Review of the planthopper genus *Metanigrus* (Hemiptera: Fulgoroidea) with description of one new species from China

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Abstract: The planthopper genus *Metanigrus* Tsaur, Yang & Wilson is reviewed and one new species, *M. rotundatus* **sp. nov.**, is described from China (Yunnan). The type species of this genus, *M. yami* Tsaur, Yang & Wilson, is redescribed and reillustrated. A key to all species of this genus are provided.

Key words: Auchenorrhyncha; Meenoplidae; Meenoplinae; taxonomy; key

中国阿脉蜡蝉属分类并记一新种（半翅目：蜡蝉总科）

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摘要：订正了阿脉蜡蝉属 *Metanigrus* Tsaur, Yang & Wilson 的种类，记述采自中国云南 1 新种：钝头阿脉蜡蝉 *M. rotundatus* **sp. nov.**，重新描记了该属的模式种蓝树阿脉蜡蝉 *M. yami* Tsaur, Yang & Wilson，提供了该属的分种检索表。

关键词：头喙亚目；粒脉蜡蝉科；粒脉蜡蝉亚科；分类；检索表

Introduction

The planthopper genus *Metanigrus* is a small group of Meenoplinae within the family Meenoplidae (Hemiptera: Fulgoromorpha). *Metanigrus* was established by Tsaur, Yang & Wilson (1986) based on the type species *M. yami* Tsaur, Yang & Wilson, 1986 from Taiwan, China. This genus is easily recognized by the median carina of vertex and frons absent, median carina of clypeus and lateral carinae of postclypeus present; tegmina vein MP_{1+2} forked; wing vein RP not branched and A2 not attaining posterior margin; male anal tube with basoventral process (Tsaur *et al.* 1986). This genus is endemic to Chinese fauna and currently contains only the type species. This study adds one new species, *M. rotundatus* **sp. nov.** based on our examination of samples collected from China (Yunnan). An identification key to all species in this genus is provided.

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Material and methods

The abdomen was removed from the male specimen, treated with 10% NaOH solution at 100°C for about 1 minute, rinsed with water, immersed in a droplet of glycerol and the male genitalia were dissected following standard procedures. Photos were taken using the Scientific Digital micrography system equipped with an Auto-montage imaging system and QIMAGING Retiga 4000R digital camera (CCD), Photographs were processed using Adobe Photoshop CS.

Body measurements are from apex of head to tip of tegmina. All measurements are in millimeters (mm). The external morphology terminologies are as follows: tegmina terminology follows Bourgoin (1997) and Bourgoin *et al.* (2015); wing terminology follows Anufriev *et al*. (1988); male genitalia terminology follows Bourgoin (1987); female genitalia terminology follows Bourgoin (1993).

All specimens are deposited in the Entomological Museum of Northwest A&F University (NWAFU).

Taxonomy

Genus *Metanigrus* Tsaur, Yang & Wilson, 1986

Metanigrus Tsaur, Yang & Wilson, 1986: 108. Type species: *M. yami* Tsaur, Yang & Wilson, 1986, by original designation.

Redescription. Small to medium-sized meenoplids. Body covered with a little powdery wax. Vertex narrow, median carina absent, with two posterolateral areolets at base; anterior margin deeply concave, posterior margin bent upward (Figs. 1A, 1C, 3A, 3C). Vertex and frons adorned with sensory pits along both lateral inner sides (Figs. 1A, 1C, 3A, 3C). Frons devoid of median carina, longer in midline than wide at widest part, with an interruption at frontoclypeal suture between lateral carinae of frons and clypeus (Figs. 1D, 3D). Median frontal ocellus and lateral ocelli present (Figs. 1D, 3D). Post- and anteclypeus with median carina, postclypeus with lateral carinae (Figs. 1D, 3D). Basal segment of antenna wider than long, second segment with sensory organs (Figs. 1D, 3D). Rostrum nearly reaching over hind tibia (Figs. 1D, 3D). Pronotum and mesonotum with median carina, lateral carinae of pronotum present (Figs. 1A–C, 3A–C). Tegmina slender, with almost same width, vein ScP + R + MP with several sensory pits (Figs. 1E, 3E). Wing with vein RP not branched, vein A2 not reaching posterior margin (Figs. 1F, 3F). Spinal formula of hind leg 8-6-5.

