

ORIGINAL ARTICLE

# Extraordinary bees of the genus *Lasioglossum* Curtis, 1833 (Hymenoptera: Apoidea: Halictidae) from China

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**Abstract** The first records of the extraordinary and amazing bees *Lasioglossum longirostre* (Morawitz, 1876) and a new species *L. submandibulare* Niu, **sp. nov.**, from China are reported in this paper, with their descriptions, illustrations, and floral association. The species of *Lasioglossum* from China is up to 170.

**Key words** Apiformes, Halictinae, fauna, new record, description.

## 1 Introduction

The classification of cosmopolitan genus *Lasioglossum* Curtis, 1833 has been a considerable taxonomic challenge due to the large number of species and the relatively few morphological characters to distinguish them (Gibbs *et al.*, 2013). In 1833, Curtis recognized the heterogeneity of the genus *Halictus* Latreille, 1804, and described a new genus *Lasioglossum* for those species with basal hair bands on the abdominal terga and rather long lanceolate and very pubescent on the sides and at the back, hence the name *Lasioglossum* means “hairy-tongue” (McGinley, 1986). Perhaps it is somewhat misleading, because the glossae of *Lasioglossum* species are not hairier than those of other halictids. *Lasioglossum* was not widely applied until Robertson (1902) restored *Lasioglossum* based primarily on characters of the forewing, in particular the strength or weakness of certain cross-veins (1 r-m, 2 r-m). Pesenko (1999) revised the phylogeny and classification of the family Halictidae, treated the tribe Halictini including three subtribes: Halictina (corresponding to the group of non-parasitic genera with “strong venation”), Gastrohalictina (corresponding to the group of genera with “weak venation”), Sphecodina (including the parasitic genus *Sphecodes* and close genera), and divided the Gastrohalictina into three conditional generic groups in accordance with distributions of their members, of which the first group includes two nearly cosmopolitan genera (both absent in Australia): *Evylaeus* Robertson (including *Dialictus* Robertson) and *Lasioglossum* Curtis (mostly with 10 subgenera only in the Palearctic fauna). Michener (2000, 2007) recognized *Lasioglossum* including 18 subgenera and divided the subgenera into two higher categories: the *Lasioglossum* series (with a strong first r-m crossvein in females) and the *Hemihalictus* series (with a weak first r-m crossvein in females), and stated that the genus *Lasioglossum* is the only halictid genus besides *Homalictus* which shows weakened distal wing venation, at least in females. Especially, Gibbs *et al.* (2012, 2013) analyzed the phylogeny of Halictinae based on molecular data, reclassified the Halictinae, recognized some additional subgenera and applied more broadly or narrowly than any previous usage of some subgenera in *Lasioglossum*, referred to *L. (Homalictus)*, *L. (Ipomalictus)*, *L. (Leuchalictus)*, *L. (Oxyhalictus)*, *L. (Rubrihalictus)*, *L. (Sphecodogastra)*, *L. (Hemihalictus)*, *L. (Evylaeus)* and *L. (Dialictus)*. Currently, Ascher & Pickering (2019) summarized the current researches

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and recorded 27 subgenera and 1824 species of *Lasioglossum* worldwide.

China stretches over the Palearctic and Oriental Regions, given its geographical and climatic diversity as well as its size. The genus *Lasioglossum* is the second largest genus with number of species in China followed *Andrena* (about with 180 species). However, most species of Chinese *Lasioglossum* were found and recorded by foreign scholars, such as Blüthgen (1934), Cockerell (1931), Ebmer (2002), Friese (1914), Morawitz (1890), Smith (1875), Strand (1914) *etc.*, except few Chinese scholars, such as Fan (1991, 1992a, b), Zhang *et al.* (2011, 2012). Zhang recorded 115 species of Chinese *Lasioglossum* in her Ph.D. thesis (2012, unpublished). Then, Niu *et al.* (2018) summarized the available information and catalogued 168 species of *Lasioglossum* occurring in China.

