

Two new species of genus *Dubius* (Diptera: Dolichopodidae) from China

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ABSTRACT

The following two species are described as new to science: *Dubius flavipedus* sp. nov. and *Dubius yunnanensis* sp. nov. A key to the world species of *Dubius* is presented.

Key words. Diptera, Dolichopodidae, Diaphorinae, *Dubius*, China, new species

INTRODUCTION

The genus *Dubius* Wei, 2012 is a recently established genus in the subfamily Diaphorinae, with 12 species distributed worldwide now, and mainly in Neotropical and Oriental regions (Wei 2012). So far only 5 species occur in China (Wei 2012). All the Chinese species occurred only in Guizhou, Southwest China.

The genus *Dubius* can be distinguished from other Diaphorinae members by the following characters: Body small to median-sized, metallic green; fr/fa (frons/face ratio) less than or equal to 1.0; eyes short haired; arista long, located at tip, short pubescent; R₄₊₅ and M parallel apically. Male genitalia: surstylus not branched; epandrial lobe long and broad; cercus small lob-like, not furcated; apex of phallus usually expanded and with process. Some species of the genus are similar to *Chrysotus* and *Diaphorus*, but can be separated from the others by the fr/fa less than or equal to 1.0 and arista located at tip (Wei 2012).

MATERIAL AND METHODS

The specimens on which this study is based were collected from 2009 to 2013 by sweep nets from

Oriental region: Yunnan, Guangxi, Hainan, Fujian. All the species were deposited in the Entomological Museum of China Agricultural University (CAU), Beijing.

Morphological terminology for adult structures mainly follows McAlpine (1981). Terms for the structures of the male genitalia follow Cumming and Wood (2009). The following abbreviations are used: acr – acrostichal bristle, ad – anterodorsal bristle, av – anteroventral bristle, d – dorsal bristle, dc – dorsocentral bristle, LI – fore leg, LII – mid leg, LIII – hind leg, pd – posterodorsal bristle, v – ventral bristle, st – sternite, tg – tergite, CuAx ratio – length of m-cu / length of distal portion of CuA.

TAXONOMY

Key to world species (males) of *Dubius* (modified from Wei, 2012).

- 1 Fr/fa ratio more than 1.0. *Chrysotus* Meigen, 1824
- Fr/fa ratio less than or equal to 1.0. 2
- 2 Arista dorsal. *Diaphorus* Meigen, 1824
- Arista apical; *Dubius* Wei, 2012 3

- 3 Fr/fa ratio equal to 1.0; pulvilli usually undeveloped 4
 — Fr/fa ratio less than 1.0; pulvilli usually developed 5
- 4 Frons and face as narrow as line; wing and tg2–5 without spot; male with lateral epandrial lobe developed *Dubius autumnalus* Wei, 2012
 — Frons and face equal in width, broad, around 1.5 times higher than broad; wing with a transverse brown spot; tg2–5 with lateral yellow spots; male with lateral epandrial lobe undeveloped *Dubius maculates* (Parent, 1930)
- 5 Abdomen covered with yellow pollinosity; st2–4 more or less with pale bristles; male with lateral epandrial lobe undeveloped 6
 — Abdomen covered with grey pollinosity; st2–4 without pale bristles; male with lateral epandrial lobe developed 10
- 6 Palpus black; fr/fa ratio less than 0.20 7
 — Palpus mainly or entirely yellow; fr/fa ratio more than 0.41 8
- 7 Fr/fa ratio 0.20 *Dubius spectabilis* A (Loew, 1861)
 — Fr/fa ratio 0.05 *Dubius spectabilis* B (Loew, 1861)
- 8 Fore coxa with only white bristles; frons partly greenish with yellowish pollinosity *Dubius angustifrons* (Robinson, 1975)
 — Fore coxa with black bristles distally; frons mostly obscured by gray pollinosity 9
- 9 Fore coxa and femur mostly yellow *Dubius wirthi* (Robinson, 1975)
 — Fore coxa and femur mostly brown or greenish *Dubius robustus* (Robinson, 1975)
- 10 Legs mainly yellow; apex of phallus simple, without complex structure 11
 — Legs mainly brown or black; apex of phallus complex, with lobe or other structure 12
- 11 Surstylus narrow at base and apex; fore femur with 2 rows of weak v *Dubius flavipedus* sp. nov.
 — Surstylus near straight; fore femur with 2 pv apically *Dubius frontus* Wei, 2012
- 12 Mid tibia without ad and pd. *Dubius hongyaensis* Wei, 2012
 — Mid tibia at least with weak pd, usually with ad 13
- 13 Claws vestigial *Dubius succurtus* Wei, 2012
 — Claws present 14
- 14 Pulvilli developed *Dubius yunnanensis* sp. nov.
 — Pulvilli undeveloped *Dubius curtus* Wei, 2012

