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Review of the bee subgenus *Lasioglossum* (*Hemihalictus*) in western North America (Hymenoptera: Halictidae)

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Abstract. Sweat bees in the cosmopolitan genus *Lasioglossum* are some of the most diverse and commonly collected bees in terrestrial ecosystems. The bee subgenus *Lasioglossum* (*Hemihalictus*) has never been reviewed in western North America. A taxonomic study was conducted to assess the status and validity of species in this region. Twenty-two species of *L.* (*Hemihalictus*) are treated, five of which are described as new: *L. angusticulum* sp. nov., *L. engleri* sp. nov., *L. opata* sp. nov., *L. pathiranae* sp. nov., and *L. tomentosum* sp. nov. Linear discriminant analysis and partitioning around medioids were used to test species limits in the *L. arizonense* species complex. *Lasioglossum vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev. is resurrected from synonymy with *L. arizonense* (Crawford, 1907). Two Palaearctic species are documented in North America: *L. villosulum* (Kirby, 1802) and *L. buccale* (Pérez, 1903). The male of *L. subobscurum* (Cockerell, 1895) is described for the first time. Additionally, several taxonomic synonymies are proposed: *L. aspilurus* (Cockerell, 1925) is recognized as a senior subjective synonym of *L. humboldtense* (Michener, 1936); within the *L. nitidiusculum* species group, *L. diatretum* (Vachal, 1904) is recognized as a senior subjective synonym of *L. supranitens* (Cockerell, 1919); *L. ruficorne* (Crawford, 1907) is considered a senior subjective synonym of *L. vaporellum* (Cockerell, 1910) and *L. pulveris* (Cockerell, 1930); and *L. synthyridis* (Cockerell, 1906) is considered a senior subjective synonym of *L. inconditum* (Cockerell, 1916). Updated keys to species are provided for the *L.* (*Hemihalictus*) bees of North America north of Mexico.

Keywords. Apoidea, Halictini, new species, revision, taxonomy.

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Introduction

Sweat bees in the cosmopolitan genus *Lasioglossum* Curtis, 1833 are some of the most diverse and commonly collected bees in terrestrial ecosystems (Rader *et al.* 2009; Landaverde-González *et al.* 2017; Venn *et al.* 2023). *Lasioglossum* is made up of several difficult to define subgenera including

L. (*Hemihalictus*) Cockerell, 1897. *Lasioglossum* (*Hemihalictus*) are primarily small (4–8 mm), dark bees occurring in North America, Eurasia, and Africa.

There is limited knowledge of their biology (Daly 1961; Plateaux-Quénu *et al.* 1989), but they are expected to be solitary based on available data and phylogenetic constraints (Danforth *et al.* 2003; Gibbs *et al.* 2012). Many species visit a broad range of flowers, but some species are host plant specialists (Moure & Hurd 1987). For example, the eastern North American species *L.* (*Hemihalictus*) *pectinatum* (Robertson, 1890) specializes on *Physalis* L. (Solanaceae Juss.) (Gibbs *et al.* 2013) and *L.* (*Hemihalictus*) *lustrans* (Cockerell, 1897) is an oligolectic species often associated with *Pyrrhopappus carolinianus* (Walter) DC., but more generally specialized on the tribe Cichorieae Lam. & DC. (Asteraceae Bercht. & J.Presl) (Michener 1947; Daly 1961; Gibbs *et al.* 2013). Males occasionally show signs of macrocephaly (Timberlake 1960; Gibbs *et al.* 2013), suggesting intrasexual conflict for females (Danforth *et al*. 2019). Similar modifications have been seen in communal species, where males defend nests (Kukuk & Schwarz 1988; Richards & Packer 2021). Knowledge of nesting biology is strongly biased toward Palaearctic species, highlighting a major gap in the taxonomic and biological understanding of Nearctic taxa.

Classification of *Hemihalictus*

For over a century, *L.* (*Hemihalictus*) was monotypic, including only the species *L. lustrans*. The extent of *L.* (*Hemihalictus*) was expanded to include >200 species based on molecular phylogenetic studies (Gibbs *et al.* 2012, 2013). This change was made to avoid paraphyly present in earlier classifications (Gibbs *et al.* 2013). All species of *L.* (*Hemihalictus*) in North America were originally described in the genus *Halictus* Latreille, 1804 (Table 1), except *L. lustrans*. These were later transferred to the genus *Lasioglossum* (Michener 1944). They were often treated as *Evylaeus* Robertson, 1902 at either the subgeneric (Michener 1951) or generic level (Mitchell 1960; Timberlake 1960; Hurd 1979; Moure & Hurd 1987). In the Nearctic, they were increasingly recognized as part of a broader *Dialictus* Robertson, 1902 (Michener 1990, 2000, 2007). In the Palaearctic, they were commonly treated as the 'carinaless' *Evylaeus* (Ebmer 1969, 1976, 1997, 2002; Pesenko *et al.* 2000; Murao & Tadauchi 2007; Pesenko 2007a; Murao *et al.* 2010). Distinct lineages were treated separately (e.g., *Sudila* Cameron, 1898; *Sellalictus* Pauly, 1980). Preliminary and unpublished phylogenetic studies suggest the subgenus *L.* (*Habralictellus*) Moure & Hurd, 1982 is nested within *Hemihalictus* s. lat. (Gibbs 2018; Gardner 2023; J. Gibbs unpubl. data).

Historical account of *Lasioglossum* (*Hemihalictus*) in western North America

Eleven species of *L.* (*Hemihalictus*) occurring in eastern North America were recently revised (Gibbs *et al.* 2013). The focus of that study was species occurring east of the Mississippi River, but several 'eastern' species extend into parts of western Canada and the USA. The greatest diversity of *L.* (*Hemihalictus*) is in western North America. Theodore D.A. Cockerell (1866–1948) was the most prolific bee taxonomist in terms of species descriptions, spending most of his career at the University of Colorado from 1904 to 1947. Cockerell described 11 species of *L.* (*Hemihalictus*) (mostly as *Halictus*) in the western Nearctic (Table 1). One of these names, *Halictus grindeliae* Cockerell, 1934 was later synonymized with *L. pectoraloides* (Cockerell, 1895) by Timberlake (Michener 1951). Grace Adelbert Sandhouse (1896–1940) and T.D.A. Cockerell jointly described two species, *Halictus vanduzeei* Sandhouse & Cockerell, 1924 and *H. chionocephalus* Sandhouse & Cockerell, 1924, using specimens from a 1921 expedition to the Baja California. Both names were later synonymized with *L.* (*Hemihalictus*) *arizonense* (Crawford, 1907) (Moure & Hurd 1987). Joseph Vachal (1838–1911), a French entomologist and politician, described a single species, *Halictus diatretus* Vachal, 1904, from this region. J.C. Crawford (1880–1950), an American entomologist, contributed to the taxonomy of North American bees and described five western species of *L*. (*Hemihalictus*) (Table 1). *Halictus cockerelli* Crawford, 1902 was later synonymized with *L.* (*Hemihalictus*) *subobscurum* (Cockerell, 1895) by Crawford (1907b). Crawford also replaced his own name, *H. vachali*, which was preoccupied, with *Halictus glabriventris* Crawford, 1907. Charles Duncan

Table 1 (continued on next page). List of available names of western North American *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 treated in this study.

Original name	Author and described year	Described location	Species	Notes
Halictus pectoraloides	Cockerell, 1895	La Cruces and Mesilla Valley, New Mexico	*L.* (*H.*) *pectoraloides*	*Halictus pectoraloides* var. *beatulus* by Cockerell 1918 as a variety
Halictus subobscurus	Cockerell, 1895	Mesilla Valley, New Mexico	*L.* (*H.*) *subobscurum*	
Halictus angustior	Cockerell, 1897c	La Cruces, New Mexico and Mesilla, New Mexico	*L. angustius*	
Halictus kincaidii	Cockerell, 1898	Olympia, Washington	*L.* (*H.*) *kincaidii*	
Halictus ovaliceps	Cockerell, 1898	Santa Fe, New Mexico	*L.* (*H.*) *ovaliceps*	
Halictus Cockerelli	Crawford, 1902	Santa Fe and Mesilla, New Mexico		Synonym of *L. subobscurum* (by Crawford 1907a)
Halictus diatretus	Vachal, 1904	Morrison, Colorado; Vancouver; Morrison, Nevada	*L.* (*H.*) *diatretum*	
Halictus Robertsoni	Crawford, 1906a	Victoria, Texas	*L.* (*H.*) *robertsoni*	
Halictus (*Evylaeus*) *synthyridis*	Cockerell, 1906	Tapaz Butte, Florissant, Colorado	*L.* (*H.*) *synthyridis*	
Halictus arizonensis	Crawford, 1907a	Arizona	*L.* (*H.*) *arizonense*	
Halictus glabriventris	Crawford, 1907b	Corvallis, Oregon	*L.* (*H.*) *glabriventre*	Replacement name proposed by Crawford for *H. Vachali* Crawford, 1906c.
Halictus ruficornis	Crawford, 1907c	Ormsby Co., Nevada (Carson City currently)	*L.* (*H.*) *ruficorne*	
Halictus vaporellus	Cockerell, 1910	Steamboat Spring, Colorado	*L.* (*H.*) *vaporellum*	Synonym of *L. ruficorne* (herewith)
Halictus supranitens	Cockerell, 1919	Longs Peak trail, Colorado, above timber line	*L.* (*H.*) *supranitens*	Synonym of *L. diatretum* (herewith)
Halictus chionocephalus	Sandhouse & Cockerell, 1924	Loreto, Lower California	*L.* (*H.*) *chionocephalus*	Synonym of *L. arizonense* (by G.C. Eickwort in Moure & Hurd 1987)
Halictus vanduzeei	Sandhouse & Cockerell, 1924	Las Animas Bay, Lower California	*L.* (*H.*) *vanduzeei*	Synonym of *L. arizonense* (by G.C. Eickwort in Moure & Hurd 1987)
Halictus aspilurus	Cockerell, 1925	Pleyto, Monterey Co., California	*L.* (*H.*) *aspilurus*	

Table 1 (continued). List of available names of western North American *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 treated in this study.

Original name	Author and described year	Described location	Species	Notes
Halictus pulveris	Cockerell, 1930	Mesa Verde, Colorado	*L.* (*H.*) *pulveris*	Synonym of *L. ruficorne* (herewith)
Halictus (*Evylaeus*) *grindeliae*	Cockerell, 1934	Hudson, Colorado		Synonym of *L. pectoraloides* (by Timberlake in Michener 1951)
Halictus (*Evylaeus*) *humboldtensis*	Michener, 1936	Garberville, Humboldtensis Co., California	*L* (*H.*) *humboldtense*	Synonym of *L. aspilurus* (herewith)
Halictus (*Evylaeus*) *sequoiae*	Michener, 1936	Ross, Marin Co., California	*L.* (*H.*) *sequoiae*	
Halictus (*Evylaeus*) *absurdiceps*	Timberlake, 1960	Merced, Merced Co., California	*L.* (*H.*) *absurdiceps*	

Michener (1918–2015), who devoted his life to the systematics and natural history of bees, described two species of *L.* (*Hemihalictus*) from western North America, *Halictus humboldtensis* Michener, 1936 and *H. sequoiae* Michener, 1936. Another prolific American entomologist of the 20th century, Philip Hunter Timberlake (1883–1981) added one more species, *Halictus absurdiceps* (Timberlake, 1960), to the fauna. The western species of *L.* (*Hemihalictus*) in America north of Mexico are reviewed herein, with a focus on species not previously treated in taxonomic revisions. The complete nomenclatural history of western North American species of *Lasioglossum* (*Hemihalictus*), including all available names and their taxonomic status, is presented in Table 1.

Material and methods

Study materials and area

This study focuses on *Lasioglossum* (*Hemihalictus*) restricted to western North America, i.e., west of the Mississippi River, that were not previously treated in a study focused on eastern North America (Gibbs *et al.* 2013). Some Mesoamerican specimens were examined for the purpose of determining distribution limits. Some species occurring in the geographical range of this study were treated in a revision of the eastern North American fauna (Gibbs *et al.* 2013).

Specimens were examined from various institutions. The following abbreviations will be used for subsequent references to these collections.

AMNH = American Museum of Natural History, New York, USA
ASUHIC = Arizona State University, Hasbrouck Insect Collection, Tempe, USA
BIML = Native Bee Lab, Patuxent Wildlife Research Center, Maryland, USA
CAS = California Academy of Sciences, San Francisco, USA
CBG = Centre for Biodiversity Genomics, University of Guelph, Guelph, Ontario, Canada
CUIC = Cornell University Insect Collection, Ithaca, USA
CMNH = Carnegie Museum of Natural History, Pittsburgh, USA
CNC = Canadian National Collection of Insects, Arachnids, and Nematodes, Ottawa, Canada
CSCA = California State Collection of Arthropods, Sacramento, USA
EMEC = University of California-Berkeley, Essig Museum of Entomology, Berkeley, USA
LACM = Natural History Museum of Los Angeles County, Los Angeles, USA

MCZ = Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA
NHMW = Naturhistorisches Museum Wien, Vienna, Austria
OSAC = Oregon State Arthropod Collection, Corvallis, USA
PCYU = Packer collection at York University, Toronto, Canada
PMAE = Royal Alberta Museum, Edmonton, Canada
RBCM = Royal BC Museum, Victoria, British Colombia, Canada
RSKM = Royal Saskatchewan Museum, Regina, Saskatchewan, Canada
SDMC = San Diego Natural History Museum, California, USA
SEMC = University of Kansas Biodiversity Institute and Natural History Museum, Lawrence, USA
SFU = Simon Fraser University, British Colombia, Canada
UBCZ = Spencer Entomological Collection, Beaty Biodiversity Museum, University of British Colombia, Vancouver, Canada
UCDC = University of California-Davis, R.M. Bohart Museum of Entomology, Davis, USA
UCMC = University of Colorado Museum of Natural History, Boulder, USA
UCRC = University of California-Riverside Entomology Research Museum, Riverside, USA
USNM = Smithsonian Institution National Museum of Natural History, Washington DC, USA
WRME = J.B. Wallis/R.E. Roughley Museum of Entomology, Winnipeg, Canada
WSU = M.T. James Entomological Collection, Washington State University, Washington, USA

Species delimitation

Morphological and geographical data were primarily used to delimit species boundaries. DNA barcodes were available for a subset of species. These data were used in an integrative approach (DeSalle *et al.* 2005; Padial *et al.* 2010). Multiple congruent differences between populations were required to recognize species. Emphasis was placed on structural characters rather than colour or size. Sex associations were made based on shared characteristics and overlapping location data.

Specimen examination and description

Specimens were examined under a dissecting microscope at magnifications ranging from 7× to 115× depending on the size of the specimen or structure. Illumination was provided by a desk lamp with a 13W fluorescent bulb, covered with diffusion paper to ensure diffuse and uniform lighting. Diffuse light is important for removing reflections and glare on the integument. Traits examined included the body structure, surface sculpturing, puncture density, pubescence, and colour. Engel (2001a) and Michener (2007) were used as references for the standard usage of the terminology of morphological characteristics and measurements of specimens (Figs 1–3). The terminology for surface sculpture adhered to Harris (1979). The general flow of the descriptions followed Gibbs (2010, 2011) and Gibbs *et al.* (2013). Hair length is stated in units of median ocellus diameters (OD). The anterior face of the first metasomal tergum (T1) often has overlapping, appressed setae oriented roughly in a fan-shape, which is referred to as a ‘fan’ in the descriptions below.

The overall frontal appearance of the head is characterized as wide, round, or long. This classification is determined by assessing the ratio of head length to width (head length/width). A head is considered wide when the ratio is equal to or less than 0.9, round within the range of 0.9 to 1.0, and long if the ratio exceeds 1.0. Eye convergence is determined by the ratio of upper ocular distance (UOD) to lower ocular distance (LOD). Typically, when this ratio falls within the range of 1.10–1.20, we considered that the eyes are convergent below.

Puncture density of the different locations on the integument were given in terms of the range of interspaces between punctures, in units of puncture diameters (PD) following Gardner & Gibbs (2020). Terms like ‘diversopunctate’ and ‘doubly punctate’ were employed to provide a more descriptive meaning of the nature of the punctures in the places where it is conspicuous. The use of diversopunctate

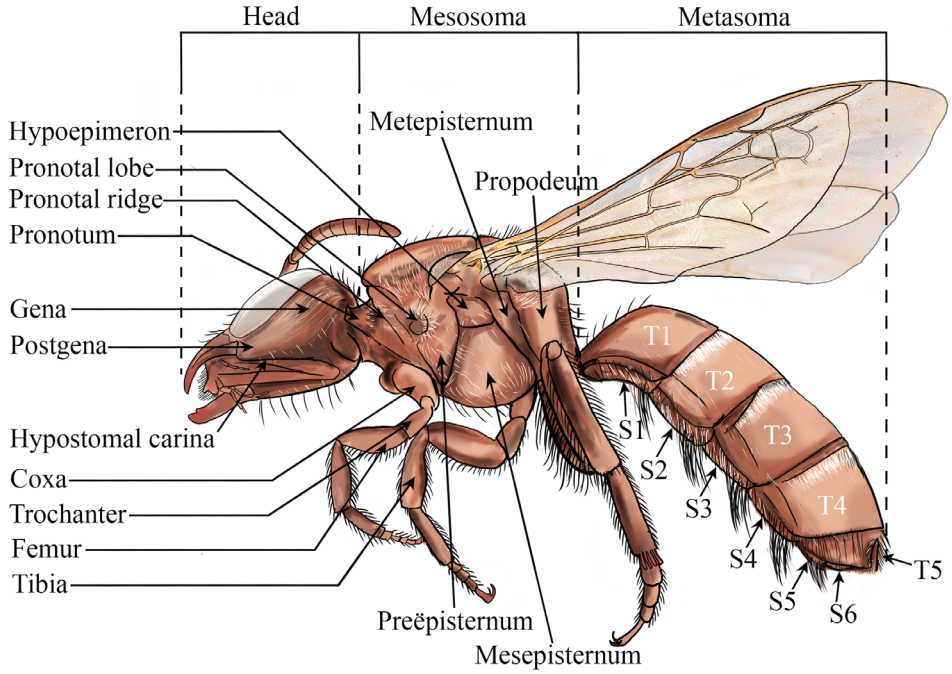


Fig. 1. Lateral view of a generalized female *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 bee with important morphological characters used in descriptions and diagnoses labeled. Tergum and sternum are abbreviated with 'T' and 'S', respectively, followed by the appropriate number. Males have an additional metasomal tergum, T7.

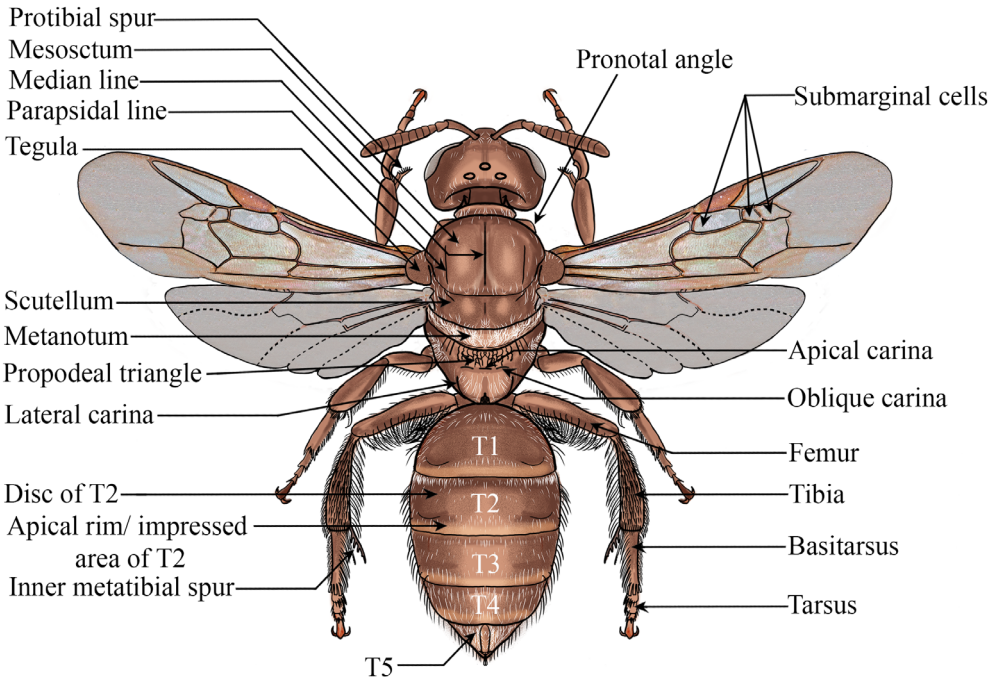


Fig. 2. Dorsal view of a generalized female *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 bee with important morphological characters used in descriptions and diagnoses labeled. Tergum and sternum are abbreviated with 'T' and 'S', respectively, followed by the appropriate number. T6 of females is often obscured by T5.

is to describe punctation featuring substantial variation in size across a spectrum (Gardner & Gibbs 2020). Doubly punctate is used when one clearly observes only two discrete types of punctures, i.e., the coexistence of large punctures intermixed with minute punctures. The term 'apical carina' is introduced here to describe a raised ridge or keel-like structure that is visible along the apical margin of the propodeal triangle.

Species descriptions follow a format used for other halictid bees, especially North American *Lasioglossum* (Gibbs 2010, 2011; Gibbs *et al*. 2013; Gardner & Gibbs 2020, 2021, 2023). Descriptions include the following sections: (1) a nomenclatural summary, including synonymy; (2) the etymology of the specific epithet, including for previously described species when informative; (3) diagnosis; (4) type material for previously described species; (5) material examined; (6) description; (7) geographic range; (8) floral host records; and (9) supplementary remarks (when additional information is present, sections may include topics such as biological and systematic remarks). In the diagnosis section, characters used for easy identification of the species are described, and any comparative species with differing characters are provided in brackets. These comparative species are included only if they occur in the same or nearby distribution regions and are either closely related or potentially confusable with the species being diagnosed. In the description section of the species, there are subsections available; a) body measurements, b) colouration, c) pubescence, d) surface sculpturing, f) structure, g) male genitalia, and variation (if applicable). Full descriptions are provided for new species. Redescriptions for existing species are provided only for *L. angustius* (Cockerell, 1897), *L. diatretum* (Vachal, 1904), *L. robertsoni* (Crawford, 1906), *L. ruficorne* (Crawford, 1907), *L. subobscurum* (Cockerell, 1895) and the species that

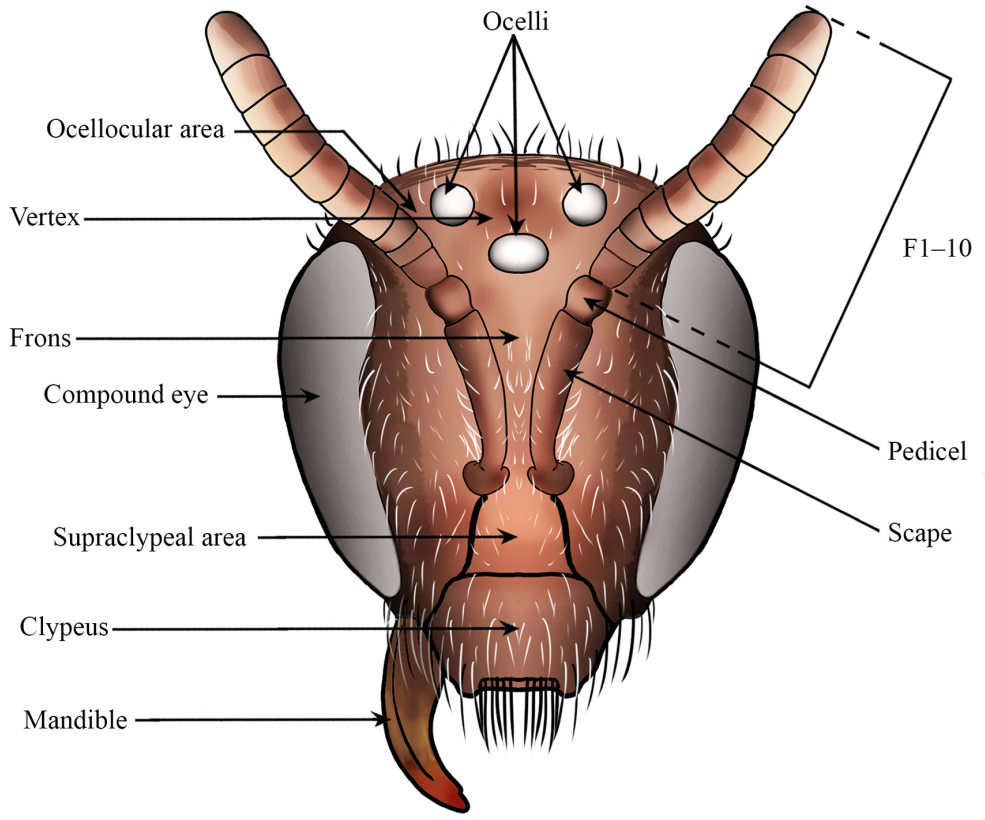


Fig. 3. Head of a generalised female *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 specimen with important morphological characters used in descriptions and diagnoses labeled. Flagellomeres are abbreviated with 'F' followed by the appropriate number. Males have an additional flagellomere, F11.

belong to the *arizonense* species groups. In specimen label and type material data, the abbreviation Co. refers to County.

Genital extraction

Male genitalia frequently display species-specific features. To extract male genitalia, we followed the procedure mentioned in Gardner & Gibbs (2020). The chosen male specimens were rehydrated within a humid chamber for a period of 24 hours or more, taking into account the age and dryness of each specimen. This process facilitated the gentle handling of the metasoma minimizing the risk of unintended breakage. Subsequently, genitalia extraction was performed using a size 0 insect pin with a hooked end. The genital capsule was carefully extracted, ensuring the full visibility of all components for a thorough examination of the species' genital armature.

Image processing

Specimens were photographed using a Canon EOS 7D camera paired with a Canon MP-E 65 mm lens. To optimize the focus and depth of field, Cognisys StackShot Macro Rail (Cognisys Inc., Traverse City, Michigan, USA) was used. The stacking process involved capturing a series of images, with adjustments made to the camera settings (4.0–5.0 F, ISO 100–200, and shutter speed 1/250) and the stack shot controller (auto-dist mode, dist/step: 0.20–0.25 micrometers) based on the specimen or body part. To illuminate the subject, two flashes (Yongnuo YN560-III Speedlite) were positioned, creating a diffuse environment with a surrounding cylinder of diffusion paper. This diffuse paper is made of white polypropene plastic (AK Diffuser, USA). The resulting images were stacked using pyramid stacking method in Helicon Focus 7 (Helicon Soft Ltd, Kharkiv, Ukraine). Images were edited in Adobe Photoshop CC 2015 (Adobe Inc., San Jose, California, USA).

Map processing

Most observed specimens were labeled with geographical data. These data were used to determine the species' geographic range. In instances where GPS coordinates were directly indicated on the labels, those coordinates are provided in the material examined section without brackets. But, when actual GPS coordinates were absent on the labels, the best possible coordinates were deduced by carefully assessing the information provided using Google Earth. Georeferenced data are provided in square brackets. All coordinates were then imported into Maxent, ver. 3.4.4 (Phillips *et al.* 2023). Maxent extrapolates the potential geographic range of a species, extending beyond the provided coordinates utilizing a combination of species presence records and environmental data (Phillips *et al.* 2023). Environmental data included 19 bioclimatic variables derived from temperature, precipitation, solar radiation, wind speed, and elevation, all obtained from WorldClim (Fick & Hijmans 2017), as well as soil classification sourced from the FAO/UNESCO Digital Soil Map of the World (FAO/UNESCO 2007).