Male genitalia. Pygofer in profile distinctly wider ventrally than dorsally (Figs. 2A, 4A). Anal tube with a finger-like process ventrobasally directed downward (Figs. 2A, 4A). In profile, phallic complex simple, tectiform structure strongly developed; periandrium tubular, lateral lobe with many scale-like productions, ventral lobe membraneous and slender; aedeagus short, acuminate (Figs. 2E, 2F, 4E, 4F). Gonostyli inner margin near apex with a convex set with long setae, dorsal margin with a large finger-shaped process, curved cephalad apically (Figs. 2C, 2D, 4C, 4D).

Female genitalia. In lateral view, anal tube nearly square. Anal style elongate. Gonapophysis VIII longer than gonocoxae VIII, a relatively narrow gap between them in profile. Gonapophysis VIII reduced into a blade-like process at apex. Gonapophysis IX greatly reduced (Figs. 2G, 2H, 4G, 4H).

Remarks. Six genera (*Metanigrus* Tsaur, Yang & Wilson, *Anigrus* Stål, *Meenoplus* Fieber, *Distantiana* Bourgoin, *Tsingya* Hoch & Bourgoin and *Afronisia* Wilson) constitute the subfamily Meenoplinae (Bourgoin, 2019). However, *Metanigrus* is easily identified from the other five genera by its frons with a big black patch and the male anal tube having a basoventral processes. Furthermore, *Metanigrus* differs from *Anigrus* by the absence of the median frontal carina (present in *Anigrus*); from *Meenoplus* by the presence of lateral carinae of postclypeus (absent in *Meenoplus*); from *Distantiana* by the tegmina having five closed subapical cells (with four closed subapical cells in *Distantiana*). *Metanigrus* also differs from *Tsingya* by the body size not exceeding 6 mm, frontal ocellus present and tegmina with Pcu vein with one row of sensory pits (body size 10–11 mm, frontal ocellus vestigial and tegmina with Pcu vein with two rows of sensory pits in *Tsingya*).

Distribution: China (Yunnan, Taiwan).

Key to species of *Metanigrus* from China

1. Tegmina MP vein 5-branched; aedeagus with two small processes at base ……*M. rotundatus* **sp. nov.**
-. Tegmina MP vein 4-branched; aedeagus without small process at base…… *M. yami*

1. ***Metanigrus yami* Tsaur, Yang & Wilson, 1986** (Figs. 1, 2)

Metanigrus yami Tsaur, Yang & Wilson, 1986: 109.

Redescription. Body length (incl. tegmina): male 3.0–3.5 mm; female 3.7–4.0 mm.

Body color (old specimens) dirty yellow (Figs. 1A, 1B). Vertex yellowish white (Figs. 1A, 1C). Eyes reddish brown (Figs. 1A–D). Frons with a big, longitudinal and sordid marking in middle, reaching apex of frons (Fig. 1D). Clypeus sordid brown (Fig. 1D). Pronotum yellowish white, sublaterally with brown patches. Mesonotum ocherous (Figs. 1A, 1C). Tegmina hyaline, veins light yellow (Figs. 1A, 1B). Wing semitransparent (Fig. 1B). Legs yellowish brown, apices of spines on tibiae and tarsi black (Fig. 1B). Abdomen brown.

