A journal of world insect systematics

INSECTA MUNDI

0958

Lasioglossum (*Dialictus*) *semicaeruleum* (Cockerell, 1895) (Hymenoptera: Halictidae) in Maryland: A disjunct population in eastern North America?

Eugene J. Scarpulla

14207 Lakerun Court
Bowie, Maryland 20720-4861

Date of issue: October 14, 2022

Center for Systematic Entomology, Inc., Gainesville, FL

Scarpulla EJ. 2022. *Lasioglossum* (*Dialictus*) *semicaeruleum* (Cockerell, 1895) (Hymenoptera: Halictidae) in Maryland: A disjunct population in eastern North America? Insecta Mundi 0958: 1–7.

Published on October 14, 2022 by
Center for Systematic Entomology, Inc.
P.O. Box 141874
Gainesville, FL 32614-1874 USA
http://centerforsystematicentomology.org/

Insecta Mundi is a journal primarily devoted to insect systematics, but articles can be published on any non-marine arthropod. Topics considered for publication include systematics, taxonomy, nomenclature, checklists, faunal works, and natural history. Insecta Mundi will not consider works in the applied sciences (i.e. medical entomology, pest control research, etc.), and no longer publishes book reviews or editorials. Insecta Mundi publishes original research or discoveries in an inexpensive and timely manner, distributing them free via open access on the internet on the date of publication.

Insecta Mundi is referenced or abstracted by several sources, including the Zoological Record and CAB Abstracts. Insecta Mundi is published irregularly throughout the year, with completed manuscripts assigned an individual number. Manuscripts must be peer reviewed prior to submission, after which they are reviewed by the editorial board to ensure quality. One author of each submitted manuscript must be a current member of the Center for Systematic Entomology.

Guidelines and requirements for the preparation of manuscripts are available on the Insecta Mundi website at http://centerforsystematicentomology.org/insectamundi/

Printed copies (ISSN 0749-6737) annually deposited in libraries

Florida Department of Agriculture and Consumer Services, Gainesville, FL, USA
The Natural History Museum, London, UK
National Museum of Natural History, Smithsonian Institution, Washington, DC, USA
Zoological Institute of Russian Academy of Sciences, Saint-Petersburg, Russia

Electronic copies (Online ISSN 1942-1354) in PDF format

Archived digitally by Portico
Florida Virtual Campus: http://purl.fcla.edu/fcla/insectamundi
University of Nebraska-Lincoln, Digital Commons: http://digitalcommons.unl.edu/insectamundi/
Goethe-Universität, Frankfurt am Main: http://nbn-resolving.de/urn/resolver.pl?urn:nbn:de:hebis:30:3-135240

Lasioglossum (*Dialictus*) *semicaeruleum* (Cockerell, 1895) (Hymenoptera: Halictidae) in Maryland: A disjunct population in eastern North America?

Eugene J. Scarpulla

14207 Lakerun Court
Bowie, Maryland 20720-4861
ejscarp@comcast.net

Abstract. Since 2004, three specimens of *Lasioglossum* (*Dialictus*) *semicaeruleum* (Cockerell, 1895) (Hymenoptera: Halictidae) have been collected in Maryland. Other than three specimens from Wisconsin, there are no additional records of this western United States species known east of the Mississippi River. I document the three Maryland records and offer possible scenarios of how the specimens could have arrived in Maryland.

Key words. human-mediated dispersal, long distance introductions, weather-transported dispersal.

ZooBank registration. urn:lsid:zoobank.org:pub:6E756528-4CFD-4DFD-B4D7-468C234B2683

Introduction

Lasioglossum (*Dialictus*) *semicaeruleum* (Cockerell, 1895) (Hymenoptera: Halictidae) is an abundant western North American species that ranges from the Canadian Prairie Provinces (Alberta, Manitoba, and Saskatchewan) through the United States west of the Mississippi River (Arizona, California, Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming) and into northern Mexico (Chihuahua, Coahuila, Durango, Nuevo León, and Sonora) (Gibbs 2010; Ascher and Pickering 2022; GBIF 2022; Fig. 1). Gibbs (2010) noted two enigmatic Maryland specimens: USGS_DRO029678, Bowie, Prince George's County, and USGS_DRO141684, Wittman, Talbot County (Fig. 2–3) and cautioned that these might be mislabeled. In 2015, a bee survey of the Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island (hereafter Poplar Island), Chesapeake Bay, Talbot County, yielded a third Maryland specimen: USGS_DRO556278 (Fig.2).

