

Four new species of *Hybos* (Diptera: Empididae) from Gaoligongshan, China

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Abstract: The genus *Hybos* Meigen, 1803 is the largest genus in the Hybotinae with over 230 known species worldwide. Five species are newly reported from Gaoligongshan. The following four species are described as new to science: *Hybos flavifemur* sp. nov., *Hybos gongshanus* sp. nov., *Hybos nigrifemur* sp. nov. and *Hybos yuqiangi* sp. nov. A key to the five species of *Hybos* from Gaoligongshan is presented.

Key words: Hybotinae; dance fly; taxonomy; key

中国高黎贡山驼舞虻属 *Hybos* 四新种 (双翅目: 舞虻科)

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摘要: 驼舞虻属 *Hybos* Meigen, 1803 是驼舞虻亚科中最大的属, 已知 230 余种分布世界各地。本文报道高黎贡山驼舞虻属 4 新种: 黄腿驼舞虻 *Hybos flavifemur* sp. nov., 贡山驼舞虻 *Hybos gongshanus* sp. nov., 黑腿驼舞虻 *Hybos nigrifemur* sp. nov. 和玉强驼舞虻 *Hybos yuqiangi* sp. nov., 编制了高黎贡山驼舞虻属分种检索表。

关键词: 驼舞虻亚科; 分类; 检索表

Introduction

The genus *Hybos* Meigen, 1803 is the largest genus in the Hybotinae with over 230 known species worldwide. 24 species are known from the Palaearctic Region and 196 species from the Oriental Region (Yang *et al.* 2007; Yang 2008; Plant 2013; Shamshev *et al.* 2015; Liu *et al.* 2021). *Hybos* is characterized by the following combination of characters: Rs short; cell cup usually distinctly longer than bm; R₄₊₅ and M₁ usually divergent; eyes narrowly but distinctly separated on face; proboscis long spine-like, as long as head or longer, lacking pseudotracheae; hind femur usually strongly thickened with strong ventral setae (Yang & Yang 2004; Plant 2013). The major references dealing with the Palaearctic and Oriental

Hybos are as follows: Brunetti (1920), Melander (1928), Frey (1954), Chvála (1983), Yang & Yang (2004), Plant (2013), Shamshev *et al.* (2015), and Kanavalová *et al.* (2021).

The Chinese species of *Hybos* were revised by Yang & Yang (2004). 135 species were known to occur in China (Yang *et al.* 2018; Liu *et al.* 2021). Gaoligongshan located in Southwest China is one of the biodiversity hotspots in Asia. The genus *Hybos* is newly reported from this region with 5 species including 4 new ones.

Material and methods

The specimens were examined and illustrated using a ZEISS Stemi 2000–c. Genitalic preparations were made by macerating the apical portion of the abdomen in cold 10% NaOH for about 6 hours. The type specimens are deposited in the Entomological Museum of China Agricultural University (CAU), Beijing. The following abbreviations are used: acr — acrostichal bristle(s); ad — anterodorsal bristle(s); av — anteroventral bristle(s); dc — dorsocentral bristle(s); ppn — postpronotal humeral bristle(s); npl — notopleural bristle(s); oc — ocellar bristle(s); pd — posterodorsal bristle(s); prsc — prescutellar bristle(s); psa — postalar bristle(s); pv — posteroventral bristle(s); sc — scutellar bristle(s); lepn — left epandrial lamella; lsur — left surstylus; repn — right epandrial lamella; rsur — right surstylus.

Taxonomy

Key to species of *Hybos* from Gaoligongshan

1. Thorax entirely black 2
- Scutellum and lower half of thoracic pleuron yellow; legs yellow with tarsomeres 3–5 dark brown *H. gongshanus* **sp. nov.**
2. First flagellomere with 1 dorsal seta at base; arista bare; fore tibia blackish, mid and hind tibiae yellow · 3
- First flagellomere without dorsal seta; arista pubescent; all tibiae yellow 4
3. All femora black except extreme tips blackish or brownish yellow; hypandrium subapically with long hook-like lateral process *H. nigrifemur* **sp. nov.**
- Fore and mid femora brownish yellow, hind femur black with yellow tip; hypandrium without subapical lateral hook-like lateral process *H. flavifemur* **sp. nov.**
4. Hind tibia apically with 1 long thick anterior bristle; hypandrium widely furcated apically *H. serratus*
- Hind tibia apically without anterior bristle; hypandrium narrowly furcated apically ... *H. yuqiangi* **sp. nov.**

1. *Hybos flavifemur* **sp. nov.** (Fig. 1)

Description. Male. Body length 3.4–3.5 mm, wing length 3.6–3.7 mm.