Vertex deeply concave anteriorly (Figs. 1A, 1C). Frons longer in middle line than wide at widest portion (about 1.5 : 1), with 22–24 sensory pits along lateral inner sides (incl. several on vertex), lateral carinae reaching over median level of anteclypeus (Fig. 1D). Post- and anteclypeus together approximately 0.73 × length of frons (Fig. 1D). Rostrum with relative length of each segment about 1.1 : 1.4 : 1. Antennae with segment II longer than I (about 2.4 : 1) (Fig. 1D). Pronotum in dorsal view width 0.81–0.83 mm, length 0.10–0.11 mm, with four lateral carinae, two of them weakly developed, bent from anterior margin to outer edge of posterior margin and end at lateral anterior margin, outer two lateral carinae adjacent to ventral margin of eyes, attaining anterior corner of tegula (Figs. 1B, 1C). Mesonotum about 6.7 times longer than pronotum in midline, median carina reaching to posterior margin, lateral carinae obscure (Figs. 1A, 1C). Tegmina about 2.5 times as long as wide, vein ScP+R + MP with 4-8 sensory pits; MP four branched; Pcu with about 20 larger sensory pits and A1 with about 20 small pits (Fig. 1E).

Male genitalia. Pygofer in lateral view with dorsal 1/3 narrow, ventral 2/3 strongly broadened, anterior and posterior margins strongly sinuate, ventral margin convex (Fig. 2A). Anal tube with a finger-like process baso-ventrally, directed caudo-ventrad (Fig. 2A), anal style slender, parallel with margin of tube in dorsal view (Fig. 2B). In profile, phallic complex with periandrium tubular, lateral lobe swollen on both sides, surface beset with scale-shaped processes, ventral lobe slender with acute apex; aedeagus short and acuminate in lateral view

(Figs. 2E, 2F). Gonostyli curved apically, tapering into a process, outer side with a thumb-like process near apex, directed upward, inner margin with a convex area lined with long setae; in caudal view, gonostyli divergent, outer margin rounded apically, inner margin ridged, forming an obtusely rounded triangle, apex strongly curved outward, forming a hook-like process (Figs. 2C, 2D).