Floral data

Floral host information was compiled primarily from specimen labels, where available. Additional records were sourced from the literature, such as Moure & Hurd (1987), when the taxon concept was not considered to be consistent between time periods. Plant records were cross-referenced and updated to align with the current taxonomy of the plants based on the Plants of the World Online (POWO 2026) and the International Plant Names Index (IPNI 2026). If the taxonomy changed, the verbatim label is also provided next to the updated names. The accuracy of the species listed as floral hosts relies upon the expertise of the individuals who identified these plants.

Morphometrics

Each description presented in this work is accompanied by standard body measurements. In addition to these measurements, a comprehensive morphometric study was conducted for the four species belonging

Table 2. Measurements and qualitative characters used in linear discriminant analysis (LDA) and partitioning around medioids (PAM).

Measurements	Qualitative characters
Face length	Clypeus apex colouration
Face length/head width ratio	Supraclypeal punctation
Upper ocular distance/lower ocular distance (UOD/LOD) ratio	Frons punctation
Supraclypeal length/width ratio	Hair colouration
Clypeal length/width ratio	Tomentum density
Mesoscutum/metanotum ratio	
Inter-tegular span (ITS)	
Mesoscutum length/ITS ratio	

to the *L. arizonense* group, involving additional specific measurements (Table 2). Only females were considered in the morphometric study as some males of this group are unknown. The measurements used in this study were listed in Table 2. All the data were measured using a Nikon SMZ800N microscope equipped with an ocular micrometer.

These measurements were analyzed in R ver. 4.3.2 (R Core Team 2023) using multiple methods. Linear discriminant analysis (LDA) was used to assess quantitative data of putative species identified through a holistic examination of specimens. LDA was executed using the MASS package (Venables & Ripley 2002). Specimens were a priori categorized into groups based on our qualitative determination of their variation. The LDA results were then visualized in an ordination. Subsequently, quantitative measurements were integrated with a subset of qualitative characters for partitioning around medoids (PAM). Gower distances were calculated from this combined dataset using the cluster package (Maechler *et al.* 2022). A silhouette analysis of the Gower distance matrix was used to determine the optimal number of groups (k) for inclusion in the PAM. Finally, T-distributed stochastic neighbor embedding was employed to plot our PAM results, using the Rtsne package (Krijthe 2015).

Results

Five new species within the *L.* (*Hemihalictus*) subgenus from western North America are recognized and described here. In total, 22 species are recognized as valid. Two Palaearctic species, *L. villosulum* (Kirby, 1802) and *L. buccale* (Pérez, 1903), are documented in western North America. Additionally, *L. vanduzeei* is recorded with a neotropical distribution, and *L. opata* sp. nov. is also primarily recorded as having a neotropical distribution.

Morphometrics

After preliminary morphological examination, a detailed morphometric study of the *L. arizonense* group was conducted. Four putative species, *L. arizonense*, *L. absurdiceps*, a new species, and a revalidated *L. vanduzeei* were considered. The LDA analysis revealed four non-overlapping clusters (Fig. 4), congruent with geographical distributions, and providing additional validation to the species delimitation process. This pattern was reinforced by the PAM results, which also revealed the clear separation of the four distinct clusters congruent with our initial hypotheses (Fig. 5).

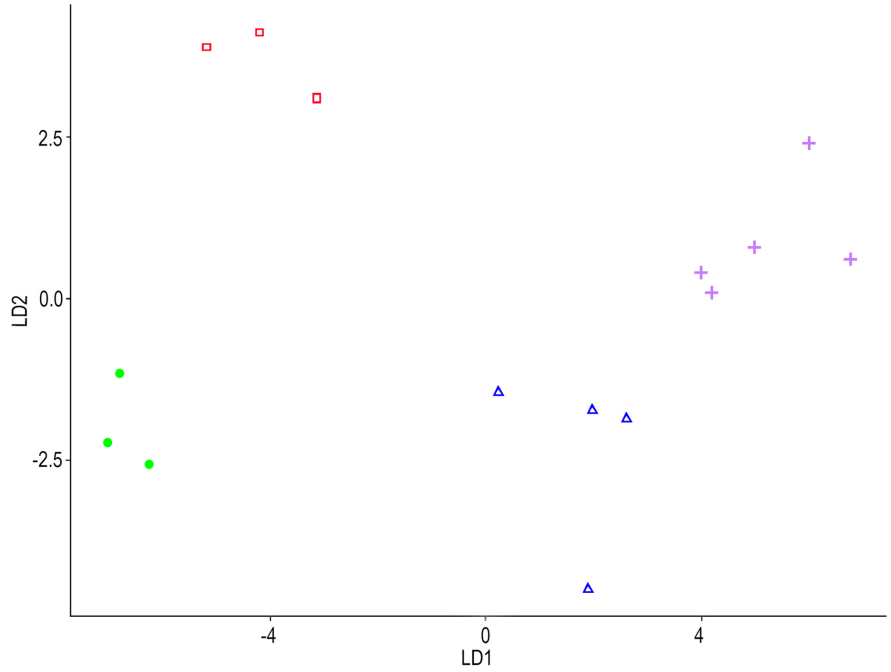


Fig. 4. Ordination of linear discriminant analysis (LDA) based on eight measurements and ratios supports four clusters aligning with species designations: *Lasioglossum* (*Hemihalictus*) *vanduzeei* (Sandhouse & Cockerell, 1924) (green circles) stat. rev., *L.* (*H.*) *absurdiceps* (Timberlake, 1960) (red squares), *L.* (*H.*) *tomentosum* sp. nov. (purple cross marks), and *L.* (*H.*) *arizonense* (Crawford, 1907) (blue triangles).

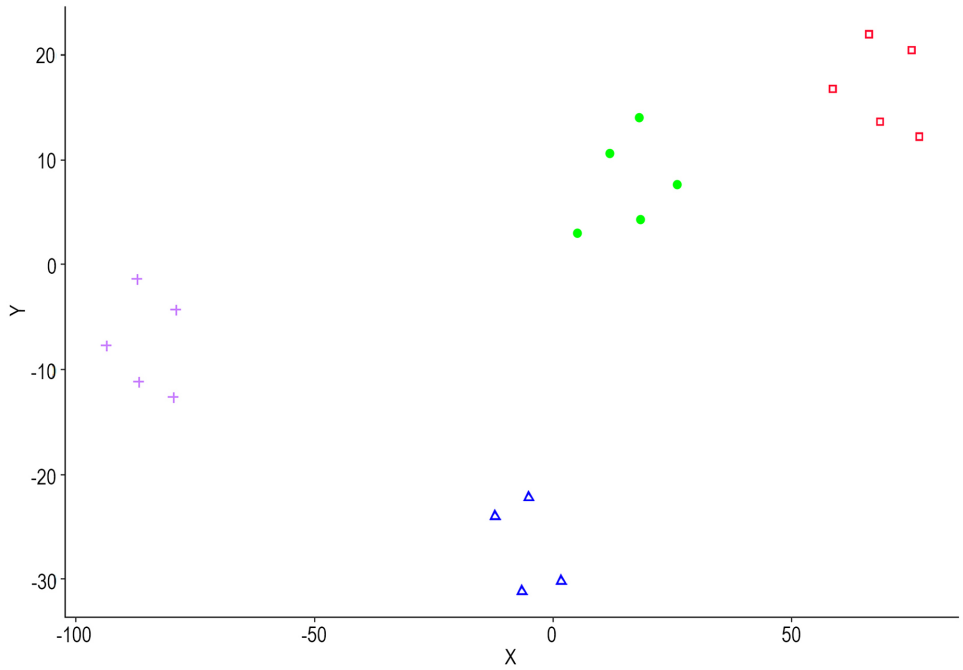


Fig. 5. Two-dimensional representation of clusters created by partitioning around medoids (PAM). Four clusters were defined based on a silhouette analysis: *Lasioglossum* (*Hemihalictus*) *vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev. (green circles), *L.* (*H.*) *absurdiceps* (Timberlake, 1960) (red squares), *L.* (*H.*) *tomentosum* sp. nov. (purple cross marks), and *L.* (*H.*) *arizonense* (Crawford, 1907) (blue triangles).

Systematics

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Family Halictidae Thomson, 1869
Tribe Halictini Thomson, 1869
Genus *Lasioglossum* Curtis, 1833

Subgenus ***Hemihalictus*** Cockerell, 1897

Hemihalictus Cockerell, 1897b: 288 (also published as new by Cockerell 1897c). Type species: *Panurgus lustrans* Cockerell, 1897a, by original designation.
Sudila Cameron, 1898: 52. Type species: *Sudila bidentata* Cameron, 1898, by designation of Sandhouse 1943. Synonymy by Gibbs *et al.* 2013.
Prosopalictus Strand, 1913: 26. Type species: *Prosopalictus micans* Strand, 1913, by original designation and monotypy. Synonymy by Gibbs *et al.* 2013.
Ceylonicola Friese, 1918: 501. Type species: *Ceylonicola atra* Friese, 1918 = *Sudila bidentata* Cameron, 1898, by designation of Sandhouse 1943. Synonymy by Gibbs *et al.* 2013.
Halictus (*Microhalictus*) Warncke, 1975: 85. Type species: *Melitta minutissima* Kirby, 1802, by original designation. Synonymy by Gibbs *et al.* 2013.
Halictus (*Puncthalictus*) Warncke, 1975: 87. Type species: *Hylaeus punctatissimus* Schenck, 1869, by original designation. Synonymy by Gibbs *et al.* 2013.
Halictus (*Marghalictus*) Warncke, 1975: 95. Type species: *Hylaeus marginellus* Schenck, 1869, by original designation. Synonymy by Gibbs *et al.* 2013.
Halictus (*Pauphalictus*) Warncke, 1981: 87. Type species: *Halictus pauperatus* Brullé, 1832, by original designation. Synonymy by Gibbs *et al.* 2013.
Lasioglossum (*Sellalictus*) Pauly, 1980: 120. Type species: *Halictus latesellatus* Cockerell, 1937, by original designation. Synonymy by Gibbs *et al.* 2013.
Habralictellus Moure & Hurd, 1982: 46. Type species: *Halictus auratus* Ashmead, 1900, by original designation. **Syn. nov.**
Lasioglossum (*Mediocralictus*) Pauly, 1984: 143. Type species: *Halictus mediocris* Benoist, 1962, by original designation. Synonymy by Gibbs *et al.* 2013.
Evylaeus (*Limbevylaeus*) Pesenko, 2007a: 20. Type species: *Halictus limbellus* Morawitz, 1876, by original designation. Synonymy by Gibbs *et al.* 2013.
Evylaeus (*Crassevylaeus*) Pesenko, 2007a: 20. Type species: *Halictus crassepunctatus* Blüthgen, 1923, by original designation and monotypy. Synonymy by Gibbs *et al.* 2013.
Evylaeus (*Laevinodilaeus*) Pesenko, 2007a: 20. Type species: *Halictus laevinodis* Morawitz, 1876, by original designation and monotypy. Synonymy by Gibbs *et al.* 2013.
Evylaeus (*Pallidevylaeus*) Pesenko, 2007a: 23. Type species: *Nomioides pallida* Radoszkowski, 1888, by original designation and monotypy. Synonymy by Gibbs *et al.* 2013.
Evylaeus (*Nitidiusculaeus*) Pesenko, 2007a: 24. Type species: *Melitta nitidiuscula* Kirby, 1802, by original designation. Synonymy by Gibbs *et al.* 2013.
Evylaeus (*Truncevylaeus*) Pesenko, 2007a: 24. Type species: *Halictus truncaticollis* Morawitz, 1877, by original designation. Synonymy by Gibbs *et al.* 2013.

Subgeneric diagnosis

Lasioglossum (*Hemihalictus*) in western North America can only be diagnosed by a combination of characters. *Lasioglossum* (*Hemihalictus*) belongs to the weak-veined *Lasioglossum*, also known as the *Hemihalictus* series. In this series, vein 1rs-m is notably weaker compared to the more proximal wing veins, resembling the weakened 2rs-m and 2m-cu, or 1rs-m is absent entirely. Both sexes have the body

entirely black, without metallic reflections (brightly metallic in Antillean species formerly considered in subgenus *Habralictellus*; dull metallic green in some Asian species formerly in *Sudila*). The propodeum of female *L*. (*Hemihalictus*) is characterized by either a weak lateral carina that incompletely separates the lateral and posterior propodeal surfaces, or in cases where the lateral carina seems robust, the entire mesosoma is coarsely sculptured. Males of *L*. (*Hemihalictus*) have metasomal sterna with moderately elongate pubescence (1–2.5 OD), retrorse lobe present (small or absent in some extralimital species), male antennae usually relatively short, female-like (except long in the *L. nitidiusculum* species group), and male heads usually unmodified, with rounded clypeus, but some males are macrocephalic, with a flat clypeus, and long mandibles.

Bees in the *Lasioglossum* series can be differentiated by the presence of a strong vein 1rs-m (less evident in males). Male *L.* (*Lasioglossum*) are usually larger, typically with a flat clypeus, and the metasoma is usually consistently densely punctate to the apex. *Lasioglossum* (*Sphecodogastra*) Ashmead, 1899 females are identifiable by their carinate propodeum, coupled with a more finely sculptured mesosoma. In cases where the carina is either absent or reduced, which is common in Onagraceae-specialist *L.* (*Sphecodogastra*), females exhibit a modified metafemoral scopa, forming a distinctive rake-like row of setae. *Lasioglossum* (*Sphecodogastra*) males have very sparse, short pubescence (< 1 OD) on the sterna, with the exception of the Onagraceae specialists. These specialists can be identified by a raised longitudinal area on S6 and enlarged ocelli. *Lasioglossum* (*Dialictus*) and *L*. (*Eickwortia* s. lat.) are distinctly metallic, at least on the head and mesosoma. *Lasioglossum* (*Eickwortia* s. str.) occur at high elevations from Mexico to Costa Rica and are black but have a strongly bidentate mandible in the female. Males of *Lasioglossum* (*Eickwortia* s. str.) have modified hind legs: these are long and slender in *L. nycteris* (Vachal, 1904) and *L. hienae* Gibbs & Dumesh, 2013, whereas *L. alexanderi* (McGinley, 1999) has a broadened metabasitarsus (Hinojosa-Díaz *et al*. 2025).. *Lasioglossum* (*Evylaeus*) females can be distinguished by combination of the wide head, inner metatibial spur denticulate-serrate, teeth not exceeding width of rachis, mesepisternum rugulose to rugose; propodeum lateral carina not extending to dorsal surface (except in *L. cinctipes* (Provancher, 1888)); and T1 without appressed hairs. *Lasioglossum* (*Evylaeus*) male genitalia are distinguished from those of *L.* (*Hemihalictus*) males by the absence of the retrorse lobe.

Lasioglossum* (*Hemihalictus*) *arizonense species group

Diagnosis

Females in the *L. arizonense* group are diagnosable using a combination of the following characters: typically orange metasoma (except in the dark morph of *L. vanduzeei*; light morphs of *L. aspilurus* (Cockerell, 1925) and *L. ovaliceps* (Cockerell, 1898) have orange metasoma); body covered by conspicuous tomentum on the head and mesosoma (no conspicuous tomentum on the body in most *L.*(*Hemihalictus*), but *L. swenki* (Crawford, 1906b), *L. subobscurum* and *L. robertsoni* might have some tomentum, which is not as conspicuous as in these bees); small bees, length 5.50–6.50 mm (*L. aspilurus*, *L. ovaliceps* and *L. swenki* are large bees with orange abdomens, 6.5–8 mm); head mostly wide, length/width ratio 0.83–0.92 (longer in *L. ovaliceps*, *L. swenki*, length/width > 1); polished mesoscutum (duller sculpturing in *L. swenki*, *L. subobscurum*); and polished mesepisternum (rough in *L. nitidiusculum* group, *L. subobscurum*).

Males in the group share similar traits. They can be diagnosed using a combination of the following characters; small size, length 4–5 mm (larger species, such as *L. pathiranae* sp. nov., *L. lustrans*, *L. pectinatum*, *L. sopinci* (Crawford, 1932), *L. fedorense* (Crawford, 1906a), and *L. swenki*, range from 5 to 8.5 mm); elongated mandibles, nearly reaching opposing mandibular base (mandible shorter in *L. nitidiusculum* group, *L. glabriventre* (Crawford, 1907), *L. ovaliceps*, *L. aspilurus*, *L. buccale*, *L. angusticulum* sp. nov., *L. pectoraloides*, *L. sequoiae* (Michener, 1936), *L. subobscurum*,

L. villosulum, *L. engleri* sp. nov., and *L. macoupinense* (Robertson, 1895)); wide head, length/width ratio 0.84–0.88 (longer in *L. ovaliceps*, and *L. pathiranae* sp. nov., length/width > 1); abundant tomentum on the head and mesosoma; usually orange metasoma (though *L. ovaliceps*, *L. aspilurus*, and *L. swenki* also have orange metasomas, while *L. subobscurum* has a brown metasoma with pale marginal areas); polished mesoscutum (duller sculpturing in *L. swenki* and *L. subobscurum*); and polished mesepisternum (rough in *L. nitidiusculum* group and *L. subobscurum*).

Included species

Lasioglossum absurdiceps (Timberlake, 1960), *L. arizonense* (Crawford, 1907), *L. vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev., and *L. tomentosum* sp. nov.

Lasioglossum* (*Hemihalictus*) *absurdiceps (Timberlake, 1960)
Figs 6–8, 9B, 10B, 11–12, 16, 95B, 96B, 115A, 120A

Halictus (*Evylaeus*) *absurdiceps* Timberlake, 1960: 105.

Evylaeus absurdiceps – Hurd 1979: 1958 (catalogue). — Moure & Hurd 1987: 69 (catalogue).

Diagnosis

Female *L. absurdiceps* has the frons rugulose-punctate to polished, with dense punctures (IS < 1 PD). In contrast, *L. tomentosum* sp. nov. also exhibits a somewhat rugulose-punctate frons from certain angles, but it is doubly punctate with small punctures throughout. It is further distinguished by its extremely dense, pale-yellow tomentum, which often obscures the underlying sculpturing and puncture patterns unless removed. The frons of *L. vanduzeei* and *L. arizonense* are polished with distinct double punctation, featuring minute, shallow punctures throughout. These 'minute' punctures are smaller than the small punctures found on the frons of *L. tomentosum*. These punctures mark the points where hairs arise; however, without removing the hairs, these characters may be difficult to observe clearly. The frons punctures of *L. arizonense* are sparser (IS = 4–6 PD) than *L. vanduzeei* (IS = 2–4 PD) (check Fig. 9).

The mesoscutal sculpture of *L. vanduzeei* and *L. absurdiceps* is comparatively less polished, with imbricate or tessellate sculpturing anteromedially. In contrast, *L. arizonense* and *L. tomentosum* sp. nov. exhibit a highly polished mesoscutum. *Lasioglossum arizonense* has comparatively very shallow and sparser (IS = 2–7 PD) punctures, with a distinctly doubly punctate pattern featuring minute punctures throughout. *Lasioglossum tomentosum* also possesses a doubly punctate mesoscutum, but with deeper minute punctures and denser density (IS = 1–3 PD, laterad of parapsidal line). In contrast, both *L. absurdiceps* and *L. vanduzeei* lack double punctation on the mesoscutum, and their punctures are deeper and denser comparatively (IS = 1–2 PD) laterad of parapsidal line (check Fig. 10).

Females of *Lasioglossum arizonense* have a smooth and polished mesepisternum, which is doubly punctate with minute punctures throughout. *Lasioglossum vanduzeei* also has sparse punctation (IS = 1–3 PD) on the mesepisternum, which becomes progressively sparser ventrally, and it is doubly punctate, though not as conspicuously as in *L. arizonense*. The punctures are sparse (IS = 1–3 PD). In contrast, the other two species (*L. absurdiceps* and *L. tomentosum* sp. nov.) lack a smooth mesepisternum, as they exhibit an indistinctly reticulate-punctate surface structure with large, dense punctures (IS < 1 PD) dorsally, though the surface remains polished.

Unlike *L. absurdiceps* and *L. tomentosum* sp. nov., where T3 is mostly fully covered by tomentum, females of *L. vanduzeei* display basal tomentum on T3, and the overall body tomentum is not dense. Due to wear of tomentum, it is difficult to comment on T3 tomentum in *L. arizonense*. Females of

Lasioglossum vanduzeei have the protibial malus extending beyond the velum, nearly ¼ of length of velum, but the mali of other three species do not reach beyond the velum.

Another reliable diagnostic character is the shape of the malus on the female's protibial spur. In *L. vanduzeei*, the malus is longer, measuring nearly ⅓ the length of the velum (Fig. 17F). In contrast, the other three species do not have a malus that extends significantly beyond the velum (as in Figs 6F, 13F, 15F). Notably, in *L. absurdiceps*, there is no developed malus (Fig. 6F).

Female *L. aspilurus* are similarly coloured but lack distinct tomentum on the mesoscutum and mesepisternum. *Lasioglossum absurdiceps* have pale wings with light setae, but setae are darker in *L. aspilurus*. *Lasioglossum swenki* occur further east and are much larger, with a longer face (length/width 1.01), duller sculpturing on the mesoscutum, and less dense tomentum. *Lasioglossum ovaliceps* have a much longer face, length/width 1.10 (±0.02 SD) and lack distinct tomentum.

Only *L. absurdiceps* and *L. vanduzeei* males are known. Males of *L. vanduzeei* have no dense tomentum and have no distinct punctures on the mesoscutum as males of *L. absurdiceps*. Males of *L. absurdiceps* have orange metasoma and in some macrocephalic males (including the holotype), the gena is tuberculate at midlength with a short process. Males of *L. vanduzeei* have brown to dark brown metasoma. Mesoscutum punctures of *L. vanduzeei* are indistinct and sparser (IS = 2–7 PD), but *L. absurdiceps* have distinct punctures which are moderately sparse (IS = 1–2 PD), becoming more sparsely punctate (IS = 1–4 PD) submedially.

Males of *L. swenki* and *L. subobscurum* can resemble the males of *L. arizonense* and *L. vanduzeei* but are distinguished by their duller mesoscutum, which results from microsculpturing. Males of *Lasioglossum subobscurum* have shorter mandibles, nearly reaching the opposing clypeal angle, whereas males of *L. arizonense* and *L. vanduzeei* possess elongated mandibles that nearly reach the opposing mandibular base. Additionally, males of *L. swenki* are larger (length 5–7 mm), while *L. arizonense* and *L. vanduzeei* are smaller (length 4–5 mm).

Etymology

Timberlake (1960) named this species for its 'cephalic pecularities'.

Type material

Holotype of *Halictus* (*Evylaeus*) *absurdiceps* (by original designation; examined)
UNITED STATES – **California** • ♂; Merced Co., 8 mi. SW of Merced; [37.22° N, 120.59° W]; 5 Sep. 1956; R.R. Snelling leg.; CAS (Figs 7, 11).

Specimen labels
"8 mi. SW / Merced, Cal./ Sept. 5, 1956 // Snelling / Coll. // On Flowers of / *Solidago* // Holotype / *H. absurdiceps*".

Other material examined

UNITED STATES – **California** • 1 ♀; Fresno Co.; [36.76° N, 119.65° W]; 23 May 1949; E.G. Linsley, J.W. MacSwain and R.F. Smith leg.; EMEC • 2 ♀♀; Inyo Co., 2 mi. E of Big Pine; [37.164° N, 118.253° W]; 7 Jun. 1975; J.D. Pinto leg.; UCRC • 1 ♂; Inyo Co., 3 mi. N of Olancha; [36.324° N, 118.006° W]; 11 Sep. 1962; J.T. Doyen leg.; UCRC • 2 ♂♂; Inyo Co., 5.5 mi. S of Shoshone; [35.892° N, 116.272° W]; 29 Aug. 1979; J.C. Hall and N. Evenhuis leg.; UCRC (Fig. 8) • 7 ♀♀; Inyo Co., Keeler; [36.483° N, 117.873° W]; 28 Aug. 1977; E.G. Linsley and J.M. Linsley leg.; ex *Tamarix aralensis*; EMEC • 1 ♀; Inyo Co., 4 mi. E of Independence; [36.802° N, 118.128° W]; 30 May 1977; E.G. Linsley and J.M. Linsley leg.; ex *Tamarix ramosissima*; EMEC • 1 ♀; Inyo Co., 5 mi. N of Ballarat; [36.119° N, 117.227° W]; 20 Sep. 1965; LACM • 1 ♀; Inyo Co., Olancha; [36.282° N, 118.007° W]; 23 Aug. 1952;

LACM • 1 ♀; Inyo Co., 12 mi. S of Olancha; [36.107° N, 118.006° W]; 8 Jul. 1982; J.C. Hall and E.M. Hall leg.; USNM • 1 ♂; Inyo Co., 3.5 mi. W of Lone Pine; [36.604° N, 118.126° W]; 8 Jul. 1961; H.V. Daly leg.; UCRC • 12 ♀♀; Inyo Co., Saratoga Springs, Death Valley National Park; [35.682° N, 116.424° W]; 17 Apr. 1974; M. Wasbauer and F. Andrews leg.; ex *Tamarix gallica*; CSCA (Fig. 9B) • 1 ♂; Inyo Co., 3 mi. N of Olancha; [36.324° N, 118.006° W]; 11 Sep. 1962; J.T. Doyen leg.; EMEC • ♂; Inyo Co., Furnace Creek Death Valley; [36.425° N, 116.886° W]; 1 Apr. 1951; J.W. MacSwain leg.; ex *Heliotropium*; EMEC • 3 ♀♀; Inyo Co., Stovepipe Wells Death Valley; [36.606° N, 117.147° W]; 30 Mar. 1953; J.W. MacSwain leg.; ex *Larrea*; EMEC (Fig. 6) • 1 ♀; Merced Co., Los Banos; [37.059° N, 120.851° W]; 23 May 1918; E.P. Van Duzee leg.; CAS • 1 ♀; San Bernardino Co., 1 km S of Zzyzx, Soda Dry Lake; 35.133333° N, 116.1° W; elev. 290 m; 29 May 1999; D. Yanega leg.; UCRC • 2 ♀♀; San

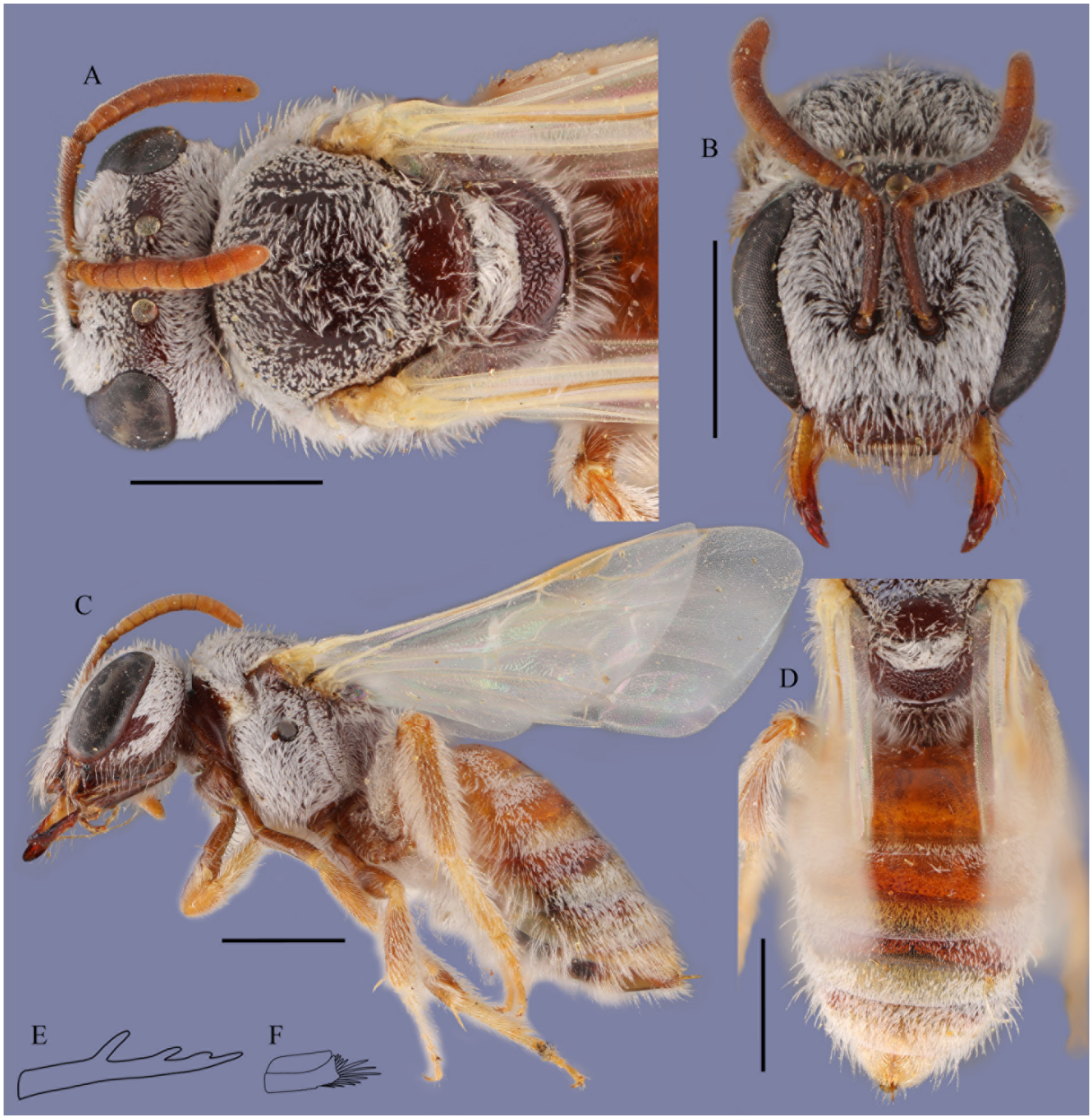


Fig. 6. *Lasioglossum* (*Hemihalictus*) *absurdiceps* (Timberlake, 1960), ♀ (EMEC). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F.** Protibial spur. Scale bars = 1 mm.

