescent in *M. huaxiensis* (Fig. 11), while the same is sparsely pubescent in *M. japonica*; ventral surface is mixed with sparse long individually distinguishable setae in the former (Figs 14, 16, 17, 19), while such setae are absent in *M. japonica*; prosternum in middle part before procoxae is slightly convex in *M. huaxiensis* (Fig. 14), however the same is distinctly convex in *M. japonica* (Fig. 54); elytral apex is truncate in *M. huaxiensis* (Fig. 12), and the same is emarginate in *M. japonica* (Fig. 64); base of metatarsal claw with a small tooth in *M. huaxiensis* (Fig. 10), but such a tooth is absent in *M. japonica* (Fig. 68); tip of median lobe of aedeagus is slightly truncate in *M. huaxiensis* (Fig. 21), while the same is more acute in *M. japonica* (Fig. 73); endophallus with ELD robust and apex of PDS broadly expanded in dorsal view in the former (Fig. 21), however the same are much more slender in *M. japonica* (Fig. 75).

The densely pubescent mentum (Fig. 11) in *M. huaxiensis* is unique as the same is glabrous or sparsely pubescent in all other members of the genus. Densely pubescent mentum is a feature of *Neohaemonia* species distributed in the new world (Askevold, 1988: 403).



FIGURES 21–23. *Macrolea huaxiensis* sp. nov. Paratype. 21–22. Medial lobe with endophallus in it (21. Dorsal view, 22. Lateral view); 23. Tegmen, dorsal view. Scale line = 0.5 mm.

***Macrolea ranina* Lou & Yu, sp. nov.**

(Figs 24–49, 88, 89)

Type locality. Zoigê County, Sichuan Province, China, 33.58143° N, 102.87080° E, 3454 m.

Types. Holotype: male, “CHINA, Sichuan Prov., Zoigê County, Keji Prairie, 33.58143°N, 102.87080°E”/ “3454 m, 2007.VI.25. Hongbin Liang coll. Institute of Zoology, Chinese Acad. Sci.”/ “*Macrolea ranina* sp. n., Holotype, designated by Lou & Yu, 2011” [red label]. Paratypes (total 10 specimens): 1 male and 1 female, “CHINA, Sichuan Prov., Zoigê County, Keji Prairie, frog stomach.”/ “3454 m, 2005.V.6. Jindong Zhang coll. Institute of Zoology Chinese Acad. Sci.”/ “*Macrolea ranina* sp. n., Paratype, designated by Lou & Yu, 2011” [yellow label]; 2 males and 2 females, “CHINA, Sichuan Prov., Zoigê County, Keji Prairie, 33.58143°N, 102.87080°E”/ “3454 m, 2007.VI.25. Hongbin Liang coll. Institute of Zoology Chinese Acad. Sci.”/ “*Macrolea ranina* sp. n., Paratype, designated by Lou & Yu, 2011” [yellow label]; 2 males (Osaka Museum of Natural History), “CHINA, Sichuan Prov., Zoigê County, Keji Prairie, 33.58143°N, 102.87080°E”/ “3454 m, 2007.VI.25. T. Sota coll.”/ “*Macrolea ranina* sp. n., Paratype, designated by Lou & Yu, 2011” [yellow label]; 1 male and 1 female, “CHINA, Sichuan Prov., Zoigê County, Keji Prairie, 33.58143° N, 102.87080° E 2007.VI, Jindong Zhang coll. Institute of Zoology Chinese Acad. Sci.”/ “*Macrolea ranina* sp. n., Paratype, designated by Lou & Yu, 2011” [yellow label].

Diagnosis. Pronotum and elytra glabrous (Figs 28, 31); ventral surface covered with dense long individually distinguishable setae (Figs 32, 34); antenna short, not extending beyond middle of elytron (Figs 24–27); fourth antennomere about 1.3 times as long as third (Fig. 33); mentum with very sparse setae, not bilobed (Fig. 30); pronotum wrinkled, with deep, wide, black median groove and two deep depressions near apical margin, coarsely punctate near apical and basal margins (Figs 28, 32); hypomerion with an oblong supracoxal pubescent patch (Fig. 32); elytral apex nearly truncate, without spine at apical angles, only with obtuse angulation (Figs 24, 26, 35); punctures along striae not arranged in paired rows, intervals with subequal width (Figs 24, 26, 31); apical metatarsomere as long as basal three combined (Fig. 39).

Description.

Size. Male: BL = 5.4–6.9 mm. BW = 2.2–2.7 mm; female: BL = 6.9–8.5 mm. BW = 2.6–3.3 mm.

Color. Head black; antenna dark brown or black (Figs 24, 26, 33); mouth parts dark brown; pronotum yellow with black median groove and black punctures (Fig. 28); scutellum black; elytra yellow with punctures along striae black and elytral suture brown (Figs 24, 26); underside black (Figs 25, 27); legs yellow, apices of femora, tibiae and tarsomeres brown (Figs 24–27).

Head. Eyes prominent, supraocular furrow distinct (Fig. 29); vertex with distinct tubercles along medial groove, with dense long yellowish setae extending over tubercles (Figs 29, 32); transverse carina behind antennal base as high as vertex, covered with long yellow setae (Figs 29, 32); frontoclypeus covered with long yellow setae (Fig. 29); anteclypeus exposed or enclosed; labrum broad, with a row of punctures at base and a few punctures at lateral sides; mentum with very sparse setae, apical margin nearly straight (Fig. 30); apical labial palpomere flattened, short, broad; labial and maxillary palpi with setae restricted to mesal surface; antenna short, not extending beyond middle of elytron (Figs 24–27); scape (antennomere 1) with mesal surface flat, smooth, glabrous, rest of scape and antennomeres 2–11 with dense short individually distinguishable setae (Figs 29, 33); length ratio of scape and antennomeres 2–4 equals 43:22:25:33.

Thorax. Pronotum (Figs 28, 32) quadrate, PL/PW = 0.92 (0.87–0.95); pronotal angles projecting, each bearing a seta (two or three setae at a single angle in a few specimens); apex slightly wider than base; apical margin convex; basal margin flat; anterolateral tubercles protruded distinctly; lateral margin narrowed in middle; posterolateral tubercle small, extending to disc, forming a conic elevation; disc shiny, glabrous, with two wrinkled depressions deep near anterolateral tubercle, and shallow posteriorly; disc with scattered coarse punctures near apical and basal margins; median groove deep, wide, slightly wrinkled at bottom. Hypomerion (Fig. 32) with wrinkles and an oblong supracoxal pubescent patch. Prosternum (Fig. 32) covered with dense long yellow setae, prosternum slightly convex in central area before procoxae. Scutellum (Fig. 28) triangular, with sharp apex.

Elytra. EL/EW = 1.78 (1.64–1.93), widest near middle, narrowed backwards; apex slightly emarginate with obtuse angulation at outer angle (Figs 24, 26, 35); punctures along striae relatively coarse, not arranged in paired rows; intervals nearly uniformly wide, convex, with irregular shallow transverse wrinkles, surface shiny (Figs 24, 26, 31), elytral suture convex, smooth (Fig. 31); sutural apex with obtuse angulation (Fig. 35); epipleuron as wide as or narrower than outermost interval, convex (Fig. 35); groove at shoulder shallow, basal depression shallow, medial depression inconspicuous (Figs 24, 26).

Abdomen. Sterna with dense long yellow setae, individual seta distinguishable, surface with large punctures, interstices microreticulate (Figs 34, 40).