Lasioglossum semicaeruleum was initially described as *Halictus semicaeruleum* by Theodore D. A. Cockerell from a specimen (Ckll. 987) collected in Santa Fe, New Mexico on 20 June 1894. The species is a polylectic, non-parasitic, soil-nester, and is assumed, but not certain, to be primitively eusocial (Sheffield et al. 2014). Since bee nests are seldom found, the nesting biology of few species have been studied. Consequently, the sociality of many taxa is implied by the phylogenetic placement of the taxon (Sheffield et al. 2014).

Most halictids overwinter as mated adult females that emerge early in the spring. This allows the females to found their nest in early spring and the colony to utilize numerous floral resources (polylecty) throughout the entire flight period (Sheffield et al. 2014). Across its range, the *L. semicaeruleum* population as a whole has at least a seven-month flight period: 8 March (Fedor, TX) to 10–20 September (Writing-On-Stone Provincial Park, AB) (Gibbs 2010). Extreme outlier dates are 11 January (San Antonio, TX) (Ascher and Pickering 2022) and 11 November (Sevilleta National Wildlife Refuge, NM) (GBIF 2022).

Materials and Methods

In 2015, I coordinated a cooperative project with the United States Fish and Wildlife Service on Poplar Island (Scarpulla et al. 2022; Fig.2). We conducted a yearlong continuously-trapping propylene glycol cup survey of the bees based on the procedures in Droege (2011, 2015). The survey yielded a third Maryland *L. semicaeruleum* specimen, USGS_DRO556278.

I searched Discover Life (Ascher and Pickering 2022), GBIF (2022), and Google Scholar for eastern records of *L. semicaeruleum*. I also inquired on the "beemonitoring" Google group listserv (https://groups.google.com/g/beemonitoring) whether any researchers were aware of known eastern records.

To check for possible weather-transported dispersal of the *L. semicaeruleum* specimens, I checked historical maximum wind speed and direction records for strong, sustained westerly wind conditions (i.e., ≥40 km/h [25 mph] for ≥2 hr) at the Ronald Reagan Washington National Airport Station (Reagan), Arlington County, Virginia, for the five-week periods prior to the collection of each of specimens (The Weather Company 2022). Reagan was chosen for the historical weather data since it was centrally located west of the three specimen locations.

The codens used for the specimen repositories cited in the manuscript are based primarily on Evenhuis (2022):

BIML Native Bee Inventory and Monitoring Lab, Eastern Ecological Science Center at Patuxent Research Refuge, United States Geological Survey, Laurel, Maryland, USA.

CSUC C. P. Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins, Colorado, USA.

PCYU Packer Collection at York University, York University, Toronto, Ontario, Canada.

WIRC University of Wisconsin Insect Research Collection, University of Wisconsin-Madison, Madison, Wisconsin, USA.