Head black with gray pollen. Eyes contiguous on frons, brownish yellow with enlarged dorsal facets dark yellow. Hairs and bristles on head blackish; ocellar tubercle weak with 2 somewhat long oc and 2 very short posterior hairs. Antenna blackish; scape without hairs, pedicel with circlet of blackish subapical hairs; first flagellomere with 1 dorsal seta at base; arista bare. Proboscis slightly shorter than head, blackish. Palpus blackish with 1 terminal hair.

Thorax black with gray pollen. Hairs on thorax blackish, bristles black; hairs on mesonotum short, ppn absent, 2 npl (posterior npl long), uniserial hair-like dc nearly as long as irregularly biserial acr, 1 long prsc, 1 long psa; scutellum with 6 marginal hairs (about 1/4 as long as sc) and 2 long sc. Legs mostly yellow to brownish yellow; fore and mid femora brownish yellow, hind femur black with yellow tip; fore tibia blackish, mid and hind tibiae yellow; all tarsi dark brown except mid and hind tarsomeres 1–2 yellow. Hairs on legs brown, bristles black, but those on coxae nearly wholly brownish yellow. Fore femur 1.05 times and hind femur 1.9 times width of mid femur. Fore and mid femora with short sparse ventral hairs. Hind femur with 1 pre-apical ad and two rows of spine-like ventral bristles on weak tubercles (4–5 av distinctly longer than pv, ventral bristles triseriate at base). Fore tibia with 1 long ad at middle; apically with 1 very long ad. Mid tibia with 1 very long ad and 1 very long av near base; apically with 6 bristles including 1 very long av. Hind tibia with 1 long ad at middle; apically with 1 long av and 1 long pd. Fore tarsomere 1 with 1 long pv at extreme base. Mid tarsomere 1 with 1 short av and 2–3 short pv. Hind tarsomere 1 with several short thick ventral bristles. Wing hyaline, slightly tinged brownish, stigma indistinctly brownish; veins brown, R_{4+5} and M_1 divergent apically. Squama dark yellow with dark yellow hairs. Halter dark yellow.

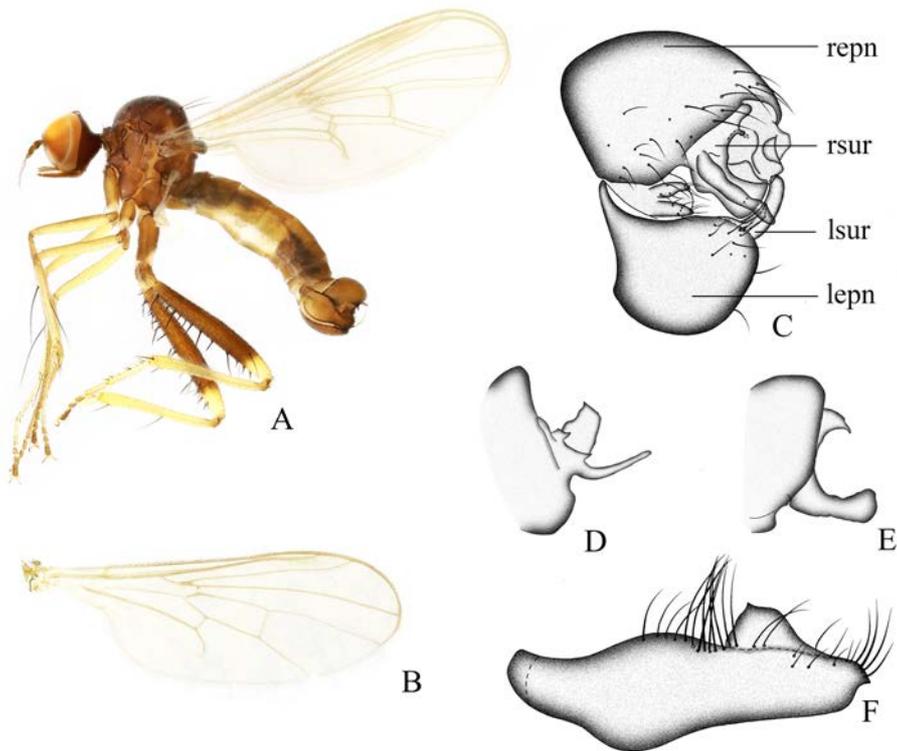


Figure 1. *Hybos flavifemur* sp. nov. A. Male habitus, lateral view; B. Wing; C. Genitalia, dorsal view; D. Right surstylus; E. Left surstylus; F. Hypandrium, ventral view.