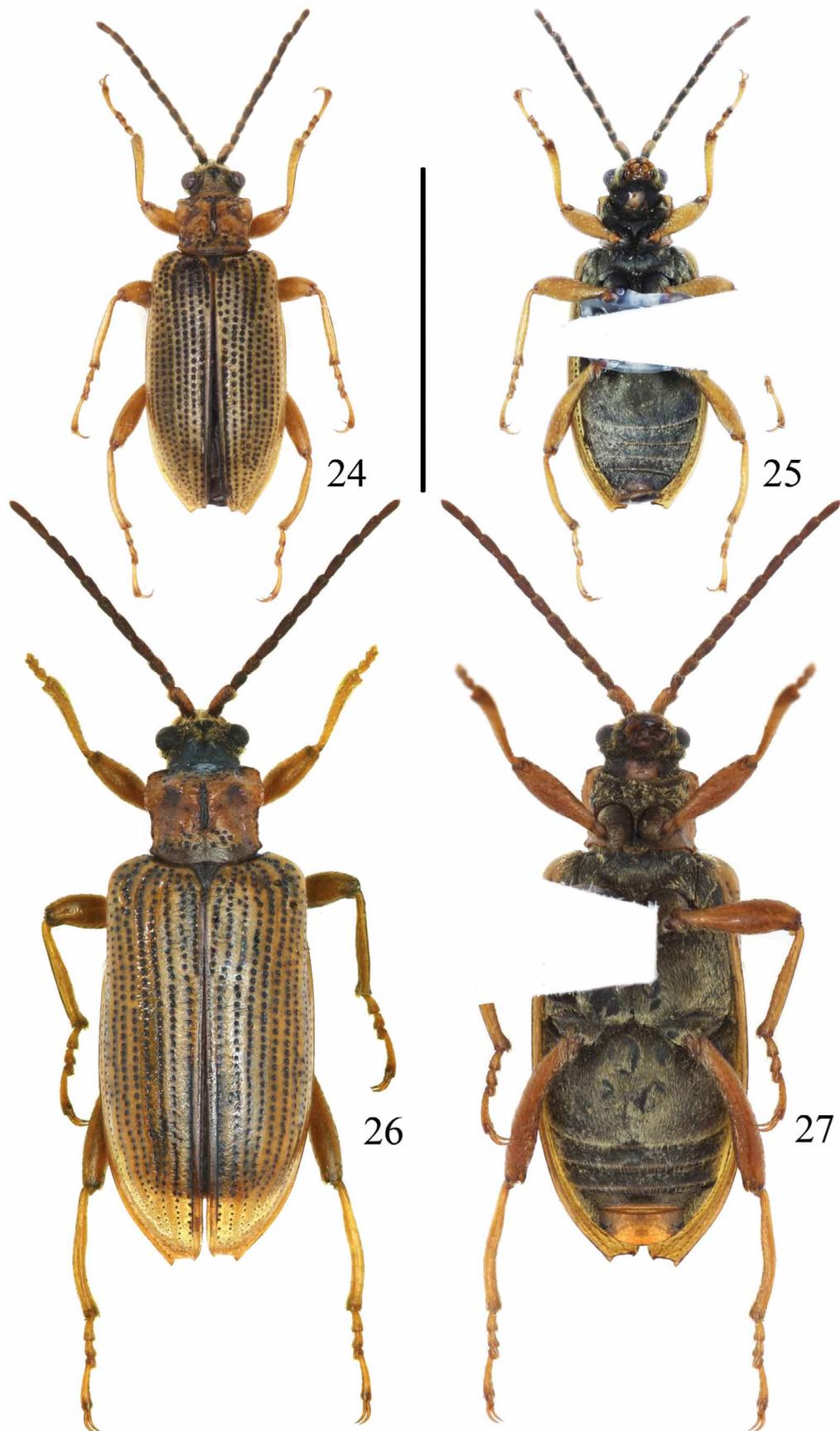
Legs. Profemur with a short linearly arranged brush of setae basally on posterior surface (Fig. 36); pro- and meso-tibial spurs short, inconspicuous, metatibia slightly curved in both sex (Figs 37, 38); metatarsus (Fig. 39) with markedly reduced pubescence, apical tarsomere elongate, as long as basal three combined, first tarsomere longer than second, second longer than third, third tarsomere cylindrical, slightly bilobed in dorsal view, tarsal claws simple, elongate, with a small tooth at base.

Male genitalia. Median lobe of aedeagus acute at apex (Figs 44, 45); cap of tegmen robust at middle, with several long setae at apex (Fig. 46); endophallus with apex of MEG turned dorsal, two ELDs fused, enclosing MEG, PDS also fused, cricoid in lateral view, without pELD (Figs 47–49).

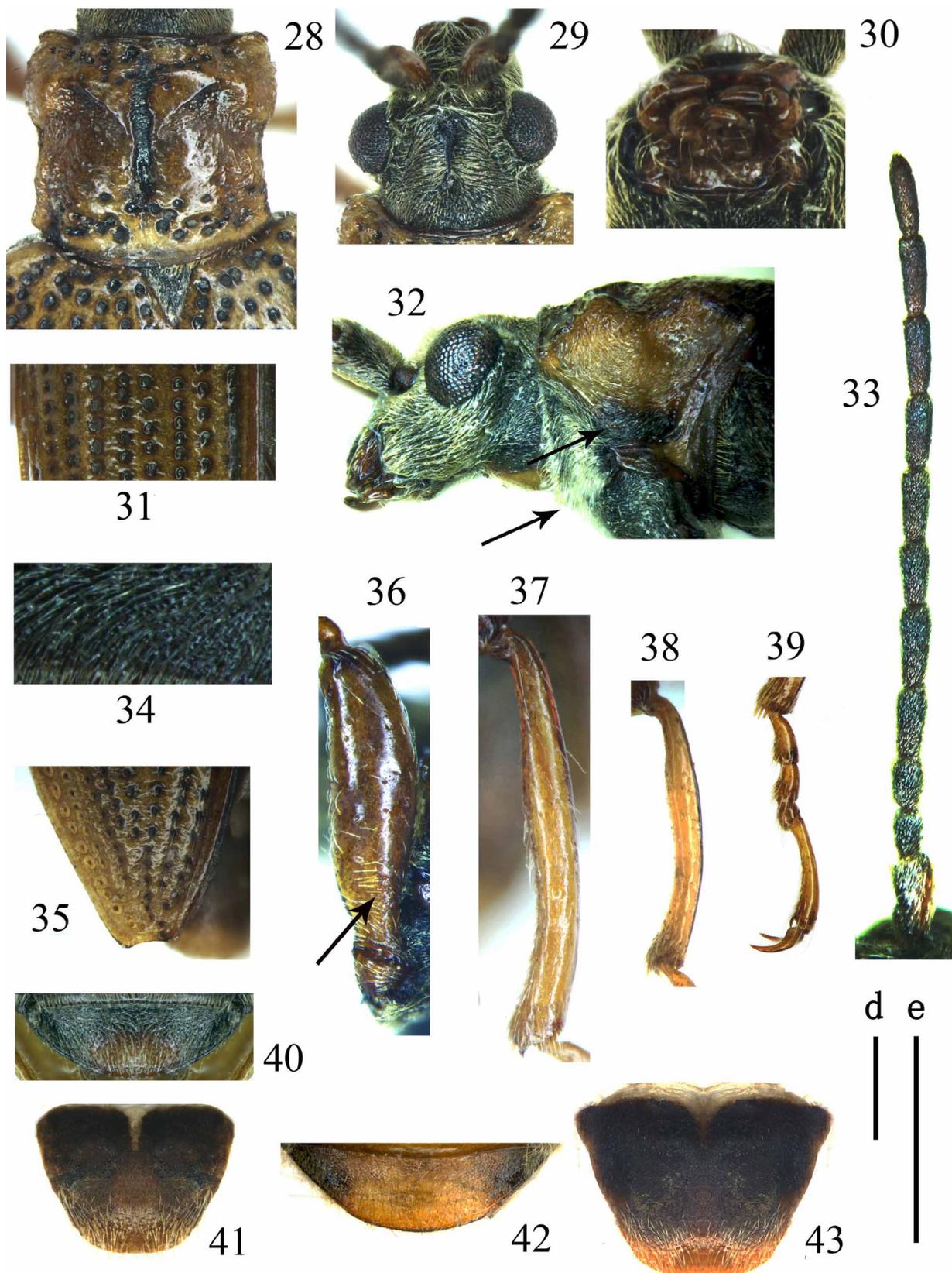
Sexual dimorphism. Male smaller than female (Figs 24–27); apical abdominal sternum with a shallow medial depression of variable depth in male (Fig. 40), while such a depression is absent in female (Fig. 42); hind margin of pygidium slightly rounded in male (Fig. 41) but the same is truncate in female (Fig. 43).