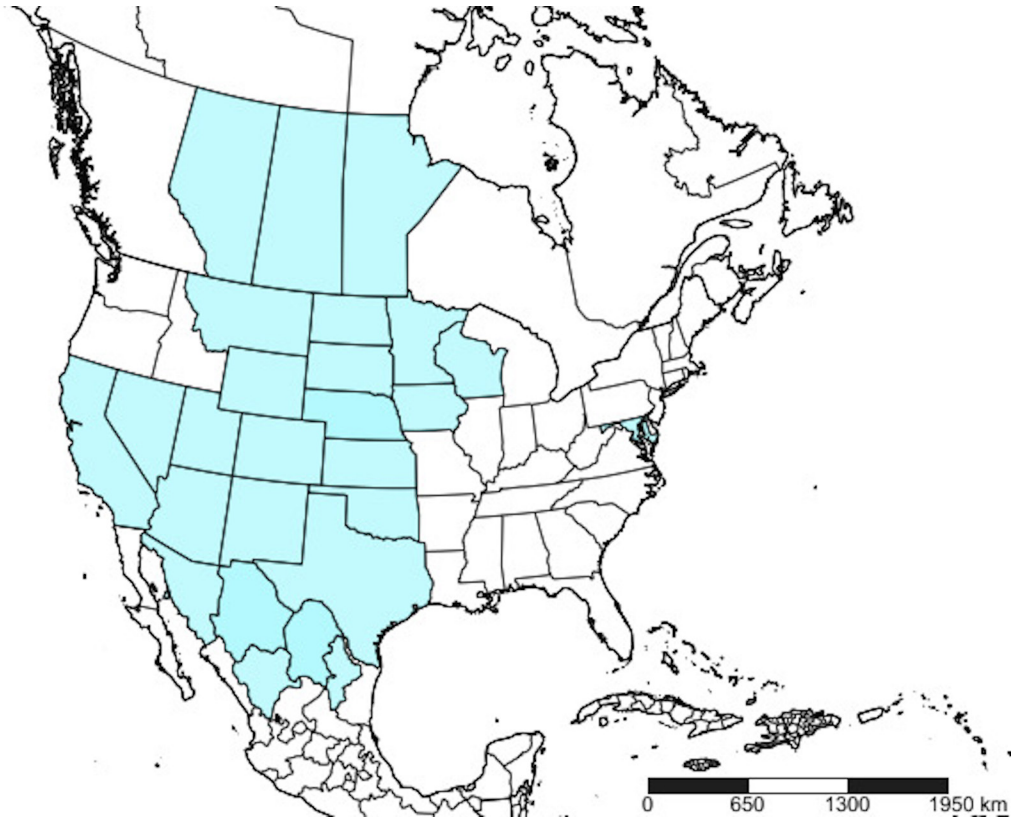

Figure 1. North American states (United States and Mexico) and provinces (Canada) with known specimen records of *Lasioglossum semicaeruleum* (Gibbs 2010; Ascher and Pickering 2022; GBIF 2022). Created with SimpleMappr (Shorthouse 2010).

Results

Except for the three Maryland *L. semicaeruleum* specimens, the only other records known east of the Mississippi River were three collected in Wisconsin. The six specimens are summarized below:

Maryland specimens. 1♀; 30 September–1 October 2004; USA, Maryland, Prince George's Co., Bowie; 38.9764°; −76.7491°; 96.1-ml (3.25-oz) bowl, soapy water; coll.: Stephanie Kolski; det.: Jason Gibbs; PCYU; USGS_DRO029678; (Ascher and Pickering 2022). 1♀; 1–4 September 2007; USA, Maryland, Talbot Co., Wittman; 38.8°; −76.2833333°; yellow pan trap; coll.: Warren E. Steiner, Jr. and Jil M. Swearingen; det.: Jason Gibbs; PCYU; USGS_DRO141684; (Ascher and Pickering 2022; Fig. 3). 1♀; 21 May–4 June 2015; USA, Maryland, Talbot Co., Poplar Island; 38.7442°; −76.3753°; 355-ml (12-oz) cup, propylene glycol; coll.: Eugene J. Scarpulla, Peter G. McGowan, Carl R. Callahan; det.: Samuel W. Droege; BIML; USGS_DRO556278; (Ascher and Pickering 2022; Scarpulla et al. 2022).

Wisconsin specimens. 1♀; 18 June 2013; USA, Wisconsin, La Crosse Co., Upper Mississippi River National Wildlife and Fish Refuge – La Crosse District; coll.: E. Kelly; det.: Michael S. Arduser; Arduser collection; (Arduser 2015a, 2015b). 1♀; 6 August 2015; USA, Wisconsin, Waushara Co., Flyte Farms, ~2.4 km (~1.5 mi) NW of Coloma; 44.064524°; −89.552646°; bowl trap in a strip of marginal land between an organic blueberry field and an organic sweet potato field (Central Sands vegetable growing region of central Wisconsin); coll.: Kathryn J. Prince; det.: Jason Gibbs; WIRC; (Prince 2016; pers. comm., 4 March 2021). 1♀; 5 June 2020; USA, Wisconsin, Monroe Co., ~6.5 km (~4 mi) SW of Millston; ~44.139981°; ~−90.693681°; pan trap within a cranberry bed (Central Sands vegetable growing region of central Wisconsin); coll.: Nolan D. Amon; det.: Samuel W. Droege; WIRC; (Amon, pers. comm., 7 February 2021 and 4 March 2021).