Abdomen apically weakly curved downward, dark brown or blackish with gray pollen; hypopygium distinctly thicker than pregenital segments. Hairs and bristles on abdomen brown or dark brown.

Male genitalia. Left epandrial lamella distinctly narrower than right epandrial lamella; left surstylus widely furcated into long thick process and short subtriangular process. Right epandrial lamella with oblique apical margin; right surstylus shallowly furcated into long thin process and short wide process. Hypandrium much longer than wide, apically not furcated, and with a large wide lateral process near apex.

Female. Body length 3.0 mm, wing length 3.5 mm. Hind femur with one row of av (3 av rather long), 2 very short pv at base and 3 long thin pv at apex.

Holotype. ♂, China, Yunnan, Baoshan, Dahaoping, 11-V-2012, Yuanye LIU (CAU).

Paratypes. 1♂, same data as holotype (CAU); 1♂1♀, Yunnan, Gongshan, Xianjiudang, 1679 m, 03-VII-2013, Wei ZHANG (CAU).

Etymology. This specific epithet refers to the yellow femora.

Diagnosis. Fore and mid femora brownish yellow, hind femur black with yellow tip. Fore tibia blackish, mid and hind tibiae yellow. First flagellomere with 1 dorsal seta at base; arista bare. Hypandrium without subapical lateral hook-like lateral process.

Remarks. The new species is similar to *H. steatopygus* Plant from Thailand and *H. nigrifemur* **sp. nov.**, but may be separated from the latter by the hypandrium not furcated apically with a large wide lateral process. In *H. steatopygus* and *H. nigrifemur* **sp. nov.**, the hypandrium is furcated apically with a long thin lateral process (Plant 2013).

2. *Hybos gongshanus* **sp. nov.** (Fig. 2)

Description. Male. Body length 3.4–3.8 mm, wing length 3.6–4.0 mm.

Head black with gray pollen. Eyes contiguous on frons, brownish yellow with distinctly enlarged dorsal facets dark yellow. Hairs and bristles on head blackish except postero-ventral surface with brownish hairs; ocellar tubercle indistinct with 2 very short oc. Antenna blackish; scape without hairs, pedicel with circlet of blackish subapical hairs; first flagellomere without dorsal seta; arista pubescent except apical 2/5 thin and bare. Proboscis slightly shorter than head, brown. Palpus dark brown with 1 terminal hair.

Thorax black with gray pollen except postero-lateral corner including postalar callus of mesonotum dark yellow and scutellum yellow; lower half of thoracic pleuron yellow. Hairs on thorax blackish, bristles black; hairs on mesonotum short, ppn absent, 2 npl (posterior npl long), uniserial hair-like dc nearly as long as irregularly quadriseriate acr, 1 long prsc, 1 long psa; scutellum with 6–8 marginal hairs (about 1/3 or 1/4 as long as sc) and 2 long sc. Legs yellow except all tarsomeres 3–5 dark brown. Hairs on legs brown, bristles black, but those on coxae brownish yellow. Fore femur 1.1 times and hind femur 1.7 times as wide as mid femur. Fore and mid femora with short sparse ventral hairs. Hind femur with 2 ad and one row of 7–8 long av (4 av on basal 2/3 rather long). Fore tibia apically with 1 long ad. Mid tibia with 1 very long ad and 1 very long av near base; apically with 5 bristles including 1 very long av. Hind tibia with row of long thin ad and long thin pd; apically with 1 long av and 1 long pd. Fore tarsomere 1 with 1 long thick pv at extreme base. Mid tarsomere 1 with 1 thick av and 2 thick pv on basal 1/2. Hind tarsomere 1 with several short thick ventral bristles. Wing hyaline,

slightly tinged brownish, stigma dark brown; veins dark brown, R_{4+5} and M_1 divergent apically. Squama dark yellow with dark yellow hairs. Halter dark yellow.