Distribution. China (Sichuan) (Fig. 85).

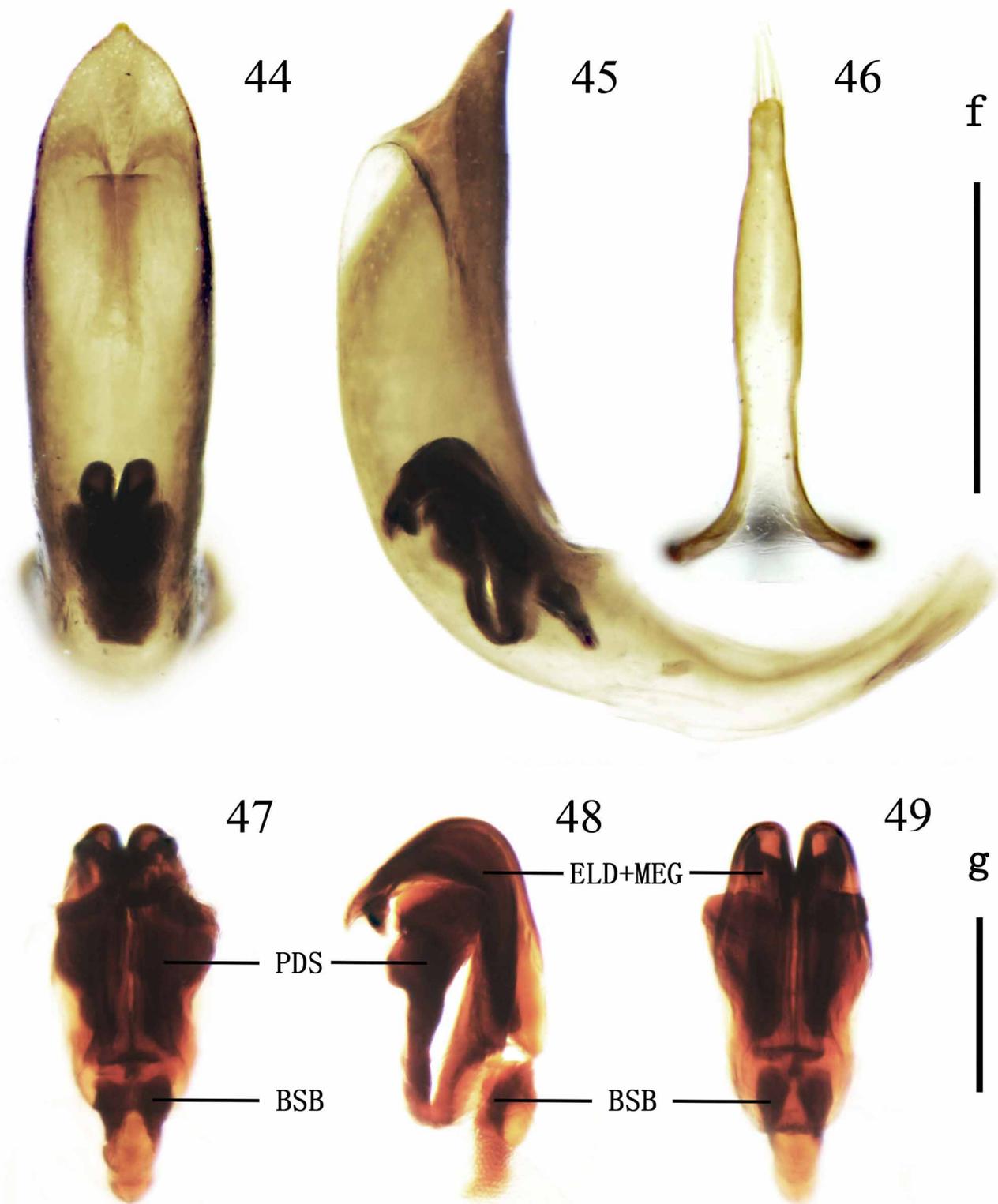
Host plant. *Hippuris vulgaris* L. (Hippuridaceae) (Larval host plant).



FIGURES 24–27. *Macroplea ranina* sp. nov. 24. Paratype, male, dorsal view; 25. Paratype, male, ventral view; 26. Paratype, female, dorsal view; 27. Paratype, female, ventral view. Scale line = 5.0 mm.



FIGURES 28–43. *Macrolea ranina* sp. nov. 28–35, 38–41. Male; 36, 37, 42, 43. Female. 28. Pronotum, dorsal view; 29. Head, dorsal view; 30. Mouth parts, ventral view; 31. Left elytron, middle part; 32. Head and prothorax, left lateral view; 33. Antenna; 34. Part of abdominal sternum, showing long setae; 35. Apex of left elytron; 36. Left profemur, ventral view; 37, 38. Right metatibia, lateral view; 39. Right metatarsus, lateral view; 40, 42. Apical abdominal sternum; 41, 43. Pygidium. Scale lines: d = 0.5 mm. (Figs 28, 29, 31–33, 35–43); e = 0.5 mm. (Figs 30, 34).



FIGURES 44–49. *Macrolea ranina* sp. nov. 44, 45. Median lobe with endophallus in it (44. Dorsal view; 45. Lateral view.); 46. Tegmen, dorsal view; 47–49. Endophallus (47. Dorsal view; 48. Lateral view; 49. Ventral view). Scale lines: f = 0.5 mm. (Figs 44–46); g = 0.2 mm. (Figs 47–49).

Biology. The type specimens of this species collected by the corresponding author (Liang) and Teiji Sota were from two fresh ponds (Figs 88, 89) at Keji Prairie, Sichuan Province in 2007. A number of live cocoons were found adhering to the roots of *Hippuris vulgaris* L. (Hippuridaceae) in one pond, and live adults and empty cocoons were found in another pond where *Ranunculus* sp. (Ranunculaceae) was dominant.

Etymology. The species is named after Ranidae, a family of frogs, from the stomach of which this new species was first collected.