***Dubius flavipedus* sp. nov.**

Figs. 1, 3–4

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Diagnosis — Fr/fa ratio 0.01. Legs mainly yellow except fore coxa with brown base, mid and hind coxae entirely brown; all tarsi from tip of tarsomere 3 onward brown.

Description — Male. Body length 2.2–2.8 mm, wing length 2.1–2.5 mm.

Head metallic green with pale gray pollinosity; eyes approach on frons and separate on face, fr/fa ratio 0.01. Hairs and bristles on head black, postocular bristles (including posteroventral hairs) black. Antenna dark brown to black, scape and pedicel black, flagellomere dark brown; first flagellomere nearly subtriangular, 1.7 times wider than long; arista dark brown, short pubescent. Proboscis brown with brown hairs; palpus brown with 3–4 black bristles.

Thorax metallic green with pale gray pollinosity. Hairs and bristles on thorax black; 7 dc(6 strong and 1 weak), 5–6 irregularly paired acr short and hair-like; scutellum with 2 pairs of bristles, basal pair long, lateral pair short and hair-like; proepisternum with 1 long black bristle on lower part and 1 short

black bristle on upper part.

Legs mainly yellow except fore coxa with brown base, mid and hind coxae entirely brown; all tarsi from tip of tarsomere 3 onward brown. Hairs and bristles on legs black. Fore and mid coxae with lots of bristles. Hind coxa with 1 black outer bristle at base and 1 weak bristle at apical 1/3. Hind trochanter with 1 black outer bristle at apical 1/3. Fore femur with 2 rows of weak v, hind femur with 2 weak av at base. Mid tibia with 1 weak ad at basal 1/6, 3–4 bristles apically; hind tibia with 1 weak ad at basal 1/5, 1 d at basal 1/2, 4–5 weak pd, 3–4 weak bristles apically. Pulvilli well developed, without claws. Relative length of tibia and 5 tarsomeres of legs LI : 6.5 : 4.1 : 2.0 : 1.1 : 0.6 : 0.6 ; LII : 7.5 : 5.0 : 2.5 : 1.4 : 0.7 : 0.7 ; LIII : 10.0 : 3.4 : 2.6 : 1.5 : 0.7 : 0.7 .

Wing hyaline; veins blackish, R_{4+5} and M parallel apically; CuAx ratio 0.3. Squama brown with brown hairs. Halter pale yellow.

Abdomen metallic green with pale gray pollinosity; hairs and bristles on abdomen black. Male genitalia: Epandrium somewhat rounded, without angular projection posteriorly. Hypandrium short, far from distal margin of lateral epandrial lobe. Lateral epandrial lobe protruded and wide. Surstylus thick with narrow base and apex, with 2 spines at apex. Cercus subtriangular, with moderated bristles. Apex of phallus straight. Postgonite thin and straight.

Female. Body length 2.1–2.6 mm, wing length 2.2–2.5 mm. Similar to male but eyes separated on frons. Claws well developed and without pulvilli.

Types — Holotype male, CHINA, Hainan: Wuzhishan, Shuimanxiang, 2009.V.3, Dan Zhou. Paratypes 1 males, CHINA, Fujian: Wuyishan, Tongmucun, 2009.VII.1, Xingyue Liu; 5 males 5 females, CHINA, Guangxi: Fangchenggang, Shiwandashan Forest Park, 2013.V.17, Xingyue Liu.

Distribution — China (Hainan, Fujian, Guangxi).

Remarks — The new species is similar to *D. frontus* Wei in the similar phallus and mid tibia with 1 ad, but may be separated from the latter by the surstylus narrow at base and apex, fore femur with 2 row of weak v. In *D. frontus*, the surstylus is nearly straight, and the fore femur has 2 pv apically (Wei 2012).