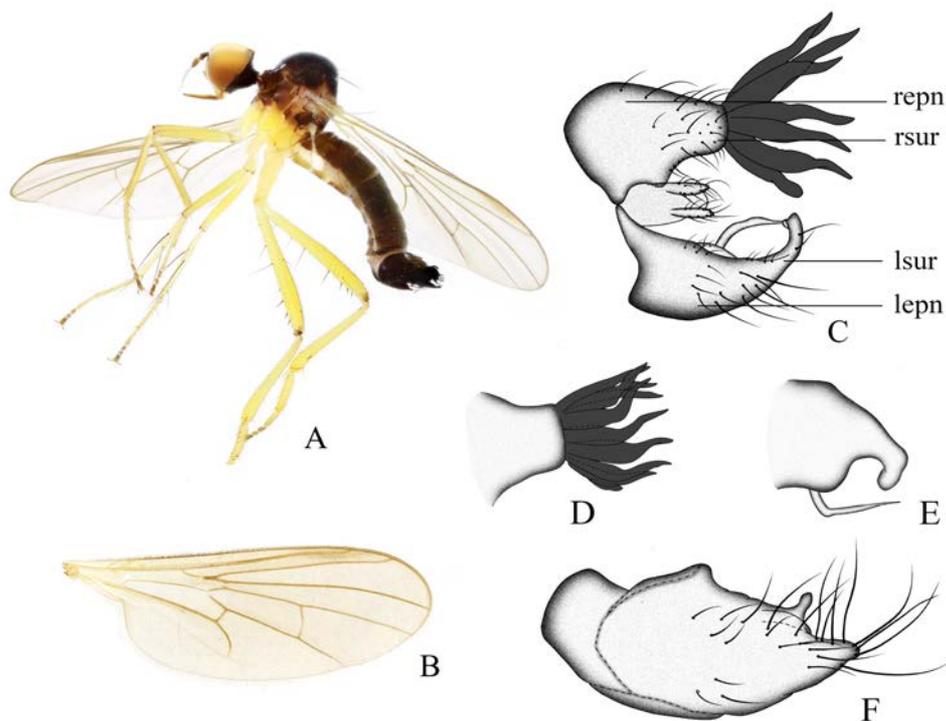


Figure 2. *Hybos gongshanus* sp. nov. A. Male habitus, lateral view; B. Wing; C. Genitalia, dorsal view; D. Right surstylus; E. Left surstylus; F. Hypandrium, ventral view.

Abdomen nearly straight, rarely apically distinctly bent downward, blackish with gray pollen; hypopygium thicker than pregenital segments. Hairs and bristles on abdomen dark brown except hypopygium with some black modified setae.

Male genitalia. Left epandrial lamella slightly narrower than right epandrial lamella; left surstylus short thick with strongly curved apex and with a spine-like lateral process subapically. Right epandrial lamella weakly convex medially at inner margin; right surstylus with row of dense finger-like processes apically bent and somewhat acute. Hypandrium distinctly longer than wide, distinctly narrowed with a very short lateral process near apex.

Female. Body length 3.7–4.0 mm, wing length 3.8–3.9 mm.

Holotype. ♂, China, Yunnan, Gongshan, Pukawang, 1452 m, 30-VI-2013, Xuankun LI (CAU). **Paratypes.** 7♂6♀, Yunnan, Gongshan, Xianjiudang, 1679 m, 03-VII-2013, Xuankun LI (CAU).

Etymology. This specific epithet refers to type locality Gongshan.

Diagnosis. Lower half of thoracic pleuron and postero-lateral corner including postalar callus of mesonotum; scutellum yellow. Legs yellow with tarsomeres 3–5 dark brown. Hind femur weakly thickened with only 7–8 av mostly rather long. Right surstylus with row of dense finger-like processes apically bent and somewhat acute.

Remarks. This new species is somewhat similar to *H. flaviscutellum* Yang & Yang from Zhejiang and Guangxi, but may be separated from the latter by the yellow lower half of the thoracic pleuron and hypandrium distinctly narrowed with a short lateral process. In *H. flaviscutellum*, the thoracic pleuron is brownish yellow, and the hypandrium is widely obtuse apically without the short lateral process (Yang & Yang 2004).

3. *Hybos nigrifemur* sp. nov. (Fig. 3)

Description. Male. Body length 3.2–3.5 mm, wing length 3.6–3.7 mm.