Remarks. The new species closely resembles *Neohaemonia voronovae* Medvedev, 1977 (type locality: Ogii Nuur, Arkhangay, Mongolia) in having shorter antenna not extending beyond the middle of elytron (Figs 24–27); pronotum with setae at anterior and posterior angles (Fig 28); pronotum with transverse elevation at anterior quarter (Figs 28, 32); elytral striae with single rows of punctures (Figs 24, 26, 31); and metatarsomeres having similar length ratio (Fig. 39).

We have not examined the type of *N. voronovae* Medvedev. However, Dr. Medvedev kindly sent us habitus photographs of the type. According to the original description and comments and photographs from Dr. Medvedev, the new species differs from *N. voronovae* Medvedev in having angulation at elytral outer angle obtuse (Fig. 35) (with long and sharp spine in *N. voronovae*); pronotum with median groove deep and wide (Fig. 28) (median groove on pronotum shallow and narrow in *N. voronovae*); pronotum with lateral margin moderately narrowed in middle (Fig. 28) (strongly narrowed in the latter) and pronotum with coarse punctures black (Fig. 28) (punctures fulvous in *N. voronovae*).

The new species differs from other *Macroplea* species by the following characters: antenna relatively short, not extending beyond middle of elytron (Figs 24–27); fifth metatarsomere as long as basal three combined (Fig. 39); punctures along elytral striae in single rows (Figs 24, 26, 31); underside with dense long individually distinguishable setae (Figs 32, 34) and hypomeron with an oblong supracoxal pubescent patch (Fig. 32). All the above characters, except the single rows of punctures along elytral striae, are attributed to species of *Neohaemonia* in the phylogenetic analysis by Askevold (1988). However *M. ranina* too shares these characters with *Neohaemonia*. Therefore, assignment of this new species in *Macroplea* has slightly expanded its generic limit. Apparently, *N. voronovae* Medvedev, 1977, too could be shifted to *Macroplea*. However, we hesitate to place *N. voronovae* in *Macroplea* pending examination of the type.

Notes on previously described species

Macroplea appendiculata (Panzer, 1794).

(Figs 50, 58, 62, 66, 70, 76–78, 90)

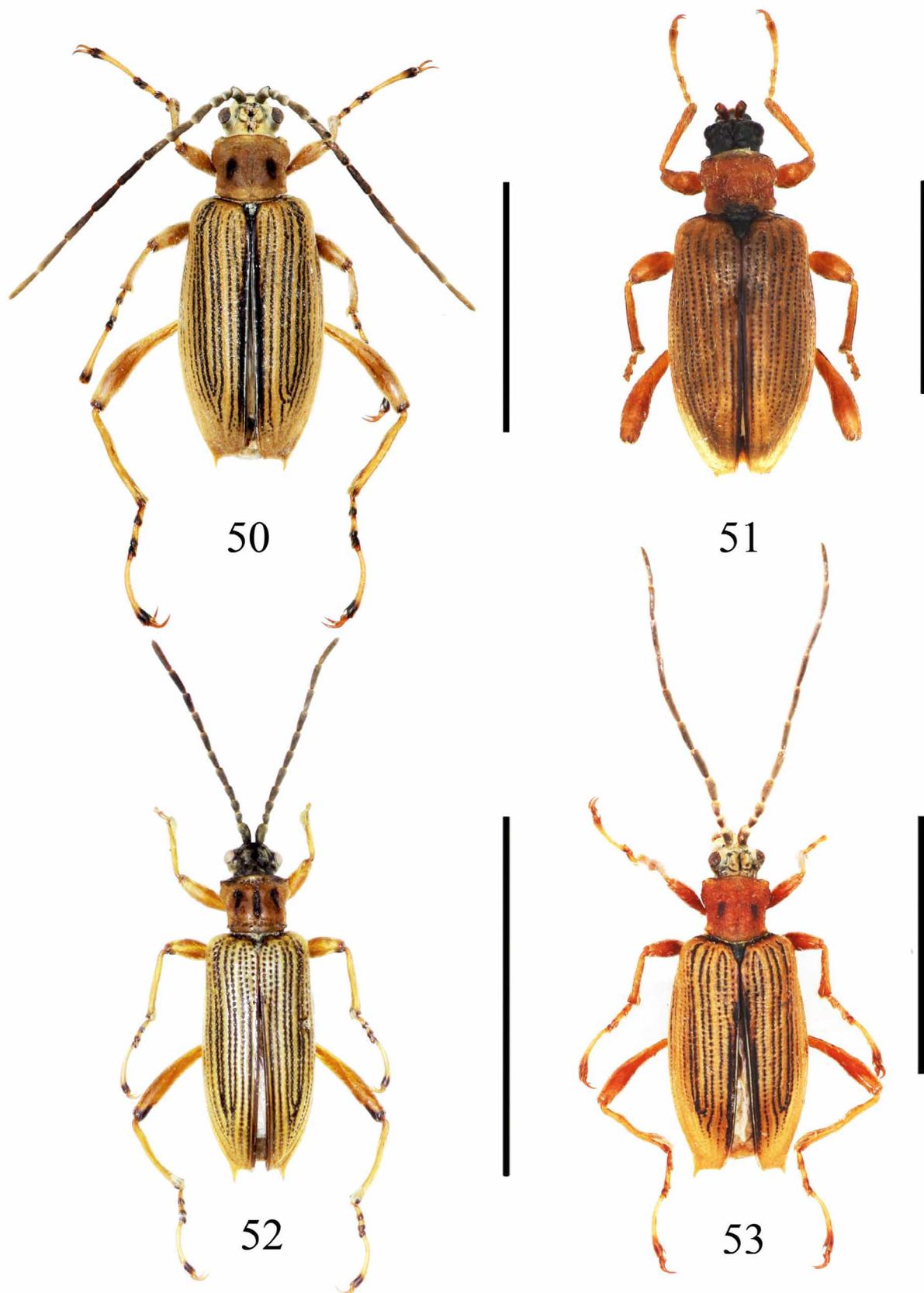
Specimens examined. Total 37 specimens: 21 males and 11 females, “China, Xinjiang, Altay, Fuyun County, a branch of Ertix River, 47.02459°N, 89.75198°E”/ “1332 m, 2009.7.11, day, Zhiliang Wang coll. Institute of Zoology”/ “Adult host plant: *Potamogeton oxyphyllus*”; 1 female, “Alsace, I. Maquin ded.”, “*Macroplea appendiculata* Panz. M. Daccordi, det. 1986”; 1 female, “Boh. Heyn VODŇANY ”; 2 females, no collecting data, “*Haemonia appendiculata* Panz.”.

Distribution. China (Xinjiang), Siberia, Middle Asia, Europe, northern Africa (Algeria).

