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Research article

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Notes on the genus *Microtachycines* Gorochov, 1992 and establishment of a new genus from China (Rhaphidophoridae: Aemodogryllinae)

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Abstract. This paper reviews the genus *Microtachycines* and establishes a new genus, *Megatachycines* gen. nov. One new species and two new combinations of the genus *Megatachycines* are recorded, i.e., *Megatachycines pentus* gen. et sp. nov., *Megatachycines elongatus* (Qin, Liu & Li, 2017) comb. nov., and *Megatachycines trispinosus* (Qin & Li, 2020) comb. nov. Images illustrating the morphology of all species of the genera *Microtachycines* and *Megatachycines* are provided.

Keywords. Rhaphidophoridae, *Microtachycines*, *Megatachycines*, new genus, China.

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Introduction

The genus *Microtachycines* Gorochov, 1992 was first described from Vietnam and *M. tamdaonensis* Gorochov, 1992 was assigned as type species (Gorochov & Storozhenko 1992). The genus differs from the other known genera of Aemodogryllini by the shapes of the male genitalia and tenth abdominal tergite. Dorso-lateral lobes of the male genitalia are semi-sclerotized and have distinctly sclerotized hooks in the apical area. The male tenth abdominal tergite has a large outgrowth in the middle.

Qin *et al.* (2017a) described two new species of the genus *Microtachycines*, i.e., *M. elongatus* Qin, Liu & Li, 2017 and *M. fallax* Qin, Liu & Li, 2017. Moreover, they revised part of the generic diagnosis into “male epiproct distinctly prolonging and lateral lobes of the male genitalia sclerotized” (Qin *et al.* 2017a). However, the revised generic diagnosis is inconsistent with the original description of the genus *Microtachycines*. Later, Qin *et al.* (2020) published one new species *M. trispinosus* Qin, Liu & Li, 2020, and regarded *M. fallax* as a junior synonym of *M. elongatus*.

Up to now, the genus *Microtachycines* has included three species, i.e., *M. tamdaonensis*, *M. elongatus* and *M. trispinosus* (Gorochov & Storozhenko 1992; Qin *et al.* 2017a; Qin *et al.* 2020). However, the characteristics of *M. elongatus* and *M. trispinosus* are inconsistent with the type species *M. tamdaonensis* Gorochov, 1992. Therefore, we establish a new genus *Megatachycines* gen. nov. and transfer *M. elongatus* and *M. trispinosus* to it.

Material and methods

Morphological structures were examined using a Leica M205A stereo microscope and a Leica DFC450 digital imaging system was used to acquire morphological images. The photos were edited with Adobe Photoshop CC 2018.

Specimens were measured with Vernier calipers. The following conventions were adopted for specimen measurements: body length from tip of fastigium verticis to posterior margin of the last abdominal tergite; pronotum length from anterior margin of pronotum to posterior margin along midline; fore femur length from base of fore femur to apex of genicular lobe; hind femur length from base of hind femur to apex of genicular lobe; hind tibia length from base of hind tibia to apex; hind basitarsus length from base of hind basitarsus to apex; ovipositor length from base of subgenital plate to apex of ovipositor.

Abbreviation for locations of type specimens

HBU = Museum of Hebei University, Baoding, China
SEMCAS = Shanghai Entomological Museum, Chinese Academy of Sciences, Shanghai, China
ZIN = Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia

Results

Class Insecta Linnaeus, 1758
Order Orthoptera Latreille, 1793
Superfamily Rhaphidophoroidea Walker, 1869
Family Rhaphidophoridae Walker, 1869
Subfamily Aemodogryllinae Jacobson, 1905
Tribe Aemodogryllini Jacobson, 1905

Genus *Microtachycines* Gorochov, 1992

Type species

Microtachycines tamdaonensis Gorochov, 1992, by original designation.

Diagnosis

Fastigium verticis with well separated tubercles. Male tenth abdominal tergite with large outgrowth in the middle, which forms a bifurcated plate in the apical area. Dorso-lateral lobes of male genitalia semi-sclerotized, apical areas with distinctly sclerotized hooks. Female tenth abdominal tergite with outgrowth.

Microtachycines tamdaonensis Gorochov, 1992

Fig. 1

Microtachycines tamdaonensis Gorochov & Storozhenko, 1992: 29.