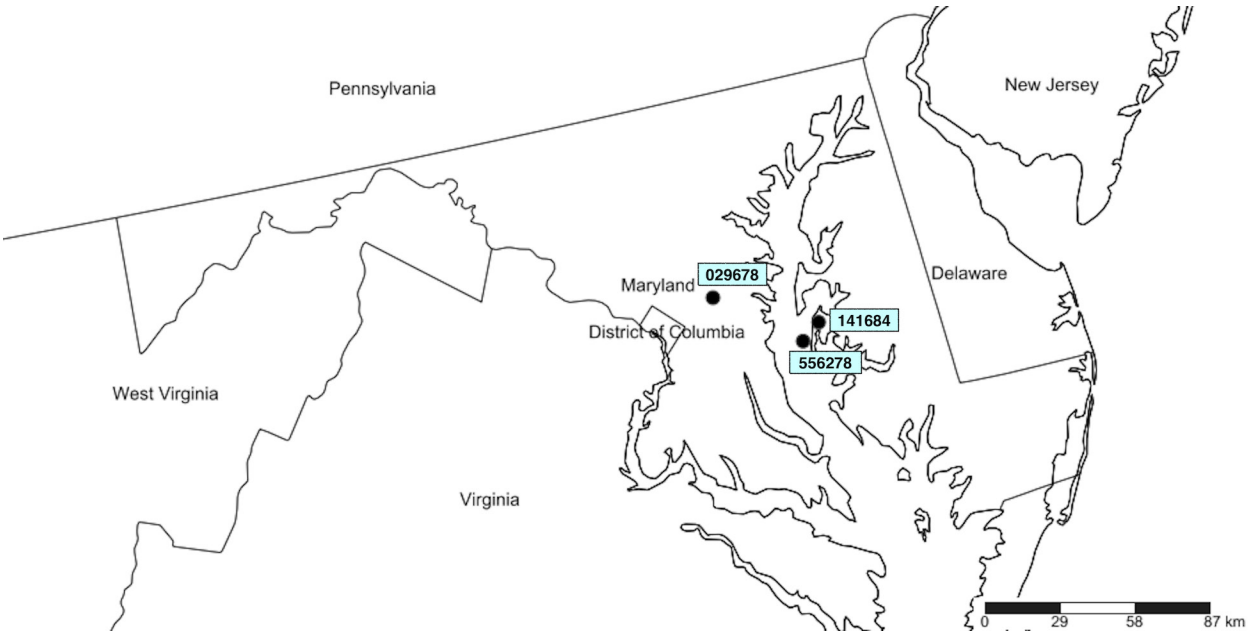

Figure 2. Maryland specimen records of *Lasioglossum semicaeruleum*. Left to right: USGS_DRO029678 (Bowie, Prince George's County), USGS_DRO556278 (Poplar Island, Talbot County), and USGS_DRO141684 (Wittman, Talbot County). Created with SimpleMappr (Shorthouse 2010).