Bernardino Co., 9 air mi. S of Baker, Zzyzx Springs; [35.136° N, 116.1036° W]; 20 Apr. 1977; ex *Larrea*; EMEC. – **Nevada** • 1 ♂; Pershing Co., Black Rock Desert T33N R26E; [40.912° N, 119.056° W]; elev. 1219 m; 10 Sep. 1972; Wm. H. and M.H. Clark leg.; UCRC.

Redescription

Female

Body measurements. Length 6.10 mm (±0.20 SD). Head length 1.47 mm (±0.02 SD). Face length 1.23 mm (±0.02 SD). Head width 1.71 mm (±0.02 SD). Wing length 4.31 mm (±0.13 SD). n = 5.

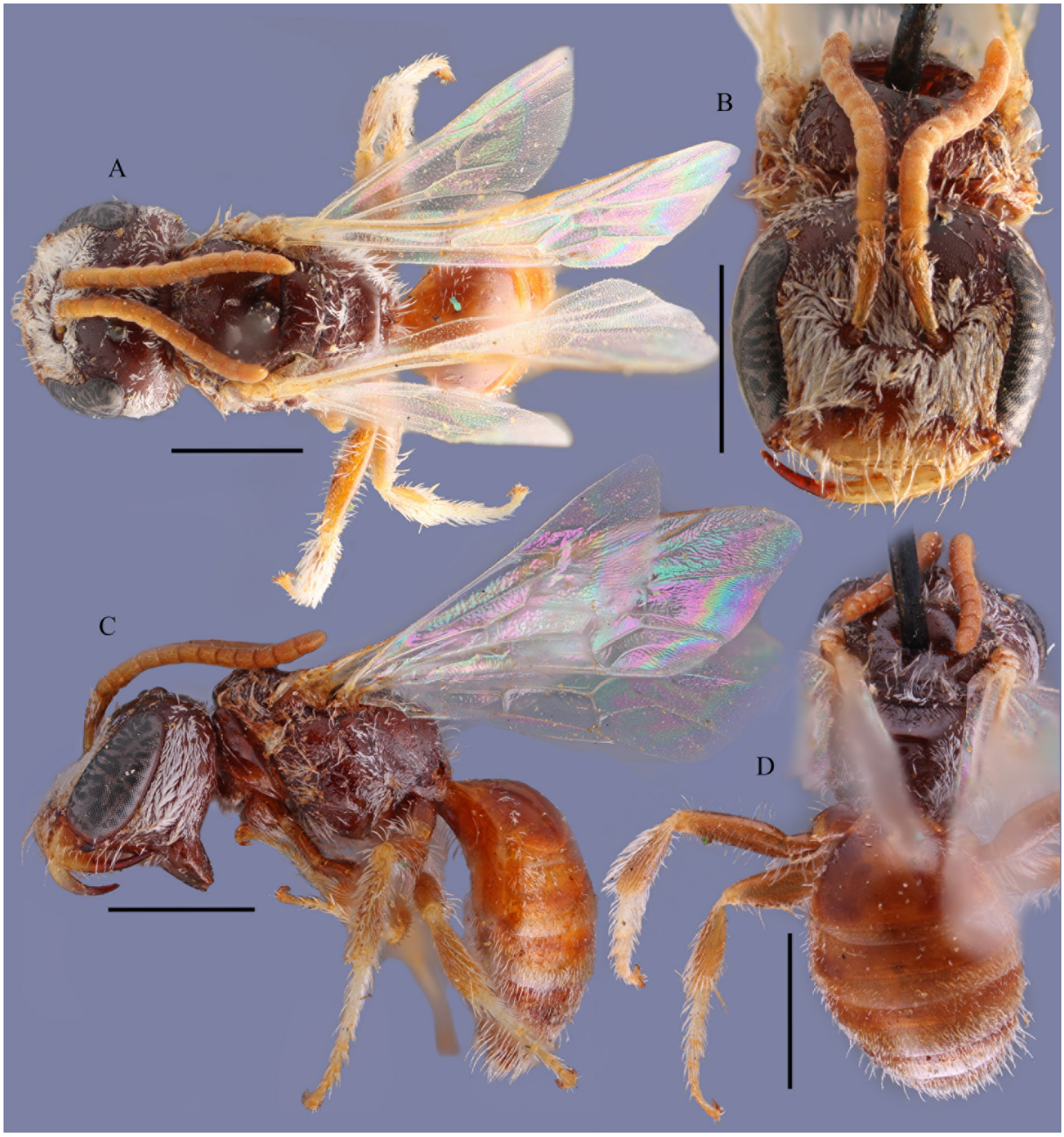


Fig. 7. Macrocephalic *Lasioglossum* (*Hemihalictus*) *absurdiceps* (Timberlake, 1960), holotype, ♂ (CAS). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

Colouration. Head and mesosoma dark brown to black. Clypeus apex dark brown to brown. Labrum brown. Mandible orange basally, reddish brown apically. Flagellum orange. Pronotal lobe orange. Tegula translucent pale amber. Wing membrane pale, veins with subcosta amber, otherwise pale amber. Legs orange, but coxae, trochanters, femora mostly brown. Metasoma orange, occasionally featuring irregular dark spots.

Pubescence. Body hair colour white. Tomentum on entire body except clypeus, postgena, pronotum anterior face, propodeum dorsal face and lateral face medially, T1 (except laterally), T2 medially and on rim and sterna; dense on supraclypeal area, paraocular area, frons, vertex, gena, pronotal angle, lobe and collar, space between pronotal lobe and tegula, mesoscutum marginally, metanotum, preëpisternum,



Fig. 8. *Lasioglossum* (*Hemihalictus*) *absurdiceps* (Timberlake, 1960), ♂ (UCRC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

metepisternum; moderately dense on mesoscutum (except marginal area), mesoscutellum, T1 laterally, T2 basolaterally and T3–T4; sparse on propodeum lateral face near marginally and posterior face. Other than the tomentum, mesosoma covered by erect, weakly plumose, short hairs (< 1 OD) on mesoscutum and erect, plumose, long hairs (< 3 OD) on other areas. Metasomal sterna with dense, erect, plumose,

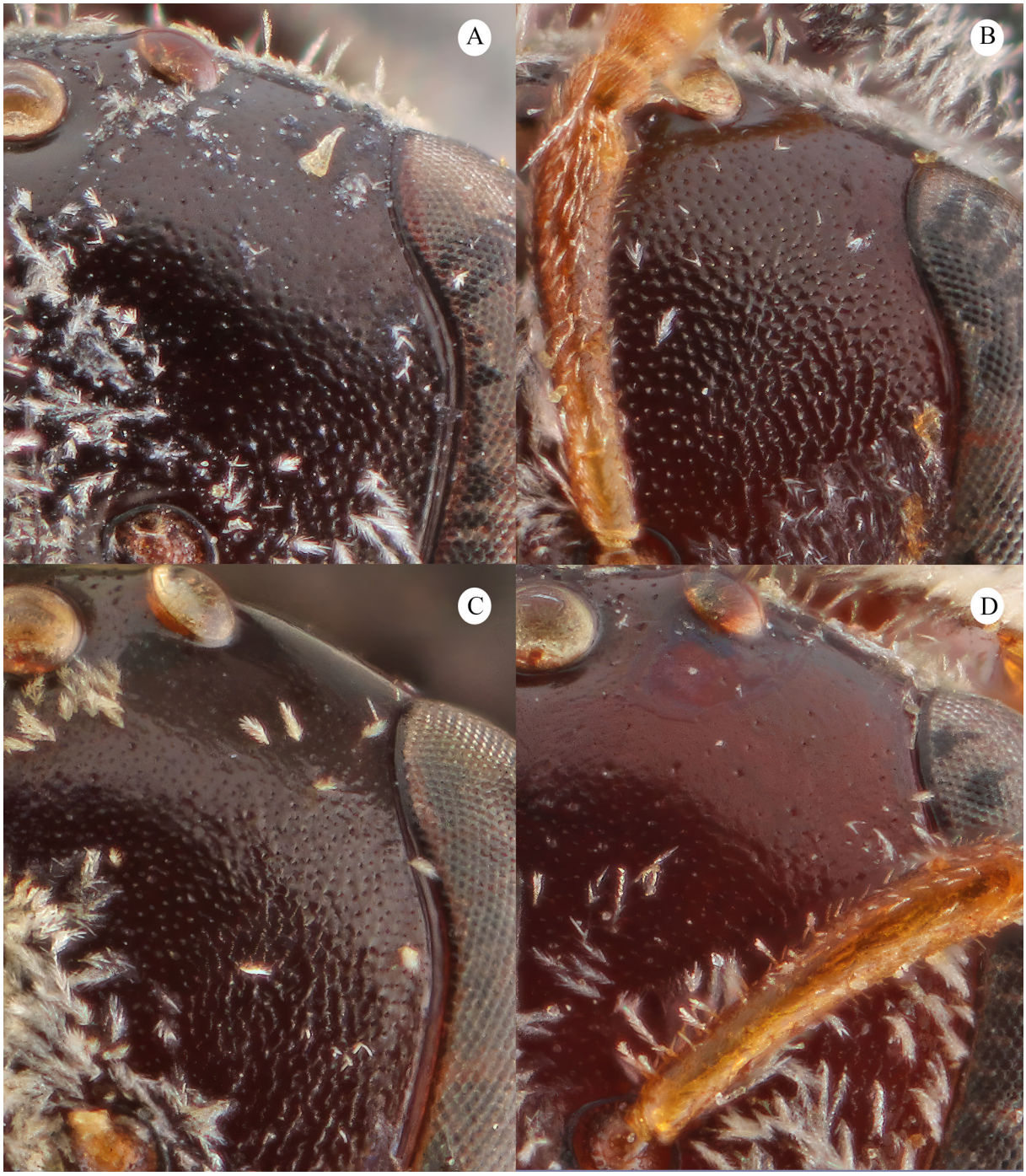


Fig. 9. Frons of females of *Lasioglossum* (*Hemihalictus*) species. **A**. *L. vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev. **B**. *L. absurdiceps* (Timberlake, 1960). **C**. *L. tomentosum* sp. nov. **D**. *L. arizonense* (Crawford, 1907). (Note: pilosity on the frons was removed in B and C; in A and D, specimens with reduced pilosity due to wear were selected to facilitate observation of integumental sculpture).

long hairs (<5 OD). Metafemoral scopa with dense plumose hairs. Wing hairs light, very short and sparse.

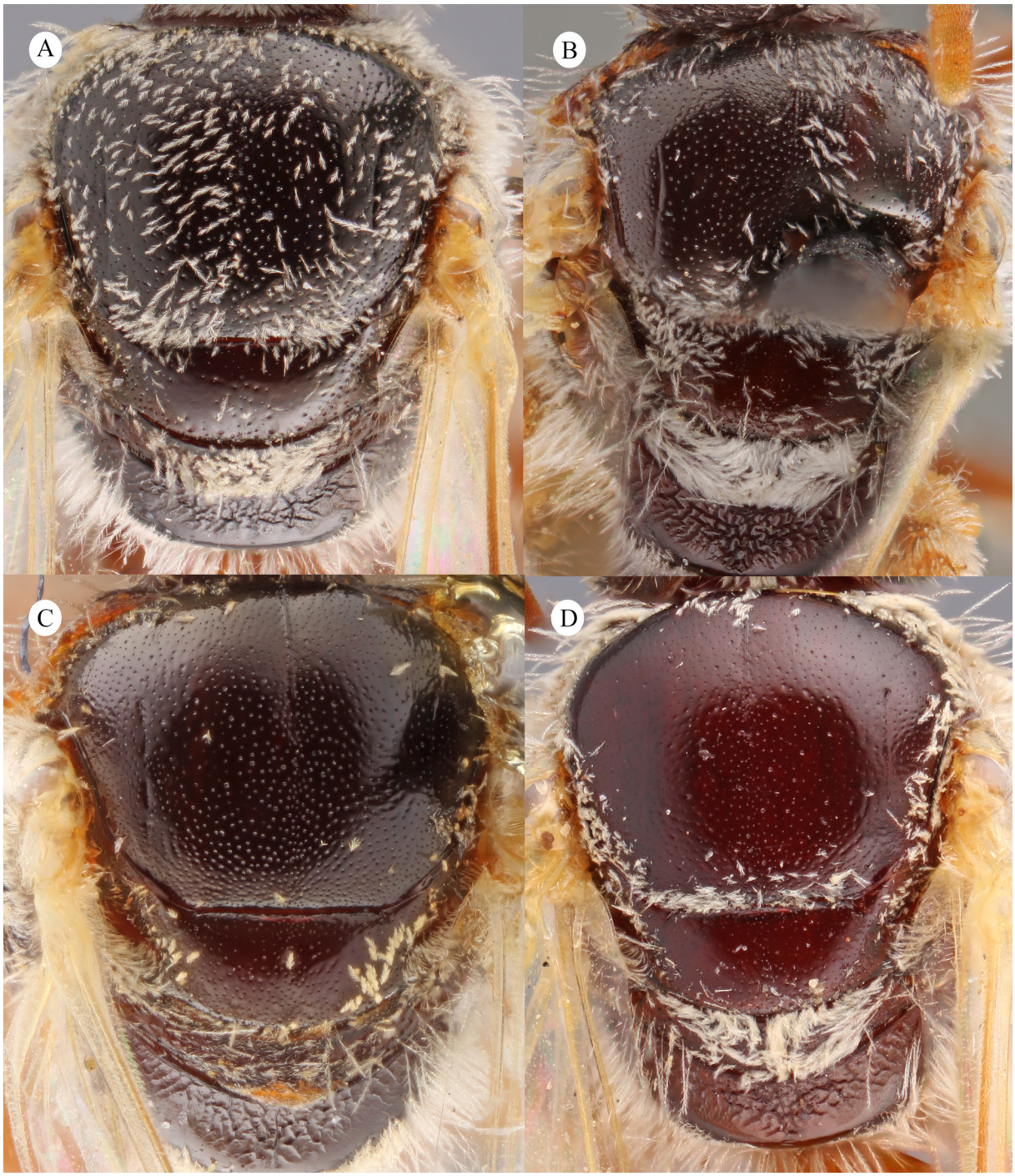


Fig. 10. Dorsal view of females of *Lasioglossum* (*Hemihalictus*) species. **A**. *L. vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev. **B**. *L. absurdiceps* (Timberlake, 1960). **C**. *L. tomentosum* sp. nov. **D**. *L. arizonense* (Crawford, 1907). (Note: pilosity on the mesosoma was removed in C; in the remaining panels, specimens with reduced pilosity due to wear were selected to facilitate observation of integumental sculpture).

Surface sculpturing. Clypeus polished throughout; punctures large, irregularly spaced (IS < 3 PD) on apical half, becoming small and moderately dense (IS = 1–2 PD) basally. Supraclypeal area polished, weakly imbricate medially; punctures dense (IS < 1PD) medially, becoming moderately sparse (IS = 1–2 PD) apically and laterally. Frons ruguloso-punctate, becoming polished dorsally; punctures dense (IS < 1 PD). Ocellocular area polished; punctures sparse (IS = 1–4 PD), doubly punctate with small punctures. Gena polished, becoming weakly rugulose posteriorly; punctures moderately dense (IS = 1–2 PD). Postgena polished, but merely imbricate adjacent to hypostomal carina. Tegula impunctate. Mesoscutum polished, becoming imbricate anteromedially and merely imbricate mesad of parapsidal line anteriorly; punctures moderately dense (IS = 1–2 PD), becoming more sparsely punctate on mesad of parapsidal line (IS = 1–4 PD), diversopunctate, but not that conspicuous. Mesoscutellum polished, punctures moderately dense (IS = 1–2 PD) on median line and near lateral and posterior margins, becoming sparse (IS = 1–5 PD) submedially, diversopunctate. Metanotum imbricate to rugulose, punctures obscure. Propodeal triangle with rugae moderately strong, nearly reaching posterior margin, strongly anastomosing; interspace sculpture shiny, but weakly imbricate among rugae and laterally, becoming narrowly polished posteriorly. Preëpisternum reticulate-punctate. Hypoepimeron interspace sculpture shiny; punctures sparse (IS = 1–3 PD). Mesepisternum polished, but indistinctly reticulate-punctate; punctures dense (IS < 1PD). Propodeum lateral face imbricate, becoming shiny anteriorly; large punctures sparsely (IS = 3–6 PD) scattered on imbricate area and minute punctures sparse (IS = 1–3 PD) on shiny edge; posterior face weakly imbricate, punctures sparsely (IS = 2–6 PD) scattered. T1 anterior face polished, punctures present laterally, sparse (IS = 3–5 PD); dorsal surface polished, with punctures sparse (IS = 1–3 PD), becoming more sparsely punctate (IS = 2–7 PD) in small subapicolateral boss and punctures fine, minute and sparse (IS = 1–3 PD) on rim, becoming impunctate on apical half and medially on rim. T2 disc polished, punctures moderately dense (IS =1–2 PD) basally, becoming sparse (IS = 1–3 PD) apically; rim weakly to distinctly coriarious, punctures minute and sparse (IS = 1–3 PD), becoming narrowly impunctate apically.

Structure. Head wide, length/width ratio 0.85 (±0.02 SD). Face length/width ratio 0.72 (±0.01 SD). Clypeus projecting ~53% below suborbital tangent; clypeus length/width ratio 0.97 (±0.09 SD). Mandible short, nearly reaching beyond opposing clypeal angle. Eyes convergent below [UOD/LOD ratio 1.13 (±0.03 SD)]. Ocelli normal. Gena/eye width ratio 0.75 (±0.05 SD). Pronotal angle obtuse. Intertegular span 1.12 mm (±0.04 SD). Mesoscutum length/width ratio 1.22 (±0.02 SD); mesoscutum/scutellum length ratio 2.81 (±0.13 SD); scutellum/metanotum length ratio 1.48 (±0.06 SD); metanotum/propodeal triangle length ratio 0.87 (±0.06 SD). Protibial spur with apical serrations longer in length to width of malus; malus not reaching beyond velum. Inner metatibial spur pectinate, teeth 3, basal teeth somewhat longer than width of rachis. Propodeal triangle posterior margin smoothly rounded. Propodeal lateral carina not reaching dorsal margin; oblique carina absent.

Variation. Some specimens have an orange clypeus as well as legs that are entirely orange (3 specimens out of all).

Male

Body measurements. Length 4.47 mm (±0.49 SD). Head length 1.30 mm (±0.11 SD). Face length 1.04 mm (±0.08 SD). Head width 1.49 mm (±0.12 SD). Wing length 3.38 mm (±0.17 SD). n = 3.

Macrocephalic holotype. Length 5 mm. Head length 1.45 mm. Face length 1.28 mm. Head width 1.72 mm. Wing length 3.9 mm.

Colouration. Head and mesosoma dark brown to black. Clypeus apical half pale yellow. Labrum pale yellow. Mandible yellow with reddish-brown apical third. Flagellum orange. Pronotal lobe pale yellow. Tegula translucent pale amber. Wing membrane pale, veins with subcosta amber, otherwise faintly amber. Legs orange with brown coxae, trochanters, and femora. Metasoma mostly orange, occasionally with irregular dark spots.

Pubescence. Body hair colour white. Tomentum dense on head except vertex area, pronotal angle, lobe and collar, space between pronotal lobe and tegula, metanotum, preëpisternum, and mesepisternum; moderately dense on mesoscutum, mesoscutellum, propodeum lateral face and posterior face dorsally; sparse on T1 laterally, T2 basolaterally, T3 basolaterally or nearly completely (due to wear difficult to say) and T4. Mesosoma covered by erect, weakly plumose, short hairs (< 1 OD) on mesoscutum and erect, plumose, long hairs (< 3 OD) on other areas. Metasomal sterna with moderately dense, erect, moderately plumose, short hairs (0.5–2 OD). Wing setae pale, short and sparse.

Surface sculpture. Clypeus polished, punctures minute, moderately dense (IS = 1–2 PD) basally, becoming moderately sparse (IS = 1–2 PD) apically. Supraclypeal area polished, punctures minute, moderately dense (IS = 1–2 PD) to dense (IS = 1–2 PD). Frons polished; punctures moderately dense

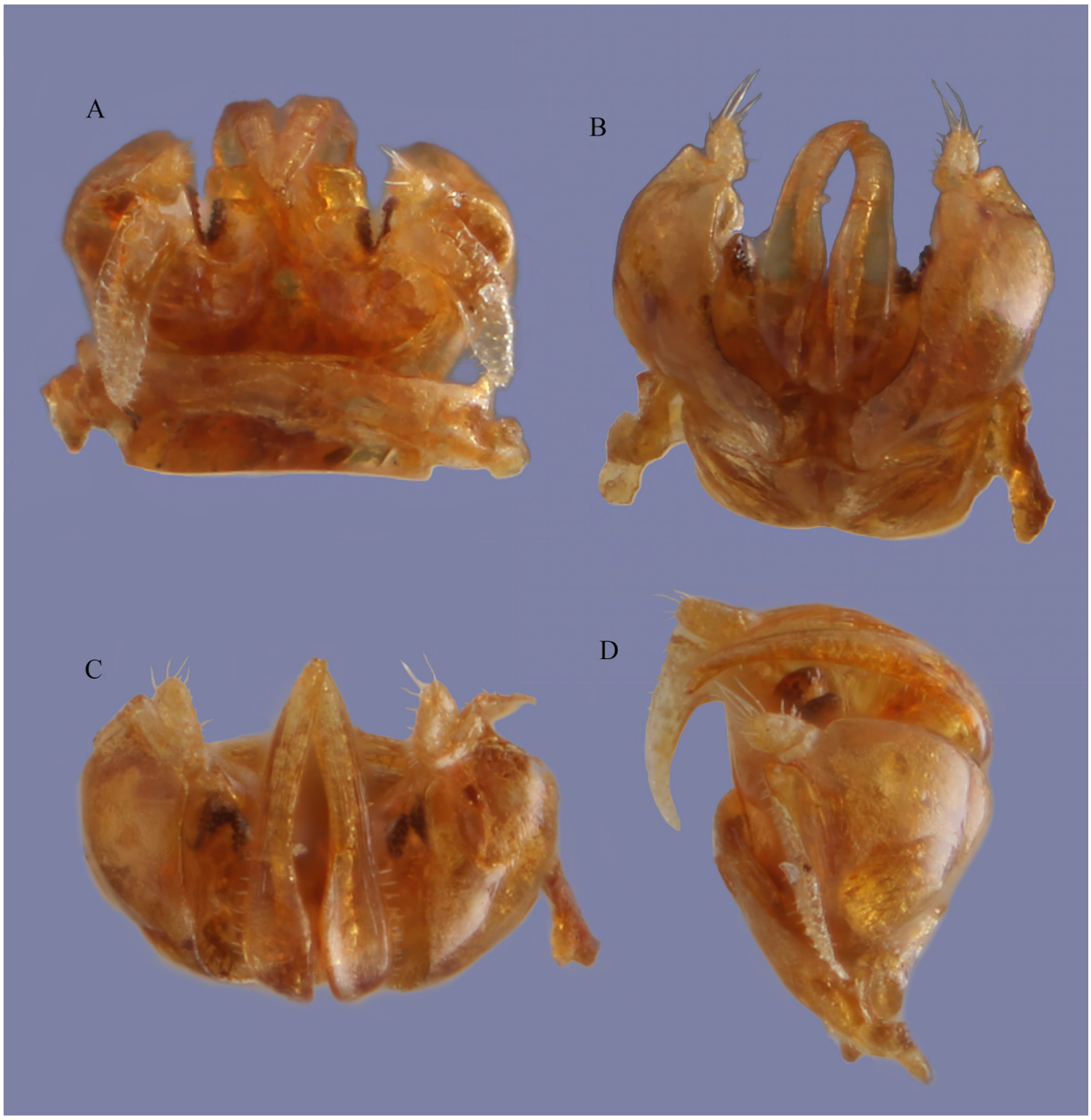


Fig. 11. Genitalia of *Lasioglossum* (*Hemihalictus*) *absurdiceps* (Timberlake, 1960), holotype, ♂ (CAS). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

(IS = 1–2 PD). Ocellocular area polished; punctures sparse (IS = 2–4 PD). Gena polished; punctures moderately dense (IS = 1–2 PD). Postgena polished. Tegula impunctate. Mesoscutum well-polished; punctures moderately sparse (IS = 1–2 PD), becoming more sparsely punctate (IS = 1–4 PD) submedially, diversopunctate, but not that conspicuous. Mesoscutellum well-polished; punctures moderately sparse (IS = 1–2 PD) marginally and on median line, sparse submedially (IS = 3–6 PD). Metanotum polished, but weakly rugulose, punctures sparse (IS = 1–4 PD). Propodeal triangle with rugae weak or nearly absent, not reaching posterior margin; mostly polished, but merely imbricate laterally and basally. Preëpisternum rugulose. Hypoepimeron polished; punctures sparse (IS = 1–3 PD) and sometime obscure. Mesepisternum smooth and polished; punctures minute, sparse (IS = 1–5 PD). Propodeum lateral face imbricate, becoming polished anteriorly; posterior face polished to weakly imbricate. T1 anterior face polished, few punctures present laterally, sparse (IS = 1–4 PD); dorsal surface polished, with punctures sparse (IS = 1–4 PD), becoming more sparsely punctate (IS = 2–5 PD) in small subapicolateral boss and towards premarginal line medially, impunctate on rim. T2 disc polished; punctures sparse (IS =1–4 PD); rim weakly coriarious, impunctate.