Material examined

Holotype

VIETNAM • ♂; Vinh Phuc Province, Tamdao; 9–18 Nov. 1990; A.V. Gorochov leg.; ZIN.

Paratype

VIETNAM • 1 ♀; same collection data as for holotype; ZIN.

Distribution

Vietnam (Tamdao).

Remarks

We examined the type specimens of *Microtachycines tamdaonensis* in ZIN and discussed with Dr A.V. Gorochov. We are sure that the male tenth abdominal tergite has a large outgrowth in the middle and the male epiproct is semicircular. Moreover, we examined the type specimens of *M. elongatus* and *M. trispinosus* in SEMCAS. All abdominal tergites of the two species have no outgrowths, but they have

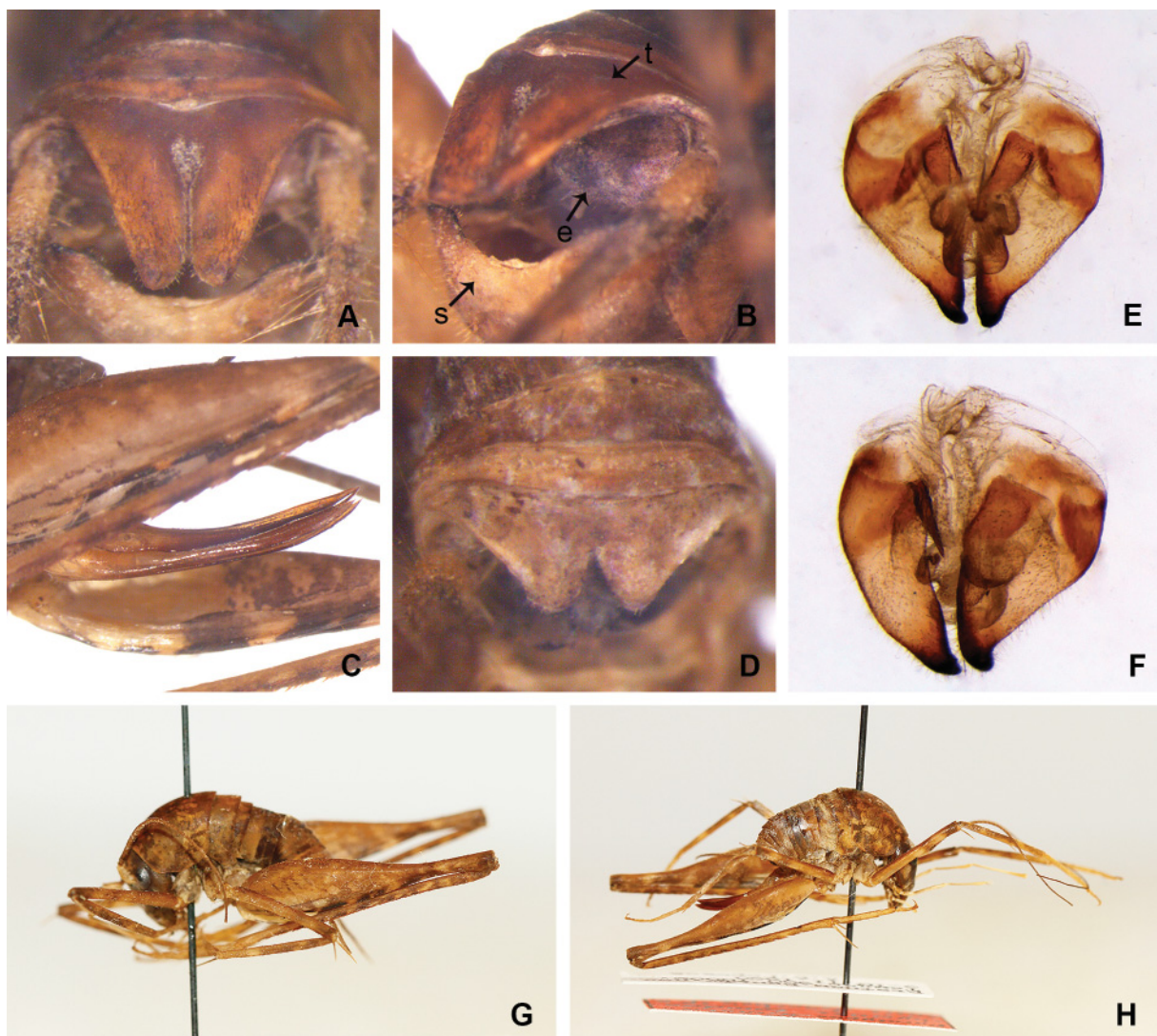


Fig. 1. *Microtachycines tamdaonensis* Gorochov, 1992. A–B, E–G. Holotype, ♂ (ZIN). A. Tenth abdominal tergite in dorsal view. B. Epiproct. E–F. Genitalia. E. Dorsal view. F. Ventral view. G. Habitus in lateral view. C–D, H. Paratype, ♀ (ZIN). C. Ovipositor in lateral view. D. Tenth abdominal tergite in dorsal view. H. Habitus in lateral view. Abbreviations: e = epiproct; s = subgenital plate; t = tenth abdominal tergite.

an extended epiproct. Therefore, we establish a new genus, *Megatachycines* gen. nov., and transfer *M. elongatus* and *M. trispinosus* to it.

Genus *Megatachycines* gen. nov.

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Type species

Megatachycines pentus gen. et sp. nov., here designated.

Diagnosis

Body medium-sized for Aemodogryllini. Hind femur with inner spines on ventral surface. Male abdominal tergites without any processes. Male epiproct extended backward, distinctly longer than paraproct, quadrangular or pentagonal. Male paraproct slightly enlarged. Dorso-lateral lobes of male genitalia distinctly sclerotized. Male subgenital plate bilobed in the apical area. Female abdominal tergites without outgrowth.

Remarks

The new genus can easily be distinguished from other known genera of Aemodogryllini by the shapes of the male epiproct, dorso-lateral lobes of the male genitalia, and the male subgenital plate.