## 2 Materials and Methods

All specimens examined and the type of the new species in this study are deposited in the Insect Collection of the Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZCAS). Specimens were studied with a Nikon SMZ 1500 stereomicroscope and images were recorded with a Nikon D7000 digital camera. Final images represent a composite of several photographs taken at different focal planes and combined using the program Helicon Focus 6®. All images were post-processed for contrast and brightness using Adobe® Photoshop® (PhotoScape X). The morphological terminology follows Michener (2007). The divided regions of propodeum follow Gibbs (2010). Absolute measurements, in millimeters (mm), are used for body length. For all other structures, relative measurements are used.

Abbreviations used in the descriptions are as follows:

BL (body length)—Measured from the base of the antennal socket to the apex of the metasoma;

EW (eye width)—The greatest width of eye in lateral view;

GW (genal width)—The greatest width of the gena in lateral view;

HL (head length)—Measured from the apicomedial margin of the clypeus to the upper margin of the vertex in frontal view;

HW (head width)—Measured at the widest point of the head across the compound eyes in frontal view;

T1, T2..., S1, S2...and F1, F2...—The first, second *etc.* segments of the terga, sterna and flagellomeres, respectively,

Punctuation density is expressed as the relationship between punctuation diameter (d) and the space between them (i), such as  $i = 1.5d$  or  $i < d$ .

## 3 Systematics

### *Lasioglossum (Hemihalictus) longirostre* (Morawitz, 1876) (Figs 1–3)

*Halictus longirostris* Morawitz, 1876: 236, ♂, ♀. Type locality: Ferghana (Ferghana Valley, Uzbekistan); Blüthgen, 1931: 324; Popov, 1959: 427, ♂, ♀, figs 1–8.

*Halictus (Rostrohalictus) longirostris* (Morawitz, 1876): Warncke, 1975: 88, ♂, ♀; Warncke, 1982: 80.

*Evyllaes longirostre* Morawitz, 1876: Aliev *et al.*, 2005: 156.

*Evyllaes (Rostrohalictus) longirostris* (Morawitz, 1876): Pesenko, 2007: 22, ♂, ♀.

*Lasioglossum (Dialictus) longirostre* (Morawitz, 1876): Michener, 2000: 361.

*Lasioglossum (Evyllaes) longirostre* (Morawitz, 1876): Pauly, 2016.

*Lasioglossum (Hemihalictus) longirostre* (Morawitz, 1876): Gibbs *et al.*, 2013: 10; Murao *et al.*, 2017: 25; Ascher & Pickering, 2019.

Material examined. China, Xinjiang, Gongliu Xian, Kuerdening (43°18'N, 82°51'E), 4♂1♀, 3.VIII.2018, leg. Yong Wang.

Distribution. China (Xinjiang), Greece, Turkey, Armenia, Azerbaijan, Georgia, Iran, Lebanon, Israel, Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan, Afghanistan.

Floral association. *Cirsium* sp. (Asteraceae), *Ferula tenuisecta* (Apiaceae), *Ixioliron tataricum* (Ixioliriaceae), *Origanum tyttanthum* (Lamiaceae), *Salvia* sp. (Lamiaceae), *Taraxacum* sp. (Asteraceae), *Rubus* sp. (Rosaceae) (Popov, 1959; Ebmer, 2011; Pauly, 2016; Murao *et al.*, 2017).

Remarks. The species is firstly recorded in China. The most obvious character of the species is its malar area very long, nearly as long as the diameter of compound eyes in male (Fig. 2D), or 0.3 times length of the diameter of compound eyes in female (Fig. 1E). The subgeneric status of the species is subject to different opinion, which perhaps due to the inconspicuous

character of the female posterior vertical surface of propodeum. The female has the posterior vertical surface of propodeum without lateral carina in upper half, but forming a distinct right angle with dorsal and lateral surfaces (Fig. 1C). Aliev *et al.*



Figure 1. *Lasioglossum (Hemihalictus) longirostre* (Morawitz, 1876), female. A. Body in lateral view. B. Fore wing. C. Propodeum in dorsolateral view. D. Inner hind tibial spur. E. Head in frontal view. F. Mesosoma in dorsal view. G. Mesosoma in lateral view. H. Metasoma in dorsal view. Scale bars: A–C, E–H = 1.0 mm; D = 0.5 mm.