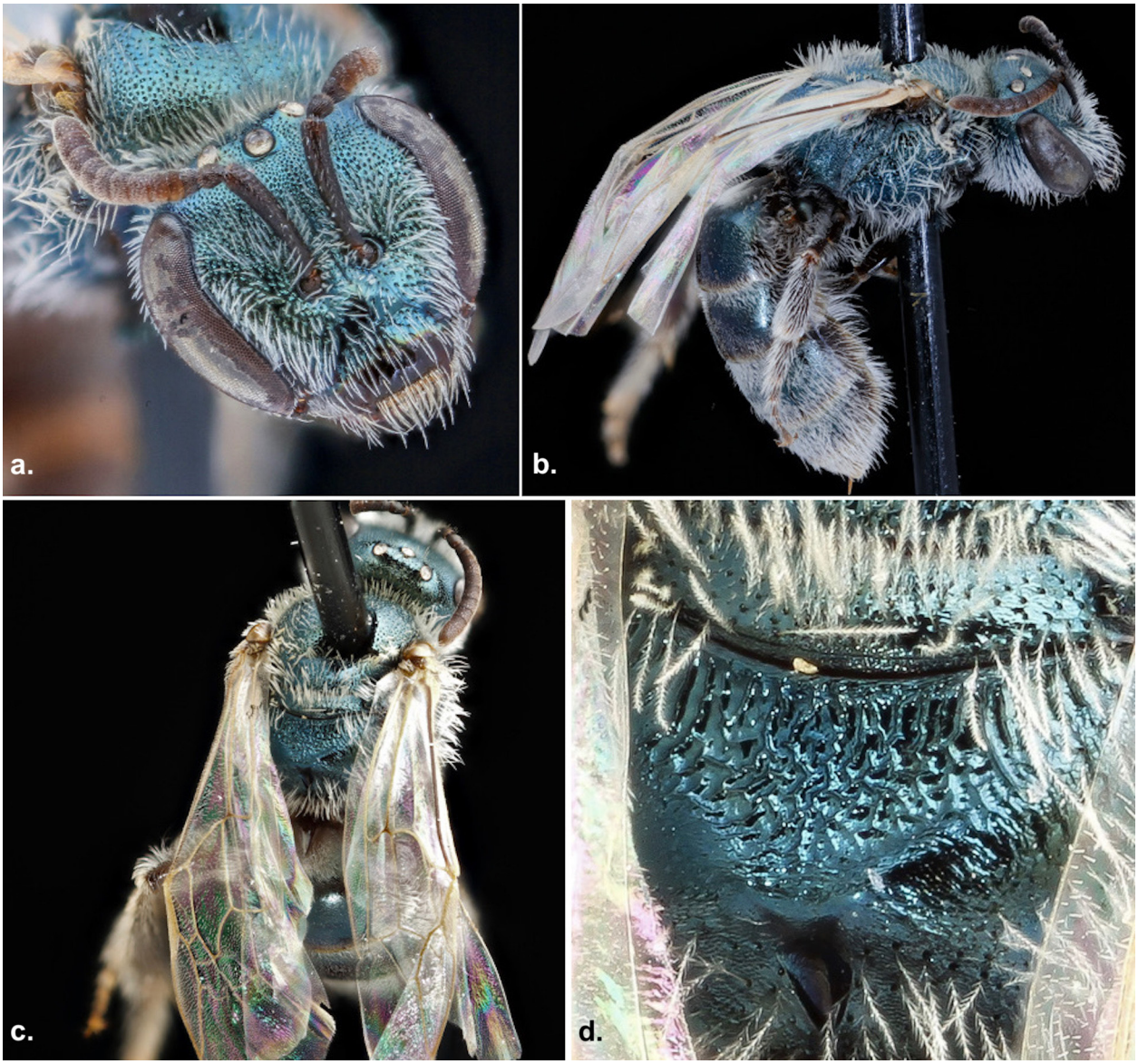

Figure 3. *Lasioglossum semicaeruleum*. **a)** Head, frontal view. **b)** Habitus, lateral view. **c)**. Habitus, dorsal view. **d)** Metapostnotum, showing distinctive strongly anastomosing rugae (Gibbs 2010). USGS_DRO141684, female, Wittman, Talbot County, Maryland, 1–4 September 2007, collected by Warren E. Steiner, Jr. and Jil M. Swearingen. Photographed by Samuel W. Droege.

Historical wind conditions. A check of historical maximum wind speed and direction records at Reagan for the five-week periods prior to the collection of each of the Maryland *L. semicaeruleum* specimens revealed no strong sustained westerly wind conditions (i.e., ≥40 km/h [25 mph] for ≥2 hr) that could account for the presence of any of the three specimens (The Weather Company 2022).

