

Description of four new species of *Helina* Robineau-Desvoidy (Diptera: Muscidae) from Yunnan, China

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Abstract: Four new species of *Helina* Robineau-Desvoidy from Yunnan Province, China are reported: *H. paratacticispina* **sp. nov.**, *H. yilaensis* **sp. nov.**, *H. similisipedana* **sp. nov.**, and *H. yutenggi* **sp. nov.**

Key words: Calyptratae; Muscoidea; description; taxonomy

中国云南省阳蝇属四新种记述（双翅目：蝇科）

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摘要: 采自我国云南省的双翅目蝇科阳蝇属4个新种首次被报道, 分别是*Helina paratacticispina* **sp. nov.**, *H. yilaensis* **sp. nov.**, *H. similisipedana* **sp. nov.** 和*H. yutenggi* **sp. nov.**。新种的所有标本均保存在沈阳师范大学昆虫研究所。

关键词: 有瓣蝇类; 蝇总科; 描述; 分类

Introduction

The family Muscidae (Diptera: Muscoidea) was first proposed by Latreille (1802). It is a diverse family with about 1705 valid species in China (Hennig 1957–1958; van Emden 1965; Hockett 1965; Pont 1980, 1986, 1989; Fan 1992; Xue & Chao 1998; Carvalho *et al.* 2005; Wang *et al.* 2008; Zhang *et al.* 2011a, b; Xue & Tian 2012, Xue *et al.* 2012, 2020; Wang 2013; Xue & Sun 2014). *Helina* Robineau-Desvoidy, 1830 is the second largest genus in Muscidae, comprising 264 valid species in China, accounting for 49% of the world's species of *Helina*. Among them, 49 species are distributed in Yunnan Province (Xue *et al.* 2020). The terrain of Yunnan is divided into three layers descending from northwest to southeast. Deqin and Shangri-La in northwest Yunnan are the first layer, the central Yunnan Plateau is the second layer, and the south, southeast and southwest Yunnan are the third layer, with an average descent of 6 meters per kilometer. Baimang Snow Mountain, also known as “Baima Snow Mountain”, is located in Deqin County, Yunnan, and covers an area of 190,144 hectares. It is a relatively well-preserved primitive forest area in the cold zone, and also has the highest elevation and largest nature reserve in Yunnan. Shangri-la City is located in the Yunnan, Sichuan and Tibetan triangle region in the northwest of Yunnan, located in the heart of Diqing

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Shangri-la. Yunnan is known as the “Animal Kingdom”, with more than 10,000 species of insects. The specimens collected in this paper are all from Baimang Snow Mountains and Shangri-La in Yunnan.

Material and methods

This study was based on combining external morphology with terminalia characteristics. The morphological terminology follows that of Cumming and Wood (2017). Absolute measurements are given in mm. The following abbreviations are used: IESNU — Institute of Entomology, Shenyang Normal University; ors — orbital setae; fr — frontal setae; acr — acrostichal setae; dc — dorsocentral setae; ial — intra-alar setae; pra — prealar setae; av — anteroventral setae; a — anterior seta; ad — anterodorsal setae; pd — posterodorsal setae; p — posterior setae; pv — posteroventral setae; r-m — radio-medial crossveins; dM-Cu — discal medial-cubital crossveins; R₄₊₅ — 4th and 5th branches of radius veins; M — media vein; C — costa; Sc — subcosta.

Type specimens are deposited in the Institute of Entomology, Shenyang Normal University, Shenyang, China.

Taxonomy

1. *Helina paratacticispina* Xue & Wang sp. nov. (Fig. 1)

Male. Body length 5.2–6.6 mm.

Head. Eyes bare; frons 2.5–3.0 times as wide as anterior ocellus, frons width subequal to distance between two posterior ocelli; frontal vitta black, distinctly wider than fronto-orbital plate; 5–6 pairs of fr on lower 3/5 of frons, without ors; ocellar seta long, subequal in length to middle fr; inner and outer vertical setae short; fronto-orbital plate and parafacial covered with grey pruinosity, parafacial subequal in width to postpedicel; antenna black, postpedicel about 2.8 times as long as wide; arista long plumose, the longest hairs about 1.2 times as long as the postpedicel width; lunule brown, with silver pruinosity; lower face not protruding; vibrissal angle situated behind frontal angle; anterior margin of gena with a row of upcurved setulae; genal and postgenal hairs black; gena and postgena with dark gray pruinosity, genal height about 1/4 of eye height; epicephalon with hairs; prementum with sparse pruinosity, about 2.5 times as long as wide; labella large, about 4/5 of prementum length; palpus black, about 1.3 times as long as prementum.

