

Discovery of *Bittacus ussuriensis* Plutenko (Mecoptera: Bittacidae) from China

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Abstract: *Bittacus ussuriensis* Plutenko, 1985 was originally described from the Far Eastern part of Russia, but its genitalia of both sexes have not been described in detail. It is now found in Liaoning and Jilin Provinces, northeastern region of China for the first time. Herein, the species is redescribed and illustrated based on the Chinese material in detail, especially for the genitalia of both sexes.

Key words: *Bittacus*; taxonomy; distribution

乌苏里蚊蝎蛉 *Bittacus ussuriensis* Plutenko 在中国的首次记录 (长翅目: 蚊蝎蛉科)

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摘要: 乌苏里蚊蝎蛉 *Bittacus ussuriensis* Plutenko, 1985 原记载分布于俄罗斯远东地区, 其两性外生殖器缺乏详细的形态描述。本文首次报道该种分布于辽宁省和吉林省, 为中国新纪录种, 并根据采集的标本进行了再描述, 尤其是对两性外生殖器做了详细描述, 同时提供了详细的形态特征图。

关键词: 蚊蝎蛉属; 分类; 分布

Introduction

Bittacidae are recognized by three pairs of raptorial legs, each having a single claw at the end of each tarsus (Tan & Hua 2008). They are commonly called hangingflies because adults suspend themselves between flights on the edges of leaves or twigs of plants using their prehensile front tarsi (Byers 2002). Adult hangingflies use their raptorial legs to capture small flying insects as food in both sexes (Ma *et al.* 2014) or as nuptial gifts in males during mating (Thornhill 1978; Gao & Hua 2013).

Bittacidae are the second largest family in Mecoptera, and comprise more than 200 species in 18 extant genera throughout the world (Cheng 1957; Tan & Hua 2009a, 2009b). In China, 34 species in three genera are recorded, among which 26 species belong to *Bittacus* Linnaeus (Chen *et al.* 2013).

The hangingfly *Bittacus ussuriensis* Plutenko, 1985 was originally described from the Far Eastern part of Russia. Recently, a series of specimens of *Bittacus* hangingflies were collected from Liaoning and Jilin Provinces, northeastern region of China, and are determined to be this species. This is the first discovery of this species from China. Here, we redescribe and

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illustrate the species in detail based on the Chinese material.

Material and methods

Adult specimens were captured from Huaboshan, Kuandian County, Liaoning Province, northeastern China from late June to July in 2011, and Sanjiaolongwan, Tonghua City, Jilin Province in June 2012. They are deposited in 75% alcohol in the Entomological Museum, Northwest A&F University, China (NWAU).

Photographs were taken with a QImaging Retiga 2000R Fast 1394 digital CCD camera (QImaging, Surrey, Canada) attached to a Nikon SMZ1500 microscope and stacked with Syncroscopy Auto-Montage software.

Taxonomy

***Bittacus ussuriensis* Plutenko, 1985** (Figs. 1–4), new record to China

Bittacus ussuriensis Plutenko 1985: 171, type locality: Maritime Territory, Ussurian Reserve, Russia.

Diagnosis. *Bittacus ussuriensis* resembles *B. sinensis* Walker, 1853 in appearance, but can be readily separated from the latter by the following characters: wings with only one pterostigmal crossvein (Pcv) (cf. two Pcv) and one anal crossvein (Av) (cf. two Av); male epandrial appendage emarginated on dorsal margin basally and apical margin medially (cf. with dorsal margin emarginated distally), gonocoxites projecting posteriorly into a distinct conical process on each side (cf. without processes); female subgenital plate with dorsal margin triangular (cf. with a rounded membranous concavity on dorsal margin).