Discussion

Long-distance introductions of North American *Lasioglossum* (*Dialictus*) species. There have been multiple long-distance introductions of North American *Lasioglossum* (*Dialictus*) species to the state of Hawai'i. Snelling (2003) documented *L. impavidum* (Sandhouse), an adventive from western North America (Snelling 2003; Ascher and Pickering 2022), occurring on the islands of Hawai'i, Kaua'i, Lāna'i, Maui, and O'ahu. Ascher and Pickering (2022) also showed one highly disjunct *L. impavidum* record for Louisiana. Magnacca et al. (2013) reported *L. imbrex* Gibbs [now synonymized as *L. helianthi* (Cockerell) (Gardner and Gibbs 2021)] on O'ahu, Moloka'i, and Hawai'i, an adventive from the western United States and Canada (Gibbs 2010; Ascher and Pickering 2022); and *L. microlepoides* (Ellis) on O'ahu, an adventive from the western United States and northern Mexico (Magnacca et al. 2013; Ascher and Pickering 2022). Tabor and Koch (2021) recorded *L. puteulanum* (Gibbs) on O'ahu, an adventive from the eastern United States (Gibbs 2011, Ascher and Pickering 2022). The above populations have persisted in the state of Hawai'i. These long-distance introductions are most likely examples of human-mediated dispersal of *L.* (*Dialictus*) species from North America rather than ones of weather-transported dispersal.

Within North America, Gardner and Gibbs (2021) described *L. immigrans* having a range in the western United States and western Mexico, but with disjunct single specimens from Manitoba, Canada, and Acapulco, Mexico.

How did the specimens initially get to Maryland from west of the Mississippi River? The species could possibly have been introduced by accidental human-mediated dispersal of eggs, larvae, pupae, or adults (Gippet et al. 2019). Gippet et al. (2019) mention the three temporal phases of dispersal: departure, transport, and arrival. This can occur passively at any developmental stage by contamination such as in commercial bags of soil or in the soil of horticultural plants (Meurisse et al. 2019) or by hitchhiking within a plane, boat, or land vehicle (Gippet et al. 2019; Meurisse et al. 2019). The closest major port to the three specimen locations is the Port of Baltimore, located ~51 km (~32 mi) up the Chesapeake Bay from Poplar Island, ~48 km (~30 mi) up the Bay from Wittman, and ~34 km (~21 mi) northeast of Bowie. Any ships traveling up the Bay from the Atlantic Ocean to the Port of Baltimore would pass by Poplar Island and Wittman. The closest international airports in the region are Baltimore/Washington International Thurgood Marshall Airport, located ~23 km (~14 mi) northeast of Bowie, ~56 km (~35 mi) northwest of Poplar Island, and ~52 km (~32 mi) northwest of Wittman; and Ronald Reagan Washington National Airport, located ~28 km (~17 mi) southwest of Bowie, ~64 km (~40 mi) west of Poplar Island, and ~65 km (~40 mi) west of Wittman. There are also various military bases in the region.

Additionally, adult insects could possibly be weather-transported by winds, fronts, or storms. The C. P. Gillette Museum of Arthropod Diversity (CSUC) at Colorado State University, Fort Collins, Colorado, houses 16 specimens of *L. semicaeruleum* (determined by Joel Gardner) that were collected in June and July 1992, on snowbanks and snowdrifts at elevations of 3,587–4,350 m (11,768–14,272 ft) on Mount Evans, Mount Warren, Goliath Peak, and Roger's Peak in Clear Creek County, Colorado (Gardner, pers. comm., 30 September 2020). Although the Colorado specimens were found within their normal geographical range, they were found at extremely high elevations where there is permanent ice and snow. Gardner speculated that strong winds probably blew the specimens from their normal lower elevation habitats up the mountain to this much more inhospitable environment. Similarly, strong westerly winds might be able to transport bees eastward out of their normal range.

Does Maryland have a small localized viable population? Members of the subgenus *Dialictus* are the most commonly collected bees in North America (Gibbs 2010). In the western Great Plains, *L. semicaeruleum* is the most abundant *Dialictus*, possibly even the most abundant bee (Gardner, pers. comm., 20 March 2022). Since *L. semicaeruleum* is so abundant in western North America (Gibbs 2010; Gardner, pers. comm., 20 March 2022), it is not surprising that disjunct specimens or a population could be moved by random chance (whether by human-mediated or weather-transported dispersal) and accidently introduced into eastern North America. The westernmost Maryland specimen (Bowie) is approximately 1,205 km (749 mi) from the easternmost Wisconsin specimen (Colima). It is interesting to note that the three Maryland specimens were all collected in different years over a 12-year period, which indicates that there is either an established population or there is some unknown recurring event that is regularly transporting them to Maryland.