Thorax. Ground-colour black, with orange-grey pruinosity; scutum with four black vittae, inner vitta about 2/3 width of median pruinose vitta, reaching the middle part of postsutural area of scutum; 4 rows of acr, only one pair of acr distinct situated in front of scutellum, dc 2+3, ial 0+2, pra hair-like or without, postpronotal setae 3, posthumeral seta 1+0; lateral and ventral surfaces of scutellum bare; basal and apical scutellar setae developed; basisternum of prosternum and proepisternum hollow in centre; anepimeron, meron, notopleuron and katepimeron all bare; anterior anepisternal seta 1, katepisternal setae 2+2; anterior and posterior spiracles small and brown.

Wings. With orange colour, veins brown, tegula dark brown, basicosta black; costal spine

longer than r-m; Sc bow-shaped, radial node bare; R_{4+5} and M straight and parallel; near r-m and dm-cu not clouded; calypters yellowish, lower calypter prominent; halter orange-yellow.

Legs. Complete black; fore tibia without median p; mid femur without distinct av, with a complete pv row, 4–5 strong pv in basal half; mid tibia with ad row (about 5–6) in distal half, at least two of them developed, a row of pd in distal 2/3, middle 3 of pd developed, lower 2 very long, about 3/5 of its tibial length, 1 preapical d, posterior setiform row in distal 3/5, without pv; hind femur with complete av row, av sparse and short in basal 3/5, 3–4 of av developed in distal, about twice as long as femoral diameter, pv row incomplete, only 4–5 pv in distal 1/3, about 1.5 times as long as femur diameter, without pv in basal 2/3; hind tibia with 2–4 av, usually 3 ad, one of them slightly long, 1 short pd in sub-basal, posterior setiform row (about 7–8) in middle part, without apical pv; tarsi all longer than tibiae, fore claw and pulvillus long and large, about 4/5 of fifth tarsomere in length.

Abdomen. Ground-colour black, long-oval in dorsal view, densely covered with orange to orange-grayish pruinosity, tergites without median vitta; syntergite 1+2 to tergites 5 each with a pair of black lateral patches on posterior half, sometimes lateral patches on sternite 3 stretch forward; tergites 3 to 5 with a complete row of posterior marginal setae; sternite 1 bare; lateral lobe of sternite 5 with 2 pairs of spinous setae, cercus at least twice as long as broad in posterior view; surstylus longer than cercus, distal half intumescent in lateral view, inner margin with a row of short spines in lower posterior part, upper anterior part with setulae.

Female. Unknown.

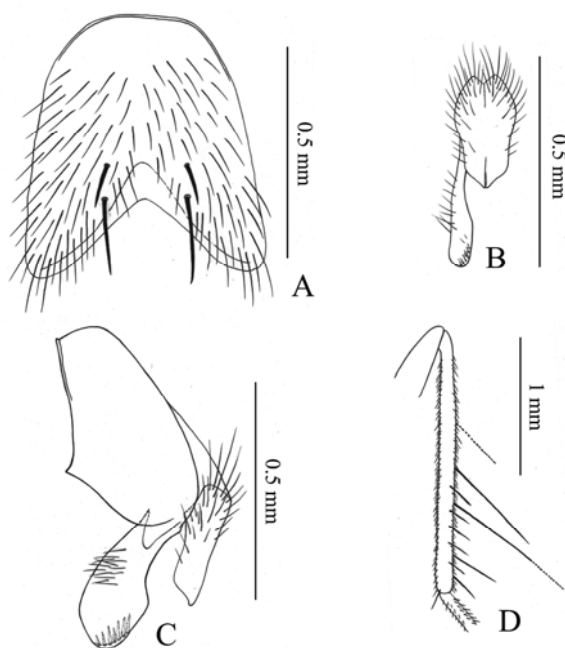


Figure 1. *Helina paratacticispina* sp. nov., ♂. A. Sternite 5, ventral view; B. Cerci, posterior view; C. Terminalia, profile view; D. Mid tibia, anterior view.