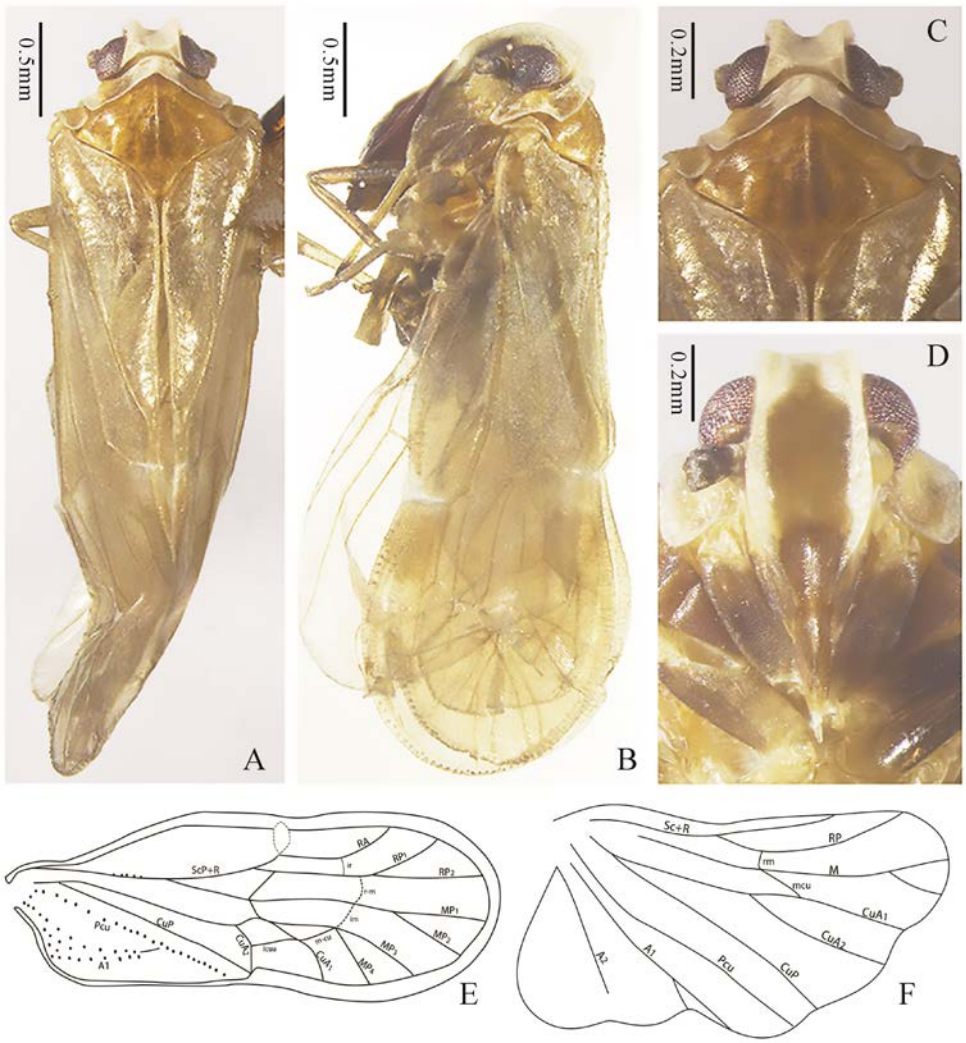

Figure 1. *Metanigrus yami* Tsaur, Yang & Wilson. A. Male adult, dorsal view; B. Male adult, left lateral view; C. Head, pronotum and scutellum, dorsal view; D. Frons; E. Tegmina; F. Wing.

Female genitalia. In lateral view, anal tube soft (Fig. 2G). Anal style elongate. Gonocoxae VIII with basocaudal angle turned mesad, produced into a thumb-shaped process. Gonapophysis VIII reduced to a stout process, apex with blade-like process. In caudodorsal view, gonocoxae VIII approximate each other, separated by gonapophysis VIII, forming a deep gap (Figs. 2G, 2H).

Specimens examined. 5♂4♀, **China,** Menglun, Yunnan Province, 18-V-1991, coll.

Wanzhi CAI & Yinglun WANG.

Distribution: China (Yunnan, Taiwan).