A small localized viable Maryland population is conceivable but could be difficult to substantiate given that only one *L. semicaeruleum* specimen was collected out of 18,703 bee specimens amassed during the yearlong continuously-trapping propylene glycol cup survey on Poplar Island (Scarpulla et al. 2022). In that survey, singleton species comprised 36% (n = 34) of the total taxa (N = 94), and singleton, doubleton, and tripleton species combined comprised 51% (n = 48). Therefore, 51% of the total taxa were represented by three or less specimens. Additional, intensive surveying is needed in the Wittman/Poplar Island area since this appears to be the most likely location if there is a small extant population. On Poplar Island, the habitat is very sandy, being human-created from dredged material from the Chesapeake Bay shipping channels. This sandy habitat is favorable for bee ground-nesting as exhibited here on Poplar Island as well as was seen in the 2009 yearlong bee survey on Hart-Miller Island (N = 86), another island in the Chesapeake Bay created from dredged material (Scarpulla 2013).

Summary

The three Maryland *L. semicaeruleum* specimens are somewhat perplexing—how did they get to Maryland and is there a small population still present in the state? It seems that adult dispersal by natural flight or by wind dispersal was unlikely and that human-mediated transport of overwintering adult females or entire nests might have facilitated establishment in Maryland. Whether a small breeding population is extant in Maryland could potentially be answered by additional surveying, particularly in the Wittman/Poplar Island area since the two Talbot County specimens were collected approximately 8 km (5 mi) from each other. For now, the three Maryland specimens remain a geographical enigma.

Acknowledgments

I thank Jason Gibbs (Department of Entomology, University of Manitoba, Winnipeg, Canada) and Laurence Packer (Department of Biology, York University, Toronto, Ontario, Canada) for locating the two original Maryland specimens; Laurence Packer for loaning the two original Maryland specimens for photography; Michael S. Arduser (Midwestern Pollinator Specialists, Missouri), Kathryn J. Prince (former Master of Science student, Agroecology and Entomology, University of Wisconsin-Madison), and Nolan D. Amon (Department of Entomology, University of Wisconsin-Madison) for providing the Wisconsin specimen data; Joel Gardner (Department of Entomology, University of Manitoba) for supplying the *L. semicaeruleum* data from the C. P. Gillette Museum of Arthropod Diversity at Colorado State University; Samuel W. Droege (Native Bee Inventory and Monitoring Lab, Eastern Ecological Science Center at the Patuxent Research Refuge, United States Geological Survey, Laurel, Maryland) for allowing use of laboratory space and for photographing the specimens; and especially Jason Gibbs and Joel Gardner for thoroughly reviewing a draft of this manuscript and providing insightful comments that greatly improved its quality.

Literature Cited

Arduser M. 2015a. Report on bees collected at selected midwestern US Fish and Wildlife refuges 2012 to 2013. Unpublished report to the United States Fish and Wildlife Service. 13 p.

Arduser M. 2015b. 2013 USFWS Big Rivers Network native bee survey project (FWS No. F11AC00869). Unpublished Excel spreadsheet to the United States Fish and Wildlife Service. 1 p.

Ascher JS, Pickering J. 2022. Discover Life bee species guide and world checklist (Hymenoptera: Apoidea: Anthophila). Available at: https://www.discoverlife.org/mp/20q?search=Apoidea. (Last accessed 21 March 2022.)

Cockerell TDA. 1895. New bees of the genus *Halictus* from New Mexico, U.S.A. The Annals and Magazine of Natural History 16(6): 63–69.

Droege S. 2011. Glycol cup traps for monitoring native bees. YouTube. Available at: https://www.youtube.com/watch?v=z0DAY7bNOR4. (Last accessed 17 February 2022.)