Megatachycines pentus gen. et sp. nov.

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Figs 2, 5A–B

Diagnosis

The new species is characterized by the shapes of the male epiproct and genitalia. Male epiproct pentagonal with concave posterior margin and dorsal sclerite of male genitalia stilliform.

Etymology

The name of the new species derives from the Greek word ‘*pent*’ (‘pentagonal’), referring to the male epiproct being pentagonal.

Material examined

Holotype

CHINA • ♂; Chongqing, Wushan, Dangyang; 3 Oct. 2020; L.Y. Wang leg.; HBU.

Paratypes

CHINA • 1 ♀; same collection data as for holotype; HBU • 2 ♂♂, 2 ♀♀; Chongqing, Wushan, Zhuxian; 19 Jul. 2021; L.Y. Wang leg.; HBU.

Other Material

CHINA • 1 ♂, 1 ♀; Chongqing, Wushan, Zhuxian; 18 Jul. 2021; L.Y. Wang leg.; HBU.

Description

BODY. Medium-sized.

HEAD. Fastigium verticis with two conical tubercles, apices obtusely rounded, pointing forward (Fig. 2C). Eyes ovoid, protruding forward; median ocellus oval, located between antennal sockets;

lateral ocelli circular, situated on lateral margins of basal fastigium verticis (Fig. 2A–B). Apical segment of maxillary palpus distinctly longer than subapical segment, apex inflated, globular.

THORAX. Pronotum long, anterior margin straight, posterior margin arcuate; lateral lobe longer than high, ventral margin arc-shaped (Fig. 2B–C). Mesonotum and metanotum short, posterior margin of mesonotum arcuate, posterior margin of metanotum straight. Fore coxa with one small spine; inner margin of fore femur with 11–12 spines on ventral surface, internal genicular lobe with one small spine, external genicular lobe with one long spine; fore tibia with one inner spine and two outer spines on ventral surface, apex with one pair of dorsal spines and one pair of ventral spines, between paired ventral spines with one small spine. Middle femur unarmed on ventral surface, internal and external