Structure. Head wide, length/width ratio 0.88 (±0.02 SD). Face length/width ratio 0.71 (±0.01 SD). Clypeus projecting ~58% below suborbital tangent. Mandible elongate and long, extending to opposing suborbital tangent, or go beyond, and sometime reaching opposing mandibular base. Flagellomeres short, F1:pedicel length ratio 0.68 (±0.18 SD); F2:F1 length ratio 2.03 (±0.32 SD); F2 length/width ratio 1.01 (±0.06 SD). Gena/eye width ratio 0.77 (±0.11 SD), sometime tuberculate at midlength. Pronotal angle obtuse. Intertegular span 0.93 mm (±0.03 SD). Mesoscutum length/width ratio 1.23 (±0.11 SD). Propodeal triangle posterior margin smoothly rounded. Propodeal lateral carina reaching dorsolateral slope; oblique carina absent.

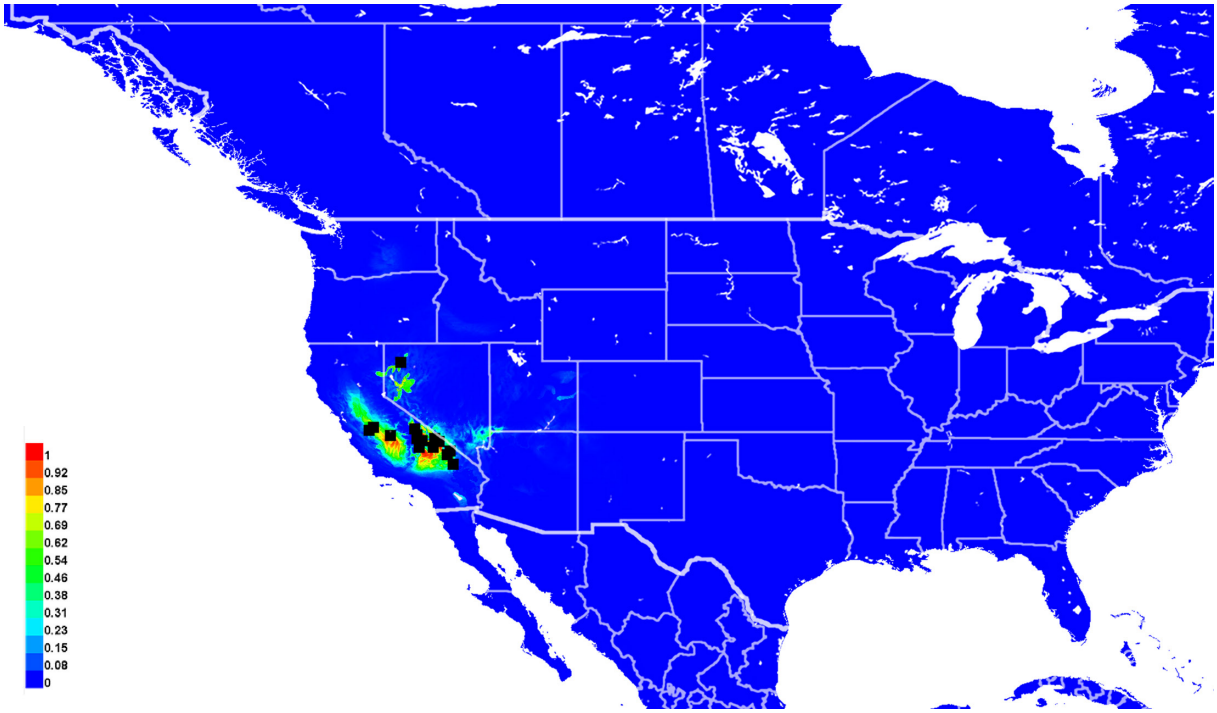


Fig. 12. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *absurdiceps* (Timberlake, 1960) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

Genitalia (Figs 11, 120A). Gonostylus short, slightly longer than broad and bears short setae. Retrorse lobe somewhat attenuated apically, about 3 times as long as broad, covered in short setae.

Variation. The male holotype exhibits an enlarged head with a prominent, elongated tubercular process on the gena, and has completely orange legs, making it a more unusual form compared to most other males. Additionally, the clypeal punctures are sparse (IS = 1–4 PD) basally, becoming sparser (IS = 3–5 PD) apically; the frons punctures moderately sparse (IS = 1–2 PD). In some specimens, the hypoepimeron has sparse (IS = 1–4 PD) punctures.

Structure of macrocephalic holotype. Head wide, length/width ratio 0.84. Face length/width ratio 0.75. Clypeus projecting same as above. Mandible elongate and long, extending beyond opposing suborbital tangent. Flagellomeres short, F1:pedicel length ratio 0.94; F2:F1 length ratio 1.60; F2 length/width ratio 0.96. Gena width (considered up to end of tubercular process) /eye width ratio 1.21, elongated tubercular process on the gena (0.74 mm long from the ocular margin). Pronotal angle obtuse. Intertegular span 1.04 mm. Mesoscutum length/width ratio 1.24. Propodeal triangle posterior margin smoothly rounded. Propodeum lateral carinae reaching dorsolateral slope; oblique carina absent.

Range

Central and northern California to northwestern Nevada (Figs 12, 16). USA (California, Nevada).

Floral hosts

ASTERACEAE: *Solidago* sp. • BORAGINACEAE: *Heliotropium* sp. • TAMARICACEAE: *Tamarix aralensis* Bunge, *Tamarix gallica* L., *Tamarix ramosissima* Ledeb. • EUPHORBIACEAE: *Euphorbia* sp. • ZYGOPHYLLACEAE: *Larrea* sp.

Lasioglossum* (*Hemihalictus*) *arizonense (Crawford, 1907)
Figs 9D, 10D, 13–14, 16

Halictus arizonensis Crawford, 1907a: 189.

Lasioglossum (*Evylaeus*) *arizonense* – Michener 1951: 1108 (catalogue).
Evylaeus arizonensis – Hurd 1979: 1958 (catalogue). — Moure & Hurd 1987: 70 (catalogue; in part).

Diagnosis

Females of *L. arizonense* can usually be distinguished from other species in the *L. arizonense* group by the following characteristics: orange clypeal apex; polished frons with distinct double punctation (large and minute punctures) and sparser puncture density (IS = 4–6 PD); highly polished mesoscutum with comparatively very shallow and sparser punctures (IS = 2–7 PD), exhibiting a distinctly doubly punctate pattern; and smooth and polished mesepisternum with sparse, conspicuous double punctation (IS = 1–3 PD). In some instances, a few females of *L. absurdiceps* have an orange clypeal apex. For additional minute characters, please refer to the diagnosis of *L. absurdiceps*, which diagnoses females of *L. arizonense*.

Males of *L. arizonense* are unknown.

Etymology

Crawford (1907a) did not explain the epithet. The specific epithet is a presumably reference to the type locality ‘Arizona’ with the adjectival suffix ‘*-ensis*’.

Type material

Holotype of *Halictus arizonensis* (by monotypy; examined)
UNITED STATES – **Arizona** • ♀; C.F. Baker leg.; USNM Type No. 10930 (Fig. 14).

Specimen labels
"Ariz / 2341 // Collection / CF Baker // Type / No 10930 / U.S.M.M. // USNMENT / 00535045".

Other material examined

UNITED STATES – **Arizona** • 1 ♀; Yuma Co., Yuma; [32.69° N, 114.63° W]; 1–31 May 1937; UCRC (Figs 9D, 10D, 13A–B). – **California** • 1 ♀; Imperial Co., Winterhaven; [32.74° N, 114.64° W]; 29 Mar.



Fig. 13. *Lasioglossum* (*Hemihalictus*) *arizonense* (Crawford, 1907), ♀♀ (UCRC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

1954; T. Gallion leg.; CSCA • 1 ♀; Riverside Co., 4 mi. SW of Ripley; [33.484° N, 114.706° W]; 30 Apr. 1952; P.H. Timberlake leg.; ex *Heliotropium* [illegible]; UCRC (Fig. 13C–D) • 1 ♀; Riverside Co., 6 mi. W of Indio; [33.718° N, 116.337° W]; 30 Apr. 1949; E.G. Linsley, J.W. MacSwain and R.F. Smith leg.; ex *Melilotus*; UCRC.

Description

Female

Body measurements. Length 5.74 mm (±0.19 SD). Head length 1.34 mm (±0.04 SD). Face length 1.16 mm (±0.02 SD). Head width 1.53 mm (±0.06 SD). Wing length 3.99 mm (±0.25 SD). n = 4.

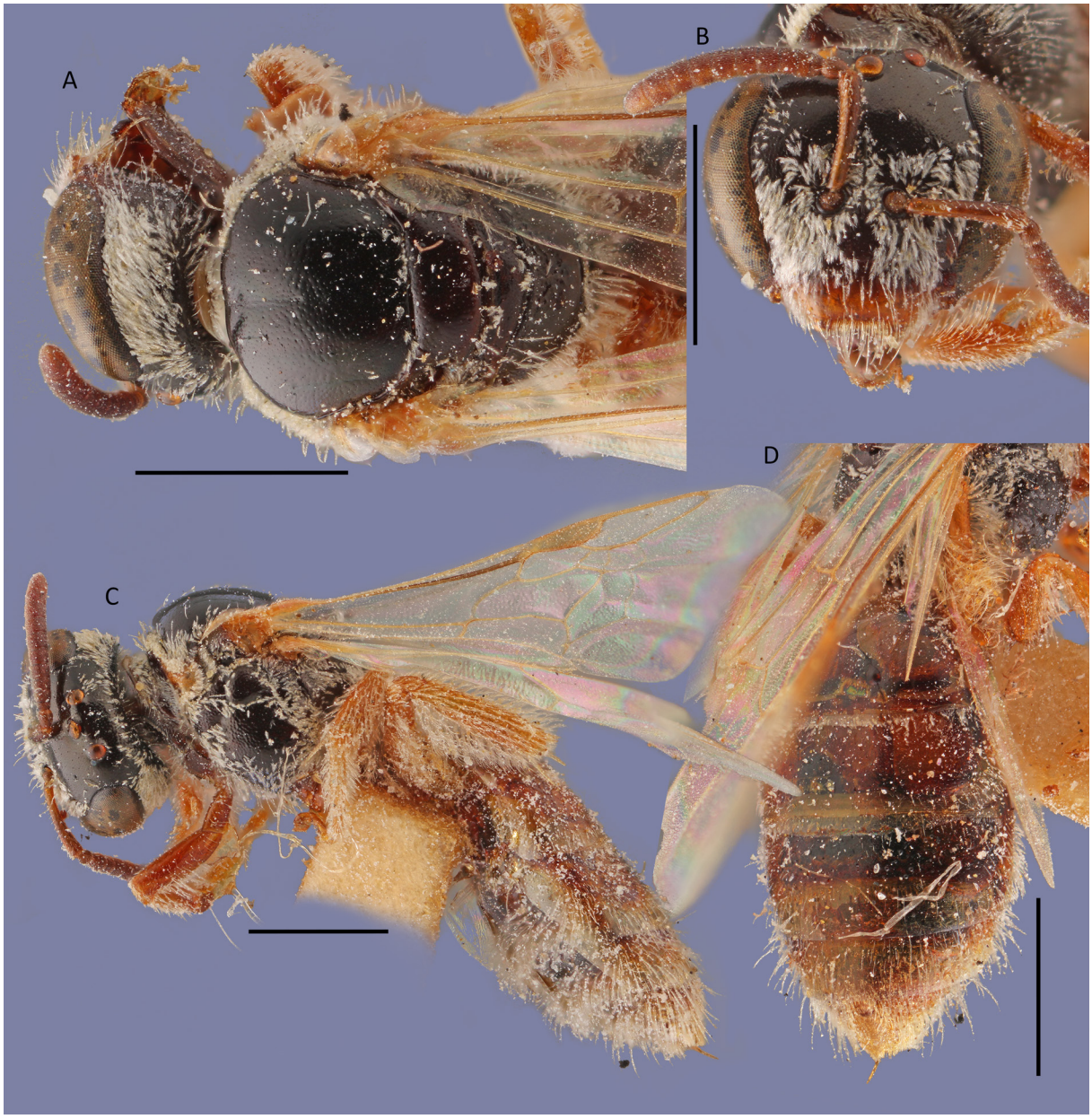


Fig. 14. *Lasioglossum* (*Hemihalictus*) *arizonense* (Crawford, 1907), holotype, ♀ (USNM Type No. 10930). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

Colouration. Head and mesosoma brown. Clypeus orange, except basally. Labrum orange. Mandible brown to orange basally, reddish brown in apically. Flagellum orange. Pronotal lobe orange. Tegula translucent pale amber. Wing membrane pale, veins with subcosta amber, otherwise pale amber. Legs orange. Metasoma orange, sometimes with irregular dark spots.

Pubescence. Body hair colour off-white. Tomentum dense on paraocular area, gena, pronotal angle, lobe and collar, space between pronotal lobe and tegula, mesoscutum marginally and metanotum anteromedially, preëpisternum, metepisternum, and propodeum lateral face; moderately dense on vertex (behind the lateral ocelli), mesepisternum, and propodeum posterior face; moderately dense or sparse (possibly due to wear) on supraclypeal area, frons, mesoscutum medially, T2 basolaterally and T3–T4. Other than the tomentum, mesosoma with erect, weakly plumose, short hairs (< 1 OD) on mesoscutum and erect, plumose, long hairs (< 3 OD) on other areas. Metasomal sterna with moderately dense, erect, plumose, long hairs (< 4 OD). Metafemoral scopa with dense plumose hairs. Wing setae light brown, very short and sparse.

Surface sculpturing. Clypeus polished throughout; large punctures present, irregularly spaced (IS < 3 PD) apically, nearly impunctate apicolaterally, and becoming smaller and denser basally (IS = 1–3 PD), diversopunctate. Supraclypeal area polished; punctures sparse (IS = 1–3 PD), diversopunctate. Frons highly polished; punctures sparse (IS = 4–6 PD), distinctly doubly punctate with minute, shallow punctures throughout (at the points where hairs arise). Ocellocular area highly polished; punctures sparse (IS = 4–6 PD), doubly punctate with minute, shallow punctures. Gena polished, becoming weakly rugulose posteriorly; punctures moderately dense (IS = 1–2 PD). Postgena polished. Tegula impunctate. Mesoscutum highly polished, becoming merely imbricate anteromedially; punctures sparse (IS = 2–7 PD), distinctly doubly punctate with minute, shallow punctures throughout. Mesoscutellum highly polished, punctures sparse (IS = 2–4 PD) marginally and on median line, sparse submedially (IS = 2–6 PD), diversopunctate. Metanotum weakly rugulose, punctures minute and sparse (IS = 1–4 PD). Propodeal triangle with rugae vary; moderately strong rugae, nearly reaching posterior margin medially, anastomosing medially and weakly so laterally or weakly developed rugae, not reaching halfway to posterior margin; interspace sculpture shiny, but weakly imbricate among rugae and laterally, becoming polished posteriorly. Preëpisternum weakly reticulate-punctate, but interspaces shiny. Hypoepimeron highly polished, with large and minute punctures intermixed, sparse (IS = 2–4 PD). Mesepisternum smooth and highly polished; punctures sparse (IS = 3–5 PD), distinctly doubly punctate with minute, shallow punctures throughout. Propodeum lateral face imbricate, becoming polished anteriorly; large punctures sparsely (IS = 3–5 PD) scattered medially and minute punctures sparse (IS = 1–3 PD) on shiny edge; posterior face polished to weakly imbricate, punctures obscure. T1 anterior face polished, punctures present laterally, sparse (IS = 1–4 PD); dorsal surface polished, punctures sparse (IS = 1–4 PD), few present on subapicolateral boss and rim punctures minute and nearly impunctate (short hairs present, but these not arising from distinct punctures). T2 disc polished; punctures sparse (IS =1–4 PD); rim polished or merely coriarious; punctures minute and nearly impunctate (short hairs present, but these not arising from distinct punctures).

Structure. Head wide, length/width ratio 0.87 (± 0.01 SD). Face length/width ratio 0.76 (± 0.02 SD). Clypeus projecting ~ 52% below suborbital tangent; clypeus length/width ratio 0.92 (± 0.10 SD). Mandible short, reaching opposing clypeal angle. Eyes convergent below [UOD/LOD ratio 1.13 (± 0.02 SD)]. Ocelli normal. Gena/eye width ratio 0.66 (± 0.05 SD). Pronotal angle obtuse. Intertegular span 1.13 mm (± 0.07 SD). Mesoscutum length/width ratio 1.13 (± 0.07 SD); mesoscutum/scutellum length ratio 2.87 (± 0.17 SD); scutellum/metanotum length ratio 1.41 (± 0.07 SD); metanotum/propodeal triangle length ratio 0.94 (± 0.03 SD). Protibial spur with apical serrations longer in length to width of malus; malus not reaching much beyond velum. Inner metatibial spur pectinate, teeth 3–4, basal teeth somewhat longer or sometime subequal to width of rachis. Propodeal triangle posterior margin smoothly rounded. Propodeal lateral carina not reaching dorsal margin; oblique carina absent. n = 4.

Male

Unknown

Range

Southern California (specifically the few examined specimens were collected from Colorado River lower basin and the Coachella Valley) to Arizona (Fig. 16). USA (Arizona, California).

Floral hosts

FABACEAE: *Melilotus* sp • BORAGINACEAE: *Heliotropium* sp.

Remarks

See remarks under *L. vanduzeei.*

Lasioglossum* (*Hemihalictus*) *tomentosum sp. nov.
urn:lsid:zoobank.org:act:6065B011-57A8-4B65-B342-EA0DFBD4D96E
Figs 9C, 10C, 15–16, 95A, 96A

Diagnosis

Females of *L. tomentosum* sp. nov. can be easily recognised from any closely related bees by extremely dense, yellowish tomentum, on the body. Even the posterior face of the propodeum is covered by tomentum. The dense tomentum poses challenges in observing the sculpturing and puncture pattern on the body, but it makes this species easily stand out from others. For additional minute characters, please refer to the diagnosis of *L. absurdiceps*.

Males of this species are unknown.

Etymology

The specific epithet '*tomentosum*' is a Latin adjective, which refers to the bees' dense layer of woolly hairs. The prominent layer of pale-yellow tomentum covering the body gives it a distinct appearance.

Type material

Holotype

UNITED STATES – **Utah** • ♀; Washington Co., St George; [37.104° N, 113.584° W]; 14 Apr. 1962; G.F. Knowlton leg.; ex *Tamarix* sp.; SEMC (Fig. 15).

Specimen labels

"UTAH Washington Co. / St George, 14 Apr. / 1962 (G.F. Knowlton) // on flowers of / *Tamarix* // *Lasioglossum* / GIBBS–13406 // HOLOTYPE / *Lasioglossum* (*Hemihalictus*) *tomentosum* Hettiarachchi and Gibbs".

Paratypes

UNITED STATES – **Utah** • 4 ♀♀; Washington Co., St George; [37.104° N, 113.584° W]; 14 Apr. 1962; G.F. Knowlton leg.; ex *Tamarix* sp.; SEMC (Fig. 10C) • 2 ♀♀; Washington Co., Santa Clara; [37.133° N, 113.654° W]; 15 Apr. 1962; G.F. Knowlton leg.; SEMC (Fig. 9C) • 3 ♀♀; Washington Co., Washington; [37.131° N, 113.508° W]; 15 Apr. 1962; G.F. Knowlton leg.; ex *Tamarix*; SEMC.

Description

Female

Body measurements. Length 5.24 mm (±0.45 SD). Head length 1.34 mm (±0.03 SD). Face length 1.15 mm (±0.03 SD). Head width 1.48 mm (±0.03 SD). Wing length 3.79 mm (±0.11 SD). n = 5.

Colouration. Head and mesosoma brown. Clypeus orange, except brown basal half. Labrum orange. Mandible orange basally, reddish brown apically. Flagellum mostly orange, sometime brown dorsally. Pronotal lobe orange. Tegula translucent pale amber. Wing membrane hyaline, veins with subcosta light brown, otherwise pale amber. Legs orange. Metasoma orange, sometimes with irregular dark spots.

Pubescence. Body hair colour pale yellow. Tomentum dense on entire body except clypeus, postgena, pronotum anterior face, propodeum dorsal face, T1, T2 medially and on rim and sterna. Other than the tomentum, mesosoma covered by erect, weakly plumose, short hairs (< 1 OD) on mesoscutum and erect, plumose, long hairs (< 3 OD) on other areas. Metasomal sterna with moderately dense, erect, plumose, long hairs (< 4 OD). Metafemoral scopa with dense plumose hairs. Wing hairs light, very short and sparse.

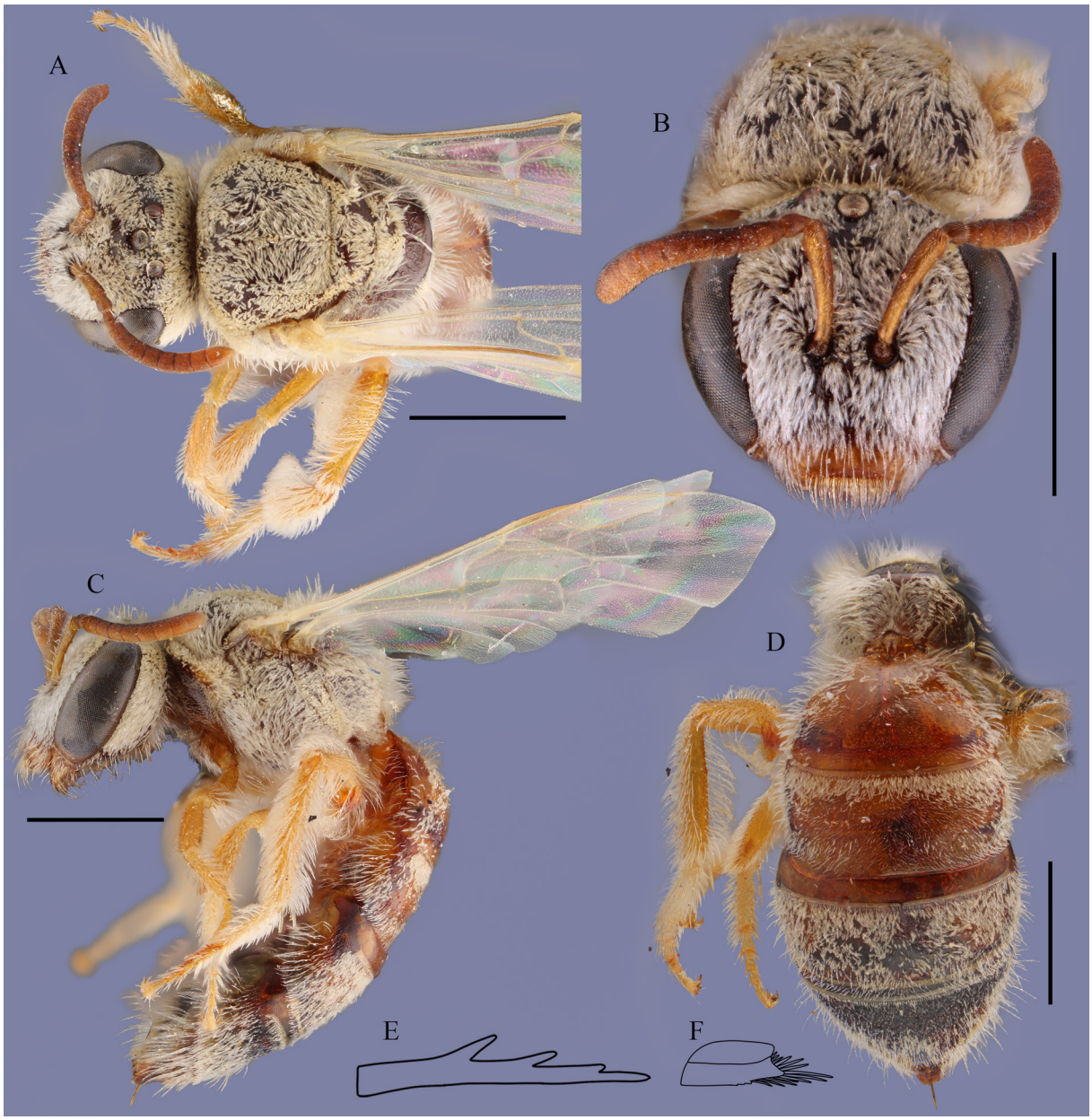


Fig. 15. *Lasioglossum* (*Hemihalictus*) *tomentosum* sp. nov., holotype, ♀ (SEMC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

Surface sculpturing. Clypeus polished throughout; few large punctures present with irregularly spaced (IS < 3 PD) apically, impunctate apicolaterally, and becoming smaller and denser basally (IS = 1–3 PD), diversopunctate. Supraclypeal area polished; punctures moderately sparse (IS = 1–2 PD), diversopunctate. Frons weakly ruguloso-punctate (or more rugulose from some angles) to highly polished; punctures sparse (IS = 1–3 PD), doubly punctate with small punctures throughout (at the points where hairs arise). Ocellocular area highly polished; punctures sparse (IS = 2–5 PD), doubly punctate with minute punctures (at the points where hairs arise). Gena polished, becoming weakly rugulose posteriorly; punctures moderately dense (IS = 1–2 PD). Postgena polished. Mesoscutum highly polished; punctures sparse (IS = 1–3 PD), becoming more sparser on mesad of parapsidal line (IS = 2–5 PD) and denser posteriorly (IS = 1–2 PD), doubly punctate. Mesoscutellum highly polished, punctures moderately sparse (IS = 1–2 PD) posteriorly and on median line, sparser submedially (IS = 2–6 PD), diversopunctate. Metanotum weakly rugulose, punctures minute and sparse (IS = 1–4 PD). Propodeal triangle with rugae weak, nearly reaching posterior margin medially; anastomosing medially and weakly so laterally;