Droege S. 2015. The very handy manual: How to catch and identify bees and manage a collection. Bee Inventory and Monitoring Lab, Patuxent Wildlife Research Center, United States Geological Survey; Laurel, MD. 65 p.

Evenhuis NL. 2022. The Insect and Spider Collections of the World Website. Available at: http://hbs.bishopmuseum.org/codens/. (Last accessed 31 January 2022.)

Gardner J, Gibbs J. 2021. New and little-known Canadian *Lasioglossum* (*Dialictus*) (Hymenoptera: Halictidae) and an emended key to species. The Canadian Entomologist 154: e3. doi:10.4039/tce.2021.47.

GBIF (Global Biodiversity Information Facility). 2022. *Lasioglossum semicaeruleum* (Cockerell, 1895) in GBIF Secretariat (2021). GBIF Backbone Taxonomy. Checklist Dataset. https://doi.org/10.15468/39omei. Available at: https://www.gbif.org/species/1355178. (Last accessed 21 March 2022.)

Gibbs J. 2010. Revision of the metallic species of *Lasioglossum* (*Dialictus*) in Canada (Hymenoptera, Halictidae, Halictini). Zootaxa 2591: 1–382.

Gibbs J. 2011. Revision of the metallic *Lasioglossum* (*Dialictus*) of eastern North America (Hymenoptera: Halictidae: Halictini). Zootaxa 3073: 1–216.

Gippet JMW, Liebhold AM, Fenn-Moltu G, Bertelsmeier C. 2019. Human-mediated dispersal in insects. Current Opinion in Insect Science 35: 96–102.

Magnacca KN, Gibbs J, Droege S. 2013. Notes on alien and native bees (Hymenoptera: Apoidea) from the Hawaiian Islands. Records of the Hawaii Biological Survey for 2012. Edited by Evenhuis NL and Eldredge LG. Bishop Museum Occasional Papers 114: 61–65.

Meurisse N, Rassati D, Hurley BP, Brockerhoff EG, Haack RA. 2019. Common pathways by which non-native forest insects move internationally and domestically. Journal of Pest Science 92: 13–27.

Prince KJ. 2016. Wild bee communities in central Wisconsin vegetable crops. Master of Science thesis, Agroecology and Entomology, University of Wisconsin-Madison, Madison, WI. 97 p.

Scarpulla EJ. 2013. A yearlong survey of the bees (Hymenoptera: Apoidea) of a human-made habitat created from dredged material: Hart-Miller Island, Chesapeake Bay, Baltimore County, Maryland. The Maryland Entomologist 6(1): 56–84.

Scarpulla EJ, McGowan PC, Callahan CR. 2022. A yearlong survey of the bees (Hymenoptera: Apoidea) at a large-scale island restoration project created from dredged material: Poplar Island, Chesapeake Bay, Maryland, USA. The Maryland Entomologist 8(2): 28–57.

Sheffield CS, Frier SD, Dumesh, S. 2014. The bees (Hymenoptera: Apoidea, Apiformes) of the Prairies Ecozone, with comparisons to other grasslands of Canada. p. 427–467. In: Giberson DJ, Cárcamo HA (eds.). Arthropods of Canadian grasslands, vol. 4: Biodiversity and systematics, Pt. 2. Biological Survey of Canada; Ottawa. 479 p.

Shorthouse DP. 2010. SimpleMappr, an online tool to produce publication-quality point maps. Available at http://www.simplemappr.net. (Last accessed 16 April 2022.)

Snelling RR. 2003. Bees of the Hawaiian Islands, exclusive of *Hylaeus* (*Nesoprosopis*) (Hymenoptera: Apoidea). Journal of the Kansas Entomological Society 76(3): 342–356.

Tabor JA, Koch JB. 2021. Ensemble models predict invasive bee habitat suitability will expand under future climate scenarios in Hawai'i. Insects 12(443): 1–18.

The Weather Company. 2022. Weather Underground: Arlington County, VA weather conditions, Ronald Reagan Washington National Airport station. Available at: https://www.wunderground.com/weather/KDCA. (Last accessed 16 April 2022.)

Received July 31, 2022; accepted September 23, 2022.
Review editor Kevin Williams.