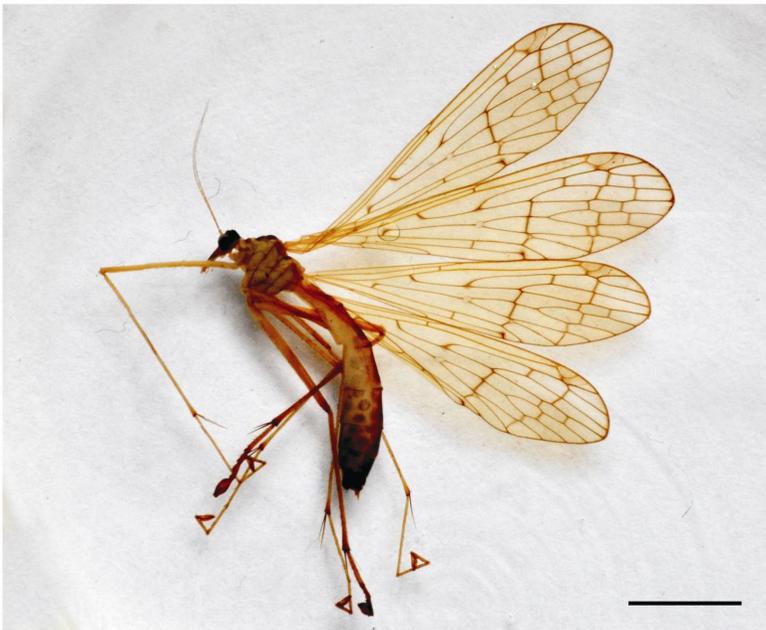


Figure 1. Habitus of *Bittacus ussuriensis*, female. Scale bar = 5 mm.

Redescription (Figs. 1–4). Body length 14.0–16.0 mm; forewing length 16.0–19.0 mm; hindwing length 15.0–18.0 mm.

Head. Vertex and occiput blackish brown; rostrum unevenly brown; ocellar triangle black; antennae filiform with 16 flagellomeres; maxillary palp with the fifth segment shorter than the fourth.

Thorax. Pronotum unevenly brown. Mesonotum fuscous in basal half, yellowish brown in distal half mesally, the remaining portion and metanotum pale yellow. Pleura pale yellow. Legs yellow, femora and tibiae bearing scattered black short setae; one apical tibial spur 1.5 times as long as the other; basitarsus longer than tarsomeres II and III together; fore and middle tarsomeres IV each with one spine on each side, hind tarsomere IV with two spines on each side; hind tarsomere III invaginated laterally.

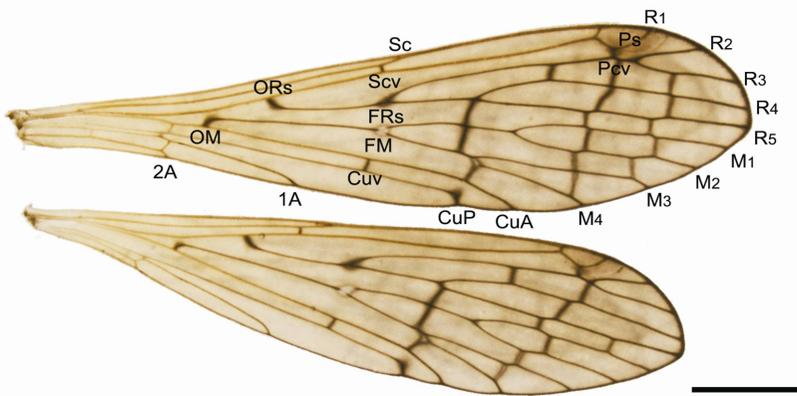


Figure 2. Right wings of *Bittacus ussuriensis*. Scale bar = 3 mm.