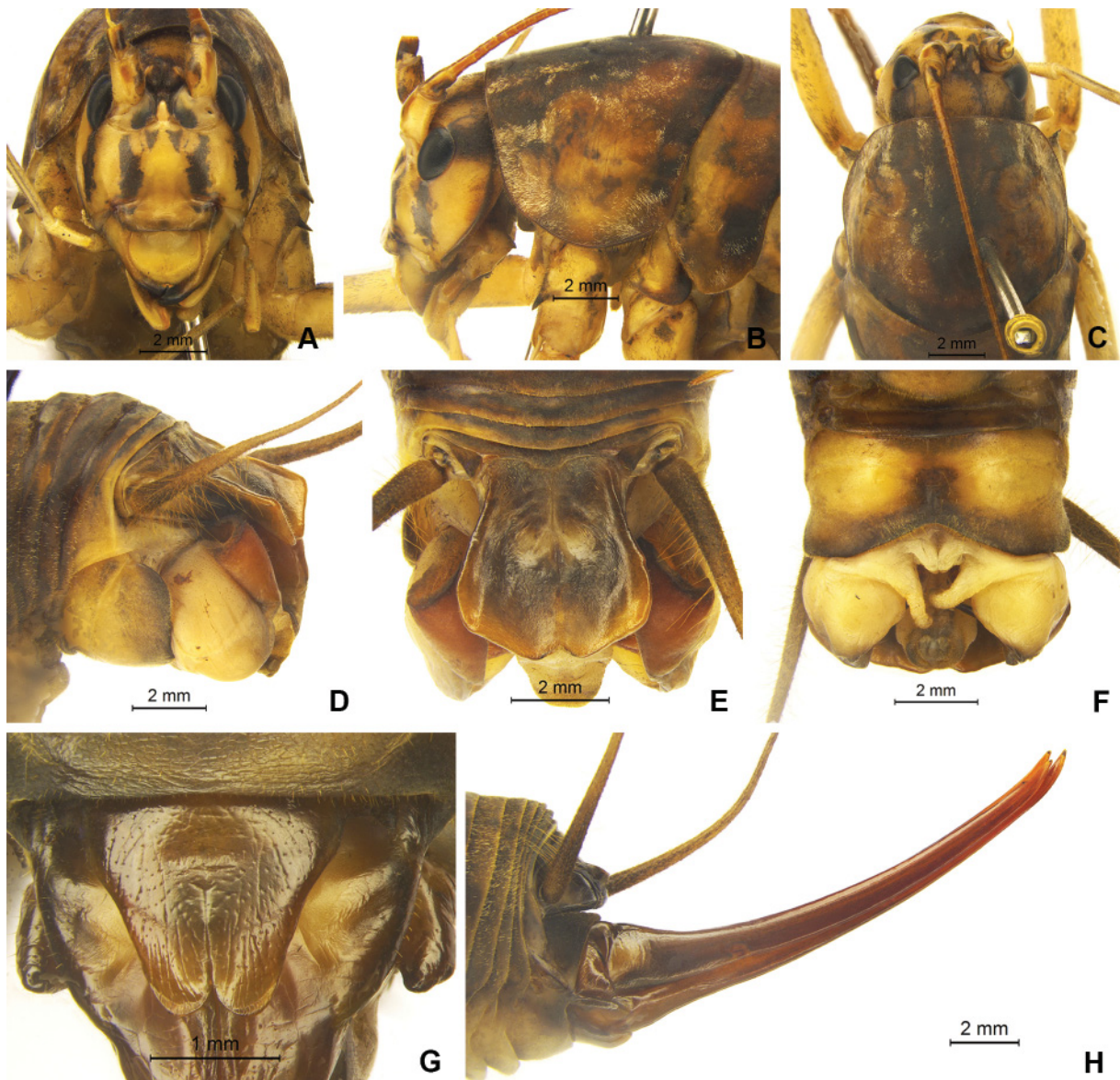


Fig. 2. *Megatachycines pentus* gen. et sp. nov. A–F. Holotype, ♂ (HBU). A–C. Head and pronotum. A. Frontal view. B. Lateral view. C. Dorsal view. D–F. Apex of abdomen. D. Lateral view. E. Dorsal view. F. Ventral view. G–H. Paratype, ♀ (HBU). G. Subgenital plate in ventral view. H. Ovipositor in lateral view.

genicular lobes each with one long spine; middle tibia with one inner spine and one outer spine on ventral surface, apex with one pair of dorsal spines and one pair of ventral spines, between paired ventral spines with one small spine. Hind femur with 7–10 inner spines on ventral surface, internal genicular lobe with one spine, external genicular lobe unarmed; hind tibia with 72–83 inner spines and 70–80 outer spines on dorsal surface, with one pair of dorsal spines in subapical area, and at apex with one pair of dorsal spines and two pairs of ventral spines, interno-dorsal spine markedly longer than hind basitarsus; hind basitarsus with one apical spine on dorsal surface.