Head black with gray pollen. Eyes contiguous on frons, brownish yellow with enlarged dorsal facets dark yellow. Hairs and bristles on head blackish except postero-ventral surface with dark yellow hairs; ocellar tubercle weak with 2 somewhat long oc and 2 very short posterior hairs. Antenna blackish; scape without hairs, pedicel with circling of blackish subapical hairs; first flagellomere with 1 dorsal seta at base; arista bare. Proboscis slightly shorter than head, blackish. Palpus blackish with 1 terminal hair.

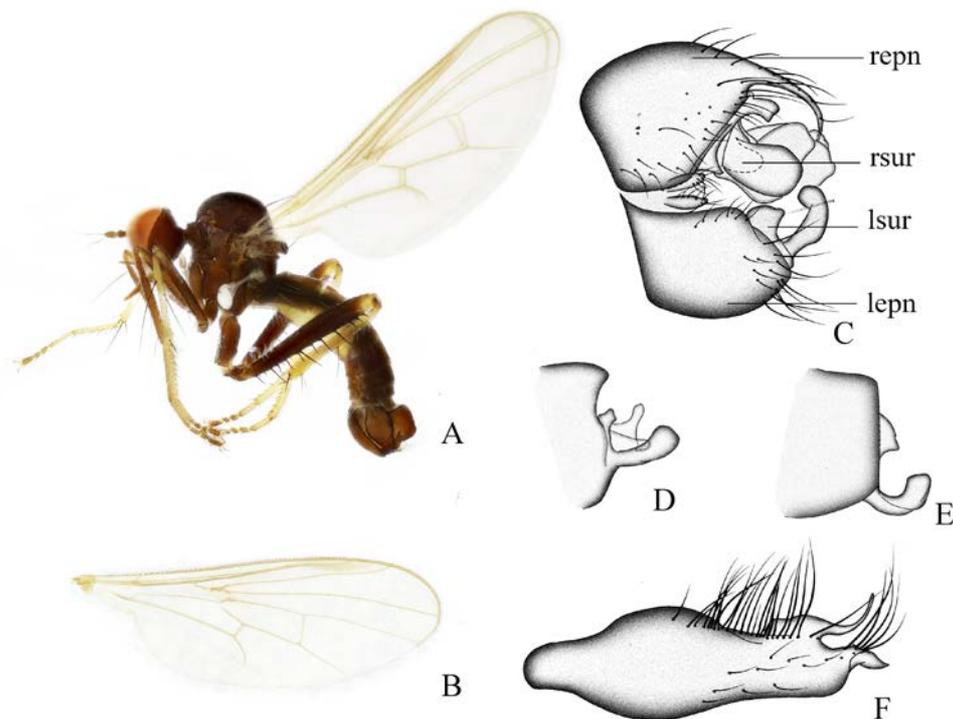


Figure 3. *Hybos nigrifemur* sp. nov. A. Male habitus, lateral view; B. Wing; C. Genitalia, dorsal view; D. Right surstylus; E. Left surstylus; F. Hypandrium, ventral view.

Thorax black with gray pollen. Hairs on thorax blackish, bristles black; hairs on mesonotum short, ppn absent, 2 npl (posterior npl long), uniserial hair-like dc nearly as long as irregularly biserial acr, 1 long prsc, 1 long psa; scutellum with 6 marginal hairs (about 1/4 as long as sc) and 2 long sc. Legs mostly black; all femora black except extreme tips blackish or brownish yellow; fore tibia black, mid and hind tibiae yellow; all tarsi dark brown except

mid and hind tarsomeres 1–2 yellow. Hairs on legs brown, bristles black, but those on coxae brownish yellow. Fore femur 1.2 times and hind femur 1.9 times width of mid femur. Fore and mid femora with short sparse ventral hairs. Hind femur with 1 preapical ad and two rows of spine-like ventral bristles on weak tubercles (5 av distinctly longer than pv, ventral bristles triseriate at base). Fore tibia with 1 long ad at middle; apically with 1 long thick ad. Mid tibia with 1 very long ad and 1 very long av near base; apically with 6 bristles including 1 very long av. Hind tibia with 1 long ad at middle; apically with 1 long av and 1 long pd. Fore tarsomere 1 with 1 long pv at extreme base. Mid tarsomere 1 with 4 short av and 4 short pv. Hind tarsomere 1 with several short thick ventral bristles. Wing hyaline, slightly tinged brownish, stigma brownish; veins dark brown, R_{4+5} and M_1 divergent apically. Squama dark yellow with dark yellow hairs. Halter dark yellow.