(2005) recorded this species in genus *Evylaeus*, and Pesenko (2007) recorded it in subgenus *Evylaeus* (*Rostrohalictus*). Michener (2000) and Pauly (2016) recorded the species in different subgenus of *Lasioglossum* (*Dialictus*), *Lasioglossum*



Figure 2. *Lasioglossum (Hemihalictus) longirostre* (Morawitz, 1876), male. A. Body in lateral view. B. Fore wing. C. Head in frontal view. D. Head in lateral view. E. Mesosoma in dorsal view. F. Propodeum in dorsolateral view. G. Metasoma in dorsal view. H. Metasoma in ventral view. Scale bars = 1.0 mm.

(*Evylaeus*), respectively. Then, Gibbs *et al.* (2013) more broadly applied the species in *Lasioglossum* (*Hemihalictus*). Murao *et al.* (2017) and Ascher & Pickering (2019) follow the treatment of Gibbs *et al.* (2013). Here, we report the species under the subgenus *Lasioglossum* (*Hemihalictus*).

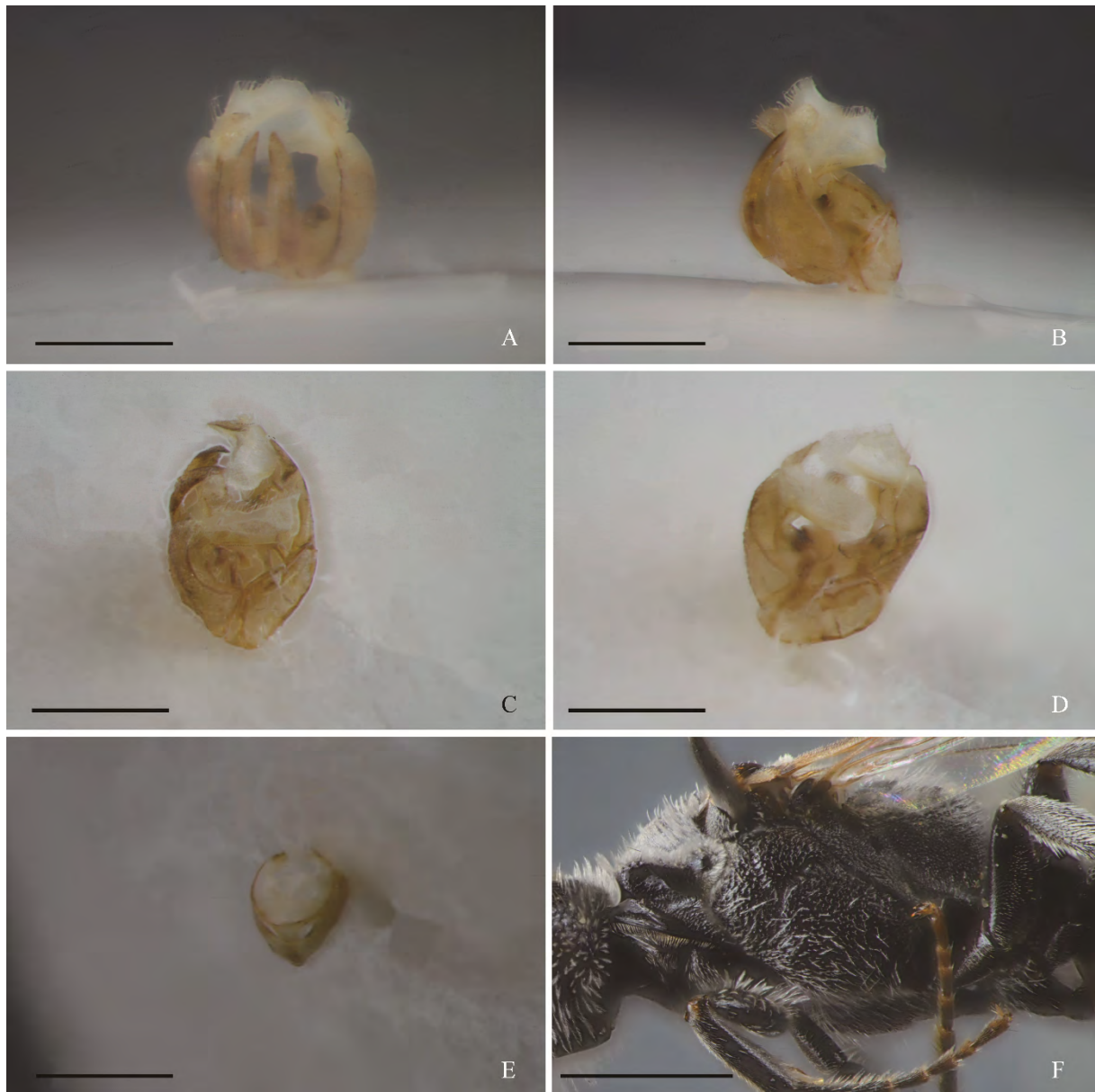


Figure 3. *Lasioglossum* (*Hemihalictus*) *longirostre* (Morawitz, 1876), male. A. Genitalia in dorsal view. B. Genitalia in lateral view. C. Genitalia in dorsolateral view. D. Genitalia in ventrolateral view. E. S7–S8 in ventral view. F. Mesosoma in lateral view. Scale bars: A–E=0.5 mm; F=1.0 mm.

***Lasioglossum* (*Dialictus*) *submandibulare* Niu, sp. nov.** (Figs 4–5)

Type material. Holotype, female, China, Sichuan, Mao Xian (31°43'N, 103°55'E), 25.V.2011, leg. Zeqing Niu.

Etymology. The specific name means the new species is very similar to *Lasioglossum mandibulare* (Morawitz, 1866).

Diagnosis. According to the current subgeneric classification of the genus *Lasioglossum* (Gibbs, 2010), the new species belongs to the subgenus *Dialictus*. The extraordinary and amazing characters of the new species is its elongated mandible (Fig. 4C) and strongly raised pronotum (Fig. 4G). The new species is very similar to *L. mandibulare* (Morawitz, 1866) by its elongated mandible. Comparing with the type species of *L. mandibulare* (Morawitz, 1866) (Astafurova & Proshchalykin, 2018), the species has following characters: head and mesosoma with blue-green metallic reflections; antennal flagellum

blackish-brown (Fig. 4A); mandible dark brown (Fig. 4C); all tibiae and tarsi brown (Fig. 5A); punctures on clypeus and supraclypeal area sparser; the dorsolateral angle of pronotum triangle, right-angle apically (Fig. 4D); lateral slope of