MALE ABDOMEN. Posterior margins of all abdominal tergites without processes. Epiproct extended, pentagonal, posterior margin concave; paraproct simple, quadrangular in lateral view (Fig. 2D–E).

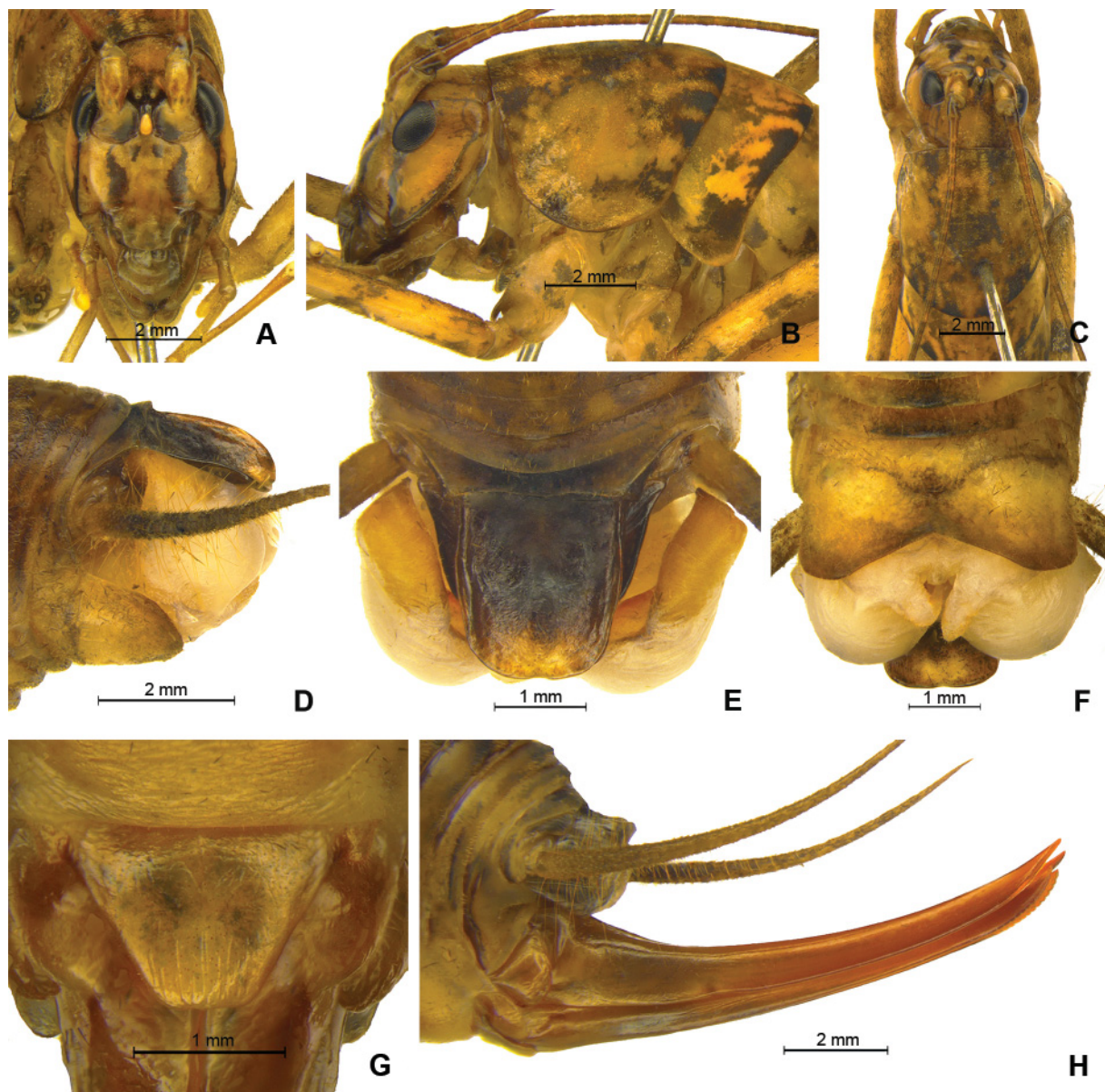


Fig. 3. *Megatachycines elongatus* (Qin, Liu & Li, 2017) comb. nov. A–F. ♂. A–C. Head and pronotum. A. Frontal view. B. Lateral view. C. Dorsal view. D–F. Apex of abdomen. D. Lateral view. E. Dorsal view. F. Ventral view. G–H. ♀. G. Subgenital plate in ventral view. H. Ovipositor in lateral view.