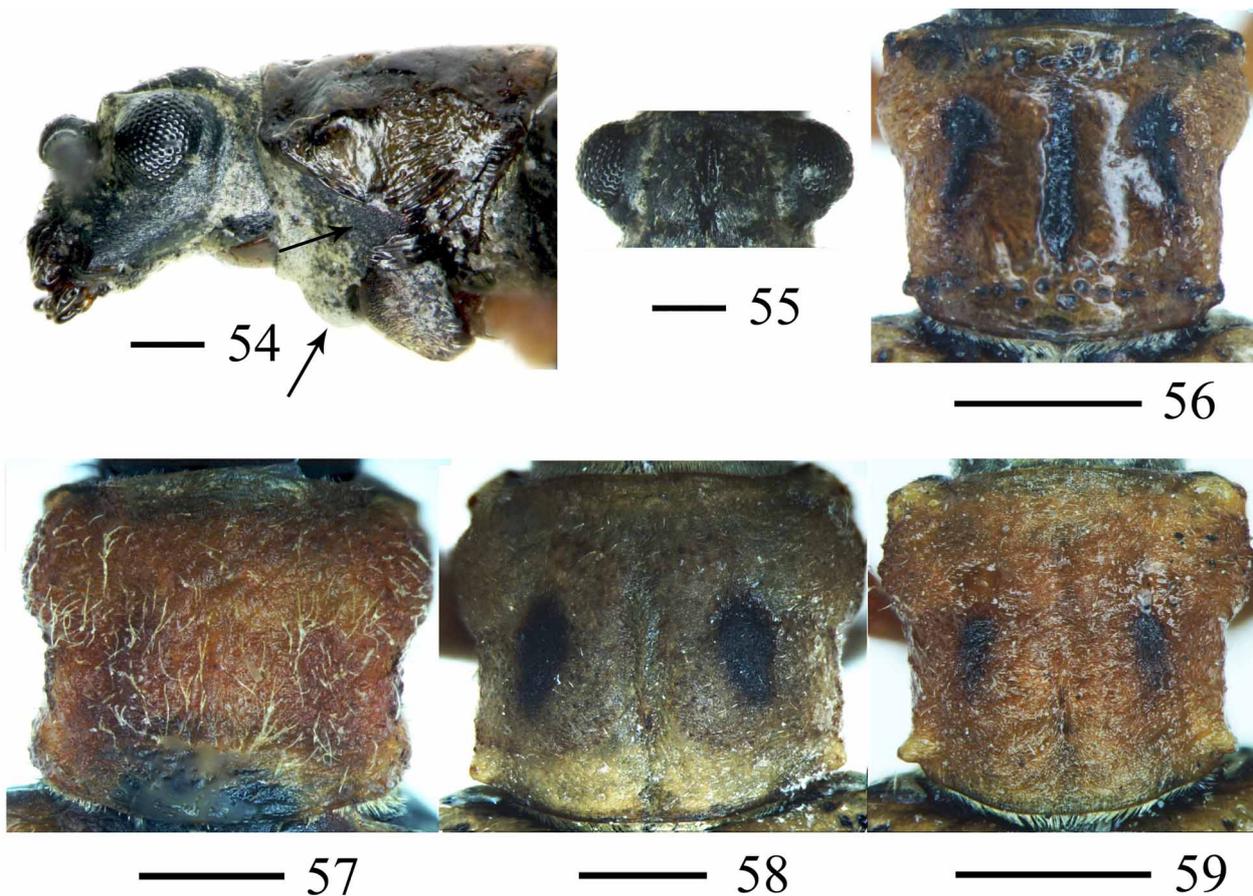
Host plants. *Ranunculus* L. (Ranunculaceae), *Carex* L. (Cyperaceae), *Potamogeton* L. (Potamogetonaceae), *Myriophyllum* L. (Haloragaceae) and *Sparganium* L. (Sparganiaceae) (Bieńkowski & Orlova-Bieńkowskaja, 2004). *Potamogeton oxyphyllus* Miq. is now recorded as adult host plant, as observed by the collector of this species, Zhiliang Wang.

Remarks. This is the first report of *M. appendiculata* from China (Xinjiang). Specimens were collected from upper stream of Ertix River (Fig. 90).

In general, *M. appendiculata* differs from *M. mutica* by its longer spine at elytral outer apical angle, and second metatarsomere longer than first (Medvedev, 2006). However, these characters were found to be highly variable. A few specimens of *M. appendiculata* from Xinjiang have relatively shorter spine, similar to those of *M. mutica*, and most specimens of *M. mutica* from Mongolia have second metatarsomere longer than first. Endophallic structures of the two species illustrated here are also similar (Figs 77, 78, 81–83). However, the shape of median lobe of aedeagus was found to be diagnostic and highly reliable in separating these two species. The median lobe of aedeagus is relatively robust with a denticle at apex in *M. appendiculata* (Figs 77, 78), while the same in *M. mutica* is relatively slender and gradually narrowed towards apex (Figs 79, 80) (also see Daccordi & Ruffo, 1978: Figs 2–5; Beenen & Winkelmann, 1989: Figs 1–4; Medvedev, 2006: Figs 7, 8).



FIGURES 50–53. *Macrolea* spp. 50. *M. appendiculata* from Xinjiang, male; 51. *M. pubipennis* from Ningxia, female; 52. *M. japana* from Jiangsu, female; 53. *M. mutica* from Tianjin, female. Scale lines = 5.0 mm.



FIGURES 54–59. Head, prothorax and pronotum of *Macroplea* spp. 54–56. *M. japana* from Jiangsu; 57. *M. pubipennis* from Ningxia; 58. *M. appendiculata* from Xinjiang; 59. *M. mutica* from Tianjin; 54. Head and prothorax, lateral view; 55. Vertex, dorsal view; 56–59. Pronotum, dorsal view. Scale lines = 0.5 mm.



FIGURES 60–67. Elytron of *Macroplea* spp. 60, 64. *M. japana* from Jiangsu; 61, 65. *M. pubipennis* from Ningxia; 62, 66. *M. appendiculata* from Xinjiang; 63, 67. *M. mutica* from Tianjin. 60–63. Left elytron, middle part; 64, 66, 67. Apex of left elytron; 65. Apexes of both elytra. Scale lines = 0.2 mm.



FIGURES 68–71. Tarsus of *Macroplea* spp. 68. *M. japana* from Jiangsu; 69. *M. pubipennis* from Ningxia; 70. *M. appendiculata* from Xinjiang; 71. *M. mutica* from Tianjin. 68, 70, 71. Right metatarsus; 69. Left protarsus. Scale lines = 0.5 mm

***Macroplea japana* (Jacoby, 1885).**

(Figs 52, 54–56, 60, 64, 68, 72–75)

Specimens examined. Total 40 specimens: 1 specimen, “Jiangsu, Wuxi, 1951.III.30, Kailing Xia coll.”; 1 specimen, same locality with dating “1951.IX.10”; 5 specimens, same locality with dating “1951.XII.7”; 6 specimens, same locality with dating “1952.II.4”; 24 specimens, same locality with dating “1952.III.20”; 2 specimens, “Hebei, Tanghai, 2000.V–VI, by light trap”; 1 male, “Department of Plant Protection, Beijing Agricultural University. Logosun Mountain, Wuchang Town, by light trap. Ruihua Jin coll., 1959.VIII.28”.

Distribution. China (Heilongjiang, Hebei, Jiangsu, Hubei), Japan, East Siberia.