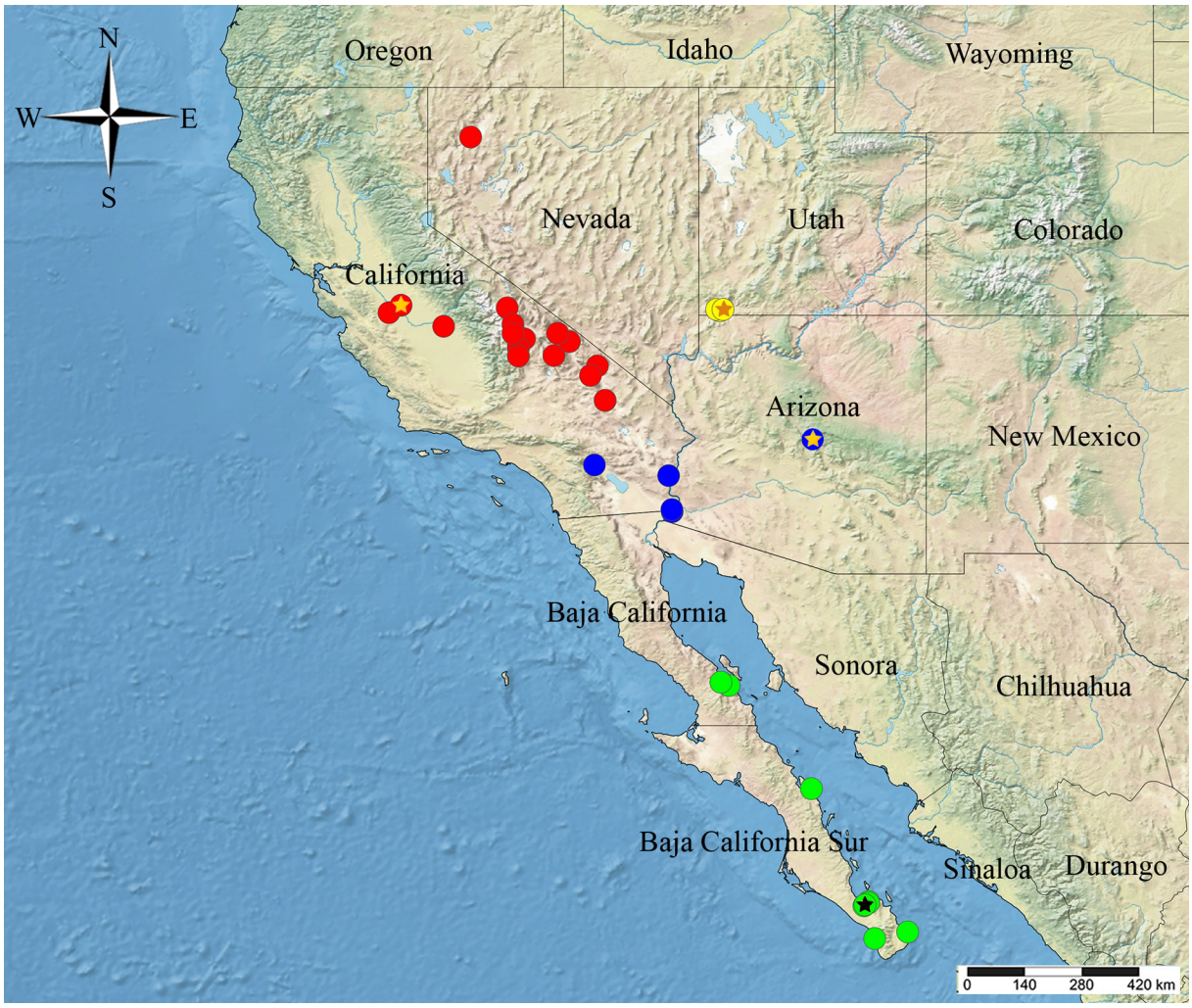


Fig. 16. Distribution map of four species in *Lasioglossum* (*Hemihalictus*) *arizonense* group: *L. absurdiceps* (Timberlake, 1960) (red dots), *L. arizonense* (Crawford, 1907) (blue dots), *L. tomentosum* sp. nov. (yellow dots), and *L. vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev. (green dots). Note: holotype locations are marked with stars inside dots; however, the blue dot with star is centrally placed, as holotype location is only known as Arizona. Produced by Simplemappr (Shorthouse 2010).

sculpture shiny, becoming weakly imbricate laterally. Preëpisternum reticulate-rugulose. Hypoepimeron weakly reticulate-rugulose, polished ventrally. Mesepisternum polished, but weakly reticulate-rugulose dorsally and becoming indistinct ventrally, minute punctures sparse (IS = 1–3 PD). Propodeum lateral face imbricate, becoming weakly imbricate anteriorly; large punctures sparsely (IS = 3–6 PD) scattered medially; posterior face imbricate to weakly imbricate, few punctures sparsely (IS = 2–6 PD) scattered. T1 anterior face polished, punctures present posteriorly, sparse (IS = 1–4 PD), diversopunctate; dorsal surface polished, becoming weakly coriarious on rim, punctures sparse (IS = 1–4 PD), becoming more sparsely punctate (IS = 4–7 PD) in small subapicolateral boss and punctures sparse (IS = 1–3 PD) on rim, becoming impunctate on apical half of rim. T2 disc polished; punctures sparse (IS =1–3 PD); rim coriarious; punctures minute and sparse (IS = 1–3 PD), becoming impunctate towards edge.

Structure. Head wide to round, length/width ratio 0.91 (±0.01 SD). Face length/width ratio 0.77 (±0.01 SD). Clypeus projecting ~53% below suborbital tangent; clypeus length/width ratio 0.97 (±0.09 SD). Mandible short, reaching opposing clypeal angle. Eyes convergent below [UOD/LOD ratio 1.13 (±0.03 SD)]. Ocelli normal. Gena/eye width ratio 0.75 (±0.05 SD). Pronotal angle obtuse. Intertegular span 1.12 mm (±0.04 SD). Mesoscutum length/width ratio 1.22 (±0.02 SD); mesoscutum/scutellum length ratio 2.81 (±0.13 SD); scutellum/metanotum length ratio 1.48 (±0.06 SD); metanotum/propodeal triangle length ratio 0.87 (±0.06 SD). Protibial spur with apical serrations longer in length to width of malus; malus not reaching much beyond velum. Inner metatibial spur pectinate, teeth 3, basal teeth shorter or subequal to width of rachis. Propodeal triangle posterior margin smoothly rounded. Propodeal lateral carina not reaching dorsal margin; oblique carina absent. n = 5.

Male

Unknown.

Range

Washington County, Utah (Fig. 16). USA (Utah).

Floral host

TAMARICACEAE: *Tamarix* sp.

Lasioglossum* (*Hemihalictus*) *vanduzeei (Sandhouse & Cockerell, 1924) stat. rev.
Figs 9A, 10A, 17–21, 96C, 100C, 107A, 120B

Halictus vanduzeei Sandhouse & Cockerell, 1924: 334.

Halictus chionocephalus Sandhouse & Cockerell, 1924: 335. Synonymy by G.C. Eickwort in Moure & Hurd 1987.

Evylaeus arizonensis – Moure & Hurd 1987: 70 (catalogue; in part).

Diagnosis

Females of *L. vanduzeei* can usually be distinguished from other species in the *L. arizonense* group by the following characteristics: polished frons with distinct double punctation consisting of large and minute punctures, punctures relatively sparse (IS = 2–4 PD) (not sparser as in *L. arizonense*); mesoscutum less polished (well-polished in *L. arizonense* and *L. tomentosum* sp. nov.) with deeper and denser punctures (shallow in *L. arizonense*); T3 with a basal tomentum (T3 fully covered by tomentum in *L. absurdiceps* and *L. tomentosum*); and the malus of the protibial spur is longer, measuring nearly ¼ the length of the velum (unlike in other species in the *L. arizonense* group, which lack an extended malus). For additional minute characters, please refer to the diagnosis of *L. arizonense*, which also diagnoses females of *L. vanduzeei.*

Females of *L. vanduzeei* occur in two morphs: a light morph, which has a mostly orange metasoma, and a dark morph, which has a mostly brown metasoma. The dark morph can be easily confused with *L. subobscurum*, as the latter species also exhibits some tomentum on the body. However, *L. subobscurum* can be distinguished by its strongly imbricate frons with dense punctures (IS < 1 PD), imbricate-tessellate mesoscutum with dense punctures (IS ≤ 1 PD), and a duller mesepisternum that lacks punctures.

For the diagnosis of males of *L. vanduzeei*, refer to *L. absurdiceps*.

Etymology

Sandhouse & Cockerell (1924) did not state the derivation of the epithet, but the specific epithet is presumably named for Mr Edward P. Van Duzee (1861–1940), former curator of entomology at the California Academy of Sciences, who collected the type series.

Type material

Holotype of *Halictus vanduzeei* (by original designation; examined by JG ca 2013 and re-examined from photographs)

MEXICO – **Baja California Sur** • ♀; La Paz; [24.14° N, 110.31° W]; 5 Jun. 1921; E.P. Van Duzee leg.; CAS 1545.

Specimen labels

"La Paz / Baja Calf. / June 5 1921 // EPVanDuzee / Collector // *Halictus* / *vanduzeei* / Cockerell + Sandhouse / Type // California Academy of Sciences / Type No. 1545".

Paratypes of *Halictus vanduzeei* (by original designation; examined)

MEXICO – **Baja California** • 1 ♀; Las Animas Bay; [28.39° N, 113.18° W]; 8 May 1921; E.P. Van Duzee leg.; USNM 39979 • 1 ♀; Angeles Bay; [28.91° N, 113.56° W]; 26 Jun. 1921; E.P. Van Duzee leg.; USNM 39979.

Specimen labels

"Las Animas / Bay Gulf Cal. / May 8 1921 // EPVan Duzee / Collector // ParatypeNo. / 39979. / U.S.N.M. // *Halictus* / *vanduzeei* / Sandhouse & Ckll. / Paratype. // *EVYLAEUS* / *ARIZONENSIS* / (CRAWFORD)".

"Angeles Bay / Gulf Calif. / Jun. 26 1921 // EPVan Duzee / Collector // ParatypeNo. / 39979. / U.S.N.M. // *Halictus* / *vanduzeei* / Sandhouse & Ckll. / Paratype.".

Holotype of *Halictus chionocephalus* (by original designation; examined by JG ca 2013 and re-examined from photographs)

MEXICO – **Baja California Sur** • ♂; Loreto; [26.01, 111.34° W]; 20 May 1921; E.P. Van Duzee leg.; CAS 1546 • 1 ♂; Las Animas Bay; [28.39° N, 113.18° W]; 8 May 1921; E.P. Van Duzee leg.; EMEC.

Specimen labels

"Loreto / Baja Cal. / May 20 1921 // EPVanDuzee / Collector // *Halictus* / *chionocephalus* / Cockerell + Sandhouse / Type // California Academy of Sciences / Type No. 1546".

Paratype of *Halictus chionocephalus* (by original designation; examined)

MEXICO – **Baja California** • 1 ♂; Las Animas Bay; [28.39° N, 113.18° W]; 8 May 1921; E.P. Van Duzee leg.; EMEC (Figs 19–20).

Specimen labels

"Las Animas / Bay Gulf Cal. / May 8 1921 // EPVan Duzee / Collector // *Halictus* / *chionocephalus* / Cockerell + Sandhouse / Cotype".

Othe material examined

MEXICO – **Baja California Sur** • 1 ♀; Bahía San Nicolás, San Sebastián; [26.617° N, 111.568° W]; 7 Mar. 1975; P. DeBach leg.; ex Malaise; WRME 0512988 • 1 ♀; same data as for preceding; 19 May 1975; P. DeBach leg.; WRME 0512989 • 1 ♀; Las Barracas; [23.475° N, 109.454° W]; 7 May 1984; P. DeBach leg.; WRME 0512991 • 1 ♀; 2 mi. S of La Paz; [24.1107° N, 110.3131° W]; 2 Aug. 1966; E. Linsley, J. Linsley, J. Chemsak and P.D. Hurd leg.; ex at light; EMEC (Fig. 17B) • 6 ♀♀; same data as for preceding; 31 Jul. 1966; E.G. Linsley and J.M. Linsley leg.; EMEC (Figs 9A, 10A, 17A, 17C–D, 18A) • 6 ♀♀; 9 mi. SW of La Paz; [24.048° N, 110.414° W]; 14 Aug. 1966; J. Powell leg.; EMEC (Fig. 18B) • 1 ♀; 2 mi. S of La Paz; [24.111° N, 110.313° W]; 7 Aug. 1966; J.A. Chemsak leg.; ex *Cleomella refracta* (verbatim: *Wislizenia refracta*); EMEC • 1 ♀; 7 mi. SW of La Paz; [24.068° N, 110.392° W]; 4 Aug. 1966; J.A. Chemsak leg.; ex *Cleomella refracta* (verbatim: *Wislizenia refracta*); EMEC • 1 ♀; El Pescadero, Playa Los Cerritos; [23.330° N, 110.177° W]; 16–17 Apr. 1979; M. Wasbauer leg.; CSCA.

Description

Female

Body measurements. Length 5.77 mm (±0.56 SD). Head length 1.45 mm (±0.07 SD). Face length 1.23 mm (±0.06 SD). Head width 1.66 mm (±0.08 SD). Wing length 3.86 mm (±0.24 SD). n = 6.

Colouration. Head and mesosoma dark brown to black. Clypeus apex dark brown to brown. Labrum brown. Mandible brown basally, light brown apically with reddish brown apex. Flagellum orange to brown. Pronotal lobe orange. Tegula translucent pale amber. Wing membrane pale, veins with subcosta light brown, otherwise amber. Legs orange with more brownish coxae, trochanters, and femora. Metasoma brown, with rims of terga and sterna broadly light brown.

Pubescence. Body hair colour off-white. Tomentum dense on paraocular area, gena, pronotal angle, lobe and collar, space between pronotal lobe and tegula, and metanotum anteromedially; moderately dense on supraclypeal area, frons, vertex, mesoscutum marginally, preëpisternum, metepisternum, propodeum lateral face near marginally, T2 basolaterally, and T3 basally; sparse on mesoscutum (except marginal area), mesepisternum, and T4. Other than the tomentum, mesosoma covered by erect, weakly plumose, short hairs (<1 OD) on mesoscutum and erect, plumose, long hairs (<3 OD) on other areas. Metasomal sterna with moderately dense, erect, plumose, long hairs (<5 OD). Metafemoral scopa with dense plumose hairs. Wing setae light brown, very short and sparse.

Surface sculpturing. Clypeus polished throughout; punctures large, irregularly spaced apically (IS<3 PD), becoming small basally and sometime minute punctures scattered basally. Supraclypeal area weakly imbricate; minute punctures scattered. Frons polished; punctures sparse (IS = 2–4 PD), distinctly doubly punctate with minute punctures throughout (at the points where hairs arise). Ocellocular area polished; punctures sparse (IS = 2–4 PD), doubly punctate with minute punctures. Gena polished, becoming weakly rugulose posteriorly; punctures moderately dense (IS = 1–2 PD). Postgena polished, becoming imbricate adjacent to hypostomal carina. Tegula impunctate. Mesoscutum polished, becoming imbricate to tessellate anteromedially; punctures moderately sparse (IS = 1–2 PD), becoming sparser on mesad of parapsidal line (IS = 1–5 PD), diversopunctate. Mesoscutellum highly polished, punctures moderately dense (IS = 1–2 PD) near lateral and posterior margins, sparse (IS = 1–4 PD) on median line and sparser or nearly impunctate submedially, diversopunctate. Metanotum weakly rugulose, punctures sparse (IS = 1–4 PD). Propodeal triangle with rugae moderately strong, not reaching posterior margin, anastomosing; interspace sculpture weakly imbricate becoming polished posteriorly. Preëpisternum rugulose. Hypoepimeron polished; punctures irregularly spaced (IS<3 PD) and sometime obscure. Mesepisternum polished; punctures sparse (IS = 1–3 PD) dorsally and anteriorly, doubly punctate with minute punctures (not conspicuous from some angles), becoming indistinct, smaller and more sparse

ventro-posteriorly (IS = 3–6 PD). Propodeum lateral face weakly tessellate to imbricate, becoming weakly so towards anterior margin; few large punctures sparsely (IS = 2–5 PD) scattered on posteriorly and minute punctures sparse (IS = 1–3 PD) anteriorly; posterior face weakly imbricate, punctures sparsely (IS = 2–6 PD) scattered. T1 anterior face polished, punctures present laterally, sparse (IS = 1–4 PD); dorsal surface polished, becoming weakly coriarious on rim, punctures sparse (IS = 1–3 PD), becoming more sparsely punctate (IS = 2–7 PD) in small subapicolateral boss and punctures sparse (IS = 1–3 PD) on rim, becoming impunctate on apical half of rim. T2 disc polished, punctures moderately dense (IS =1–2 PD) basally, becoming sparse (IS = 1–3 PD) apically; rim coriarious sometimes, punctures minute and sparse (IS = 1–3 PD), becoming impunctate towards edge.

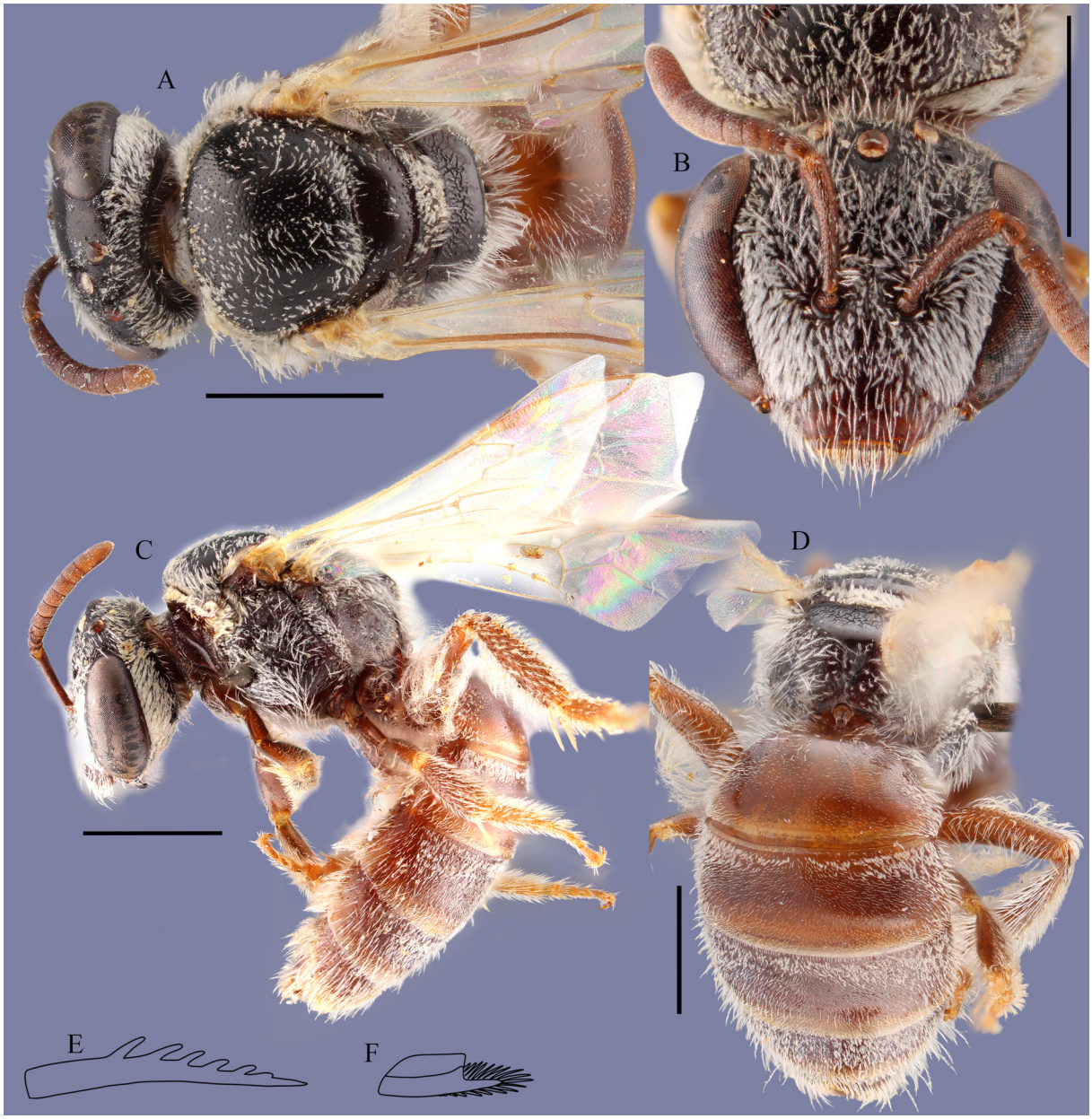


Fig. 17. *Lasioglossum* (*Hemihalictus*) *vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev., ♀♀ (EMEC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

Structure. Head wide, length/width ratio 0.87 (±0.01 SD). Face length/width ratio 0.74 (±0.02 SD). Clypeus projecting ~54% below suborbital tangent; clypeus length/width ratio 1.00 (±0.11 SD). Mandible short, just extending beyond opposing clypeal angle. Eyes convergent below [UOD/LOD ratio 1.15 (±0.06 SD)]. Ocelli normal. Gena/eye width ratio 0.74 (±0.02 SD). Pronotal angle obtuse. Intertegular span 1.23 mm (±0.08 SD). Mesoscutum length/width ratio 1.14 (±0.05 SD); mesoscutum/scutellum length ratio 2.99 (±0.23 SD); scutellum/metanotum length ratio 1.54 (±0.15 SD); metanotum/propodeal triangle length ratio 0.91 (±0.11 SD). Protibial spur with apical serrations longer in length to width of malus; malus extending beyond the velum, nearly ¼ of length of velum. Inner metatibial spur pectinate, teeth 4–5, basal teeth somewhat longer or sometime subequal to width of rachis. Propodeal triangle posterior margin smoothly rounded. Propodeal lateral carina nearly reaching dorsolateral slope; oblique carina absent. n = 6.

Variation. The mesoscutum is occasionally tessellate anteriorly and medially, while other are regions weakly tessellate; the mesoscutellum can also be weakly tessellate to tessellate, particularly in posterior areas; in some instances, the rugae on the propodeal triangle can appear strong, and the sculpture may exhibit weak tessellation posteriorly; The rim area of T1 also can occasionally appear coriaceous. The colour of the metasoma varies between orange and brown. Some dark morphs exhibit a reddish-brown coloration, while others have an entirely brown metasoma with light-brown rims on the terga and



Fig. 18. Metasoma of *Lasioglossum* (*Hemihalictus*) *vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev., ♀ ♀ (EMEC). **A**. light morph. **B**. Dark morph. Scale bar = 1 mm.

sterna. Although all type specimens represent the dark morph with a brown metasoma, the light morph, characterized by an orange metasoma, is noted here as a variation.

Male

Body measurements. Length 4.9 mm. Head length 1.38 mm. Face length 1.2 mm. Head width 1.57 mm. Wing length 3.5 mm. n = 1.

Colouration. Head and mesosoma dark brown to black. Clypeus light brown apically. Labrum light brown. Mandible orange with reddish brown apical ⅓. Flagellum orange. Pronotal lobe orange. Tegula translucent pale amber. Wing membrane pale, veins with subcosta light brown, otherwise amber. Legs light brown. Metasoma brown to black with rims of T4–5 light brown.

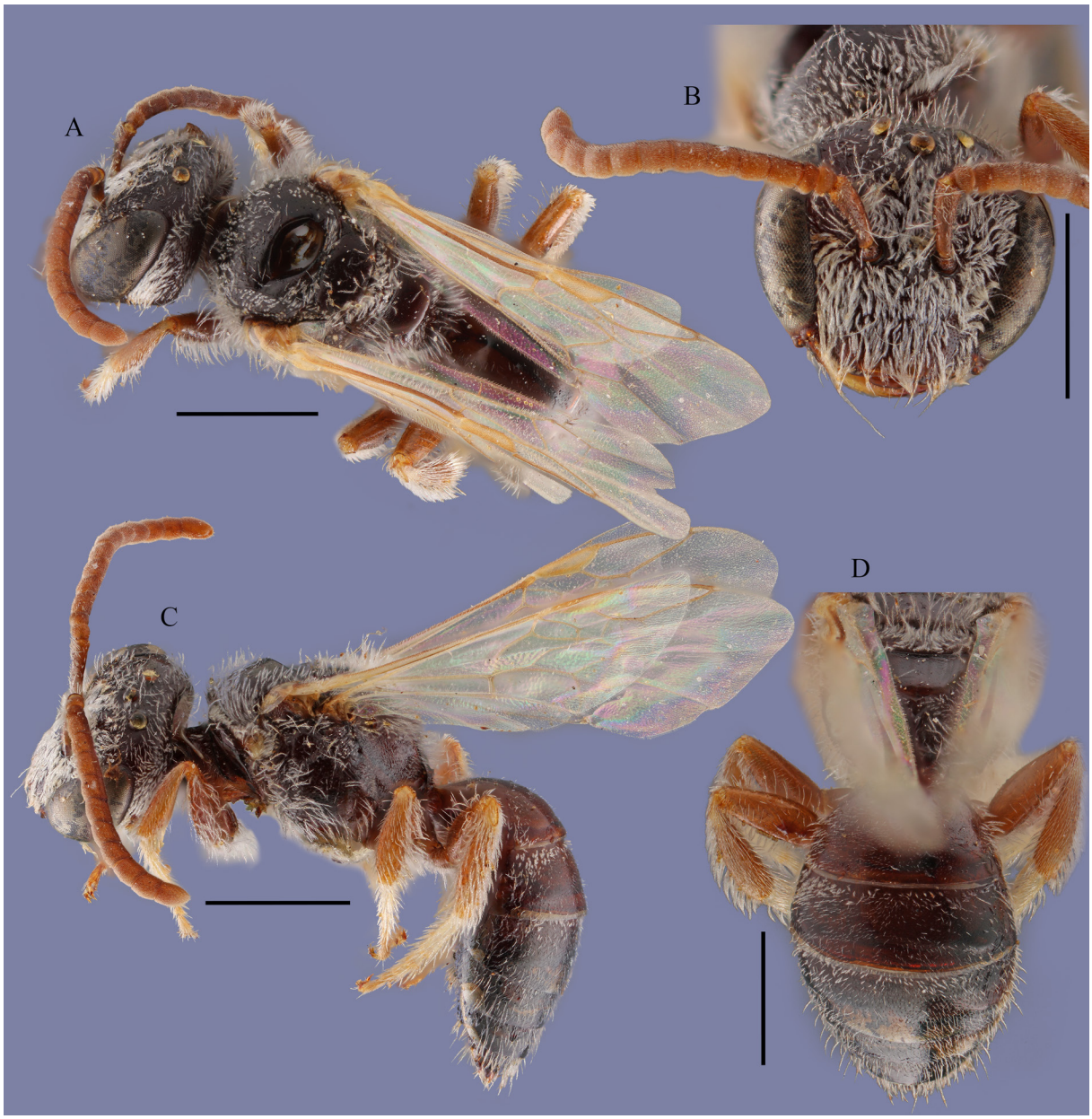


Fig. 19. *Lasioglossum* (*Hemihalictus*) *vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev., paratype, ♂ (EMEC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

Pubescence. Body hair colour white. Tomentum dense on head except vertex area, pronotal angle, lobe and collar, space between pronotal lobe and tegula, and metanotum; moderately dense on mesoscutum, scutellum, and T2–T3 basolaterally. Due to the wear on the specimen, assessing the tomentum on other parts of the body is challenging. Mesosoma covered by erect, weakly plumose, short hairs (< 1 OD) on mesoscutum and erect, plumose, long hairs (< 3 OD) on other areas. Metasomal sterna with moderately dense, erect, moderately plumose, short hairs (< 2 OD). Wing hairs light, short and sparse.