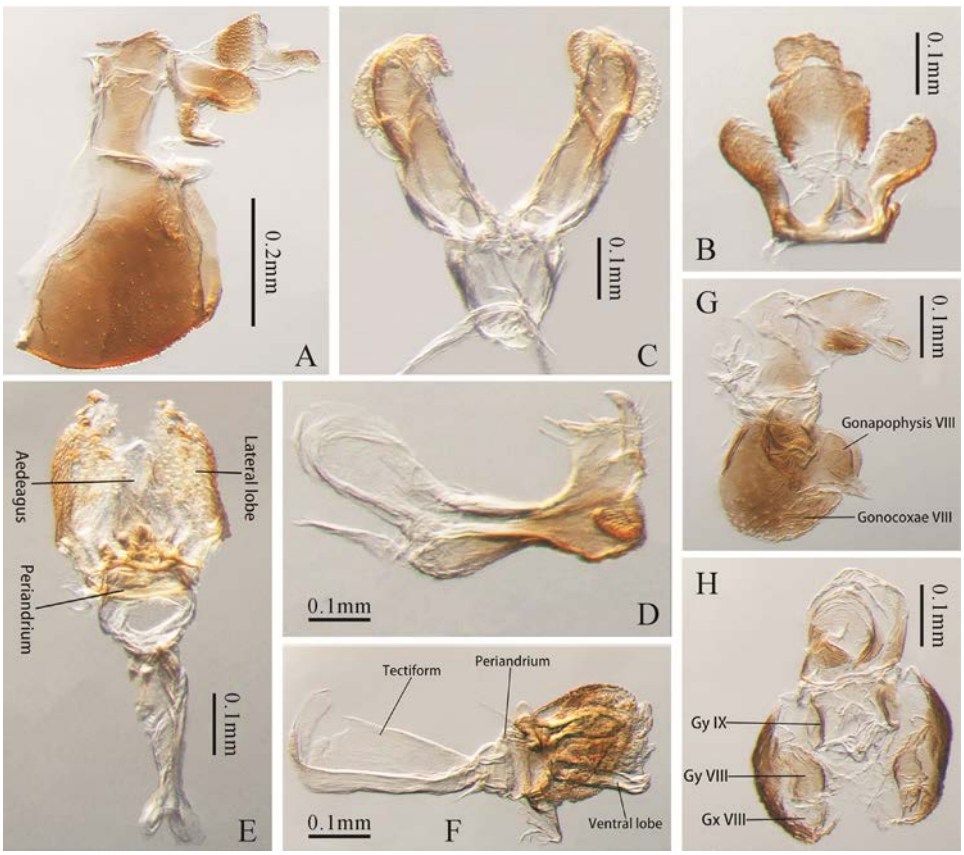

Figure 2. *Metanigrus yami* Tsaur, Yang & Wilson. A. Pygofer, left lateral view; B. Anal tube, dorsal view; C. Gonostyli, caudal view; D. Gonostyli, right lateral view; E. Aedeagus, dorsal view; F. Aedeagus, left lateral view; G. Female genitalia, left lateral view; H. Female genitalia, caudodorsal view.

2. ***Metanigrus rotundatus* sp. nov.** (Figs. 3, 4)

Body length (incl. tegmina): male 3.1–3.2 mm; female 3.5–3.7 mm.

Body color (old specimens) yellowish brown (Figs. 3A, 3B). Vertex whitish yellow (Figs. 3A, 3C). Eyes blackish red (Figs. 3A–D). Frons whitish yellow, medially with a big, longitudinal, brown patch in apex 2/3, reaching apex of frons (Fig. 3D). Clypeus black brown (Fig. 3D). Pronotum sublaterally with brown patches (Figs. 3A–C). Mesonotum brown, with a wide, longitudinal, brown stripe in middle (Figs. 3A, 3C). Tegmina somewhat infuscate, veins brownish (Figs. 3A, 3B). Wing smoky. Legs brown, apices of spines on tibiae and tarsi black (Fig. 3B). Abdomen yellow brown.

Vertex deeply concave anteriorly (Figs. 3A, 3C). Frons longer in middle line than wide at widest portion (about 1.5 : 1), with about 19–20 sensory pits (incl. several pits on vertex) along lateral inner sides, lateral carinae convex; post- and anteclypeus together approximately 0.69 × length of frons (Fig. 3D). Rostrum with relatively length of each segment about 1.1 :

1.3 : 1.1 (Fig. 3D). Antennae with segment II longer than I (about 2.3 : 1) (Fig. 3D). Pronotum in dorsal view width 0.76–0.78 mm, length 0.10–0.11 mm, with four lateral carinae, two of them weakly developed, bent from anterior margin to outer edge of posterior margin and ending at lateral anterior margin, outer two lateral carinae adjacent to ventral margin of eyes, attaining anterior corner of tegula (Figs. 3B, 3C). Mesonotum about 7.0 times longer than pronotum in midline, median carina reaching to posterior margin, lateral carinae obscure (Figs. 3A, 3C). Tegmina about 2.6 times as long as wide, veins ScP+R + MP with about 4 sensory pits; MP five branched, Pcu with 12 larger sensory pits at basal half and A1 with about 23 small pits (Fig. 3E).