Holotype. ♂, **China**, Shangri-la, Yunnan, 27°47'N, 99°37'E, altitude 3500 m, 30-V-2014, Ping WANG leg. **Paratypes.** **China**, 25♂, same data as holotype; 10♂, Shangri-la,

Yunnan, 27°47'N, 99°37'E, 3500 m, 30-V-2014, by Hongkui SUN; 44♂, Shangri-la, Yunnan, 27°47'N, 99°37'E, 3500 m, 30-V-2014, Teng YU leg.

Etymology. The specific epithet is based on sternite 5 having 2 pairs of paratactic and spinous setae. Latin word “*paratactic*” means paratactic, “*spina*” meaning thorn or spine.

Remarks. This species belongs to the *Helina quadrum*-group and resembles *Helina huae* Xue, 2001 but it differs from the latter by frontal vitta distinctly wider than fronto-orbital plate (in *H. huae* narrower than fronto-orbital plate); R_{4+5} and M parallel (*H. huae* with ends are slightly apart); mid tibia with *ad* row (about 5–6) in distal half (*H. huae* only with 1 *ad*); hind femur with incomplete *pv* row, only 4–5 *pv* in distal 1/3 (*H. huae* without *pv*); each tergite without median vitta (*H. huae* tergites 3 to 5 with fuscous median vitta); tergites 2 to 5 each with a pair of black lateral patches on posterior half (*H. huae* tergite 2 and tergite 5 without patch); lateral lobe of sternite 5 with 2 pairs of spinous setae (*H. huae* without spinous setae), cercus at least twice as long as broad in posterior view (in *H. huae* the length is the same as the width); surstylus longer than cercus in lateral view (in *H. huae* distinctly shorter than cercus).

2. *Helina yilaensis* Xue & Wang sp. nov. (Fig. 2)

Male. Body length 5.4–5.6 mm.

Head. Eyes bare; frons 1.0–1.2 times as wide as anterior ocellus, frons width subequal to 1/3 distance between posterior ocelli; frontal vitta black, disappearing in the narrowest part; fronto-orbital plate adjoined; 5–6 pairs of *fr* on lower 3/5 of frons, without *ors*; ocellar seta slightly shorter than the lower *fr*; inner and outer vertical setae short; fronto-orbital plate and parafacial covered with silver pruinosity; middle part of parafacial subequal in width to postpedicel; antenna black; postpedicel about 2.8 times as long as wide (2.5 times as long as pedicel); arista short plumose, the longest hairs about 4/5 of postpedicel width; lunule brown; lower face not prominent; vibrissal angle situated behind frontal angle; anterior margin of gena with a row of upcurved setulae; genal and postgenal hairs black; gena and postgena with dark grey pruinosity; genal height about 1/4 of eye height; epicephalon with hairs; prementum with dense pruinosity, about 3.0 times as long as wide; labella large, about 4/5 of prementum length; palpus black, about 1.3 times as long as prementum.

Thorax. Ground-colour black, with green-grayish pruinosity; scutum with 4 black vittae, the inner vitta as wide as median pruinose vitta, reaching scutoscutellar suture; 4 rows of *acr*, only one pair of *acr* distinct and situated in front of scutellum, *dc* 2+4, *ial* 0+2, *pra* hair-like or without, postpronotal setae 3, posthumeral seta 1+0; lateral and ventral surfaces of scutellum bare; basal and apical scutellar setae developed; basisternum of prosternum and proepisternum hollow in centre; anepimeron, notopleuron, meron and katepimeron all bare; anterior anepisternal seta 1, katepisternal setae 2+2; anterior and posterior spiracles small and brown. Wings: With orange colour, veins brown, basicosta yellow, tegula dark red; costal spine shorter than *r-m*; *Sc* bow-shaped; radial node bare; R_{4+5} and M straight in distal part, parallel; near *r-m* and *dM-Cu* not clouded; margins of calypters and upper calypter white, the lower calypter prominent, with yellowish colour; halter orange-yellow.

Legs. completely black; fore tibia without median *p*; mid femur without distinct *av*, with 4–5 distinct *pv* in basal half; mid tibia without *ad* and *pv*, 2 *p*; hind femur with a complete *av* row, *av* setiform in basal 2/5, *av* long and large in distal half, about two times as long as its femur diameter, without *pv*; hind tibia with 2 *av*, 2 *ad*, 1 short *pd* in sub-basal, without apical

pv; tarsi longer than tibiae, claw and pulvillus long, about 4/5 of fifth tarsomere in length, claws of fore leg about 1.2 times as long as fifth tarsomere length.