Cercus slender, conical, apex acute (Fig. 2D). Dorsal sclerite of genitalia stilliform; dorso-lateral lobes distinctly sclerotized (Fig. 5A–B). Subgenital plate transverse and broad, apical area bilobed (Fig. 2F).

FEMALE ABDOMEN. Ovipositor longer than half length of hind femur, slightly curved upward. Subgenital plate nearly trapezoid, basal area broad, narrowing to apex, posterior margin with a concavity.

COLORATION. Body light brown, with black spots. Face with four longitudinal black stripes, inner margin of antennal socket black. Eyes black, ocelli yellow. All femora with two black rings.

Measurements (mm)

Body length: ♂: 19.46–23.38, ♀: 18.32–22.60; length of pronotum: ♂: 7.00–8.08, ♀: 8.32–8.62; length of fore femur: ♂: 11.58–13.60, ♀: 13.02–13.16; length of hind femur: ♂: 23.20–27.40, ♀: 26.08–27.56; length of hind tibia: ♂: 26.00–30.00, ♀: 27.66–30.12; length of hind basitarsus: ♂: 4.64–6.08, ♀: 5.28–5.84; length of ovipositor: 17.46–18.36.

Distribution

China (Chongqing).

Megatachycines elongatus (Qin, Liu & Li, 2017) comb. nov.
Figs 3, 5C–D

Microtachycines elongatus Qin, Liu & Li, 2017a: 597.

Microtachycines fallax, Qin, Liu & Li 2017a: 600.