Abdomen apically distinctly curved downward, blackish or black with gray pollen; hypopygium distinctly thicker than pregenital segments. Hairs and bristles on abdomen brown or dark brown.

Male genitalia. Left epandrial lamella slightly narrower than right epandrial lamella; left surstylus short thick, strongly curved inward. Right epandrial lamella with oblique apical margin; right surstylus short wide, irregularly trifurcated. Hypandrium much longer than wide, apically shallowly furcated, and with a long hook-like lateral process at apical 1/4.

Female. Body length 3.5–4.1 mm, wing length 3.8–3.9 mm. Hind femur with one row of av (3 av rather long), 2 very short pv at base and 3 long thin pv at apex.

Holotype. ♂, **China**, Yunnan, Baoshan, Dahaoping, 11-V-2012, Yuanye LIU (CAU).

Paratypes. 3♂2♀, same data as holotype (CAU); 3♂5♀, Yunnan, Lushui, Pianma, 2123 m, 06-VII-2013, Xuankun LI (CAU).

Etymology. This specific epithet refers to the black femora.

Diagnosis. All femora black except extreme tips blackish or brownish yellow. Fore tibia black, mid and hind tibiae yellow. First flagellomere with 1 dorsal seta at base; arista bare. Hypandrium shallowly bifurcated apically with a long hook-like lateral process at apical 1/4.

Remarks. This new species is similar to *H. steatopygus* Plant, 2013 from Thailand, but may be separated from the latter by all femora black with the blackish or brownish yellow extreme tips and hypandrium shallowly bifurcated apically with the lateral process at apical 1/4. In *H. steatopygus*, the fore and mid femora are yellow but darkened dorsally, the hind femur is black with a yellow apex, and the hypandrium is deeply furcated apically with the lateral process at apical 2/5 (Plant 2013).

4. *Hybos serratus* Yang & Yang, 1992 (Fig. 4)

Hybos serratus Yang & Yang, 1992: 1089. Type locality: China: Sichuan, Xichang.

Hybos serratus: Yang & Yang, 2004: 210; Yang, 2008: 621.

Specimens examined. 1♂, **China**, Yunnan, Gongshan, Xianjiudang, 1679 m, 03-VII-2013, Wei ZHANG (CAU). 3♂8♀, Yunnan, Lushui, Pianma, 2123 m, 06-VII-2013, Wei ZENG (CAU).

Distribution. China (Henan, Sichuan, Yunnan, Guizhou, Guangxi, Hainan).

Remarks. This species is reported from Yunnan for the first time.



Figure 4. *Hybos serratus* Yang & Yang, 1992. A. Male habitus, lateral view; B. Wing.

5. *Hybos yuqiangi* sp. nov. (Fig. 5)

Description. Male. Body length 3.4–3.6 mm, wing length 3.2–3.4 mm.

Head black with pale gray pollen. Eyes contiguous on frons, brownish yellow with distinctly enlarged dorsal facets dark yellow. Hairs and bristles on head black except postero-ventral surface with dark yellow hairs; ocellar tubercle weak, with 2 short oc and 2 short posterior hairs. Antenna black; scape without hairs, pedicel with circlet of subapical hairs; first flagellomere without dorsal hair; arista black, pubescent except apical 1/4 thin and bare. Proboscis shorter than head, black. Palpus black, with 1 extreme hair.

Thorax black with pale gray pollen. Hairs on thorax blackish, bristles black; hairs on mesonotum short, ppn absent, 2 npl (posterior npl long), uniserial hair-like dc nearly as long as irregularly biserial acr, 1 long prsc, 1 long psa; scutellum with 2 marginal hairs (about 1/3 as long as sc) and 2 long sc. Legs yellow except tips of femora and entire tarsomeres 3–5 brown or dark brown. Hairs and bristles on legs black, but those on coxae dark yellow or brownish yellow. Fore femur 1.1 times and hind femur 1.8 times width of mid femur. Fore femur with row of hair-like pv nearly as long as femur thickness. Hind femur with 4 ad and 1 pd on apical half and two rows of spine-like ν on weak tubercles (av longer than pv). Fore tibia with 1 ad at middle; apically with 1 long ad. Mid tibia with 2 very long ad and 1 very long av; apically with 6 bristles including 1 very long av. Hind tibia with two rows of hair-like d and 1 ad at middle; apically with 1 av and 1 brownish yellow pd. Fore tarsomere 1 with 1 short av and 1 long pv at extreme base and 1 pv near middle. Mid tarsomere 1 with 1

short av and 1 long pv at extreme base. Hind tarsomere 1 with several short thick ventral spines. Wing hyaline, slightly tinged grayish, stigma dark brown; veins dark brown, R_{4+5} and M_1 divergent apically. Squama dark yellow with dark yellow hairs. Halter dark yellow.