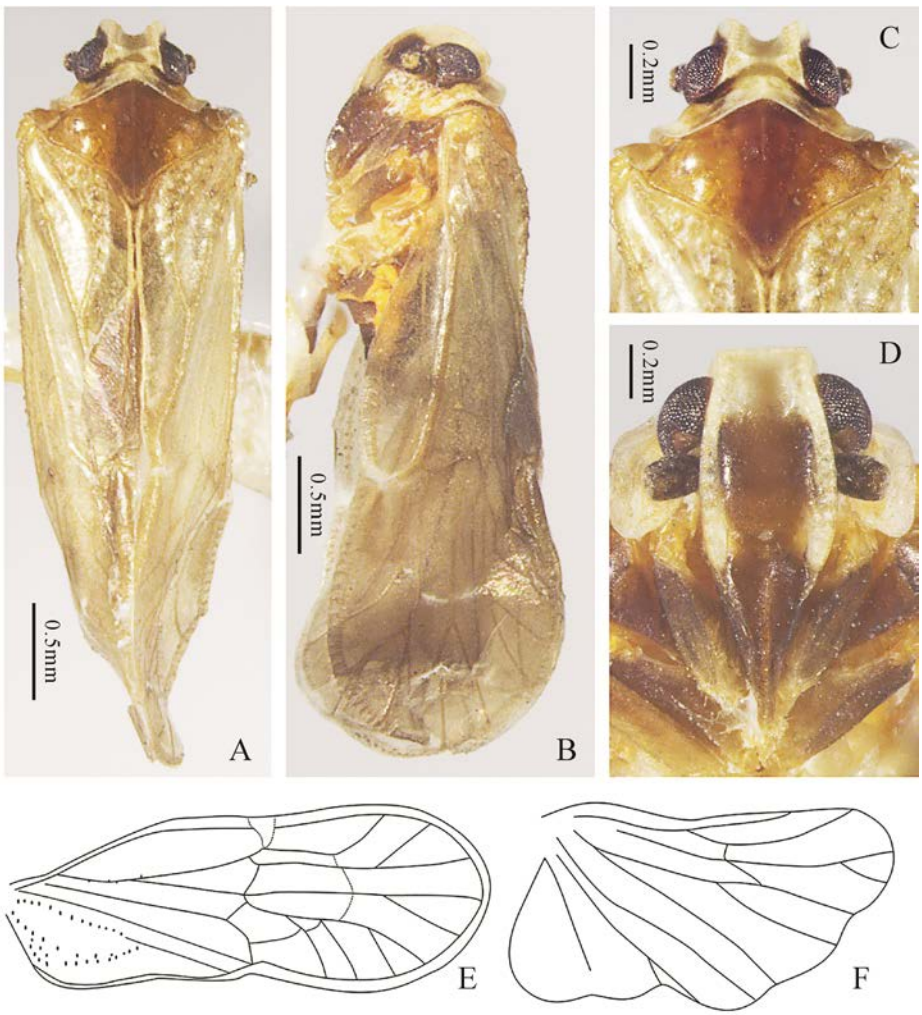

Figure 3. *Metanigrus rotundatus* **sp. nov.** A. Male adult, dorsal view; B. Male adult, left lateral view; C. Head, pronotum and scutellum, dorsal view; D. Frons. E. Tegmina; F. Wing.

Male genitalia. Pygofer in lateral view with dorsal 1/5 narrow, then distinctly broadened ventrad, anterior and posterior margins strongly sinuate (Fig. 4A). Anal tube trapezoidal, with a large process baso-ventrally, directed caudo-ventrad (Fig. 4A); anal style slender, parallel

with margin of tube in dorsal view (Fig. 4B). In profile, phallic complex with periandrium tubular, dorsal margin of lateral lobes sclerotized and swollen, adorned with many trim processes, stripe-shaped in appearance; ventral lobe membraneous, slender, apex acute in lateral view; aedeagus shorter than lateral lobes, apex acuminate with two small processes at base (Figs. 4E, 4F). Gonostyli short, in profile, obtusely rounded apically, with a finger-shaped projection at apical 1/3, curved cephalad apically, inner margin with a convex set with long setae. In caudal view, gonostyli divergent, nearly same width, inner margin smooth, outer margin with processes at apical 1/3 (Figs. 4C, 4D).