Etymology — The specific epithet refers to the

yellow legs of the species.

***Dubius yunnanensis* sp. nov.**

Figs. 2, 5–7

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Diagnosis — Fr/fa ratio 0.34. Fore tibia yellow, mid tibia yellow with brown base, hind tibia yellow with brown base and apex.

Description — Male. Body length 2.5–2.8 mm, wing length 2.4–2.7 mm.

Head metallic green with pale gray pollinosity; eyes approach but not contiguous on frons and separated on face, fr/fa ratio 0.34. Hairs and bristles on head black, postocular bristles (including posteroventral hairs) black. Antenna brown to black, scape and pedicel black, flagellomere brown; first flagellomere subtriangular, 1.6 times wider than long; arista brown, short pubescent. Proboscis dark brown with black hairs; palpus dark brown with 3 black bristles.

Thorax metallic green with pale gray pollinosity. Hairs and bristles on thorax black; 5 strong dc, 6 irregularly paired acr short and hair-like; scutellum with two pairs of bristles, basal pair short and hair-like; proepisternum with 1 long black bristle on lower part and 1 short black bristle on upper part.

Legs mainly black. Fore femur black with yellow tip, mid femur black with dark yellow tip, hind femur black with brown tip; fore tibia yellow, mid tibia yellow with brown base, hind tibia yellow with brown base and apex. All tarsi from tarsomere 1 onward yellow or dark yellow to black. Hairs and bristles on legs black. Fore and mid coxae with lots of bristles. Hind coxa with 1 black outer bristle at base. Hind trochanter with 1 black outer bristle at apical 1/3. Fore femur with 2 row of v. Mid tibia with 1 ad at basal 1/6, 1 weak pd, 3–4 bristles apically; hind tibia with 3 pd each at basal 1/6, 1/3 and 1/2, 4 bristles apically. Claws existing, pulvilli well developed. Relative length of tibia and 5 tarsomeres of legs LI : 7.0 : 3.8 : 1.8 : 1.2 : 0.8 : 0.8 ; LII : 8.0 : 4.2 : 2.0 : 1.4 : 0.8 : 0.8 ; LIII : 9.2 : 3.2 : 2.2 : 1.5 : 0.9 : 0.9 .

Wing hyaline; veins blackish, R_{4+5} and M parallel apically; CuAx ratio 0.3. Squama pale yellow with yellow hairs. Halter pale yellow.

Abdomen metallic green with pale gray pollinosity; hairs and bristles on abdomen black. Male genitalia: Epandrium somewhat rounded, without angular projection posteriorly. Hypandrium with acute end, far from distal margin of lateral epandrial lobe. Lateral epandrial lobe protruded. Surstylus thick, with acute end. Cercus short, with moderated bristles. Apex of phallus complex, with 2 sharp lobes and a hollow sheet structure.

Female. Unknown.

Types — Holotype male, CHINA, Yunnan: Longling, Heishan Conservation Area, 2012.IV.26, Wenliang Li. Paratypes 2 males, CHINA, Yunnan: Tengchong, Datang, Cizhuhe, 2012.V.8, Wenliang Li; 1 male, CHINA, Yunnan: Yingjiang, Xima, 2012.V.4, Wenliang Li; 1 male, CHINA, Yunnan: Honghe, Lvchun, Yakou, 2011.V.7, Lihua Wang.

Distribution — China (Yunnan).

Remarks — The new species is similar to *Dubius hongyaensis* Wei in the similar apex of phallus and the same CuAx ratio, but can be separated from the latter by the fr/fa ratio is 0.34 and mid tibia with 1 ad at basal 1/6. In *D. hongyaensis*, the fr/fa ratio is 0.04 and the mid tibia has no ad (Wei 2012).

Etymology — The specific epithet refers to locality of the holotype Yunnan.

DISCUSSION

Before this study, five species of *Dubius* in China were known occurred only in Guizhou Province of Southwest China. But now, 7 *Dubius* species are found in 5 provinces in Southwest China and South China (Fig. 8). All these area belongs to Oriental region with tropical or subtropical climate. Although it is not continuous in distribution, *Dubius* maybe exist in other tropical or subtropical provinces in China.