Abdomen. Ground-colour black, long-oval in dorsal view, with dense gray to gray-orange pruinosity, tergites without median vitta; near trichopore without pruinosity; tergites 3 and 4 each with a pair of black patches, tergite 3 with incomplete posterior marginal setae; sternite 1 bare; each sternite quadrate, without pruinosity; lateral lobe of sternite 5 with long setae, without spiniform seta; cercus subequal in length to surstylus in profile, inner and outer surfaces of anterior margin of surstylus each with spiniform setulae; cercus narrowing in distal part in posterior view.

Female. Unknown.

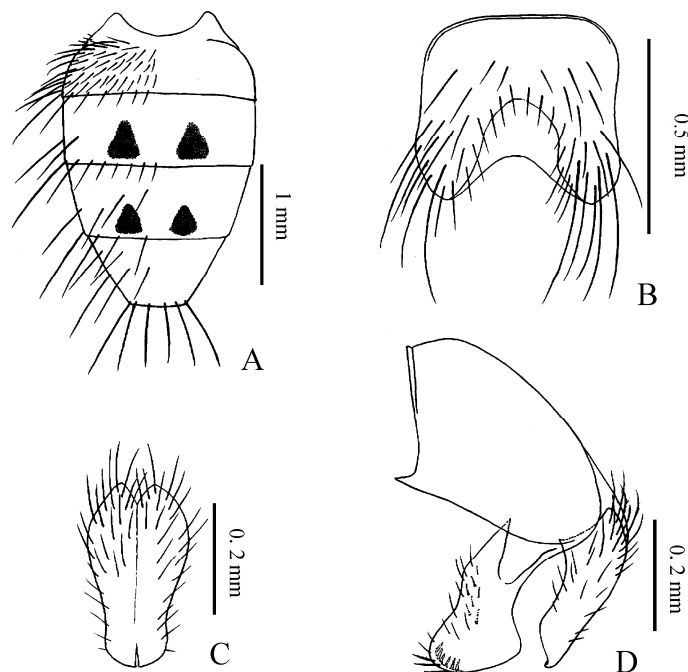


Figure 2. *Helina yilaensis* sp. nov., ♂. A. Abdomen, dorsal view; B. Sternite 5, ventral view; C. Cerci, posterior view; D. Terminalia, profile view.

Holotype. ♂, **China**, Yila Prairie, Shangri-la, Yunnan, 27°52'N, 99°39'E, altitude 3300 m, 29-V-2014, Teng YU leg. **Paratype.** 1♂, same data as holotype.

Etymology. This new species is named after its type locality.

Remarks. This species belongs to *Helina intermedia*-group and resembles *Helina spinisternita* Fang & Fan, but it differs from the latter by frons width subequal to 1/3 distance between posterior ocellus (in *H. spinisternita* wider than the distance between posterior ocellus); frontal vitta disappearing in the narrowest part; fronto-orbital plate adjoined (in *H. spinisternita* wider than fronto-orbital plate); arista short plumose, the longest hair about 4/5 of postpedicel width (*H. spinisternita* plumose, the longest hair equal to the width of postpedicel); near r-m and dM-Cu not clouded (*H. spinisternita* clouded); the upper calypter white and the lower calypter yellowish; halter orange-yellow (*H. spinisternita* calypter and

halter all yellow); mid tibia without *ad* (*H. spinisternita* with 2 *ad*); lateral lobe of sternite 5 with long setae, without spiniform seta (*H. spinisternita* with 2 spiniform setae); cercus subequal in length to surstylus in profile, inner and outer surfaces of anterior margin of surstylus each with spiniform setulae (*H. spinisternita* cercus about half length of surstylus in profile, surstylus without spiniform setulae); cercus narrowing in distal part in posterior view (*H. spinisternita* not narrowing in distal part).

3. *Helina similisipedana* Xue & Du sp. nov. (Fig. 3)

Male. Body length 8.2–9.5 mm.

