NATURAL HISTORY AND OBSERVATIONS

An unusual specimen of the subgenus *Lasioglossum* Curtis from British Columbia, Canada (Hymenoptera, Halictidae)

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The genus *Lasioglossum* Curtis *s. l.* (Halictidae) represents one of the largest and most taxonomically difficult groups of bees (Michener 2007; Gibbs 2010a), with at least 1,750 described species (Gibbs *et al*. 2012). In North America north of Mexico, six subgenera are currently recognized: *Dialictus* Robertson, *Evylaeus* Robertson, *Hemihalictus* Cockerell, *Lasioglossum s. str*., *Sphecodogastra* Ashmead, and the introduced *Leuchalictus* Warncke. Globally, all subgenera have been placed within one of two *Lasioglossum* "series" (Michener 2007; Gibbs *et al*. 2012). The *Lasioglossum* series contains species in which only one (i.e., the third) submarginal crossvein (i.e., 1rs-m) is weakened, and is represented in North America by the subgenera *Lasioglossum s. str.* and *Leuchalictus*. All other subgenera in North America normally have two weakened submarginal crossveins and have been placed in the *Hemihalictus* series. However, weak venation is not always perceptible in males and some female specimens of *Lasioglossum s. l.*, and Ebmer (1969), Michener (2007) and Gibbs *et al*. (2013) stress the difficulty in placing these problematic specimens within subgenera and even within series using these diagnostic characters.

The problems with wing venation in *Lasioglossum* are not limited to these difficult cases, as recently summarized by Gibbs (2010b). *Hemihalictus*, as originally defined by Cockerell (1897), was monotypic, the species *L. lustrans* (Cockerell) differing from all other non-metallic *Hemihalictus* series *Lasioglossum* in having only two submarginal cells; Cockerell (1897) used this character to separate his *H. lustrans* from all other *Halictus* Latreille. However, Gibbs (2010b) and Gibbs *et al*. (2013) showed that a small proportion of specimens of *L. lustrans* have three submarginal cells. Similarly, *Dialictus* was originally defined (Robertson 1902a) as monotypic and included one metallic species with two submarginal cells, *L. anomalum* (Robertson); *Chloralictus* was used to distinguish metallic species with three submarginal cells with two weakened submarginal crossveins (Robertson 1902b). Gibbs (2010b) indicated that *L. anomalum* is also known to have individuals with three submarginal cells. Therefore, wing venation alone is not always reliable for species- or subgenus-level identification in *Lasioglossum s. l*. In fact, Stephen *et al*. (1969) felt that these differences were so minimal that they considered many of the taxa currently recognized as subgenera of *Lasioglossum* to be subgenera of *Halictus*.

Both *Hemihalictus* and *Dialictus* are now defined much more broadly than these historic usages. Based on phylogenetic data, Gibbs *et al*. (2013) placed many species of *Evylaeus* (i.e., the non-metallic carinaless species, or non-metallic *Dialictus*) into the subgenus *Hemihalictus*; thus, the subgenus is no longer considered monotypic (as per Michener 2007). Mitchell (1960) was the first to define *Dialictus* (at genus level) as all metallic Halictinae with two submarginal cells or two weakened submarginal crossveins. Michener *et al.* (1994) were among the first to consider these as subgenera of *Lasioglossum*. To this date, two submarginal-celled forms are known from only the

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Hemihalictus series of *Lasioglossum*, specifically in the subgenera *Hemihalictus* and *Dialictus*.

Our objective here is to describe an aberrant specimen of *Lasioglossum s. str.* from British Columbia, Canada; it therefore represents the first documented case of a two-submarginal celled individual within the *Lasioglossum* series. As part of ongoing work on bee diversity and taxonomy in Canada, specimens were collected throughout the Western Interior Basin Ecozone (=Southern Interior Ecoprovince) of British Columbia. This area is considered the most bee species–rich in the country, with more than 50% of Canada's bee species known from this relatively small area (5.7 million ha), over 1/3 of which have not been recorded elsewhere in the country (Sheffield *et al*. 2014; Heron and Sheffield 2016). Among the specimens collected from this area between 2009 and 2016, one male specimen of *Lasioglossum* collected on Mt. Kobau, South Okanagan Grasslands Protected Area, near Osoyoos [49.106, –119.651, 08 Aug 2014, Col. C. Sheffield] was morphologically unique in being a non-metallic *Lasioglossum s. l.* with two submarginal cells (Figure 1), thus superficially resembling *L. lustrans* of eastern North America, although with antenna resembling *Lasioglossum s. str.* (McGinley 1986). Since the "two submarginal cell" condition of *L. lustrans* and *L. anomalum* is not always consistent (Gibbs 2010b) and because no Halictinae with two-submarginal cells in the forewing have been previously recorded from western North America (Stephen *et al.* 1969), including western Canada (Gibbs 2010b), DNA barcoding was used to compare sequences from the specimen (BOLD Sample ID CCDB-20945 F01) to other specimens from western Canada (following methods of Sheffield *et al*. 2009, 2017). Despite examining thousands of specimens from the Western Interior Basin, including from the Mt. Kobau area of British Columbia, no additional specimens of *Lasioglossum* with two submarginal cells could be found. The specimen in question (Figure 1) was identified as a member of the subgenus *Lasioglossum s. str*. due to the characteristic basal antennal structure (Figure 2; proportion of length of flagellomere 1 to 2), and tentatively as *L.* (*Lasioglossum*) *sisymbrii* (Cockerell) largely due to the characteristic pale, translucent tegulae (Figure 1) and by dissection and examination of the genitalia (Figure 3), including sternum 8 (Figure 4) (McGinley 1986); this identification was supported through comparison of COI sequences, matching identically with material in BOLD identified as this species (see Sheffield *et al.* 2017). Although both sexes of this species typically have a complete basal hair band on tergum 1 (McGinley 1986), this was probably worn on our specimen. Our specimen also differed in having rather pale tarsi (Figure 1)—not concolorous with the tibiae (McGinley 1986).