The body size of *Dubius* is always larger than *Chrysotus* in the same regions. And the species number of *Chrysotus* is more than *Dubius*. But besides fr/fa ratio, it is not easy to distinguish the two genera. So what makes *Dubius* larger and rarer than *Chrysotus*, that is needed to check more samples and to do more work to explain it.

ACKNOWLEDGEMENTS

We are grateful to Dr. Wenliang Li (Beijing), Ms. Lihua Wang (Beijing), Dr. Xingyue Liu (Beijing) and Ms. Dan Zhou (Beijing) for collecting specimens. The research was funded by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (201410054-03).

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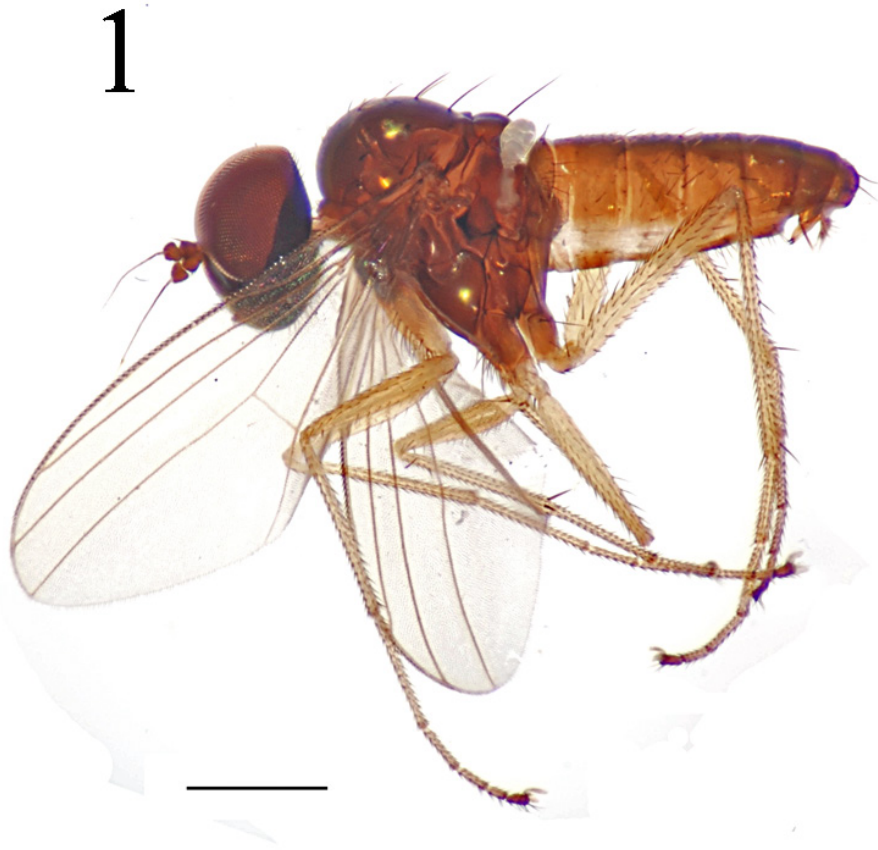


Figure. 1. *Dubius flavipedus* sp. nov. (male). Scale bars = 0.5 mm.