Wings (Fig. 2). Forewing membrane yellowish, pterostigma inconspicuous; four black flecks each at origin of radial sector (ORs), first fork of radial sector (FRs), origin of media (OM) and the subdistal part of posterior cubitus (CuP); apical crossveins clouded darkening; two thyridia each at first fork of media (FM) and the base of M₄; one pterostigmal crossvein (Pcv); subcosta (Sc) terminating slightly beyond the level of FRs; subcostal crossvein (Scv) and FRs almost at the same level; cubital crossvein (Cuv) approaching or ending before the level of FM; one anal crossvein (Av) before OM; 1A very short, ending far beyond the level of FM, and with two crossveins between 1A and 2A; in some specimens, with one crossvein between R₂ and R₃. Hindwing similar to forewing, but Sc ending before or almost at the level of FM. Av absent; 1A coalesced with CuP subbasally.

Abdomen. Male abdominal terga II–VI and sterna II–V yellowish brown; terga VII–VIII and sterna VI–VIII fuscous; terga III–VIII each with a narrow black antecosta; tergum VIII emarginated on posterior margin. Epandrial appendage irregular, narrow basally and broad distally, emarginated on dorsal margin basally and apical margin medially in lateral view; ventral margin almost rectangular; dense long setae along the dorsal and apical margins; inner surface of the epandrial appendage with an arcuate ridge along middle line and two processes; one process lobe-like at the basal third of the dorsal margin, extending posteroventrad and tapering apically; another process blunt at the base of apical margin and hirsute; epandrial appendage with two plates of spines apically on inner surface. Upper branch of proctiger

strongly sclerotized, with long hairs, curved anterodorsad and slightly concave apically; lower branch of proctiger very short, about one-fifth length of the upper branch. Tergum X broad, without distinct ventral plates. Cercus relatively long, about half length of gonocoxites, with middle part slender. Gonocoxites shorter than epandrial appendages, each projecting posteriorly into a distinct conical process. Gonostyli trapezoidal in lateral view, truncate apically, and with numerous setae along dorsal margins. Aedeagus broad basally, median penisfilum coiled greatly, and without distinct aedeagal lobes (Fig. 3).

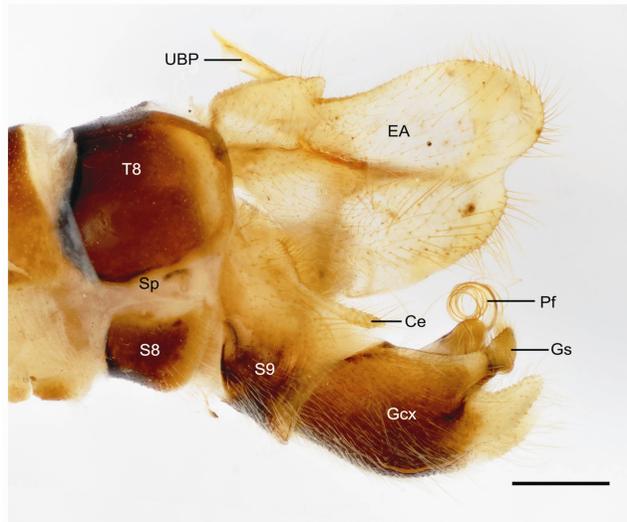


Figure 3. Male terminalia of *Bittacus ussuriensis* in lateral view. Ce, cercus; EA, epandrial appendage; Gcx, gonocoxite; Gs, gonostylus; Pf, penisfilum; S, sternum; Sp, spiracle; T, tergum; UBP, upper branch of proctiger. Scale bar = 0.5 mm.