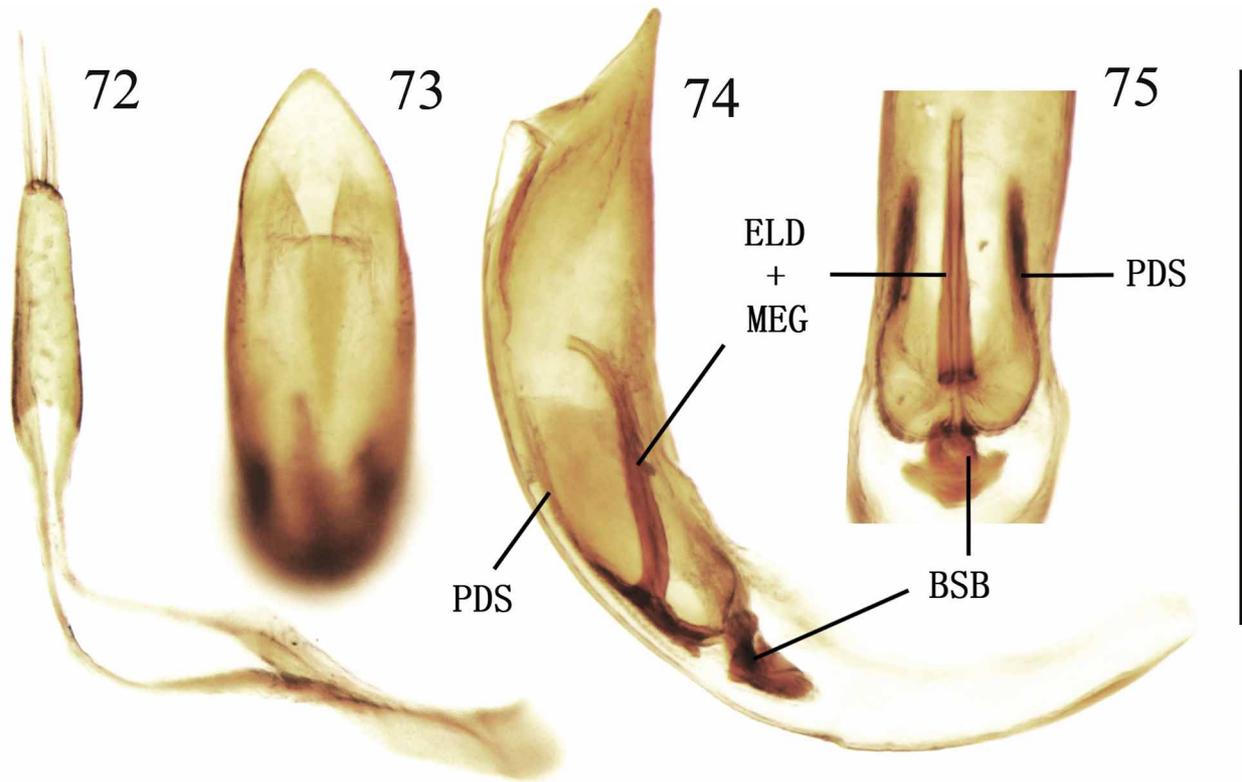
Host plant. Unknown.

Biology. The two adults of *M. japana* from Hebei and one adult from Hubei were collected by light trap, indicating possibility of flight in this species. Light trap records were also found for *Neohaemonia* species (Askevold, 1988: 373).

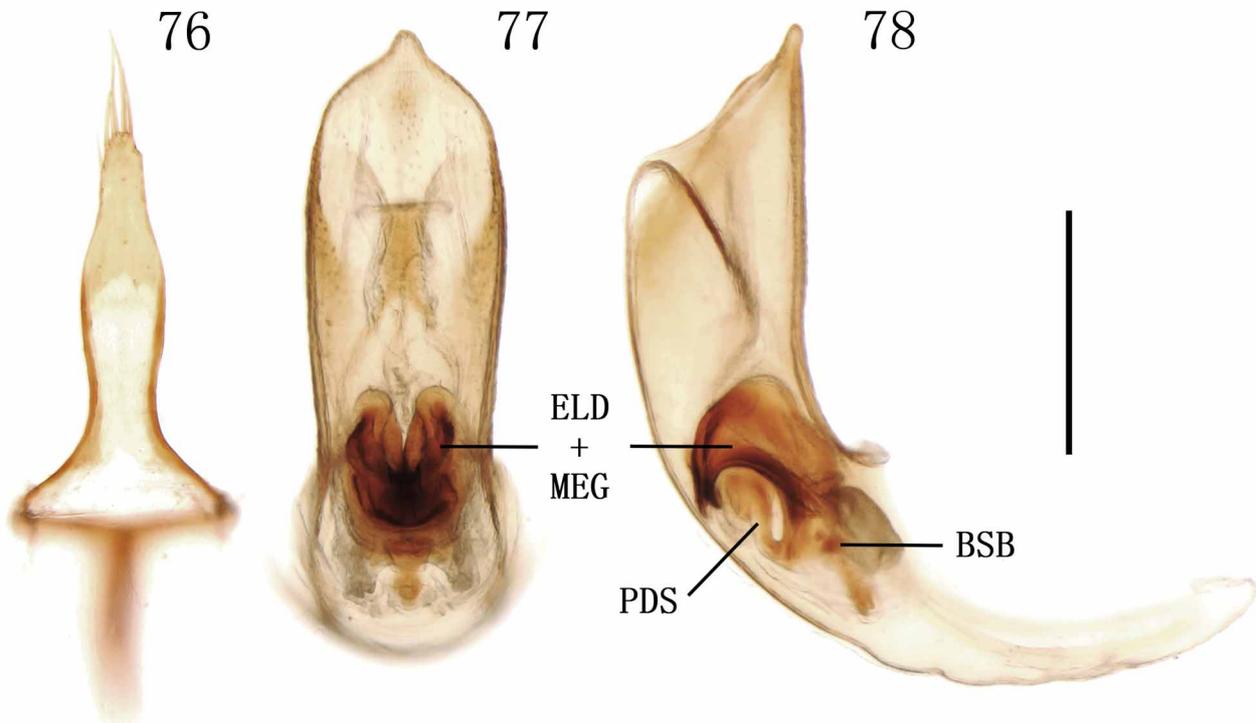
Remarks. Kölsch *et al.* (2006) recorded *M. japana* in Heilongjiang, China.

M. japana was treated as a subspecies of *M. mutica* by workers like Dubieshko (1973) and Kimoto & Takizawa (1994). However, Hayashi & Shiyake (2001) revived its species status after studying the holotype.

In 2006, Medvedev described *M. skomorokhovi* from Primorskii Territory (Russian Far East). Based on the original description, it differs from *M. japana* in having round elytral apical sutural angle (see Medvedev, 2006: Fig. 5) (angulate or protruding in *M. japana*). However, in a recent personal communication, Dr. Medvedev has informed us that his illustration is not accurate: the sutural angle of *M. skomorokhovi* is, in fact, angulate. After comparing the types, Dr. Medvedev has opined that *M. skomorokhovi* is a junior synonym of *M. japana*, and he will correct the error through a publication later.



FIGURES 72–75. *Macroplea japana* from Jiangsu. 72. Tegmen, dorsal view of cap; 73, 74. Median lobe with endophallus in it (73. Dorsal view; 74. Lateral view); 75. Endophallus in median lobe, dorsal view. Scale line = 0.5 mm.



FIGURES 76–78. *Macroplea appendiculata* from Xinjiang. 76. Tegmen, dorsal view; 77, 78. Median lobe with endophallus in it (77. Dorsal view; 78. Lateral view). Scale line = 0.5 mm.