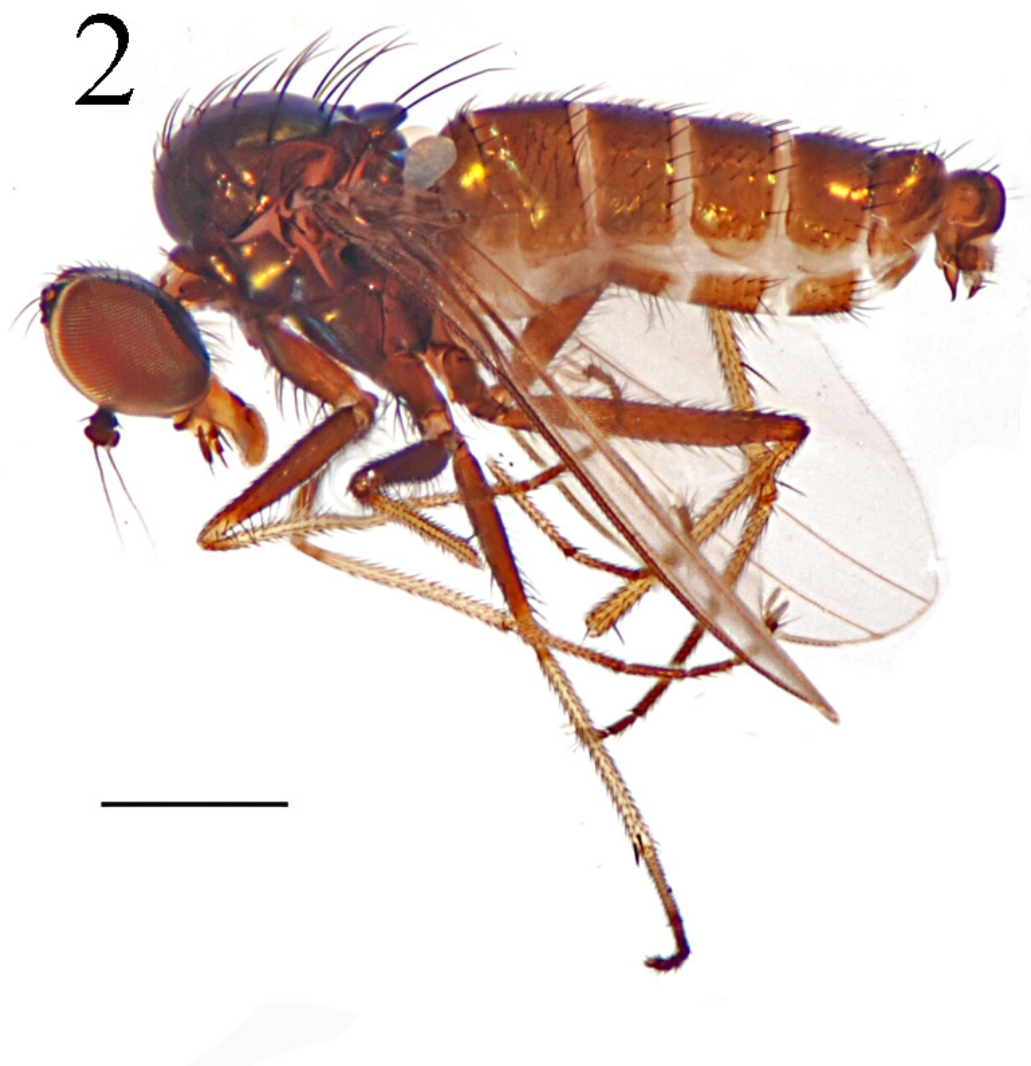
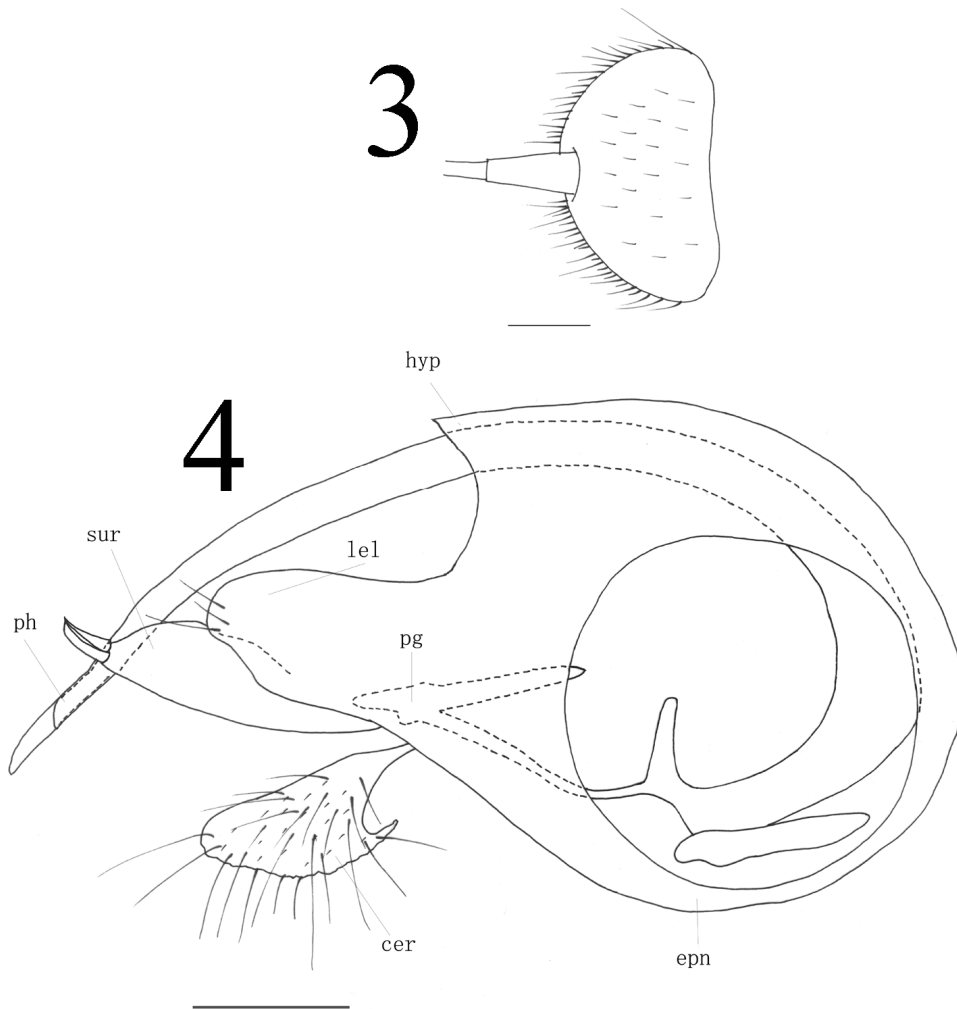