Abdomen nearly straight, subshiny blackish with pale gray pollen; hypopygium weakly swollen. Hairs and bristles on abdomen black except tergite 1 with mostly dark yellow hairs and bristles, sternites 1–5 with dark yellow hairs and bristles.

Male genitalia. Left epandrial lamella distinctly narrower than right epandrial lamella; left surstylus thick finger-like with a short small process at base. Right epandrial lamella with oblique apical margin; right surstylus thick finger-like, distinctly curved inward. Hypandrium distinctly longer than wide, basally nearly truncate, apically furcated into short thick process and slightly long finger-like process.

Female. Unknown.

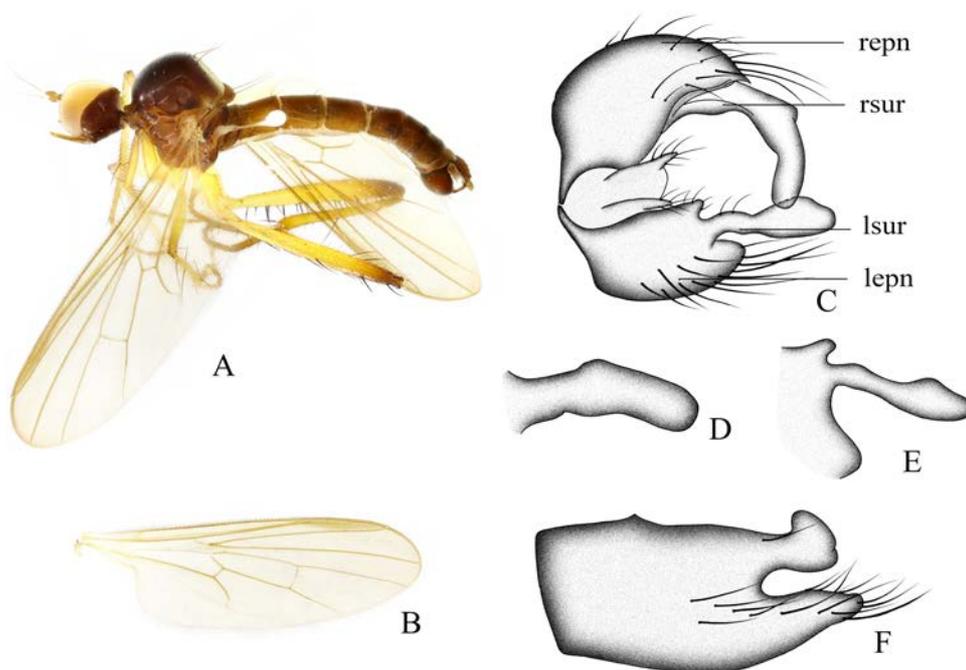


Figure 5. *Hybos yuqiangi* sp. nov. A. Male habitus, lateral view; B. Wing; C. Genitalia, dorsal view; D. Right surstylus; E. Left surstylus; F. Hypandrium, ventral view.

Holotype. ♂, China, Yunnan, Lushui, Pianma, 1900 m, 02-VIII-2012, Yuqiang XI.

Paratype. 1♂, same data as holotype (CAU).

Etymology. This specific epithet recognizes the collector Yuqiang XI.

Diagnosis. Legs yellow except tips of femora and entire tarsomeres 3–5 brown or dark brown. Hind tibia with two rows of hair-like d and 1 ad at middle, apically with 1 av and 1 brownish yellow pd. Hypandrium shallowly furcated apically.

Remarks. This new species is very similar to *H. bawanglingensis* Yang from Hainan, but may be separated from the latter by the left and right surstyli rather wide with the obtuse apex. In *H. bawanglingensis*, the surstyli are rather narrow with an acute apex (Yang 2008).

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