***Macroplea mutica* (Fabricius, 1792).**

(Figs 53, 59, 63, 67, 71, 79–84)

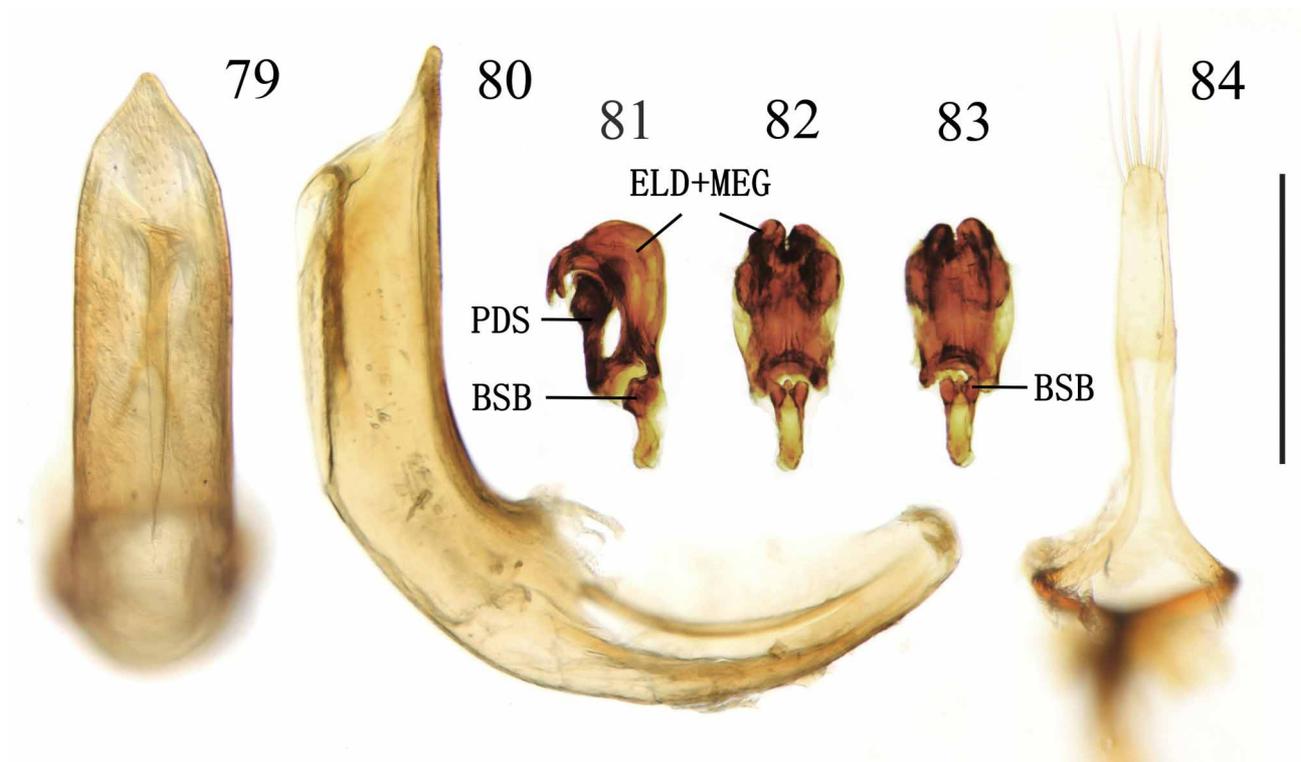
Specimens examined. Total 80 specimens: 1 male, “Balitai, Tianjin City, China, 8.V.1956”; 1 male, same locality with dating “10.V.1956”; 1 male and 1 female, same locality with dating “30.IV.1957, Jiajun Tang collector”; 1 female, same locality with dating “30.IV.1957”; 1 male, same locality with dating “10.IV.1958”; 1 male, “Tschita été 192, leg. V.J. Tomachov, Musée Heude”; 31 males and 31 females, “Mongolia, Bulgan Teshig, Hargal Nuur, Potamogetonaceae, N49.92762, E102.72817”/ “1058 m, 2010.7.10 D, Liang H.B., Shi C.M., Institute of Zoology, Chinese Acad. Sci.”; 11 specimens in cocoons preserved in alcohol, “Mongolia, Arkhangay, Ogii Nuur, Sparganiaceae, N47.76197, E102.81206”/ “1338 m, 2010.7.2 D, Liang H.B., Shi C.M., Institute of Zoology, Chinese Acad. Sci.”.

Distribution. China (Heilongjiang, Tianjin), Japan, Siberia, Mongolia, Middle Asia, Europe.

Host plants. *Brasenia* Schreb. (Cabombaceae), *Potamogeton* L. (Potamogetonaceae), *Ruppia* L. (Zosteraceae) and *Zostera* L. (Zosteraceae) (Bieńkowski & Orlova-Bieńkowskaja, 2004). Sparganiaceae are also host plants of *M. mutica* according to our observation.

Biology. The corresponding author (Liang) recently collected specimens of *M. mutica* in large numbers from Hargal Nuur and Ogii Nuur of Mongolia. In Ogii Nuur lake, the adults were still in Cocoon on the roots of Sparganiaceae on July 2, 2010. However, in Hargal Nuur, many adults were observed walking slowly on the leaves of Potamogetonaceae on July 10, 2010. Immobility (cannot swim or fly) is believed to be the specific feature of *M. mutica* by Mende *et al.* (2010: 101).

Remarks. Kölsch *et al.* (2006), and Mende *et al.* (2010) recorded *M. mutica* from Daqing, Heilongjiang, China. Hori (2006) recorded one female specimen in Japan.



FIGURES 79–84. *Macroplea mutica* from Tianjin. 79, 80. Median lobe without endophallus in it (79. Dorsal view; 80. Lateral view); 84. Tegmen, dorsal view; 81–83. Endophallus (81. Lateral view; 82. Dorsal review; 83. Ventral review). Scale line = 0.5 mm.

***Macrolea pubipennis* (Reuter, 1875).**

(Figs 51, 57, 61, 65, 69)

Specimens examined. Total 3 specimens. 1 female, “Ningxia, Qingtongxia, Shuxin Forest, 1985.IV.17, Guodong Ren collector, Department of Landscape Architecture in Agricultural College of Ningxia”; 2 specimens from Ost-Turkestan, Aksu, 1067m, 1903.V, Coll. Hauser, *Haemonia piligera* Weise, Lopatin det. [Examined by the second author (Yu) at Bishop Museum and National Museum of Natural History, Smithsonian Institution, respectively].

Distribution. China (Heilongjiang, Ningxia, Gansu, Xinjiang), Finland.

Host plant. Unknown in China.

Remarks. *Macrolea pubipennis* was formerly known only from Finland (Jolivet, 1970; Borowiec, 1984). Askevold (1990: 648) treated *Haemonia piligera* Weise, 1889 (type locality: Kansu = Gansu) and *Haemonia incostata* Pic, 1907 (type locality: Ost-Turkestan, Aksu = Xinjiang, Aksu) as junior synonyms of *M. pubipennis*, thus extending its distribution to China. Recent molecular evidence demonstrated that *M. pubipennis* is present in Heilongjiang (Kölsch *et al.*, 2006). We examined one female (in bad condition) from Ningxia, China.