Surface sculpture. Clypeus polished, punctures, moderately sparse (IS = 1–2 PD) basally, becoming sparse (IS = 1–4 PD) apically, diversopunctate. Supraclypeal area polished, punctures dense (IS≤1 PD). Frons polished; punctures minute, moderately dense (IS = 1–2 PD). Ocellocular area polished; punctures minute, sparse (IS = 3–7 PD). Gena polished, becoming ruguloso-lineate posteriorly; punctures moderately dense (IS = 1–2 PD). Postgena imbricate. Tegula impunctate. Mesoscutum well-polished; punctures sparse (IS = 2–4 PD), becoming more indistinct and sparse mesad of parapsidal line (IS = 3–7 PD). Mesoscutellum well-polished; punctures sparse (IS = 1–3 PD) marginally and on median line, nearly impunctate submedially. Metanotum weakly rugulose, punctures sparse (IS = 1–4 PD). Propodeal triangle with rugae absent; sculpture tessellate, becoming polished posteriorly. Preëpisternum weakly rugulose. Hypoepimeron polished; punctures sparse (IS = 1–4 PD), diversopunctate. Mesepisternum polished; punctures sparse (IS = 1–3 PD), becoming smaller and more sparsely punctate (IS = 2–6 PD) ventrally, diversopunctate. Propodeum lateral face imbricate, becoming ruguloso-lineate dorso-posteriorly; posterior face polished to weakly imbricate. T1 anterior face polished, few punctures present laterally; dorsal surface polished, punctures sparse (IS = 1–2 PD), becoming more sparsely punctate (IS = 2–6 PD) in small subapicolateral boss, and punctures sparse (IS = 1–3 PD) on rim, becoming impunctate on apical half of rim. T2 disc polished; punctures sparse (IS =1–6 PD) basally, becoming closer medially (IS =1–3 PD); rim polished, punctures sparse (IS =1–3 PD) becoming impunctate apically.

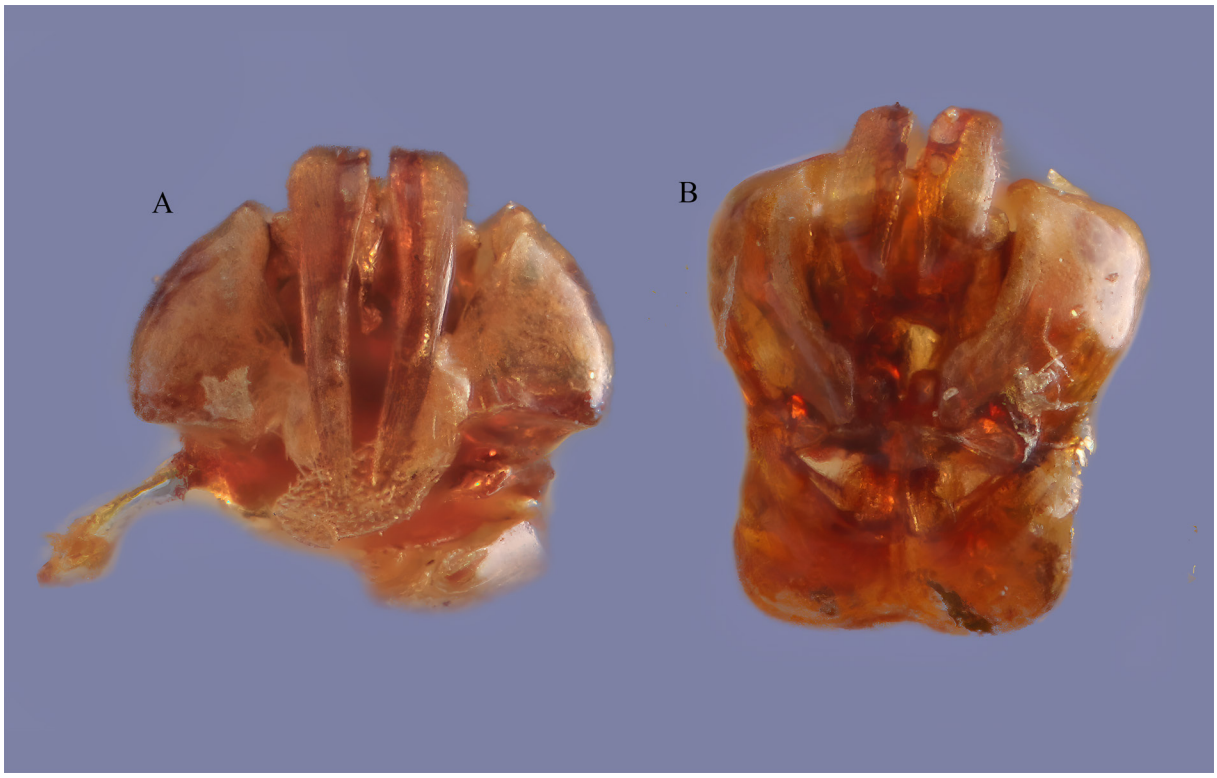


Fig. 20. Genitalia of *Lasioglossum* (*Hemihalictus*) *vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev., paratype, ♂ (EMEC). **A**. Dorsal view. **B**. Ventral view.

Structure. Head wide, length/width ratio 0.88. Face length/width ratio 0.77. Clypeus projecting ~54% below suborbital tangent. Mandible long and elongate, nearly reaching opposing mandibular base. Flagellomeres short, F1:pedicel length ratio 0.7; F2:F1 length ratio 1.93; F2 length/width ratio 1.13. Gena/eye width ratio 0.67. Forewing with 3 submarginal cells. Pronotal angle obtuse. Intertegular span 0.99 mm. Mesoscutum length/width ratio 1.18. Propodeal triangle posterior margin smoothly rounded. Propodeal lateral carina reaching dorsolateral slope; oblique carina absent. n = 1.

Genitalia (Figs 20, 120B). Gonostylus approximately twice as long as broad, with short setae. Retrorse lobe rounded apically, about 3 times as long as broad, covered in short setae.

Range

Baja California Peninsula (Figs 16, 21).

Floral host

CAPPARACEAE: *Cleomella refracta* (Engelm.) J.C.Hall & Roalson • BORAGINACEAE: *Heliotropium curassavicum* var. *oculatum* (A.Heller) Thorne • FABACEAE: *Melilotus* sp. • TAMARICACEAE: *Tamarix aralensis* Bunge, *Tamarix ramosissima* Ledeb. • ZYGOPHYLLACEAE: *Larrea tridentata* (DC.) Coville.

Remarks

Halictus vanduzeei and *H. chionocephalus* were described in the same paper. Although their similarity was noted, differences in the propodeal sculpturing led the authors to keep them separate. They were later both treated as synonyms of *L. arizonense* in a catalogue of halictid bees (Moure & Hurd 1987), which was attributed to George Eickwort. Our study of the *L. arizonense* group has led to the resurrection

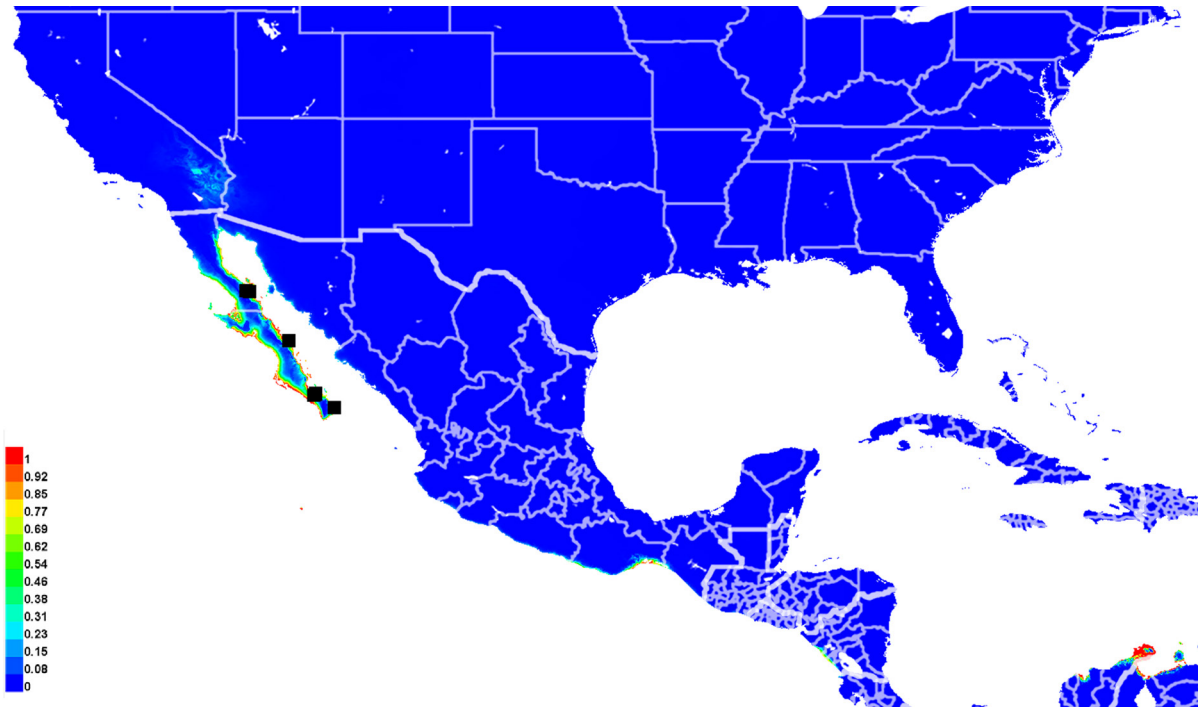


Fig. 21. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev. (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

of *Lasioglossum vanduzeei* as a valid species, distinct from *L. arizonense*, with *H. chionocephalus* remaining its synonym.

Lasioglossum* (*Hemihalictus*) *aspilurus (Cockerell, 1925)
Figs 22–26, 95E, 98B, 104K, 112E, 119B, 120C

Halictus aspilurus Cockerell, 1925: 190.
Halictus (*Evylaeus*) *humboldtensis* Michener, 1936:166. **Syn. nov.**

Lasioglossum (*Evylaeus*) *aspilurum* – Michener 1951: 1108 (catalogue).
Lasioglossum (*Evylaeus*) *humboldtense* – Michener 1951: 1108 (catalogue).
Evylaeus aspilurus – Hurd 1979: 1959 (catalogue). — Moure & Hurd 1987: 70 (catalogue).
Evylaeus humboldtensis – Hurd 1979: 1960 (catalogue). — Moure & Hurd 1987: 75 (catalogue).

Diagnosis

Both sexes are readily identifiable by their short head (length/width ratio < 1) and reddish orange metasoma, which is a unique combination for *L.* (*Hemihalictus*) west of the Sierra Nevada Mountains. *Lasioglossum ovaliceps* is similarly coloured but has a long head (length/width ratio > 1.1) (see Diagnosis for *L. ovaliceps*). Both sexes of *L. aspilurus* have been recorded with dark morphs, characterized by brown abdomens, though such individuals are exceedingly rare (Fig. 24). *Lasioglossum aspilurus* lack the tomentum present in the *L. arizonense* group. *Lasioglossum aspilurus* may be mistaken for *Sphecodes* Latreille, 1804, but the generic characters for *Lasioglossum* will distinguish them and the yellow maculation of the male is not present in *Sphecodes.*

Etymology

The specific epithet is presumably a reference to the absence of tomentum on the metasoma. It is apparently derived from the Greek ‘σπίλος’ for ‘spot’ and ‘οὐρά’ for ‘tail’, and the prefix ‘a-’ indicating their absence. The ending ‘-urus’ is ambiguous and could be a Greek noun ending (-ος) or Latin adjectival ending (-us). Following article 31.2.2 and 34.2.1 (ICZN 1999), we treat it as a noun in apposition and retain the original spelling.

Type material

Holotype of *Halictus aspilurus* (by original designation; examined by JG ca 2013 and re-examined from photographs)
UNITED STATES – **California** • ♀; Monterey Co., Pleyto; [35.86 ° N, 120.99° W]; 22 May 1920; E.P. Van Duzee leg.; CAS 1651.

Specimen labels
“Pleyto Cal. / MontereyCo. / May 22 1920 // EPVan Duzee / Collector // *Halictus* / *aspilurus* / Ckll TYPE // California Academy / of Sciences / Type No. 1651”.

Holotype of *Halictus* (*Evylaeus*) *humboldtensis* (by original designation; examined by JG ca 2013 and re-examined from photographs)
UNITED STATES – **California** • ♀; Humboldt Co., Garberville; [40.10° N, 123.80° W]; 19 Apr. 1935; E. P. Van Duzee leg.; CAS 4200.

Specimen labels
“Garberville Cal. / Humboldt Co. / IV-19-35 // EPVan Duzee / Collector // *Ceanothus* // *Halictus* / *humboldtensis* / Mich. / TYPE // California Academy / of Sciences / Type No. 4200”.

Material examined

CANADA – **British Columbia** • 1 ♀; Okanagan Falls, Vaseux Lake Provincial Park; 49.29913° N, 119.53065° W; 7 Jul.–16 Aug. 2021; H. Singh and T. McGratton (J.H) leg.; RSKM.

UNITED STATES – **California** • 1 ♂; Alameda Co., Arroyo Mocho; 20 mi. S of Livermore; [37.558° N, 121.581° W]; 22 Jul. 1955; ex Asclepias; EMEC (Figs 23, 24D) • 4 ♀♀; Butte Co., Chico; [39.729° N, 121.8371° W]; 26 Apr. 1967; R.G. Malin leg.; UCRC (Figs 22, 24A) • 1 ♀; Contra Costa Co., Pine Canyon, Mount Diablo; [38.456° N, 121.978° W]; 23 May 1937; R.L. Usinger leg.; EMEC • 1 ♀; El Dorado Co., Snowline Camp; [38.747° N, 120.624° W]; 20 Jun. 1948; P.D. Hurd leg.; ex *Chamaebatia foliolosa*; EMEC • 2 ♀♀; Humboldt Co., Garberville; [40.10° N, 123.80° W]; 19 Apr. 1935; ex *Cercocarpus betuloides*; UCRC (Fig. 24B) • 1 ♂; Humboldt Co., Redwood Creek at Stover Road, Redwood Valley N. of Hwy 299; [37.505° N, 122.213° W]; elev. 198.12 m; 10 Aug. 1966; H.B. Leech leg.; CAS (Fig. 25) • 2 ♀♀; Humboldt Co.; [40.75° N, 123.87° W]; 23 May 1911; F.W. Nunenmacher leg.; USNM • 1 ♀; Inyo Co., Haiwee Reservoir; [36.155° N, 117.953° W]; 23 Apr. 1944; R.D. Flrich leg.; UCRC • 1 ♀; Los Angeles Co., 5 mi. S of Pearblossom; [34.431° N, 117.910° W]; 23 Apr. 1956; E.G. Linsley leg.; ex *Tamarix gallica*; EMEC • 2 ♀♀; Los Angeles Co., Acton; [34.470° N, 118.197° W]; 19 Mar. 1956; E.G. Linsley leg.; EMEC • 3 ♀♀; same data as for preceding; 19 Mar. 1936; E.G. Linsley leg.; ex *Salix*; EMEC • 1 ♀; same data as for preceding; 19 Apr. 1936; E.G. Linsley leg.; ex *Salix*; EMEC • 1 ♀; Los Angeles Co., San Gabriel Can. near Dam no. 1; [34.2064° N, 117.8603° W]; 17 Apr. 1955; Hogue leg.; LACM • 1 ♀; Los Angeles Co., Santa Monica Mountains; [34.120° N, 118.932° W]; 18 Apr. 1953; A. Fukushima leg.; LACM • 1 ♀; Madera Co.; [37.25° N, 119.7° W]; 19 May 1942; A.J. Walz leg.; ex Lupinus; EMEC • 1 ♀; Mariposa Co., Yosemite; [37.833° N, 119.500° W]; 9 May 1941; Cockerell leg.; ex Nemophila; UCRC • 1 ♀; Mariposa Co., Yosemite National Park; [37.865° N, 119.538° W]; 1–31 May 1910; LACM • 1 ♀; Mariposa Co., Yosemite Valley; [37.746° N, 119.594° W]; 19 Jun. 1921; E.O. VanDyke leg.; CAS • 1 ♀; same data as for preceding; 17 Jun. 1921; E.P. Van Duzee leg.; CAS • 1 ♀; Mariposa Co.; [37.51° N, 119.88° W]; 2 Jun. 1914; F.W. Nunenmacher leg.; EMEC • 1 ♀; Mendocino Co., Big Rock Creek; [34.408° N, 117.828° W]; 25 Apr. 1926; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; Mendocino Co., Hopland; [38.979° N, 123.108° W]; 9 May 1925; E.P. Van Duzee leg.; CAS • 1 ♀; Mendocino Co., UC Hopland Field Station, near Headquarters; [39.001° N, 123.083° W]; elev. 268.22 m; 17 May 1968; W.J. Turner leg.; EMEC • 2 ♀♀; Monterey Co., Arroyo Seco Campground; [36.236° N, 1231.482° W]; 24 Apr. 1976; M. Wasbauer leg.; CSCA • 1 ♀; Nevada Co., 3 mi. NW of Newton; [38.735° N, 120.719° W]; 14 Apr. 1934; P.H. Timberlake leg.; ex *Cryptantha intermedia*; UCRC • 2 ♀♀; Plumas Co., Belden; [40.006° N, 121.249° W]; 12 Apr. 1949; J.W. MacSwain leg.; ex *Rhus*; EMEC • 1 ♀; Riverside Co., Riverside; [33.956° N, 117.372° W]; elev. 290 m; 19 Feb. 1928; P.H. Timberlake leg.; ex *Salix vestita* (verbatim: *Salix leiolepis*); UCRC • 1 ♀; same data as for preceding; 2 May 1939; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 6 Apr. 1940; P.H. Timberlake leg.; ex *Salix gooddingii*; UCRC • 2 ♀♀; same data as for preceding; 13 May 1951; P.H. Timberlake leg.; ex boysenberry; UCRC • 1 ♀; same data as for preceding; 4 May 1950; P.H. Timberlake leg.; ex *Sisymbrium irio*; UCRC • 1 ♀; same data as for preceding; 4 May 1950; P.H. Timberlake leg.; ex *Salix vestita* (verbatim: *Salix leiolepis*); UCRC • 1 ♀; same data as for preceding; 22 Feb. 1935; P.H. Timberlake leg.; ex *Sedum*; UCRC • 1 ♀; same data as for preceding; 24 May 1925; P.H. Timberlake leg.; ex ?*Margarita*; UCRC • 1 ♀; same data as for preceding; 18 May 1947; P.H. Timberlake leg.; ex *Veronica*; UCRC • 1 ♂; Riverside Co., Riverside; Santa Ana River; [33.988° N, 117.396° W]; 26 Jun. 1965; G.R. Ballmer leg.; UCRC • 1 ♀; San Benito Co., Paicines; [36.7305° N, 121.2791° W]; 24 Apr. 1968; J.A. Chemsak leg.; ex *Baccharis*; EMEC • 2 ♀♀; San Bernardino Co., Tetley Park; [34.246° N, 117.309° W]; 08 May 1940; Philip H. Timberlake leg.; ex *Erodium cicutarium*; UCRC • 1 ♀; same data as for preceding; 15 May 1937; P.H. Timberlake leg.; ex *Salix laevigata*; UCRC • 1 ♀; San Bernardino Co., 15 km SSE of Hesperia, Hwy 173; [34.301° N, 117.238° W]; elev. 1021.1 m; 21 Apr. 1981; J.A. Bethke leg.; UCRC • 1 ♀; San Bernardino Co., Lytle Creek Ranger Sta., 10 mi. N of Fontana; [34.234° N, 117.480° W]; 14 Apr. 1965; C. Slobodchikoff leg.; EMEC • 1 ♀; San Bernardino Co., Lytle Creek; 8 mi. of N of Fontana; [34.259° N, 117.500° W]; 14 Apr. 1965; J. Powell leg.; ex

Ceanothus; EMEC • 1 ♀; San Bernardino Co., Mill Creek; [40.360° N, 121.493° W]; elev. 1341 m; 1–31 May 1930; ex *Cryptantha intermedia*; UCRC • 1 ♀; San Bernardino Co., Miller Canyon, San Bernardino Mountains; [34.13° N, 116.88° W]; 19 May 1941; E.O. VanDyke leg.; CAS • 1 ♀; San Bernardino Co., Wildwood Canyon; 5 mi. E of Calimesa; [34.020° N, 116.999° W]; 14 May 1969; M.E. Irwin leg.; UCRC • 1 ♀; San Diego Co., Cuyumaca; [32.946° N, 116.576° W]; 19 Apr. 1950; E.G. Linsley leg.; ex *Baeria*; EMEC • 1 ♀; San Diego Co., Descanso; [32.853° N, 116.616° W]; 30 Mar. 1961; P.D. Hurd leg.; ex *Salix*; EMEC • 1 ♀; San Diego Co., Rincon; [33.324° N, 116.969° W]; 16 Jul. 1928; E.O. VanDyke leg.; CAS • 1 ♀; San Diego Co., Warner Springs; [33.282° N, 116.634° W]; 19 Apr. 1950; E.G. Linsley leg.; ex *Cryptantha*; EMEC • 2 ♀♀; San Luis Obispo Co., 5 mi. NW of Nipomo; [35.093° N, 120.539° W]; 19 Mar. 1969; P.A. Opler leg.; ex *Ceanothus*; EMEC • 1 ♀; San Luis Obispo



Fig. 22. *Lasioglossum* (*Hemihalictus*) *aspilurus* (Cockerell, 1925), ♀ (UCR). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

Co., Nacimiento Dam; [35.855° N, 120.926° W]; 14 Apr. 1967; P.A. Rude leg.; EMEC • 1 ♀; San Luis Obispo Co., Paso Robles; [36.293° N, 120.703° W]; 22 Apr. 1919; E.P. Van Duzee leg.; CAS • 1 ♀; San Luis Obispo Co., Pozo; [35.305° N, 120.375° W]; 28 Apr. 1962; C.A. Toschi leg.; EMEC • 1 ♀; same data as for preceding; 27 Apr. 1962; J. Powell leg.; EMEC • 1 ♀; same data as for preceding; 20 Apr. 1962; C.A. Toschi leg.; EMEC • 1 ♂; San Mateo Co., Corte de Madera Creek, Portola; [37.397° N, 122.316° W]; 27 Jun. 1959; P.H. Arnaud Jr leg.; CAS • 1 ♀; Santa Barbara Co., Los Prietos; [34.542° N, 119.802° W]; 25 Jun. 1965; E.M. Omi leg.; EMEC • 1 ♀; same data as for preceding; 23 Jun. 1965; E.M. Omi leg.; EMEC • 1 ♀; same data as for preceding; 23 Jun. 1965; J. Powell leg.; EMEC • 1 ♂; same data as for preceding; 23 Jun. 1965; R.W. Gear leg.; EMEC (Fig. 24E) • 2 ♀♀; Santa Clara Co., Stanford University; [37.43° N, 122.17° W]; 4 Apr. 1956; P.H. Arnaud Jr leg.; CAS • 1 ♀; same data as for preceding; 10 Apr. 1956; P.H. Arnaud Jr leg.; ex *Stellaria media*; CAS • 1 ♀; Santa Clara Co., Stevens

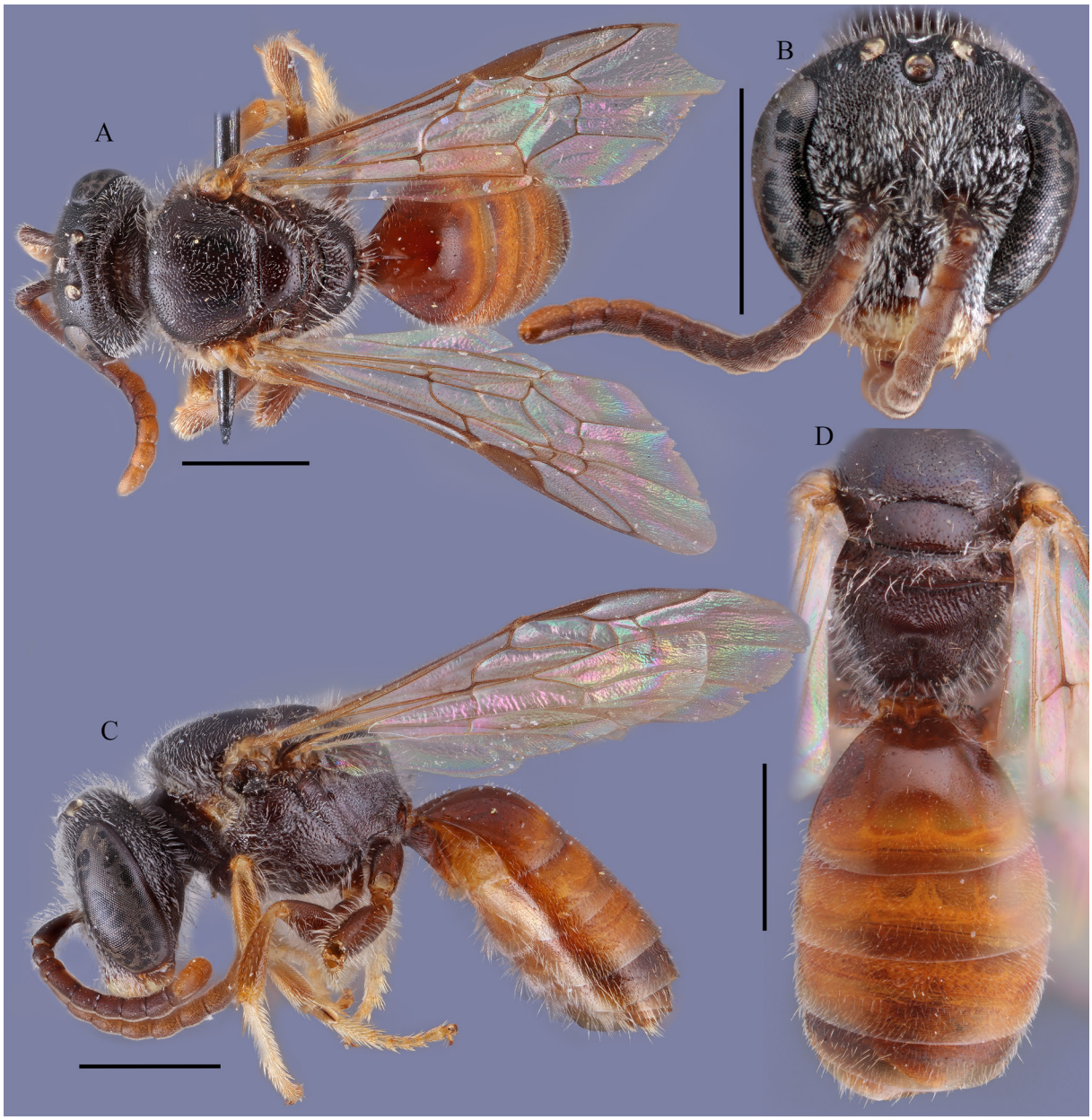


Fig. 23. *Lasioglossum* (*Hemihalictus*) *aspilurus* (Cockerell, 1925), ♂ (EMEC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

Creek Reservoir; [37.297° N, 122.077° W]; 13 Apr. 1953; D. Burdick leg.; EMEC • 1 ♂; Santa Cruz Co., Mount Hermon; [37.051° N, 122.058° W]; 7–30 Jul. 1932; F.E. Blaisdell leg.; CAS • 1 ♀; Shasta Co., 7 mi. NE of Burney; [40.953° N, 121.566° W]; 30 May 1952; J.G. Rozen leg.; EMEC • 1 ♀; Shasta Co., Castle Rock State Park; [37.230° N, 122.125° W]; elev. 2133.6 m; 3 May 1953; J.D. Lattin leg.; EMEC • 1 ♀; Shasta Co., Old Station; [40.675° N, 121.431° W]; 22 Jun. 1955; E.E. Lindquist leg.; EMEC • 1 ♀; Shasta Co., Redding; [40.579° N, 122.394° W]; 7 Jul. 1979; T.R. Haig leg.; CSCA • 1 ♀; Shasta



Fig. 24. Metasoma of *Lasioglossum* (*Hemihalictus*) *aspilurus* (Cockerell, 1925). **A–B**. Light morphs of females (UCRC). **C**. Dark morph of female (UCRC). **D**. Light morph of male (UCRC). **E**. Dark morph of male (UCRC). Scale bar = 1 mm.