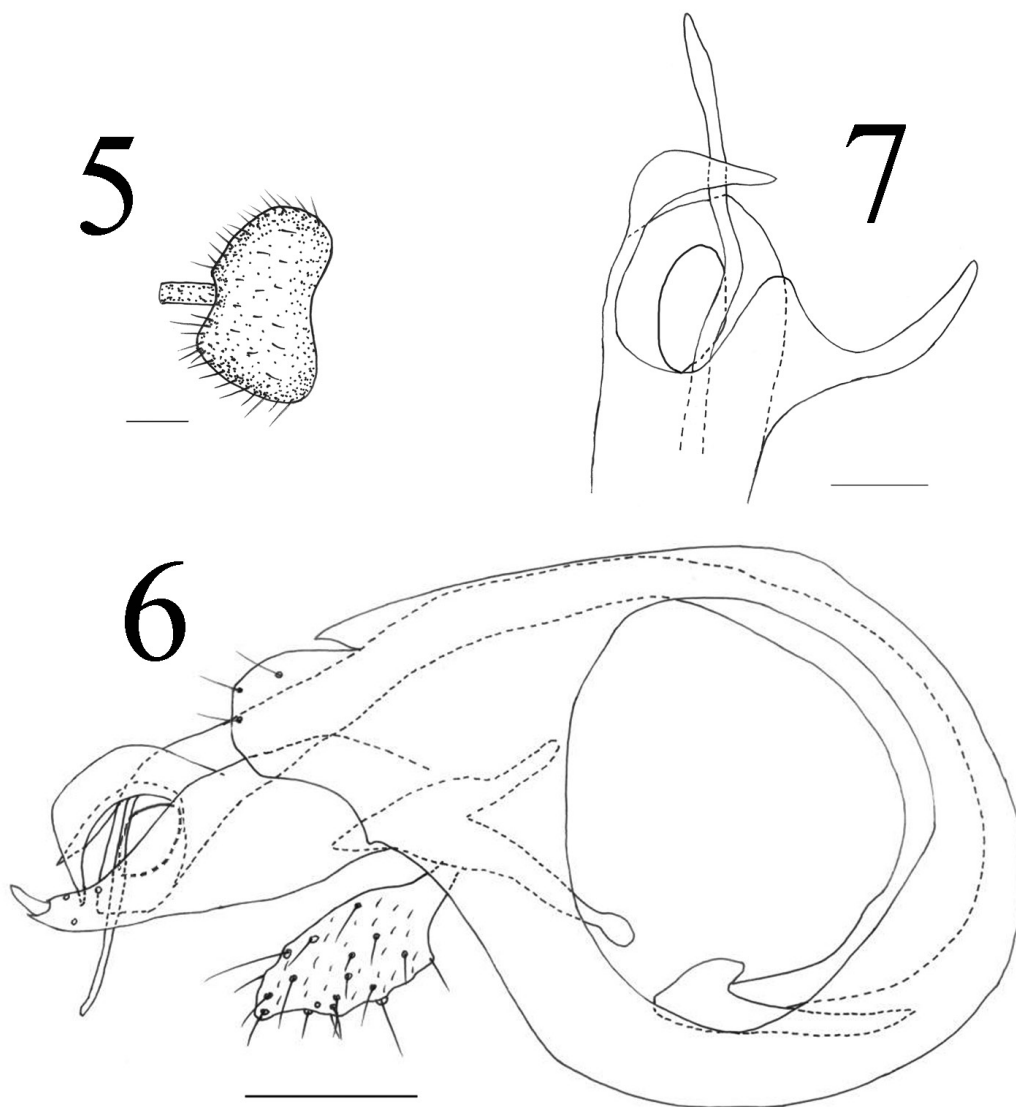