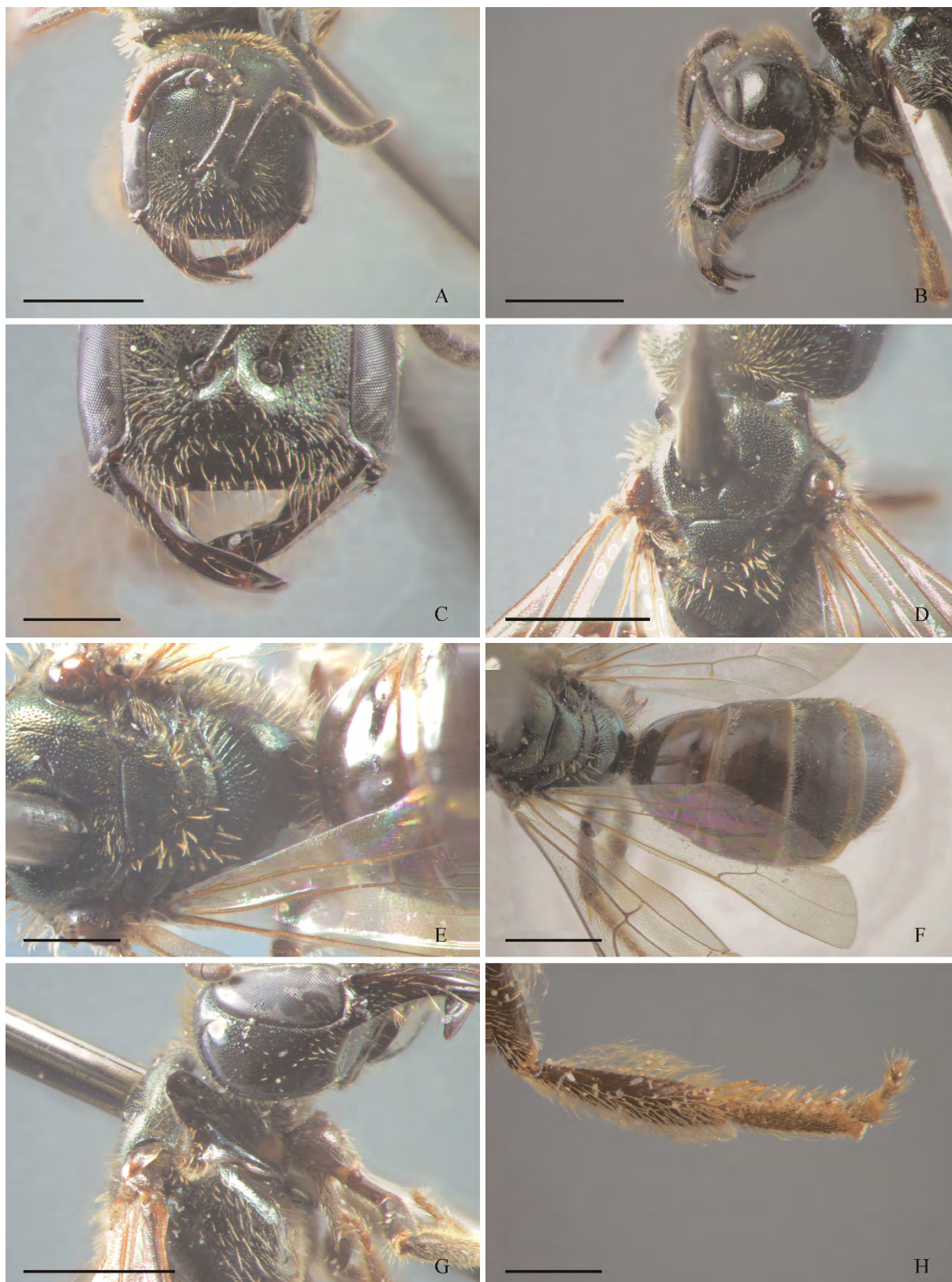


Figure 4. *Lasioglossum (Dialictus) submandibulare* Niu, **sp. nov.**, female, holotype. A. Head in frontal view. B. Head in lateral view. C. Clypeus in frontal view. D. Mesosoma in dorsal view. E. Propodeum in dorsal view. F. Metasoma in dorsal view. G. Pronotum in lateral view. H. Inner hind tibial spur. Scale bars: A–B, D, F=1.0mm, C, E, H=0.5mm.

propodeum smooth, without fine striate (Fig. 4E). Meanwhile, *L. mandibulare* (Morawitz, 1866) is characterized by: head and mesosoma black, without metallic reflections; antennal flagellum yellowish-brown; mandible yellow; all tarsi yellowish-brown; lateral slope of propodeum with fine striae.

The new species is also similar to *L. pronotale* Ebmer, 2002 by the strongly raised pronotum, but has the head as broad as long, nearly quadrate in frontal view, while the head of *L. pronotale* is longer than broad, longitudinal rectangular in frontal view.