Co.; [40.79° N, 121.85° W]; 2 May 1913; F.W. Nunenmacher leg.; EMEC • 1 ♀; Stanislaus Co., La Grange; [37.664° N, 120.464° W]; 15 Apr. 1961; R.R. Snelling and M.D. Snelling leg.; ex *Salix*; LACM • 1 ♀; Trinity Co., 6 mi. NE of Hayfork; [40.611° N, 123.101° W]; 20 May 1973; J. Chemsak leg.; ex *Rhamnus*; EMEC • 1 ♀; Trinity Co., Hayfork; [40.555° N, 123.184° W]; 23 May 1973; J. Chemsak leg.; EMEC • 1 ♀; Trinity Co., Hayfork Ranger Station; [40.553° N, 123.165° W]; elev. 701 m; 18 May 1973; EMEC • 1 ♀; Tulare Co., 2 mi. E of Johnsondale; [35.975° N, 118.504° W]; 27 Apr. 1964; C.A. Toschi leg.; EMEC • 1 ♀; same data as for preceding; 27 Apr. 1964; C.A. Toschi leg.; ex *Prunus subcordata*; EMEC • 1 ♀; same data as for preceding; 27 Apr. 1964; J. Powell leg.; ex *Prunus subcordata*; EMEC • 2 ♀♀; same data as for preceding; 27 Apr. 1964; P. Rude leg.; ex *Salix* sp.; EMEC • 1 ♀; Tulare Co., Fairview; [37.679° N, 122.051° W]; 27 Apr. 1964; C.A. Toschi leg.; EMEC • 1 ♀; Tulare Co., Visalia; [36.330° N, 119.292° W]; Culbertson leg.; USNM • 1 ♀; Tuolumne Co., Basin Creek campground;

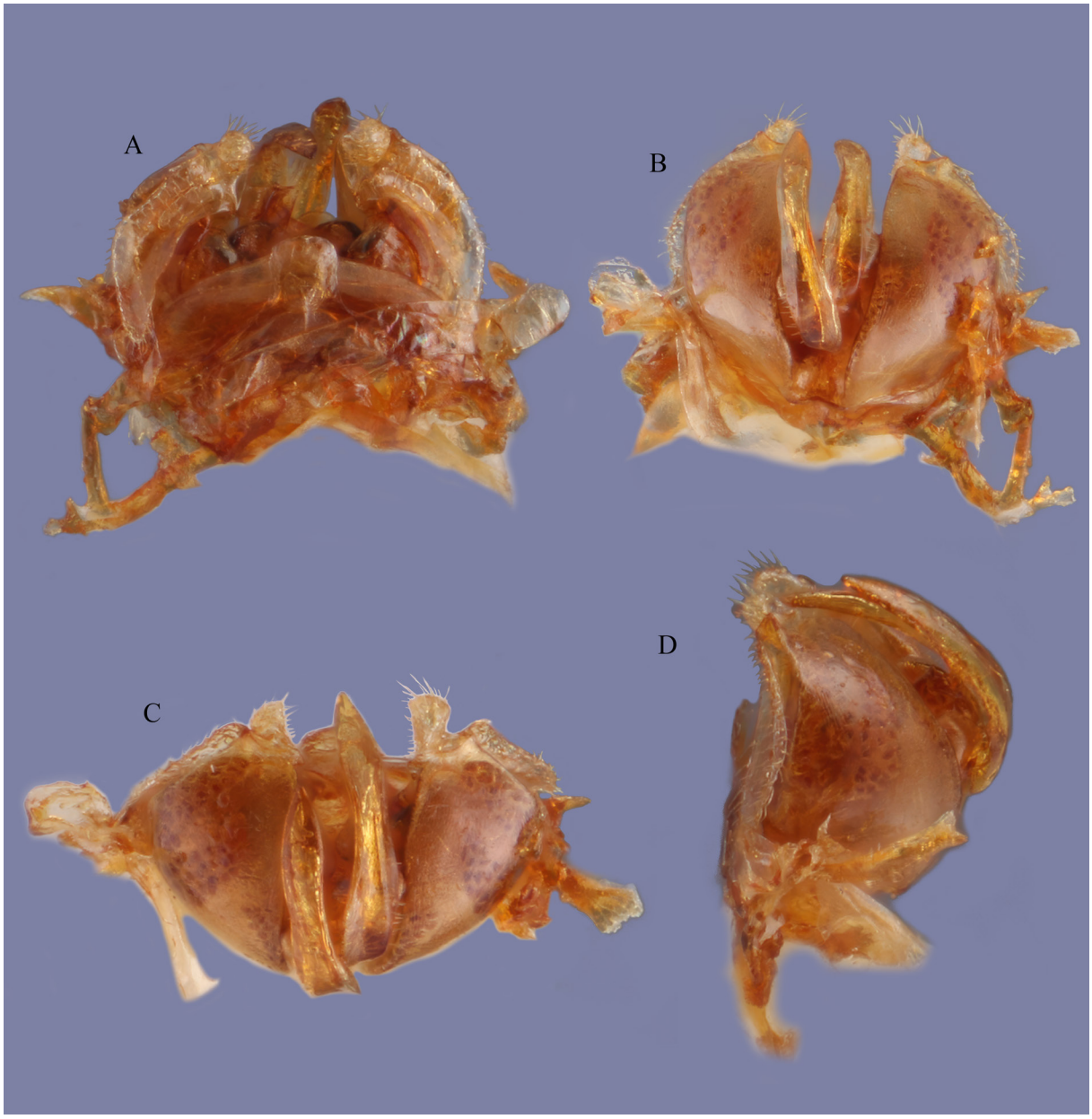


Fig. 25. Genitalia of *Lasioglossum* (*Hemihalictus*) *aspilurus* (Cockerell, 1925), ♂ (CAS). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

[38.166° N, 120.184° W]; 1 Jul. 1963; P.H. Arnaud Jr leg.; CAS • 1 ♀; Ventura Co., Chuchupate Ranger Station, base Frazier Mtn; [34.816° N, 119.011° W]; 5 May 1959; G.I. Stage leg.; ex *Descurainia sophia*; EMEC • 1 ♀; Ventura Co., Grade Valley; 9 mi. SW of Stauffer P.O.; [34.655° N, 119.109° W]; 7 May 1959; C.W. O'Brien leg.; EMEC • 10 ♀♀; Ventura Co., Lockwood Creek near Stauffer P.O.; [34.730° N, 119.033° W]; 5 May 1959; P.D. Hurd leg.; ex *Descurainia sophia*; EMEC • 1 ♀; Ventura Co., Lockwood Creek, near Stauffer P.O.; [34.730° N, 119.033° W]; 5 May 1959; J.R. Powers leg.; ex *Descurainia sophia*; EMEC • 2 ♀♀; same data as for preceding; 7 May 1959; P.D. Hurd leg.; ex *Descurainia sophia*; EMEC • 1 ♀; Ventura Co., Lockwood Creek, near Stauffer P.O.; [34.729° N, 119.033° W]; 7 May 1959; J.R. Powers leg.; EMEC • 1 ♀; same data as for preceding; 7 May 1959; P.D. Hurd leg.; EMEC • 1 ♀; same data as for preceding; 5 May 1959; C.W. O'Brien leg.; EMEC • 1 ♀; same data as for preceding; 5 May 1959; G.I. Stage leg.; EMEC • 1 ♀; same data as for preceding; 5 May 1959; G.I. Stage leg.; ex *Salix*; EMEC • 1 ♀; Ventura Co., Lockwood Valley; [34.733° N, 119.042° W]; 10 May 1954; P.H. Timberlake leg.; ex *Phacelia ciliata*; UCRC • 1 ♀; same data as for preceding; 5 May 1959; P.H. Timberlake leg.; ex *Eleutherine bulbosa* (verbatim: *Sisyrinchium bulbosum*); UCRC • 1 ♀; Ventura Co., Lockwood Creek; near Stauffer P.O.; [34.730° N, 119.033° W]; 7 May 1959; J. Powell leg.; ex *Euphorbia albomarginata*; EMEC • 1 ♀; same data as for preceding; 7 May 1959; J. Powell leg.; ex *Hesperochiron californicus*; EMEC • 1 ♀; same data as for preceding; 5 May 1959; C.W. O'Brien leg.; ex *Descurainia sophia*; EMEC • 1 ♀; Ventura Co., Lockwood Valley; [34.733° N, 119.042° W]; 10 May 1954; P.H. Timberlake leg.; ex *Phacelia ciliata*; UCRC • 1 ♀; same data as for preceding; 5 May 1959; P.H. Timberlake leg.; ex *Eleutherine bulbosa* (verbatim: *Sisyrinchium bulbosum*); UCRC • 1 ♀; Ventura Co., S. Gorge; [34.579° N, 119.258° W]; 15 May 1955; Menke and Stange leg.; LACM • 1 ♀; Cuyama Valley; [35.02° N, 119.87° W]; 26 Apr. 1905; P.M. Daumirs leg.; UCRC. – **Washington** • 1 ♀; Benton Co., Prosser, Irr. Exp. Sta. Roza Unit; [46.267° N, 119.741° W]; 17 Apr. 1951; E. Klostermeyer leg.; WSU • 1 ♀; Whitman Co., Almota; [46.703° N, 117.469° W]; WSU • 1 ♀; Whitman Co., Pullman; [46.730° N, 117.182° W]; 14 May 1904; WSU • 1 ♀; same data as for preceding; 2 May 1949; H.F. Menke leg.; WSU • 1 ♀; Whitman Co., Wawawai; [46.637° N, 117.375° W]; 14 May 1910; WSU

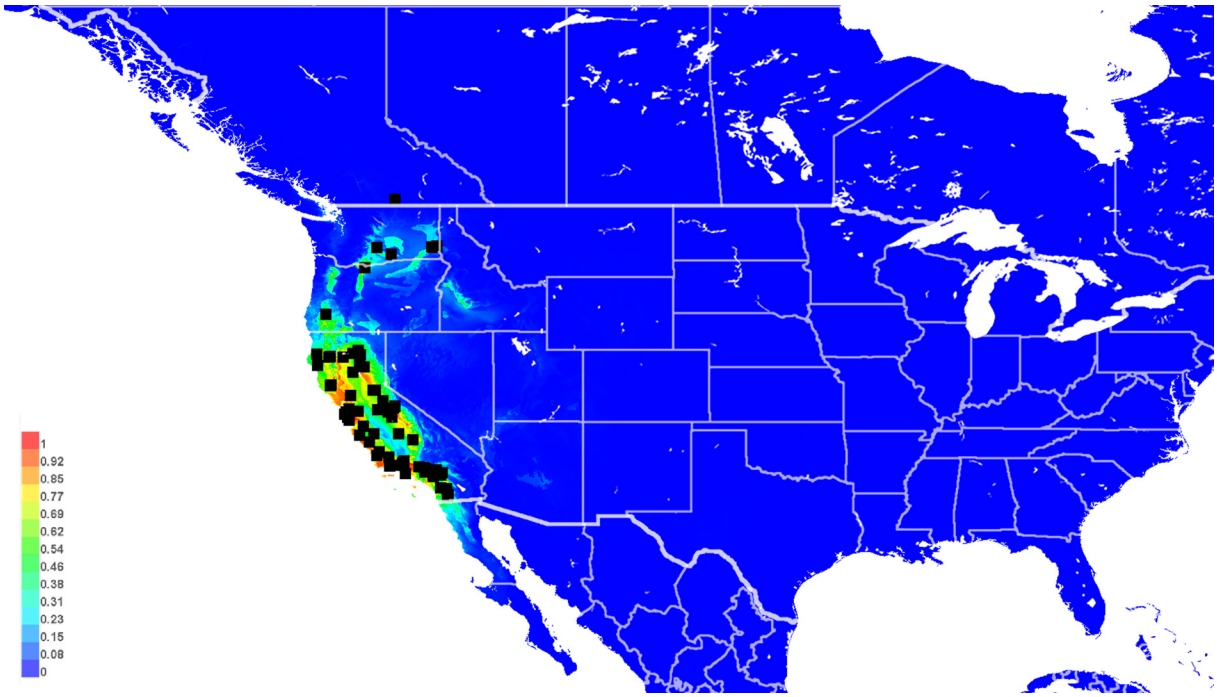


Fig. 26. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *aspilurus* (Cockerell, 1925) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

• 1 ♀; same data as for preceding; R.W. Doane leg.; WSU • 1 ♀; same data as for preceding; WSU • 1 ♀; Yakima Co., Selah; [46.654° N, 120.530° W]; 14 May 1919; RBCM.

Description

Genitalia (Figs 25, 120C). Gonostylus short, approximately as long as broad, with short setae. Retrorse lobe attenuated apically, about 3.5 times as long as broad, covered in short sparse setae.

Range

Canada (British Columbia) and the USA (California, Oregon, and Washington) (Fig. 26).

Floral hosts

ANACARDIACEAE: *Rhus* sp. • APOCYNACEAE: *Asclepias* sp. • ASTERACEAE: *Argyranthemum frutescens* (L.) Sch.Bip., *Lasthenia* sp. • BORAGINACEAE: *Cryptantha intermedia* (A.Gray) Greene • BRASSICACEAE: *Descurainia sophia* (L.) Webb ex Prantl, *Sisymbrium irio* L., *Thysanocarpus curvipes* Hook. • CRASSULACEAE: *Sedum* sp. • GERANIACEAE: *Erodium cicutarium* (L.) L'Hér. • HYDROPHYLLACEAE: *Nemophila* sp., *Phacelia ciliata* Benth., *Phacelia distans* Benth. • PAEONIACEAE: *Paeonia brownii* Douglas ex Hook. • GROSSULARIACEAE: *Ribes roezlii* Regel • RANUNCULACEAE: *Ranunculus californicus* Benth. • RHAMNACEAE: *Ceanothus leucodermis* Greene, *Ceanothus* sp., *Rhamnus ilicifolia* Kellogg, *Rhamnus* sp. • ROSACEAE: *Cercocarpus betuloides* Nutt., *Prunus subcordata* Benth., *Rubus* sp. • SALICACEAE: *Salix gooddingii* C.R.Ball, *Salix laevigata* Bebb, *Salix vestita* Pursh, *Salix* sp. • TAMARICACEAE: *Tamarix gallica* L.

Remarks

Both Cockerell (1925) and Michener (1936) only refer to a single specimen in their original descriptions. The type localities are separated by over 500 km along the California coast. Michener (1936) distinguished *L. humboldtense* from *L. aspilurus* based on the black apex of the metasoma and the sparser mesoscutal punctures. Two specimens collected with the *L. humboldtense* holotype have reddish brown T5 and small impunctate areas mesad of the parapsidal line. Individuals of *L. aspilurus* show variation in the density of mesoscutal punctures in this area. Some are rather close, but there is too much variation even within a single location to discriminate species on this basis.

Lasioglossum* (*Hemihalictus*) *buccale (Pérez, 1903)
Figs 27–30, 95I, 97E, 112C, 116B, 119C, 120D

Halictus buccalis Pérez, 1903: 215.

Lasioglossum (*Evylaeus*) *buccale* – Ebmer 1971: 71, 86 (key), 117 (taxonomy); 1988: 673 (catalogue); 2003: 383 (distribution records, behavioural notes).
Evylaeus (*Puncthalictus*) *buccalis* – Pesenko 2007a: 23 (taxonomy).

Diagnosis

Both sexes of *L. buccale* are entirely black, and easily diagnosed from North American *Lasioglossum* by their size (females 9–10 mm, males 7.5–8.5 mm); long heads (females length/width 1.25 (± 0.04), males length/width 1.28 (± 0.02 SD)); and coarse mesepisternal punctures. The female inner metatibial spur has 10–14 teeth, shorter than the width of the primary rachis (Fig. 27E). *Lasioglossum ovaliceps* is the most similar but is easily separated by the orange-red metasoma in both sexes, and the female inner metatibial pectinate with 3–5 long branches.

Etymology

Pérez (1903) did not explain the epithet. The specific epithet likely has its roots in the Latin '*bucca*' meaning 'jaw' or 'mouth', with an adjectival suffix, '*-alis*'; however, the author's intent is unknown.

Material examined

AUSTRIA – **Burgenland** • 1 ♀; Illmitz, Seedamm 400 m N of Biol. Station; 47.7731° N, 16.7663° E; 11–12 Aug. 2023; L. Bertsch and K. Kraus leg.; Leander Bertsch's personal collection • 1 ♀; same data as for preceding; 12 Aug. 2023; L. Bertsch leg.; Leander Bertsch's personal collection • 1 ♀; same data as for preceding; 11 Aug. 2023; L. Bertsch leg.; WRME.

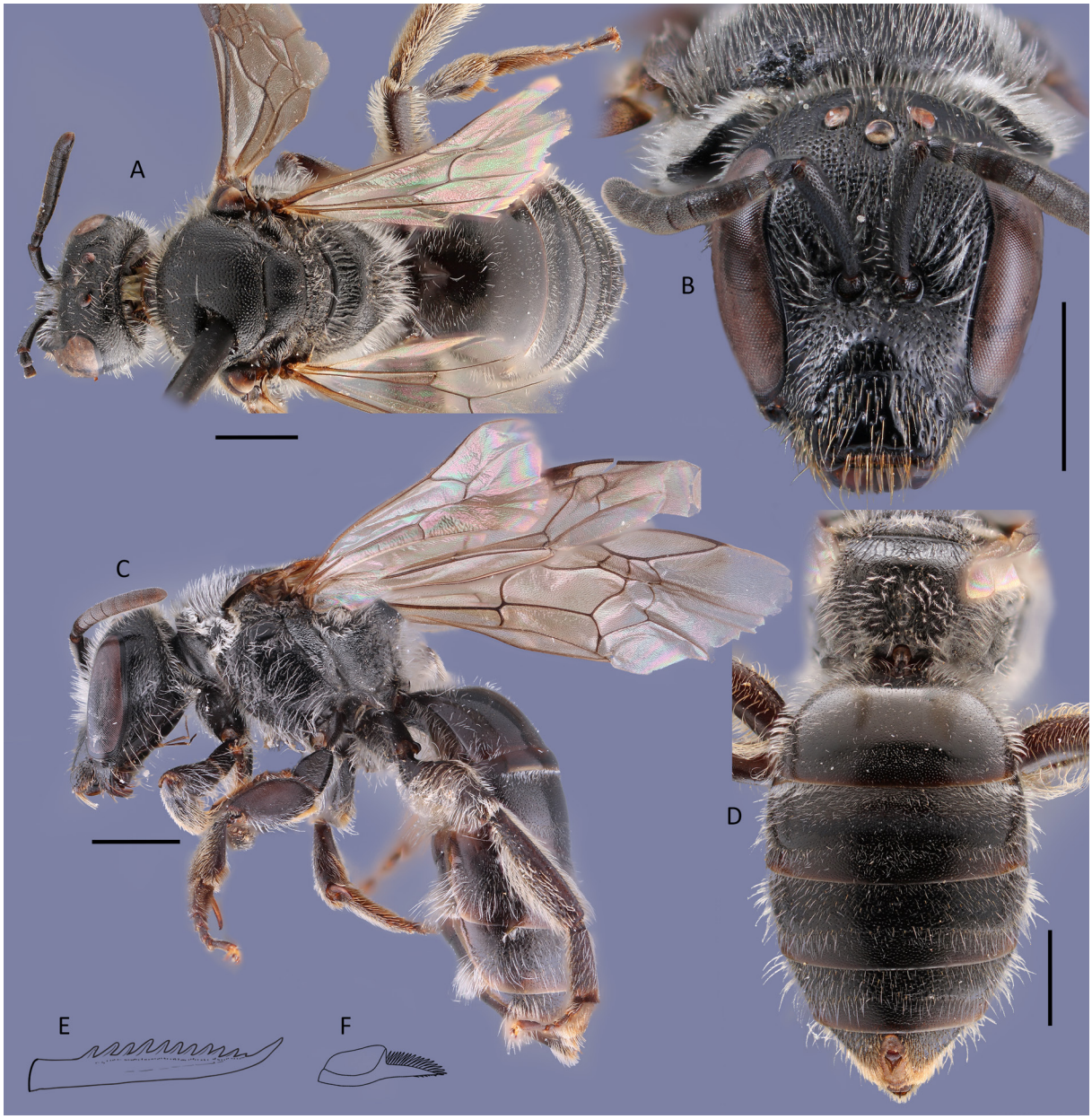


Fig. 27. *Lasioglossum* (*Hemihalictus*) *buccale* (Pérez, 1903), ♀ (WRME). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

CANADA – **British Columbia** • 2 ♀♀; Oliver, Inkaneep Provincial Park; 49.22381° N, 119.53921° W; 14 Jun.–20 Jul. 2017; K.G. Marks leg.; RSKM • 2 ♀♀; Inkaneep Provincial Park; 49.22381° N, 119.53921° W; 14 Jun.–20 Jul. 2017; D. Marks and K. Grant (J. Heron) leg.; RSKM.

GERMANY – **Baden-Württemberg** • 1 ♀; Achkarren am Kaiserstuhl, Schneckenberg; 48.0695° N, 7.6253° E; 8 May 2022; Handfang leg.; Leander Bertsch's personal collection.

UNITED STATES – **Oregon** • 1 ♀; Marion Co., Independence; 44.839° N, 123.166° W; 15 May 2017; G. Hoffman leg.; WRME • 1 ♀; Multnomah Co., Oxbow Meadow; 45.4844° N, 122.3015° W; 30 Sep. 2020; J.D. Engler leg.; OSAC • 1 ♀; Multnomah Co., Oxbow Meadow; 45.485° N, 122.302° W; 27 Jul.



Fig. 28. *Lasioglossum* (*Hemihalictus*) *buccale* (Pérez, 1903), ♂ (OSAC). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

2021; J.D. Engler leg.; OSAC • 1 ♀; same data as for preceding; 28 Jul. 2021; J.D. Engler leg.; OSAC • 1 ♂; Multnomah Co., Oxbow Pkway; 45.494° N, 122.313° W; 3 Aug. 2021; J.D. Engler leg.; OSAC • 1 ♂; Multnomah Co., Oxbow Meadow; 45.485° N, 122.302° W; 31 Jul. 2021; J.D. Engler leg.; OSAC (Fig. 29) • 1 ♂; same data as for preceding; 2 Sep. 2021; J.D. Engler leg.; OSAC • 1 ♀; same data as for preceding; 7 Jun. 2022; J.D. Engler leg.; OSAC • 1 ♀; same data as for preceding; 15 Jun. 2022; J.D. Engler leg.; OSAC. – **Washington** • 1 ♀; Chelan Co., Ardenvoir, Cougar Creek Fire area; 47.772° N, 120.422° W; 29–30 May 2023; A. Maust leg.; WSU • 1 ♀; Chelan Co., Chelan; [47.83° N, 120.02° W]; 5 Jul.–1 Aug. 2022; A. Maust leg.; WSU • 2 ♀♀; same data as for preceding; 22 Jun.–6 Jul. 2021; A. Maust leg.; WSU • 2 ♀♀; same data as for preceding; 22 Jun.–3 Aug. 2021; A. Maust leg.; WSU • 2 ♀♀; same data as for preceding; 28 Apr.–3 Aug. 2021; A. Maust leg.; WSU • 1 ♀; same data as for



Fig. 29. Genitalia of *Lasioglossum* (*Hemihalictus*) *buccale* (Pérez, 1903), ♂ (OSAC). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

preceding; 8 Jun.–6 Jul. 2021; A. Maust leg.; WSU • 1 ♀; Chelan Co., Chelan; 47.939° N, 120.055° W; 12–13 Jun. 2022; A. Maust leg.; WSU • 2 ♀♀; Chelan Co., Chelan; 47.939° N, 120.055° W; 10–11 Jul. 2023; A. Maust leg.; WSU • 1 ♀; Chelan Co., Chelan; 47.940° N, 120.042° W; 12–13 Jun. 2023; A. Maust leg.; WSU • 1 ♀; Chelan Co., Chelan; 47.940° N, 120.042° W; 29–30 May 2023; A. Maust leg.; WSU • 1 ♀; Chelan Co., Chelan; 47.964° N, 120.047° W; 12–13 Jun. 2023; A. Maust leg.; WSU • 1 ♀; Chelan Co., Chelan; 47.953° N, 120.036° W; 26–27 Jun. 2023; A. Maust leg.; WSU • 1 ♀; Chelan Co., Chelan; 47.940° N, 120.042° W; 12–13 Jun. 2023; A. Maust leg.; WSU • 2 ♂♂; Jefferson Co., near Crowberry Bog; 47.805° N, 124.201° W; elev. 144 m; 6 Aug. 2023; I. Carmean leg.; ex *Hypochaeris radicata*; WSU • 1 ♂; Jefferson Co., Jefferson, near Forks; 47.805° N, 124.201° W; elev. 144 m; 6 Aug. 2023; A. Wilson leg.; ex *Chamaenerion angustifolium*; WSU • 2 ♀♀; same data as for preceding; 6 Aug. 2023; A. Wilson leg.; ex *Digitalis purpurea*; WSU • 4 ♀♀; King Co., Beacon Food Forest; 47.5686° N, 122.3126° W; 16 Jul. 2014; E. Bloom leg.; WSU • 1 ♀; King Co., Interbay; 47.6410° N, 122.3762° W; 18 Jul. 2014; E. Bloom leg.; WSU • 1 ♀; King Co., Magnuson Park; 47.6826° N, 122.2585° W; 18 Jul. 2014; E. Bloom leg.; WSU • 1 ♀; King Co., Marra Farm; 47.5215° N, 122.3289° W; 15 Jul. 2014; E. Bloom leg.; WSU • 1 ♀; King Co., Rainier Beach Urban Farm and Wetland; 47.5259° N, 122.2628° W; 4 Aug. 2016; E. Bloom leg.; WSU • 1 ♀; King Co., Seattle; 47.4274° N, 122.3081° W; 5 Jul. 2020; Peterman W. leg.; WRME (Fig. 27) • 1 ♀; King Co., Seattle; 47.6062° N, 122.3321° W; 6 Sep. 1964; OSAC • 1 ♀; King Co., Seattle; 47.5059° N, 122.2672° W; 10 Jun. 2016; R. Redmond and E.A. Sugden leg.; WRME • 1 ♀; King Co., Seattle; 47.5039° N, 122.2757° W; 19 Apr. 2015; R. Redmond and E.A. Sugden leg.; WRME • 1 ♀; King Co., Seattle; 47.4285° N, 122.3036° W; 6 Aug. 2018; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; King Co., Seattle; 47.4274° N, 122.3081° W; 5 Jul. 2020; W. Peterman leg.; WRME • 1 ♀; King Co., Steel Wheel Farm; 47.5817° N, 121.9175° W; 21 Jul. 2014; E. Bloom leg.; WSU • 1 ♀; Lincoln Co., Lamona; 47.360732° N, 118.476279° W; 18 May 2016; T.D. Hatten leg.; WRME • 1 ♀; Lincoln Co., Lamona, Sage Downs Rd N, S of Coal Coule; 47.377576° N, 118.391616° W; 23 May 2016; T.D. Hatten