Head. Eyes with dense and orange cilia, cilia about 2.5 times as long as width of anterior ocellus; frons 1.2–1.5 times as wide as anterior ocellus, or subequal to a half distance between posterior ocelli; fronto-orbital plates adjoin on upper half; frontal vitta black, only anterior part triangular; 6–7 pairs of fr on lower half of frons, without ors; ocellar seta subequal in length to the longest fr; fronto-orbital plate and parafacial with silver pruinosity; gena with dark grayish pruinosity; parafacial about 1.2 times as broad as postpedicel; antenna black; postpedicel about 2.5 times as long as wide, anterior surface of pedicel with sparse greyish pruinosity; arista long plumose, the longest hair 1.2 times as long as postpedicel width; lunule orange, with silver pruinosity; lower face not prominent; vibrissal angle situated behind frontal angle; anterior margin of gena with a row of upcurved setulae; genal and postgenal hairs black; genal height about 1/5 of eye height; occiput with dark grayish pruinosity, epicephalon with black hairs; prementum with gray pruinosity, about twice as long as wide; labella large, subequal in length to prementum; palpus black-brown, about 1.3 times as long as prementum.

Thorax. Ground-colour black, pleura with grey pruinosity; scutum with 4 black vittae and gray pruinosity; anterior part of the inner vitta narrower than median pruinose vitta, broader toward posterior part, reaching scutoscutellar suture; 6 rows of presutural acr, only one pair of acr distinct and situated in front of scutellum, dc 2+4, ial 0+2, pra long, subequal in length to posterior notopleural seta, postpronotal setae 3, posthumeral seta 1+0; basal and apical scutellar setae developed, a pair of lateral scutellar setae; scutellum with setulae in lateral surface and basal part of ventrolateral surface, ventral surfaces of scutellum bare; basisternum of prosternum and proepisternum hollow in centre; anepimeron and katepimeron bare, meron and notopleuron with hairs; anterior anepisternal seta 1, katepisternal setae 2+2; anterior and posterior spiracles brown. Wings. With brownish colour, basicosta yellow, tegula black; subcostal sclerite brownish, with dense, orange and short hairs; costal spine slightly longer than diameter of C; Sc bow-shaped; radial node bare; R₄₊₅ and M straight, deviating in distal part; near r-m clouded and near dm-cu not clouded; calypters yellowish, the lower calypter ligule-shaped prominent, margins of calypters yellow; halter orange-yellow.

Legs. Completely black; fore tibia with 1 median p; mid femur with slightly distinct *av* in basal half, length about 3/5 of its femoral diameter, *av* setiform in distal half, *pv* row complete, only 4–5 broaden in basal part; mid tibia without *ad*, 4–5 p, 1–2 of p short; hind femur with 3–5 *av* in distal 1/3, without *pv*; hind tibia with 4–5 *av*, 3 *ad*, a row of *pv* (about 10–12) in distal 3/4, without *pd* and apical *pv*; tarsi longer than tibiae; claws and pulvillus long, at least subequal in length to fifth tarsomere, fore claw about 1.2 times as long as fifth tarsomere length.

Abdomen. Ground-colour black, oval in dorsal view, with dense grey pruinosity; tergites 3 to 5 with shifting patches, syntergite 1+2 and tergite 3 each with a pair of black patches,

syntergite 1+2 and tergite 5 each with a pair of indistinctly orange-grey patches, only syntergite 1+2 with a median black vitta, tergites 3 and 4 with a pair of median marginal setae; sternite 1 with hairs, sternite 2 subquadrate, with 2–3 pairs of strong setae in distal part; sternites 3 and 4 rectangular, each with 2 pairs of strong setae in distal part; sternite 5 thin and long; surstylus without long setae; basal part of cercus slightly broad in posterior, inner process about 1/6 length of cercus, cercus with small hairs in distal part.