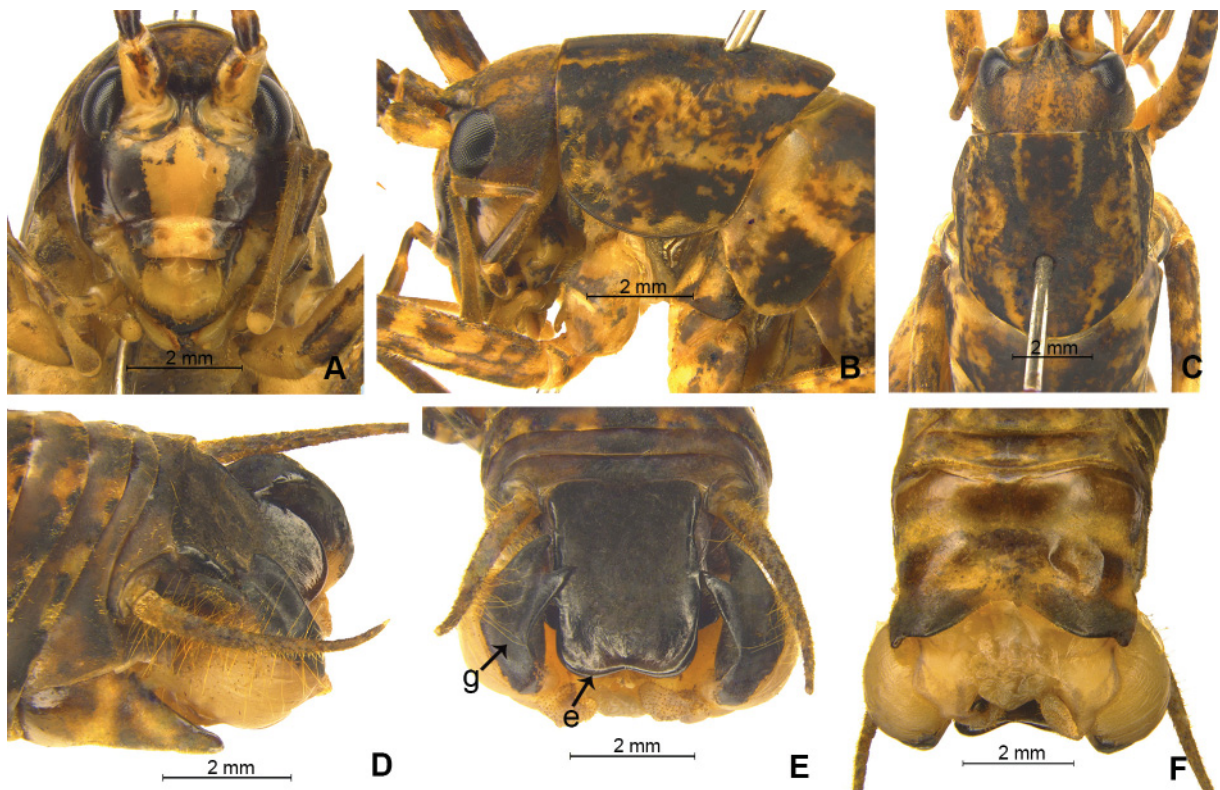


Fig. 4. *Megatachycines trispinosus* (Qin & Li, 2020) comb. nov. ♂. A–C. Head and pronotum. A. Frontal view. B. Lateral view. C. Dorsal view. D–F. Apex of abdomen. D. Lateral view. E. Dorsal view. F. Ventral view. Abbreviations: e = epiproct; g = dorso-lateral lobes of genitalia.

Material examined

Holotype

CHINA • ♂; Zhejiang Prov., Lin'an, Qingliangfeng; alt. 1000 m; 20 Jul. 2009; Feng & Yin leg.; SEMCAS.

Paratypes

CHINA • 1♂, 2 ♀♀; same collection data as for holotype; SEMCAS.

Other material

CHINA – **Zhejiang Prov.** • 1 ♂, 1 ♀; Lin'an, Qingliangfeng; 4 Oct. 2019; Q.D. Zhu leg.; HBU • 1 ♂, 3 ♀♀; Kaihua, Gutianshan; 8 Oct. 2018; T. Wang leg.; HBU. – **Anhui Prov.** • 1 ♂, 7 ♀♀; Yuexi,