Figure 2. *Dubius yunnanensis* sp. nov. (male). Scale bars = 0.5 mm.



Figures 3–4. *Dubius flavipedus* sp. nov. (male). 3. First flagellomere, lateral view; 4. genitalia, lateral view. Scale bars = 0.1 mm. Abbreviations: cer, cercus; epn, epandrium; hyp, hypandrium; lel, lateral epandrial lobe; pg, postgonite; ph, phallus; sur, surstylus.



Figures. 5–7. *Dubius yunnanensis* sp. nov. (male). 5. First flagellomere, lateral view; 6. genitalia, lateral view; 7. apex of phallus, ventral view. Scale bars = 0.1 mm.

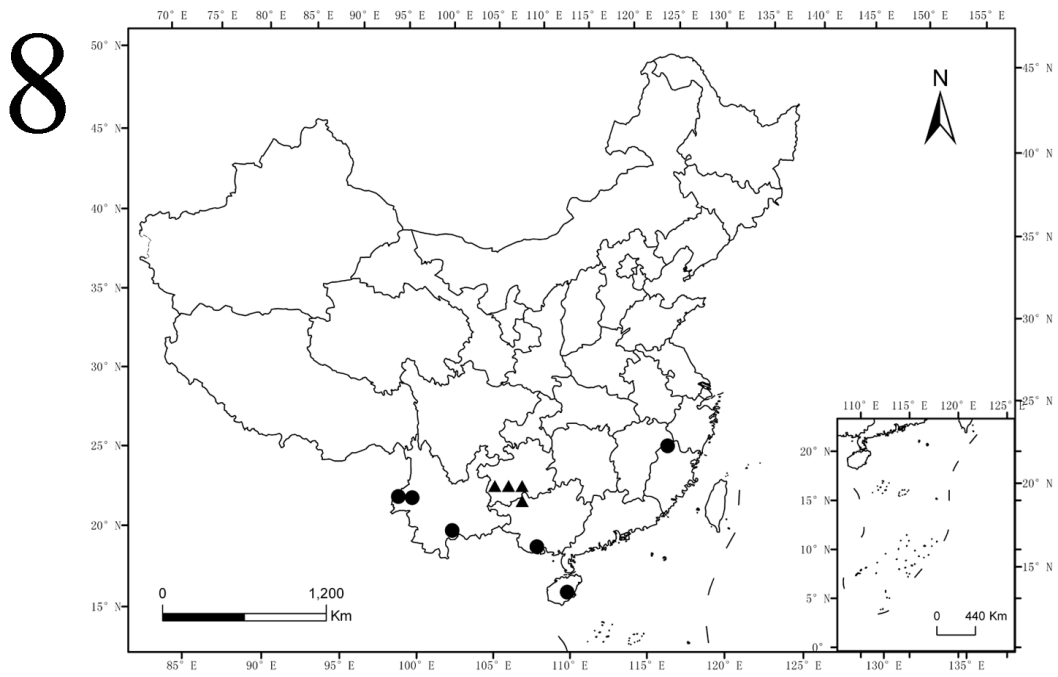


Figure. 8. Distribution of *Dubius* in China. ▲ known species; ● new species.