**Description.** Female. BL 7.0 mm (Fig. 5A); head quadrate in frontal view, nearly as broad as long, HW:HL=48:47 (Fig. 5B); vertex long, ocelloccipital distance long, about 4 times as long as the lateral ocellus diameter (Fig. 4A); gena obviously broader than eye, GW:EW=19:9 (Fig. 4B). Clypeus rectangle, nearly 3 times as broad as long, apical margin truncate (Fig. 4C); mandible elongate, with single preapical tooth (Fig. 4C); forewing with three submarginal cells, 1st equal in length to 2nd and 3rd combined, distal veins (1rs-m, 2rs-m, 2m-cu and distal abscissae of M) weak, marginal cell pointed on anterior margin of wing (Fig. 5B); dorsolateral angle of pronotum triangle, right-angle shaped apically (Fig. 4D), pronotum strongly convex toward to the dorsum (Fig. 4G); propodeal dorsum as long as scutellum, nearly flat, with very fine striae not reaching posterior margin of propodeal dorsum (Fig. 4E); lateral slope of propodeum smooth, without fine striae (Fig. 4E), posterior vertical surface of propodeum carinate along lateral margin, but the carina ill-developed, only up to 2/3 of the lateral margin, lateral carina and transverse carina absent (Fig. 4E); hind basitibial plate present, enclosed by carina; inner hind tibial spur pectinate with two large teeth (Fig. 4H). Clypeus nearly polished, only with a few scattered punctures (Fig. 4C); supraclypeal area very sparsely punctate,  $i=3-5d$  (Fig. 4C); paraocular area and frons very densely and finely punctate,  $i=0.2-1.0d$  (Fig. 4C); vertex very sparsely punctate,  $i=5-6d$  (Fig. 4A); scutellum sparsely punctate,  $i=1-3d$  (Fig. 4D); T1 polished, without punctures (Fig. 4F). Head, mesosoma with blue-green metallic reflections, metasomal terga dull reddish-brown, without metallic reflections (Figs 4F, 5A); mandible dull reddish-brown (Fig. 4C); antenna blackish-brown except flagellum with ventral surface lighter, brown (Fig. 4A); forewing subhyaline with brownish-yellow veins and stigma except R vein brown (Fig. 5B); legs dark brown (Figs 4H, 5A). Clypeus, lower part of paraocular area, vertex, and mesosoma covered sparse dirty-yellowish pubescence. T2–T3 with basal whitish tomentum (Fig. 4F). Hind femur and tibia with yellowish plumose hairs forming the scopa (Fig. 4H).

Male. Unknown.

Distribution. China (Sichuan).

Floral association. No information.

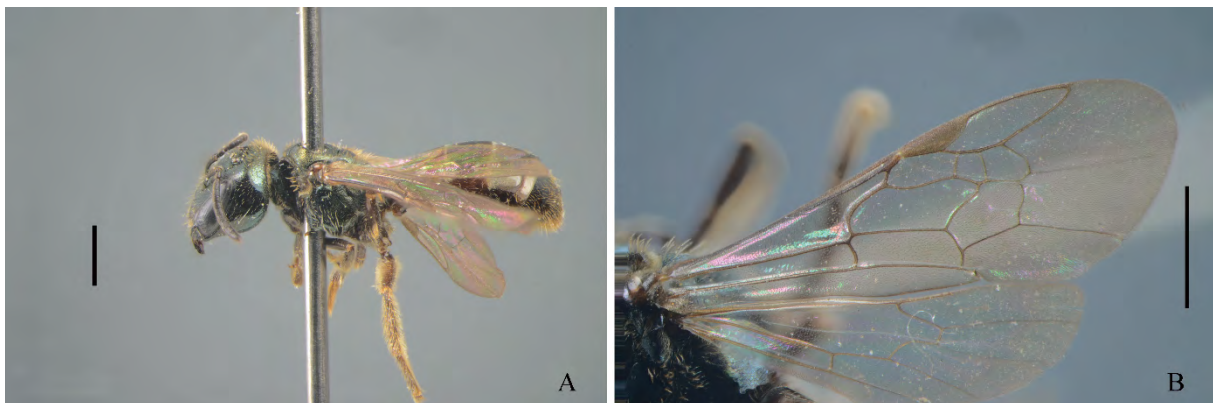


Figure 5. *Lasioglossum (Dialictus) submandibulare* Niu, **sp. nov.**, female, holotype. A. Body in lateral view. B. Fore wing. Scale bars=1.0 mm.

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