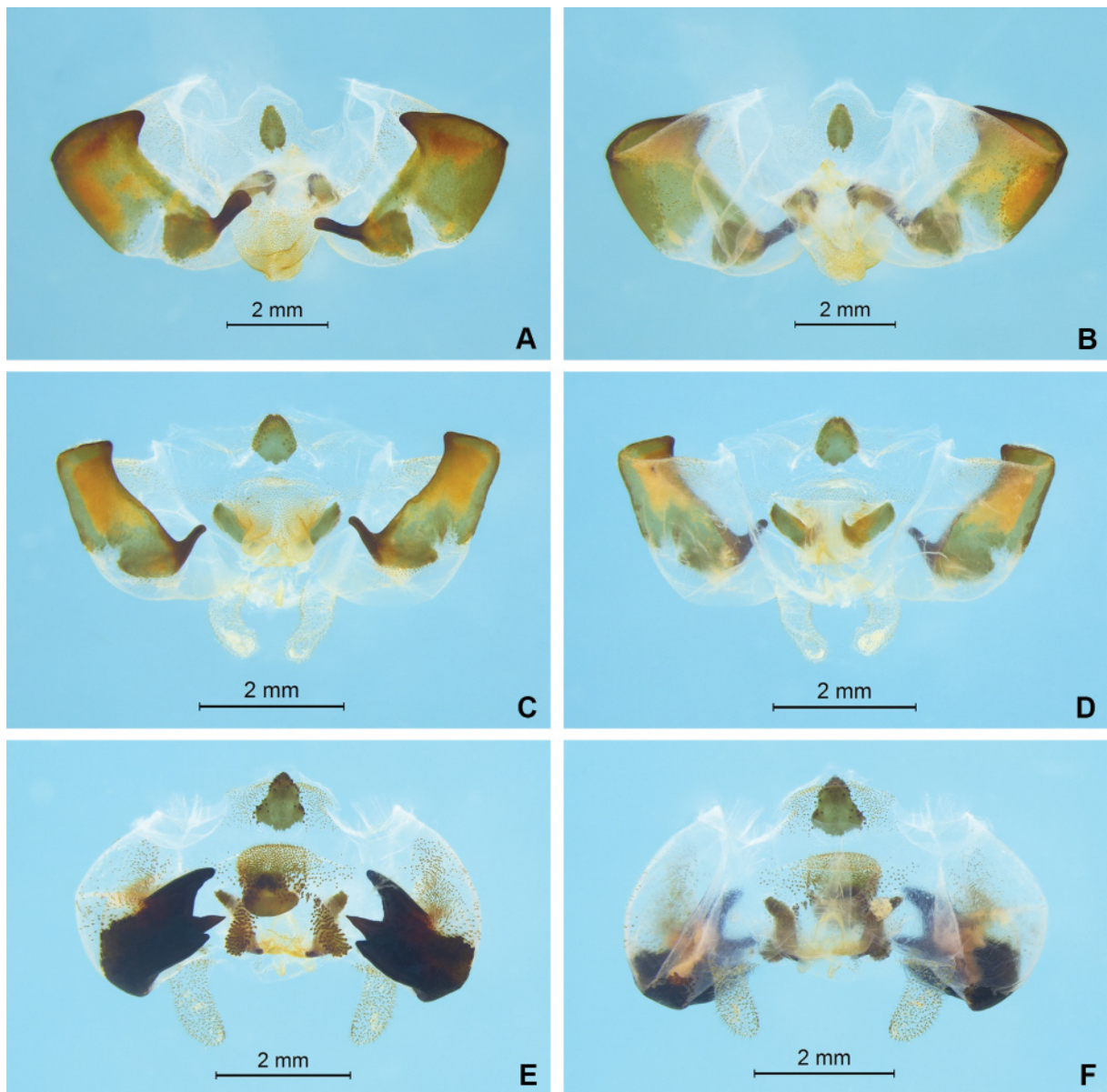


Fig. 5. Male genitalia. **A, C, E.** Dorsal view. **B, D, F.** Ventral view. **A–B.** *Megatachycines pentus* gen. et sp. nov., paratype, ♂ (HBU). **C–D.** *Megatachycines elongatus* (Qin, Liu & Li, 2017) comb. nov. **E–F.** *Megatachycines trispinosus* (Qin & Li, 2020) comb. nov.

Yaoluoping; 18 Sep. 2019; T. Wang leg.; HBU • 3 ♂♂, 1 ♀; Huangshan, Tangkou; 16 Sep. 2019; Y.Q. Li leg.; HBU. – **Jiangxi Prov.** • 3 ♂♂, 1 ♀; Lushan, Guling; 7 Aug. 2018; T. Wang leg.; HBU. – **Hubei Prov.** • 7 ♂♂, 6 ♀♀; Shennongjia; 11 Aug. 2018; P. Wang leg.; HBU • 2 ♂♂, 4 ♀♀; Xianning, Jiugongshan; 2 Aug. 2021; Q.D. Zhu leg.; HBU. – **Hunan Prov.** • 1 ♂; Shimen, Hupingshan; 14 Aug. 2018; T. Wang leg.; HBU. – **Chongqing Municipality** • 2 ♂♂, 1 ♀; Wushan, Zhuxian; 17 Jul. 2021; L.Y. Wang leg.; HBU.

Distribution

China (Anhui, Chongqing, Fujian, Hubei, Hunan, Jiangxi, Zhejiang).

Megatachycines trispinosus (Qin & Li, 2020) comb. nov.

Figs 4, 5E–F

Microtachycines trispinosus Qin, Liu & Li, 2020: 575.

Material examined

Holotype

CHINA • ♂; Jiangxi Prov., Sanqingshan; 27 Jul. 2019; X.W. Liu, H.Q. Wang and Y.Y. Qin leg.; SEMCAS.

Paratype

CHINA • 1 ♂; same collection data as for holotype; SEMCAS.

Other material

CHINA • 1 ♂; Jiangxi Prov., Lushan, Dayueshan; 3 Aug. 2018; T. Wang leg.; HBU.

Distribution

China (Jiangxi).

Discussion

The tribe Aemodogryllini is characterized by the sclerotized dorsal plate of the male genitalia, the absence of outgrowths on the male abdominal tergites, and having only one dorso-apical spine on the hind basitarsus. It might be a younger tribe deriving from Diestramimini (Gorochov 1998). In Aemodogryllini, the male genitalia differ between genera. Some genera have only the dorsal plate sclerotized, while the dorso-lateral lobes of the genera *Gymnaetoides*, *Pseudotachycines*, *Microtachycines* and *Megatachycines* are also sclerotized (Storozhenko 1990; Gorochov & Storozhenko 1992; Gorochov 1998, 2010; Qin *et al.* 2017b, 2017c). In addition, there are some specialized structures, such as the outgrowth on the male tenth abdominal tergite (*Microtachycines*), and the extended male epiproct (*Megatachycines*) and paraproct (some species of *Pseudotachycines*). So, which trait is the main common basic character to identify the genus? What's more, the phylogenetic relationship among genera is still unclear. More evidence is needed for further study.

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