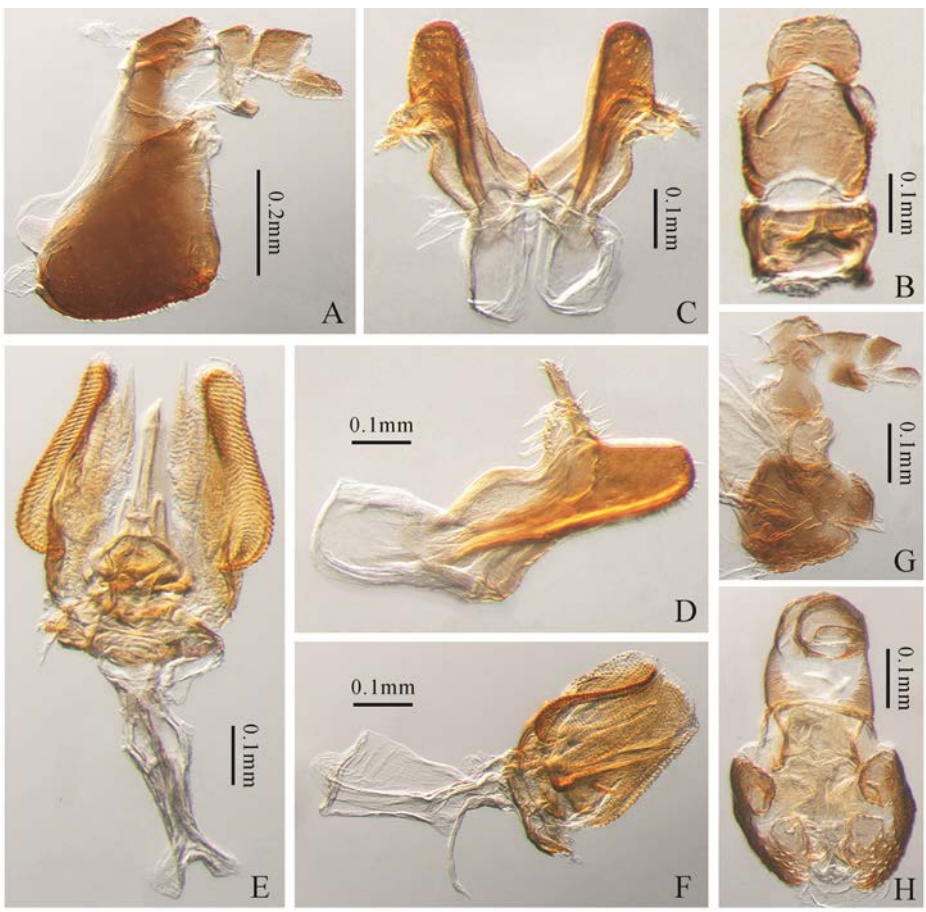

Figure 4. *Metanigrus rotundatus* **sp. nov.** A. Pygofer, left lateral view; B. Anal tube, dorsal view; C. Gonostyli, caudal view; D. Gonostyli, right lateral view; E. Aedeagus, dorsal view; F. Aedeagus, left lateral view; G. Female genitalia, left lateral view; H. Female genitalia, caudodorsal view.

Female genitalia. In lateral view, anal segment stout (Fig. 4G). Anal style elongate. Gonocoxae VIII with basocaudal angle turned mesad, produced into a thumb-shaped process. Gonapophysis VIII reduced into a stout process, apex with blade-like process. In caudodorsal view, gonocoxae VIII approximate each other, separated by gonapophysis VIII, forming a deep gap (Figs. 4G, 4H).

Holotype. ♂, **China,** Daluo, Yunnan Province, 31-V-1991, coll. Wanzhi CAI & Yinglun WANG. **Paratypes**. 3♂4♀, same data as holotype.

Etymology. This specific epithet is derived from the Latin root "*rotundatus*", referring to the gonostyli being obtusely rounded apically.

Diagnosis. This species differs from the type species of this genus by the following aspects: 1) tegmina vein MP with 5 branches (4 branches in *M. yami*); 2) aedeagus with two small processes at base (without any small process at base in *M. yami*); 3) gonostyli short, obtusely rounded apically, with a finger-shaped projection at apical 1/3, curved cephalad apically, inner margin with a convex area lined with long setae (in *M. yami* gonostyli curved apically, tapering into a process, outer side with a thumb-like process near apex, directed upward, inner margin with a convexity lined with long setae).

Acknowledgements

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