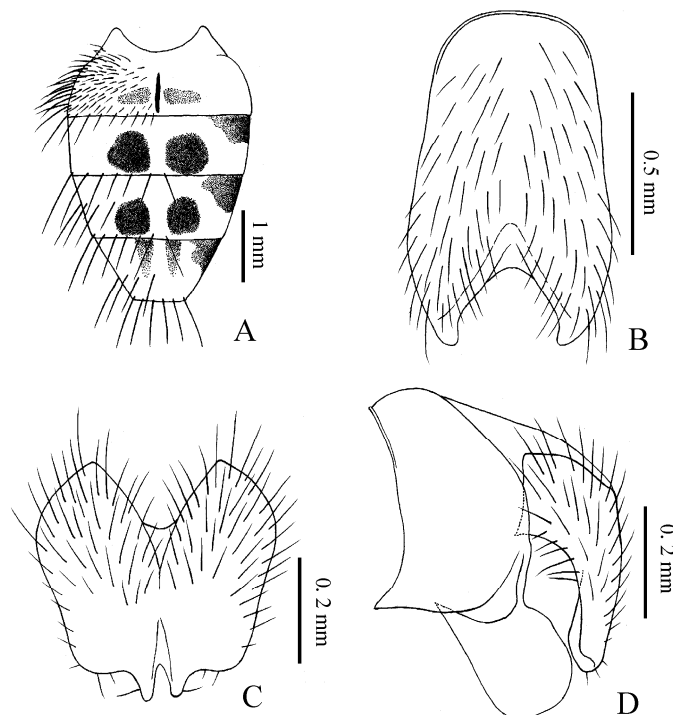


Figure 3. *Helina similispedana* sp. nov., ♂. A. Abdomen, dorsal view; B. Sternite 5, ventral view; C. Cerci, posterior view; D. Terminalia, profile view.

Female. Unknown.

Holotype. ♂, **China**, Shangri-la, Yunnan, 27°47'N, 99°37'E, 3500 m, 30-V-2014, Teng YU leg. **Paratype.** 1♂, **China**, Yila Prairie, Shangri-la, Yunnan, 27°52'N, 99°39'E, 3300 m, 29-V-2014, Hongkui SUN leg.

Etymology. The specific epithet is based on the new species being similar to *Helina pedana* Feng. Latin word “*similis*” means similar.

Remarks. This species belongs to *Helina annosa*-group and resembles *Helina pedana* Feng, but it differs from the latter by frons width subequal to the half distance between posterior ocelli (*H. pedana* slightly narrower than the distance between posterior ocelli); parafacial about 1.2 times as wide as postpedicel (in *H. pedana* equal to the width of postpedicel); antenna all black (*H. pedana* scape yellow); arista long plumose, the longest hair 1.2 times as long as postpedicel width (*H. pedana* arista plumose, the longest hair equal to the width of postpedicel); *pra* long, subequal in length to posterior notopleural seta (*H. pedana* about 2/3 length of posterior notopleural seta); near dM-Cu not clouded (*H. pedana* clouded); hind femur with 3–5 av in distal 1/3 (*H. pedana* with a row of av); tergite 4 with a pair of median marginal setae (*H.*

pedana with posterior marginal setae); sternite 2 with 2–3 pairs of strong setae in distal part (*H. pedana* with 10 long setae); sternite 5 thin and long (*H. pedana* normal).

4. *Helina yutenggi* Xue & Du sp. nov. (Fig. 4)

Male. Body length 6.0–6.5 mm.

Head. Eyes bare; frons distinctly wider than postpedicel (3.0–3.5 times as wide as anterior ocellus); frontal vitta black, the narrowest part subequal in width to anterior ocellus; 7–8 pairs of fr on lower 3/5 of frons, without *ors*; ocellar seta about 4/5 length of longest fr; fronto-orbital plate, parafacial and gena with dark grey pruinosity; parafacial 1.2–1.3 times as wide as postpedicel; antenna black; postpedicel about 2.5 times as long as broad, anterior surface of pedicel with grayish pruinosity; arista long plumose, the longest hair about 1.2 times as long as postpedicel width; lunule dark brown; lower face not prominent; vibrissal angle situated behind frontal angle; anterior margin of gena with a row of upcurved setulae, genal and postgenal hairs black; genal height about 1/4 of eye height; occiput with dark gray pruinosity, epicephalon with black hairs; prementum with grey pruinosity, about 2.2 times as long as wide; labella large, posterior part stretching upward, subequal in length to prementum; palpus black-brown, about 1.2 times as long as prementum.