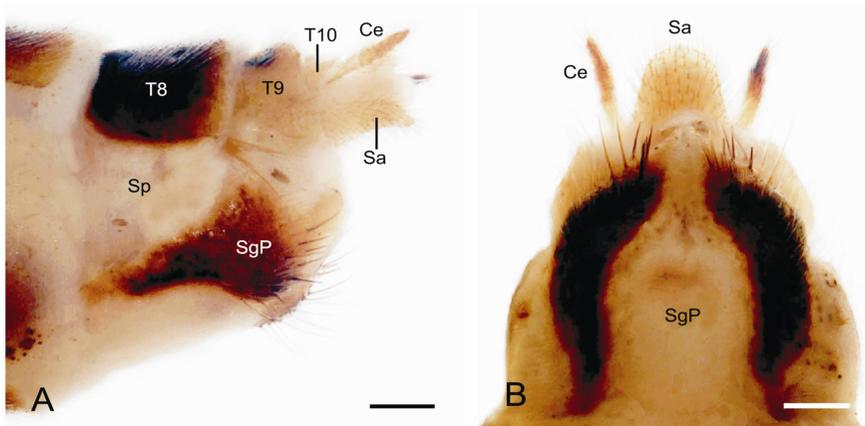


Figure 4. Female terminalia of *Bittacus ussuriensis* in lateral (A) and ventral views (B). Ce, cercus; Sa, subanale; SgP, subgenital plate; Sp, spiracle; T, tergum. Scale bars = 0.25 mm.

The female subgenital plate with two sclerotized areas, which are separated mesally by a broad membranous area, and are converged apically (Fig. 4B); dorsal margin triangularly extending to the anterior portion of tergum IX (Fig. 4A); apex with approximately 10 black thick setae. Tergum IX emarginated apically; tergum X extending ventrad. Supraanale truncated or concave apically, and slightly shorter than subanale; subanale blunt apically.

Specimens examined. 2♂10♀, **China**, Liaoning, Huaboshan (41°06'N, 125°02'E, elev. 650–1100 m), Kuandian County, 25-VI–06-VII-2011, Lu JIANG; 1♂, Jilin, Sanjiaolongwan (42°22'N, 126°26'E, elev. 800 m), Tonghua City, 02-VI-2012, Lu JIANG.

Distribution. China (Liaoning; Jilin) and Russia (Ussurian Reserve; Tigrovoy; Kedrovaya Pad Nature Reserve; Anisimovka).

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References

- Byers GW. 2002. Scorpionflies, hangingflies, and other Mecoptera. *The Kansas School Naturalist*, 48: 3–15.
- Chen J, Tan JL & Hua BZ. 2013. Review of the Chinese *Bittacus* (Mecoptera: Bittacidae) with descriptions of three new species. *Journal of Natural History*, 47(21-22): 1463–1480.
- Cheng FY. 1957. Revision of the Chinese Mecoptera. *Bulletin of the Museum of Comparative Zoology*, 116: 1–118.
- Gao QH & Hua BZ. 2013. Co-evolution of the mating position and male genitalia in insects: a case study of a hangingfly. *PLoS ONE*, 8(12): e80651.
- Ma N, Huang J & Hua BZ. 2014. Fine structure and functional morphology of the mouthparts of *Bittacus planus* and *Terrobittacus implicatus* (Insecta: Mecoptera: Bittacidae). *Zoologischer Anzeiger*, 253(6): 441–448.
- Plutenko AV. 1985. New and little-known species of Mecoptera from the Soviet Far East. *Entomologicheskoye Obozrenie*, 64(1): 171–176.
- Tan JL & Hua BZ. 2008. Structure of raptorial legs in *Bittacus* (Mecoptera: Bittacidae). *Acta Entomologica Sinica*, 51(7): 745–752.
- Tan JL & Hua BZ. 2009a. *Bicaubittacus*, a new genus of the Oriental Bittacidae (Mecoptera) with descriptions of two new species. *Zootaxa*, 2221: 27–40.
- Tan JL & Hua BZ. 2009b. *Terrobittacus*, a new genus of the Chinese Bittacidae (Mecoptera) with descriptions of two new species. *Journal of Natural History*, 43: 2937–2954.
- Thornhill R. 1978. Sexually selected predatory and mating behavior of the hangingfly, *Bittacus stigmaterus* (Mecoptera: Bittacidae). *Annals of the Entomological Society of America*, 71(4): 597–601.