We have not examined the male genitalia of *M. pubipennis*. However, from the photograph in Askevold (1999: 607: Photograph O), it is clear that its endophallic structure is similar to that of *M. appendiculata*, *M. mutica* and *M. ranina* **sp. nov.**

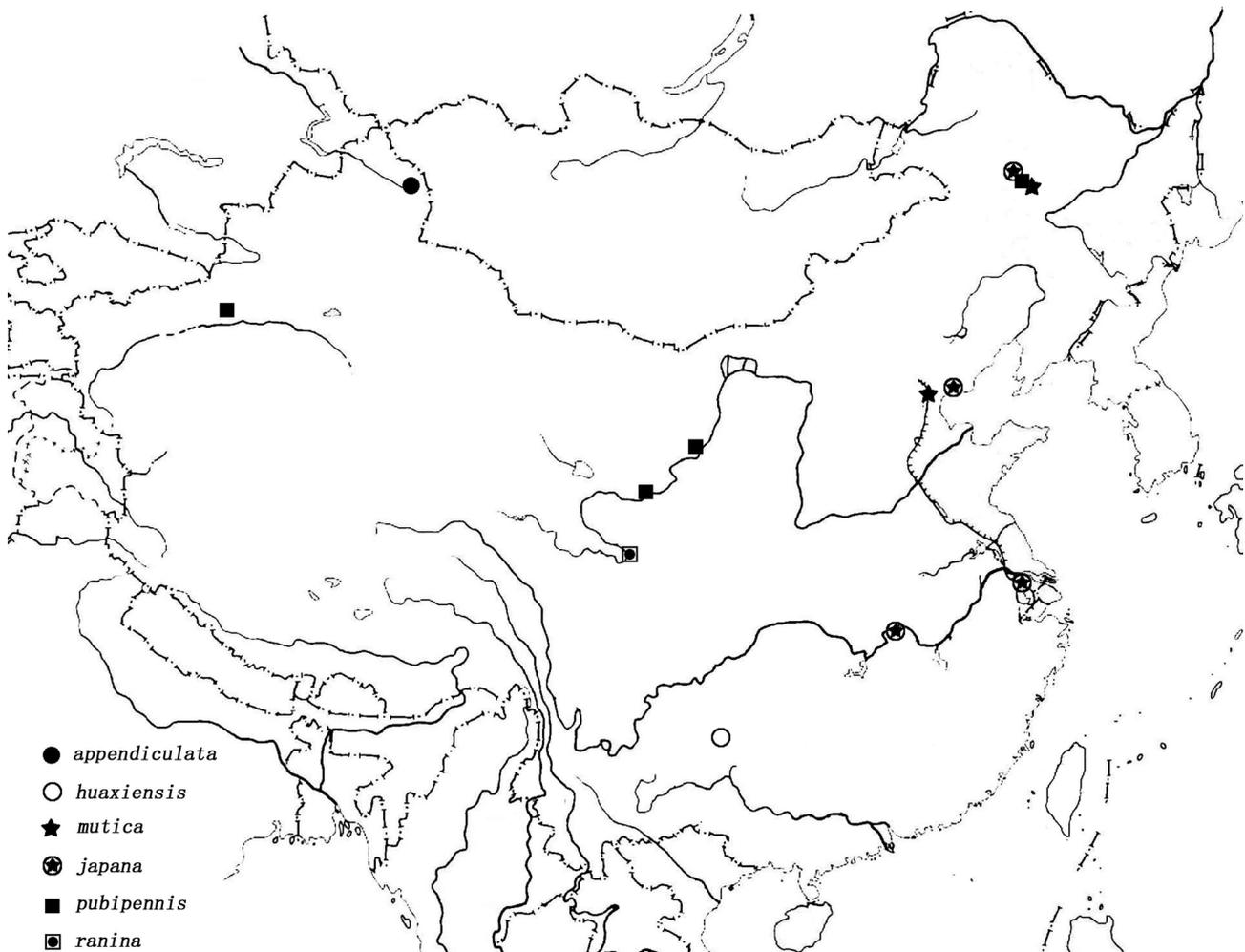
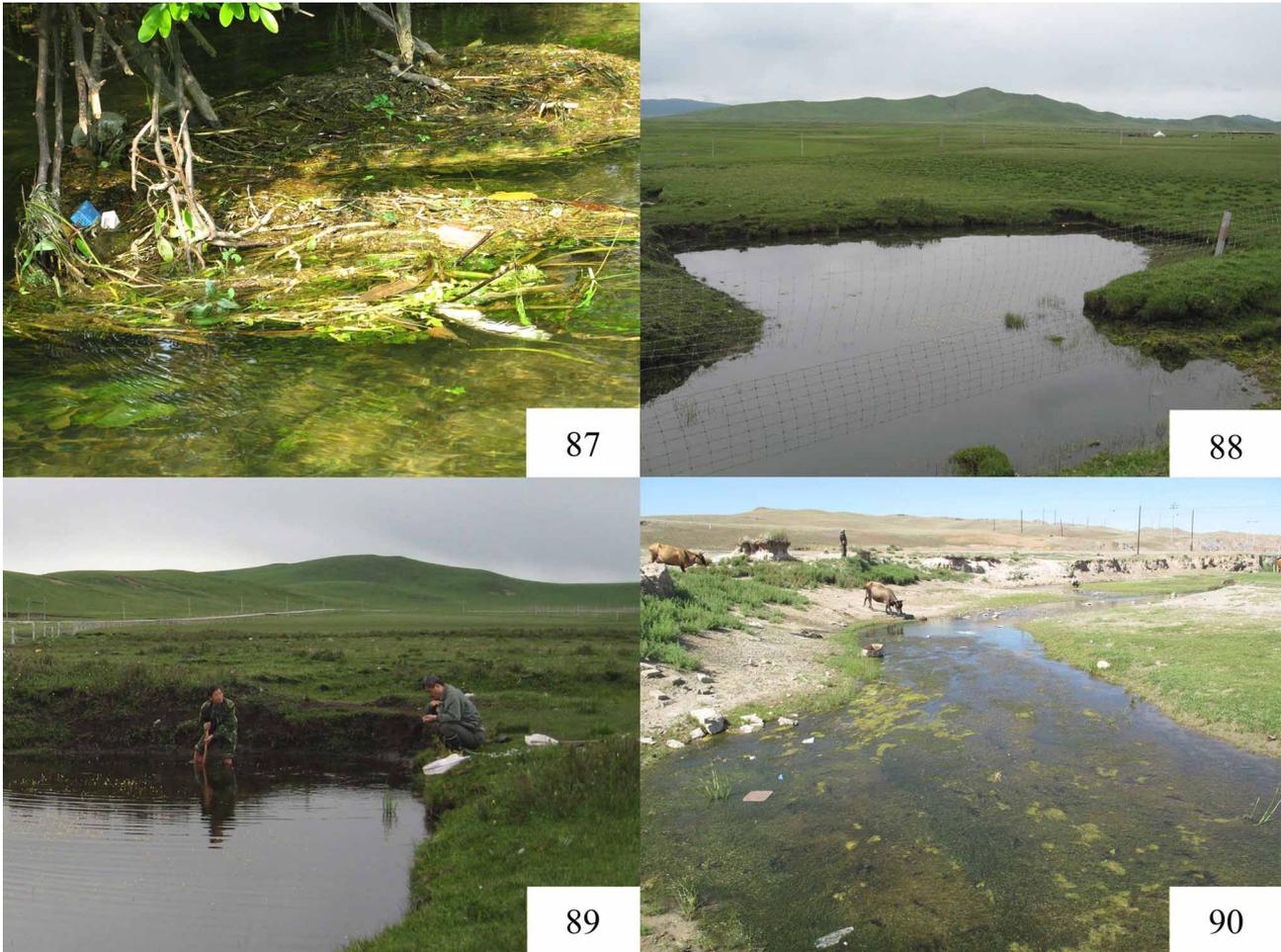


FIGURE 85. Geographical distribution of *Macrolea* spp. in China.



FIGURE 86. Various stages of *Macroplea huaxiensis* sp. nov.



FIGURES 87–90. Habitat of *Macroplea* spp. 87. *M. huaxiensis* **sp. nov.** (Huaxi River); 88, 89. *M. ranina* **sp. nov.** (a pond at Keji Prairie). 90. *M. appendiculata* (upper stream of Ertix River).

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