Thorax. Ground-colour black, pleura with grey pruinosity, slightly shining; scutum with 4 black vittae and orange-gray pruinosity; inner vitta reaching scutoscuteellar suture; 4 rows of presutural acr, only a pair of acr distinct and situated in front of scutellum, dc 2+4, ial 0+2, pra hair-like, about a half of posterior notopleural seta in length, postpronotal setae 3, posthumeral seta 1+0; basal and apical scutellar setae developed, a pair of lateral setae; lateral and ventral surfaces of scutellum bare; basisternum of prosternum and proepisternum hollow in centre, anepimeron, meron and katapimeron bare; anterior anepisternal seta 1, katapisternal setae 2+2; anterior spiracle brown, posterior spiracle dark brown. Wings. With brownish colour, basicosta black; subcostal sclerite brownish, with orange hairs; costal spine slightly longer than diameter of C; Sc bow-shaped; radial node bare; R₄₊₅ and M straight, deviating in distal part; near r-m and dM-Cu not clouded; calypters yellowish, the lower calypter ligule-shaped and prominent, margins of calypters yellow; halter orange-yellow. Legs. Hind tibia in distal 3/4 and mid tibia in distal 1/5 yellow, the remaining parts of legs black; fore tibia without median p; mid femur without distinct *av*, with a complete *pv* row, slightly long in basal half; mid tibia without *ad*, 4–5 p, 2–3 of p long, about twice as long as tibial diameter; hind femur intumescent in pre-apical, with complete *av* row, *av* long in distal half, length about 2.5 times as long as middle diameter of its femur, *pv* row complete, ventral surface with 2–3 rows of fringe in distal half; hind tibia with 3 *av*, 3 *ad*, a short *pd* in sub-basal part, without apical *pv*; tarsi longer than tibiae, claws and pulvillus of mid and hind legs subequal in length to fifth tarsomere, claw and pulvillus of fore leg about 1.2 times as long as fifth tarsomere length.

Abdomen. Ground-colour black, long-oval in dorsal view, with dense orange-gray pruinosity, tergites 3 and 4 each with a pair of dark brown lateral patches, median orange vitta indistinct; tergite 5 with a row of discal setae. Sternite 1 bare; sternites 2 to 4 thin and long, sternite 2 with long and dense setae. Surstylus yellow, inner margin with 3–4 spines in distal part.

Female. Unknown.

Holotype. ♂, China, Baimang Snow Mountain, Yunnan, 28°26'N, 99°06'E, altitude 4400 m, 28-V-2013, Teng YU leg. **Paratype.** 1♂, same data as holotype.

Etymology. The specific epithet refers to the name of its collector.

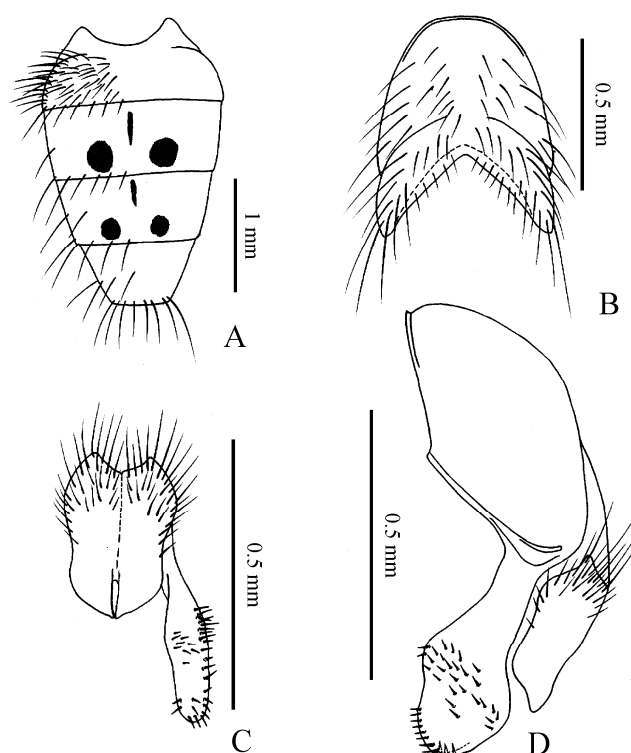


Figure 4. *Helina yutenggi* sp. nov., ♂, A. Abdomen, dorsal view; B. Sternite 5, ventral view; C. Cerci, posterior view; D. Terminalia, profile view.

Remarks. This species belongs to the *Helina intermedia*-group and resembles *Helina ampycoloba* Fang & Fan, but it differs from the latter by body smaller (*H. ampycoloba* 8 mm); arista long plumose, the longest hair about 1.2 times as long as postpedicel width (*H. ampycoloba* plumose, the longest hair equal to the width of postpedicel); posterior spiracle dark brown (*H. ampycoloba* brown); hind tibia in distal 3/4 and mid tibia in distal 1/5 yellow (*H. ampycoloba* all legs black); mid tibia with 4–5 p (*H. ampycoloba* only 3); male cercus slightly broad in distal part, surstylus slightly thin in basal half (*H. ampycoloba* cercus narrower in distal part, surstylus broad in basal half and narrow in distal part).

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