A puzzling feature of our male specimen is the 12-segmented antennae (i.e., 10 flagellomeres; Figure 2)—the normal condition for female bees. Males of most bees have 13-segmented antennae, although males of *Cherogas* (Halictidae: Augochlorini) and a few other genera are 12-segmented (Michener 2007; Engel 2010). One possibility is that the specimen is a gynandromorph, although this condition has not been reported previously for this species (see Wcislo *et al*. 2004; Michez *et al*. 2009; Hinojosa−Díaz *et al*. 2012). If the specimen is indeed a gynandromorph, this condition seems restricted only to the antennae, and the specimen otherwise resembles a male. Wcislo *et al*. (2004), Michez *et al*. (2009), and Hinojosa−Díaz *et al*. (2012) have listed bee species known as gynandromorhps, the most recent study indicating that it has only been observed in 21 species of Halictidae, eight of which are *Lasioglossum s. l.* The other possibility is that this condition represents a development anomaly with this specimen.

This specimen of *L. sisymbrii* becomes the first account of a member of the *Lasioglossum* series having two submarginal cells, and perhaps the first reported case of gynandromorphy in a North American *Lasioglossum*. As with the other published works cited above, we feel that documenting such anomalous specimens is important to account for the variation that exists within species and, as discussed above, variable wing venation has had an important impact on nomenclatural history for sweat bees in the past.

Figure 1. Lateral habitus of male *Lasioglossum sisymbrii* (Cockerell), with two submarginal cells in each forewing (numbered for the left forewing).

Figure 2. Face of male *Lasioglossum sisymbrii* (Cockerell) showing the 12-segmented antennae (i.e., 10 flagellomeres; the normal condition in males is 11 flagellomeres).

Figure 3. Genitalia *Lasioglossum sisymbrii* (Cockerell) – A) dorsal, B) ventral, and C) lateral views.

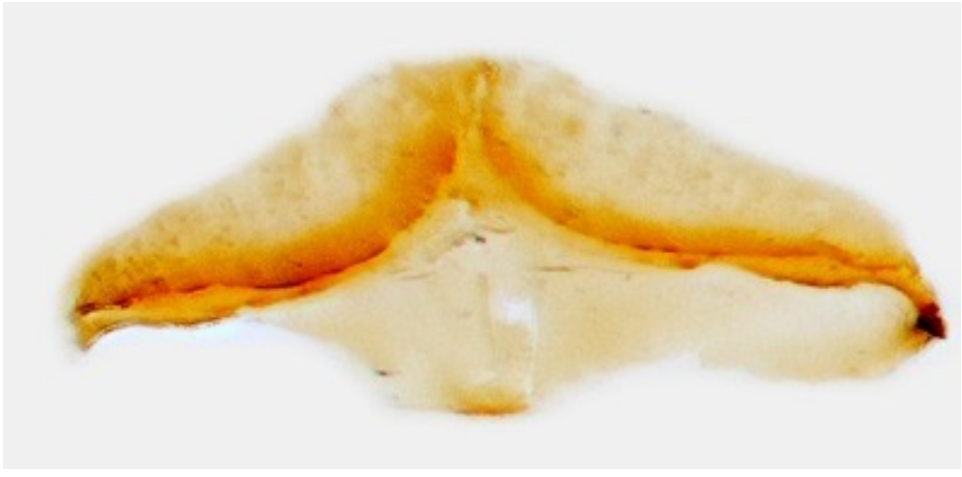

Figure 4. Sternum 8 of *Lasioglossum sisymbrii* (Cockerell).

ACKNOWLEDGEMENTS

Laurence Packer, York University, provided helpful comments on an early draft of the manuscript, and two anonymous reviewers for constructive suggestions. Dave Fraser and Orville Dyer provided local information. Orville Dyer, Dawn Marks, Cara Dawson, Sara Bunge, Mark Weston and Brenda Costanzo assisted with surveys. Funding for surveys provided by B.C. Ministry of Environment, B.C. Ministry of Forests, Lands and Natural Resource Operations and federal Habitat Stewardship Program – Prevention Stream. The specimen has been deposited in the Royal Saskatchewan Museum.

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