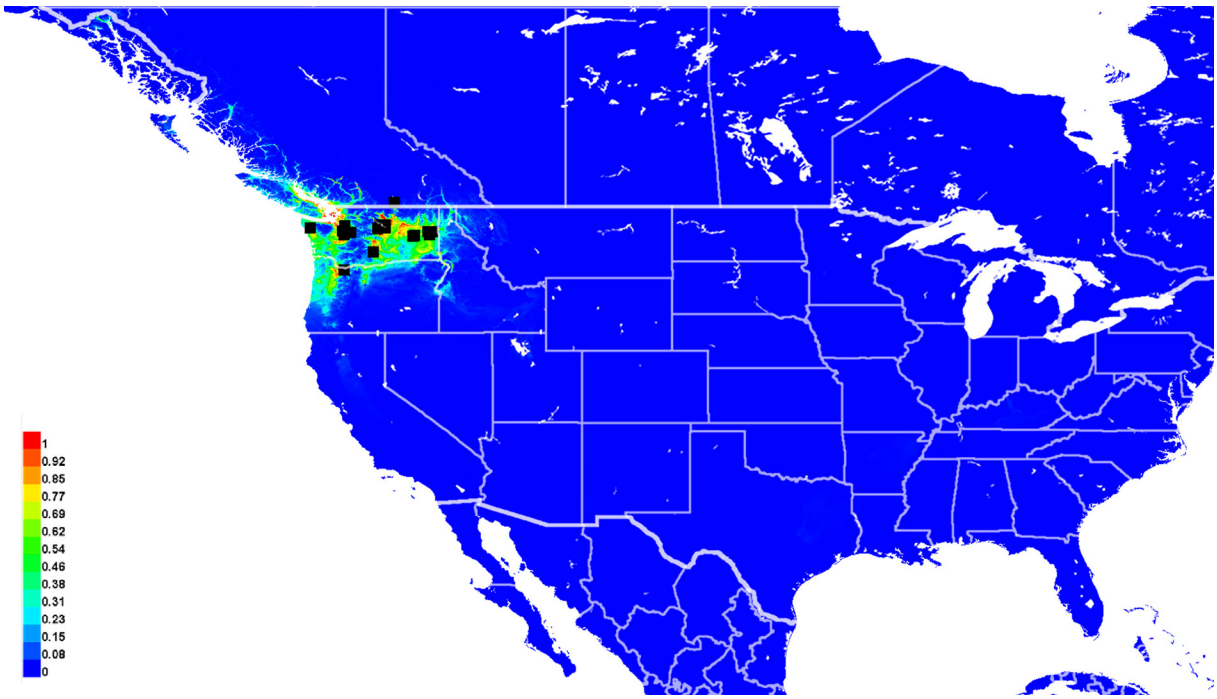


Fig. 30. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *buccale* (Pérez, 1903) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

leg.; WRME • 1 ♀; Lincoln Co., Lamona; 47.360732° N, 118.476279° W; 20 May 2016; T.D. Hatten leg.; WRME • 1 ♀; Lincoln Co., Lamona; 47.360732° N, 118.476279° W; 2 Aug. 2017; Sprague R. leg.; WRME • 1 ♀; Lincoln Co., Lamona; 47.360732° N, 118.476279° W; 27 Jul. 2017; T.D. Hatten leg.; WRME • 1 ♀; same data as for preceding; 2 Aug. 2017; T.D. Hatten leg.; WRME • 1 ♂; Spokane Co.; 47.62° N, 117.4° W; 15 Oct. 1967; Robin D. Gray leg.; WSU • 1 ♀; Spokane Co., Fairchild Airforce Base, 10 mi. W of Spokane; 47.60393° N, 117.62817° W; elev. 735 m; 7 Jun. 2024; R.S. Zack leg.; WSU • 1 ♀; Spokane Co., Turnbulls; 47.42553° N, 117.565653° W; 25 Jul. 2017; Dibble M. leg.; WRME • 1 ♂; Snohomish County Co., Everett; 47.93° N, 122.2852° W; 30 Jul. 2018; E.A. Sugden and W. Peterman leg.; WSU • 1 ♀; Thurston Co.; 46.953° N, 123.025° W; elev. 57 m; 26 Jul. 2009; C. Fimbel leg.; PCYU • 1 ♀; Thurston Co., Wendell Berry Garden; 47.0521° N, 122.8732° W; 13 Jul. 2014; R. Bietz leg.; WSU • 1 ♀; Yakima Co., White Swan; 46.4693° N, 120.7016° W; 20 Jul. 2013; A.A. Jordan leg.; WSU.

Description

Genitalia (Figs 29, 120D). Gonostylus short and broad approximately as long as broad, with setae short. Retrorse lobe broad and curved, about 3 times as long as broad, rounded at apex, covered in circular bumps.

Range

Oregon, Washington, and west of British Columbia (Fig 30).

Floral hosts

ASTERACEAE: *Hypochaeris radicata* L. • CARYOPHYLLACEAE: *Silene spaldingii* S.Watson. • ONAGRACEAE: *Chamaenerion angustifolium* (L.) Schur • SCROPHULARIACEAE: *Digitalis purpurea* L.

In its native range, *L. buccale* has been associated with *Linaria vulgaris* Mill. and related taxa in Plantaginaceae Juss. like *Digitalis* L. and *Antirrhinum* L. (Burger 2020; Ebmer 2003). *Linaria vulgaris* is a widespread, introduced species in North America.

Remarks

Ebmer (2003) reports seeing a female entering a nest in a stone wall "fing ich beim Einflug zum Nest in einer Trockenmauer". The collection records from Seattle, Washington, in September 1964, and Spokane, Washington, in October 1967, indicate that this species has been present in the region for several decades, suggesting it is not a recent introduction. However, it is interesting that this species began to appear again in collections data after 2013 (Hatten *et al.* 2024), raising questions about its recent presence or increased documentation in the region.

DNA barcodes

DNA barcodes from Washington, Austria, and France were compared and found to form a discrete cluster from other *Lasioglossum* species.

Lasioglossum* (*Hemihalictus*) *engleri sp. nov.

urn:lsid:zoobank.org:act:1995AA5A-9DB0-4422-9A74-B991C5237149

Figs 31–34, 102A, 117D, 119E, 120E

Diagnosis

Females of *L. engleri* sp. nov. can be recognised by the following combination of characters: head long, length/width 1.05 (±0.03 SD); supraclypeal punctation sparse (IS = 1–3 PD) medially and anteriorly,

becoming dense (IS≤1 PD) laterally and posteriorly; mesepisternum distinctly punctate; and T2–T3 basolaterally tomentum. Males of *L. engleri* sp. nov. can be recognised by the following combination of characters: head long, length/width ratio 1.06 (±0.02 SD); supraclypeal punctation dense (IS≤1 PD); and mesepisternum distinctly punctate.

Eastern North American *L. macoupinense* (Robertson, 1895) and *L. birkmanni* (Crawford, 1906a) are very closely related to *L. engleri* sp. nov. However, both sexes of *L. birkmanni* can be distinguished by their shorter heads (length/width ratio 0.95–1.03). Females of *L. engleri* can be distinguished from *L. macoupinense* by the presence of short setae overhanging the margin of T2–3, which are particularly evident laterally (Fig. 102). While some *L. macoupinense* females may also exhibit some short setae overhanging the margin of T2–3, *L. engleri* is characterized by significantly denser and longer hairs on the metasoma, especially on T2–3. Additionally, females of *L. macoupinense* have a coriarious microsculpture on the T2 apical impressed area, while females of *L. engleri* lack or exhibit only very weak coriarious microsculpture in this region (Fig. 102).

Males of *L. macoupinense* can be distinguished from *L. engleri* sp. nov. by their supraclypeal area: *L. engleri* has a polished supraclypeal area with deep punctures, while *L. macoupinense* males exhibit shallow punctures on an imbricate supraclypeal area.

Etymology

The specific epithet '*engleri*' is a dedication to Joseph D. Engler, U.S. Fish and Wildlife Service, Regional Refuge Biologist and Pacific Northwest Pollinator Conservation Coordinator (retired) for sharing specimens, DNA barcode information, and valuable context regarding this species.

Type material examined

Holotype

UNITED STATES – **Oregon** • ♀; Sherman Co., Fulton Canyon; 45.6345° N, 120.86424° W; 10 May 2011; J.D. Engler leg.; OSAC (Fig. 31).

Specimen labels

"USA: OR: Sherman Co. / Fulton Canyon / N 45.63450, W 120.86424 / 10 May 2011; J.D. Engler // *Lasioglossum* (*Hemihalictus*) *macoupinense* / Det: JD Engler 2021 // *Lasioglossum* / GIBBS-14928 // HOLOTYPE / *Lasioglossum* (*Hemihalictus*) *engleri* Hettiarachchi and Gibbs".

Paratypes

CANADA – **Alberta** • 5 ♀♀; Cypress Co., Medicine Hat near Gas City Campgr., wet coulee bottom; 50.037222° N, 110.729722° W; 4 Jan.–31 May 2016; M. Buck leg.; PMAE • 1 ♀; Cypress Co., Redcliff, floodplain, river sand; 50.054722° N, 110.786667° W; 26–28 Jan. 2017; M. Buck leg.; PMAE • 3 ♀♀; Newell Co., Dinosaur Provincial Park, Sandhill Creek Valley; 50.755833° N, 111.519167° W; 14–15 Jul. 2010; Buck and Heule leg.; PMAE • 1 ♀; Warner No. 5, Writing-on-Stone Provincial Park; [49.08° N, 111.62° W]; 21–28 Jul. 1990; D. McCorquodale leg.; PMAE • 2 ♀♀; Edmonton, Kinnaird Park, vertical river bank; 53.556944° N, 113.454167° W; 10 Aug. 2018; M. Buck leg.; PMAE.

UNITED STATES – **California** • 1 ♀; Cruz Co., Bates Creek, 2 mi. NE of Soquel; [37.008° N, 121.932° W]; 2 May 1971; J. Doyen leg.; EMEC • 3 ♀♀; El Dorado Co., Pino Grande, SW of Lake Edson; [37.631° N, 119.524° W]; 29 Jun. 1967; W. Turner leg.; EMEC • 1 ♀; El Dorado Co.; [38.76° N, 120.57° W]; 30 Jun. 1912; F.W. Nunenmacher leg.; EMEC • 1 ♀; El Dorado Co., Pollock Pines; [38.761° N, 120.587° W]; 27 May 1970; D.P. Levin leg.; LACM • 1 ♀; Humboldt Co., 3 mi. N of Gargerville; [40.143° N, 123.795° W]; 23 May 1976; R. Wharton and R. Coville leg.; EMEC • 1 ♀; Mendo Co., 5 mi. N of Branscomb; [39.725° N, 123.626° W]; 24–25 May 1976; R. Wharton

leg.; EMEC • 1 ♀; Mendocino Co., Russian River, Hopland; [38.973° N, 123.111° W]; 3 Apr. 1968; J. Powell leg.; EMEC • 1 ♂; Modoc Co., Alturas Insp. Sta; [41.523° N, 120.476° W]; 1 Oct. 1975; T.R. Haig leg.; CSCA (Fig. 32) • 1 ♂; Mono Co., 7 mi. S of Mill Creek Canyon, Junction Highway; [33.986° N, 117.039° W]; 25–26 Aug. 1979; M. Wasbauer and P. Adams leg.; CSCA (Fig. 33) • 1 ♀; Sacramento Co., Walnut Grove; [38.242° N, 121.511° W]; 6 Apr. 1931; ex Pear tree; CSCA • 1 ♀; Santa Clara Co., Palo Alto; [37.429° N, 122.138° W]; 25 Mar. 1995; EMEC • 1 ♀; Shasta Co., Old Station; [40.675° N, 121.431° W]; J.W. MacSwain leg.; EMEC • 1 ♀; Shasta Co., 7 mi. SW of Viola; [40.446° N, 121.772° W]; elev. 1219.2 m; 20 May 1966; J. Powell leg.; EMEC • 1 ♀; Trinity Co., Hayfork Ranger Station; [40.548° N, 123.164° W]; elev. 701 m; 18 May 1973; J. Powell leg.; EMEC. – **New Mexico** • 1 ♀; Rio Arriba Co. Co., Ojo Caliente; [36.1094° N, 106.143° W]; 13 Jun. 1999; L. Packer leg.; PCYU. – **Oregon** • 1 ♀; Baker Co., Big Creek, 26 mi. SE of Union; [44.977° N, 117.428° W]; elev. 1280.2 m; 1–3 Jul. 1976; E.J. Davis leg.; WSU • 1 ♂; Baker Co., Cougar Creek, 37 mi. SE of Union; [44.879° N, 117.252° W]; elev. 1243.6 m; 22–25 Aug. 1976; E.J. Davis leg.; WSU • 1 ♀; Benton Co., 4 mi. SW of Corvallis; [44.523° N, 123.320° W]; 1 May 1956; J.D. Lattin leg.; ex *Ranunculus*; EMEC • 1 ♀; Benton Co., Corvallis; [44.567° N, 123.283° W]; 23 May 1945; Grace Bennett leg.; OSAC • 1 ♀; Crook Co., Pineville; 44.171° N, 120.545° W; elev. 1024 m; 9 May 2019; A. Bessette leg.; OSAC • 1 ♀; Douglas Co., Roseburg; [43.223° N, 123.352° W]; 6 Apr. 1930; J. Wilcox leg.; OSAC • 1 ♀; Josephine Co., Gallice; 42.562° N, 123.584° W; elev. 215 m; 19 Mar. 2020; J. Maxwell leg.; OSAC • 1 ♀; Josephine Co., Wolf Creek; 42.651° N, 123.59° W; elev. 223 m; 6 May 2019; E. Watrous leg.; OSAC • 1 ♀; Lake Co., Booth State Park; 14 mi. W of Lakeview; [42.197° N, 120.591° W]; 18 Jun. 1952; V. Roth leg.; OSAC • 1 ♀; Lane Co., Oakridge; 43.881° N, 122.225° W; elev. 701 m; 23 Aug. 2019; L. Humphreys leg.; WRME • 1 ♀; Linn Co.; [44.63° N, 123.09° W]; 12 Jul. 1929; J.E. Davis leg.; OSAC • 1 ♀; Harney Co., Malheur NWR, Tower; 43.2365° N, 118.8421° W; 4–17 Jun. 2011; T. Coe leg.; OSAC • 1 ♀; Sherman Co., Fulton Canyon; 45.6345° N, 120.86424° W; 10 May 2011; J.D. Engler leg.; OSAC • 1 ♀; Umatilla Co., Cayuse; [45.676° N, 118.574° W]; 13 May 1938; J. Schuh leg.; OSAC • 1 ♀; Union Co., La Grange, NF-5176; 45.1451° N, 118.3709° W; 22 Jun. 2018; G. Pederson leg.; WRME • 1 ♀; Union Co., La Grange, HWY 244; 45.2737° N, 118.3437° W; 22 Jun. 2018; G. Pederson leg.; OSAC • 1 ♀; Union Co., Union; [45.21° N, 117.8647° W]; elev. 827.8 m; 6 Sep. 1926; H.A. Scullen leg.; OSAC • 1 ♀; Wallowa Co., Wallowa Canyon Fount; 5 mi. E of Minam; [45.617° N, 117.552° W]; elev. 823 m; 21 Jul. 1929; H.A. Scullen leg.; OSAC • 1 ♀; Washington Co., Beaverton; 45.450° N, 122.874° W; elev. 205 m; 28 Apr. 2021; S. Albright leg.; WRME • 1 ♀; Yamhill Co., McMinnville; 45.211° N, 123.174° W; elev. 33 m; 12 Apr. 2019; M. O'Loughlin leg.; WRME. – **Washington** • 1 ♂; Asotin Co., Fields Spring State Park, 4 mi. of S of Anatone; [46.0814° N, 117.171° W]; elev. 1097.3 m; 5 Jul. 1984; W. Turner leg.; WSU • 1 ♂; Clark Co., Vancouver; [45.63° N, 122.67° W]; 10 Jul. 1970; WSU • 1 ♂; Clark Co., Vancouver; [45.631° N, 122.675° W]; 10 Jul. 1970; WSU • 1 ♀; Island Co., Whidbey Island, Fort Casey; [48.164° N, 122.679° W]; 18 Jun. 1980; D.F. Frechin leg.; WSU • 1 ♀; King Co., Seattle; [47.61° N, 122.33° W]; UCMC • 1 ♀; same data as for preceding; OSAC • 1 ♂; Spokane Co., Dartford; [47.78° N, 117.42° W]; 29–31 Jul. 1969; R.D. Gray leg.; WSU • 1 ♀; Thurston Co., Olympia; [47.0451° N, 122.895° W]; UCMC • 1 ♀; Whitman Co., Pullman; [46.73° N, 117.17° W]; 7 May 1969; R.W. Dawson leg.; WSU • 2 ♂♂; same data as for preceding; 13 Jul. 1901; WSU • 2 ♀♀; same data as for preceding; 27 May 1965; R.D. Akre leg.; WSU • 1 ♀; same data as for preceding; 26 May 1965; R.D. Akre leg.; WSU • 1 ♀; same data as for preceding; 11 May 1965; R.D. Akre leg.; WSU • 1 ♂; same data as for preceding; 16 Aug. 1965; R.D. Akre leg.; WSU • 1 ♀; Whitman Co., Almota; [46.703° N, 117.467° W]; 6 May 1972; W.J. Turner leg.; WSU • 1 ♀; same data as for preceding; 27 Apr. 1972; W.J. Turner leg.; WSU • 1 ♀; Whitman Co., Almota; [46.703° N, 117.467° W]; 28 Jun. 1975; J. Powell leg.; EMEC • 1 ♀; Whitman Co., 10 mi. SW of Colton, Steptoe Canyon; [46.485° N, 117.301° W]; 3 Aug. 1974; W.J. Turner leg.; WSU. – **Wyoming** • 1 ♀; Teton Co., Jackson Hole Research Station, Grand Teton National Park; [43.833° N, 110.701° W]; elev. 2042.2 m; 11 Jul. 1967; H.E. Evans and M.A. Evans leg.; UCRC.

Description

Female

Body measurements. Length 6.73 mm (±0.63 SD). Head long 1.72 mm (±0.06 SD). Face length 1.41 mm (±0.05 SD). Head width 1.64 mm (±0.05 SD). Wing length 4.97 mm (±0.30 SD). n = 6.

Colouration. Head and mesosoma black. Clypeus apex black to dark brown. Labrum brown. Mandible dark brown basally, becoming light brown medially and reddish brown apically. Flagellum dark brown to brown dorsally, light brown ventrally. Pronotal lobe brown. Tegula light brown, with brown base. Wing



Fig. 31. *Lasioglossum* (*Hemihalictus*) *engleri* sp. nov., holotype, ♀ (OSAC). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

membrane faintly brown, veins brown. Legs brown to light brown. Metasoma black to dark brown with rims of terga and sterna broadly light brown.

Pubescence. Body hair colour off-white, but more yellowish. Tomentum dense on pronotal angle, and lobe, space between pronotal lobe and tegula, metanotum anteromedially, and T2–T3 basolaterally. Mesosoma covered by sub-appressed to erect, simple to weakly plumose, short hairs (0.5–1 OD) on mesoscutum and erect, plumose, long hairs (< 1.5 OD) on other areas. Metafemoral scopa with dense plumose hairs. Wing hairs brown, very short and sparse.

Surface sculpturing. Clypeus polished, becoming weakly imbricate in the basal third; punctures irregularly sparse (IS ≤ 2 PD) apically, becoming smaller and denser (IS ≤ 1 PD) basally. Supraclypeal



Fig. 32. *Lasioglossum* (*Hemihalictus*) *engleri* sp. nov., paratype, ♂ (CSCA). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

area imbricate, becoming weakly so or weakly polished medially; punctures sparse (IS = 1–3 PD) anteromedially, becoming dense (IS≤1 PD) posterolaterally. Frons reticulate-punctate; punctures crowded (IS = 0 PD). Ocellocular area polished; punctures moderately sparse (IS = 1–2 PD) anterolaterally, diversopunctate. Gena polished, becoming lineolate posteriorly; punctures dense (IS≤1 PD), becoming obscure posteriorly. Postgena lineolate. Tegula broadly impunctate, minute punctures present anteriorly and basally, moderately sparse (IS = 1–2 PD). Mesoscutum polished, becoming imbricate anteriorly and medially halfway on median line; punctures dense (IS≤1 PD), becoming moderately dense (IS = 1–2 PD) mesad of parapsidal line and anteromedially. Mesoscutellum polished; punctures dense (IS≤1 PD) marginally and on median line, sparse submedially (IS = 1–4 PD). Metanotum rugulose. Propodeal triangle with rugae moderately strong, reaching ¾ towards posterior margin, weakly anastomosing medially, lateral rugae extending to dorsolateral slope of propodeum lateral face; interspace sculpture imbricate to tessellate. Preëpisternum weakly rugulose, punctures crowded (IS = 0 PD). Hypoepimeron polished, becoming rugulose dorsally; punctures dense (IS≤1 PD). Mesepisternum polished, but weakly rugulose from some angles; punctures sparse (IS = 1–3 PD), doubly punctate, but not that conspicuous. Propodeum lateral face strongly imbricate, punctures obscure; posterior face imbricate-rugulose, but

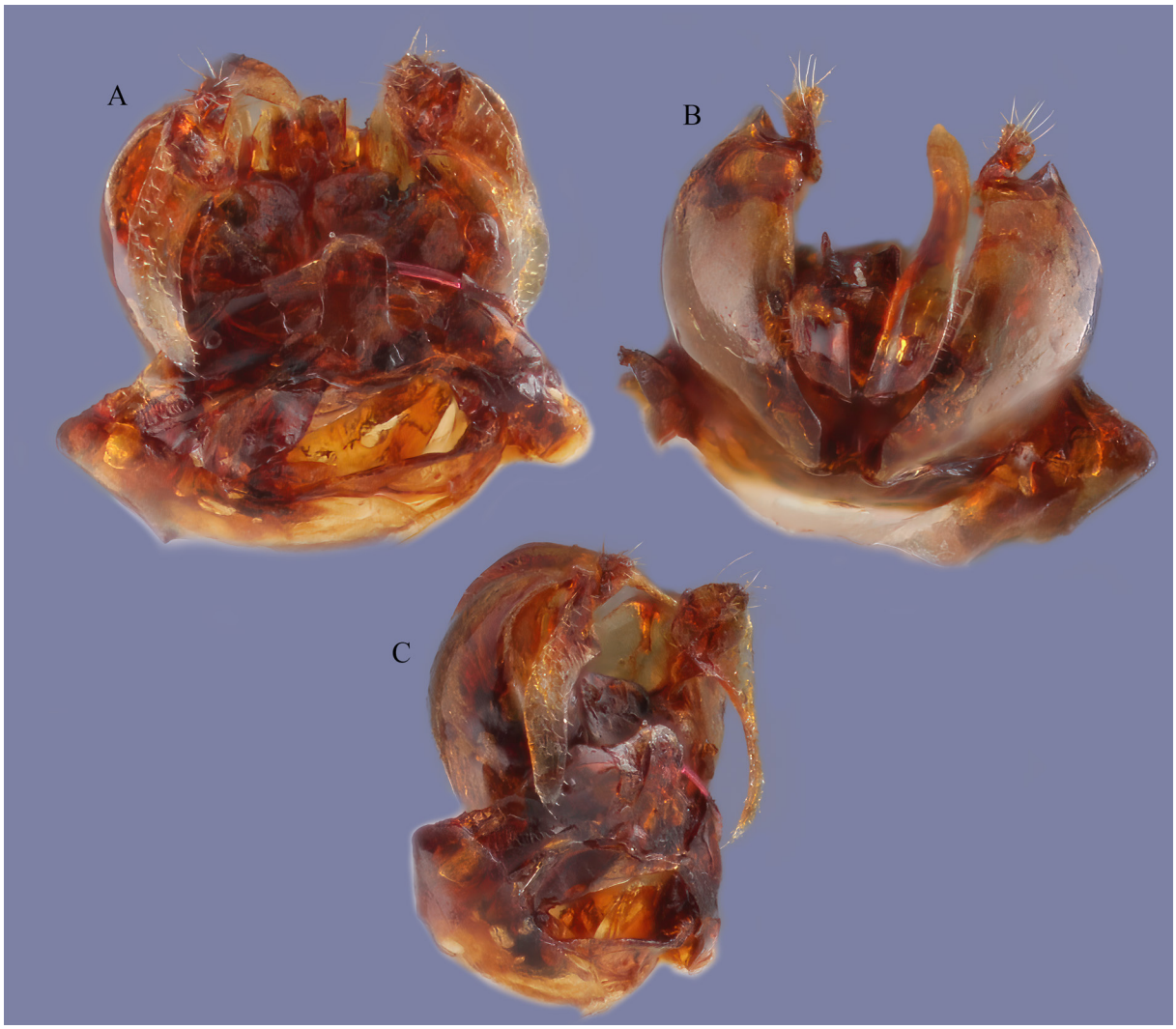


Fig. 33. Genitalia of *Lasioglossum* (*Hemihalictus*) *engleri* sp. nov., ♂ (CSCA). **A**. Dorsal view. **B**. Ventral view. **C**. Lateral view. (note: one penis valve is broken).

weakly strigate, punctures obscure. T1 anterior face polished, punctures present laterally, sparse (IS = 1–6 PD); dorsal surface polished, punctures present laterally, sparse (IS = 1–3 PD), becoming sparser (IS = 1–6 PD) and fine towards premarginal line and nearly impunctate medially and in small subapicolateral boss, punctures fine, sparse (IS = 3–6 PD) on rim. T2 disc polished, punctures moderately sparse (IS = 1–2 PD) basally becoming sparse (IS = 1–4 PD) apically; rim weakly coriarious, punctures fine, sparse (IS = 1–4 PD).

Structure. Head long, length/width ratio 1.05 (±0.03 SD). Face length/width ratio 0.86 (±0.01 SD). Clypeus projecting ~70% below suborbital tangent. Mandible short, reaching opposing clypeal angle. Eyes convergent below [UOD/LOD ratio 1.20 (±0.03 SD)]. Ocelli normal. Gena/eye width ratio 0.76 (±0.05 SD). Pronotal angle obtuse. Intertegular span 1.20 mm (±0.05 SD). Mesoscutum length/width ratio 0.93 (±0.06 SD); mesoscutum/scutellum length ratio 2.69 (±0.23 SD); scutellum/metanotum length ratio 1.85 (±0.16 SD); metanotum/propodeal triangle length ratio 0.76 (±0.09 SD). Protibial spur with apical serrations shorter than width of malus; malus extending beyond the velum, nearly ¾ the length of velum. Inner metatibial spur pectinate, teeth 3–5, basal teeth somewhat longer than width of rachis. Propodeal triangle posterior margin rounded onto posterior propodeal surface. Propodeal lateral carina nearly reaching dorsolateral slope, oblique carina obscure.

Male

Body measurements. Length 5.13 mm (±0.46 SD). Head length 1.56 mm (±0.03 SD). Face length 1.26 mm (±0.03 SD). Head width 1.46 mm (±0.04 SD). Wing length 4.01 mm (±0.13 SD). n = 4.

Colouration. Head and mesosoma black. Clypeus apical half light brown to yellow. Labrum light brown. Mandible dark brown basally, becoming yellow medially and reddish brown apically. Flagellum light brown to brown. Pronotal lobe brown. Tegula light brown, with brown base. Wing membrane faintly

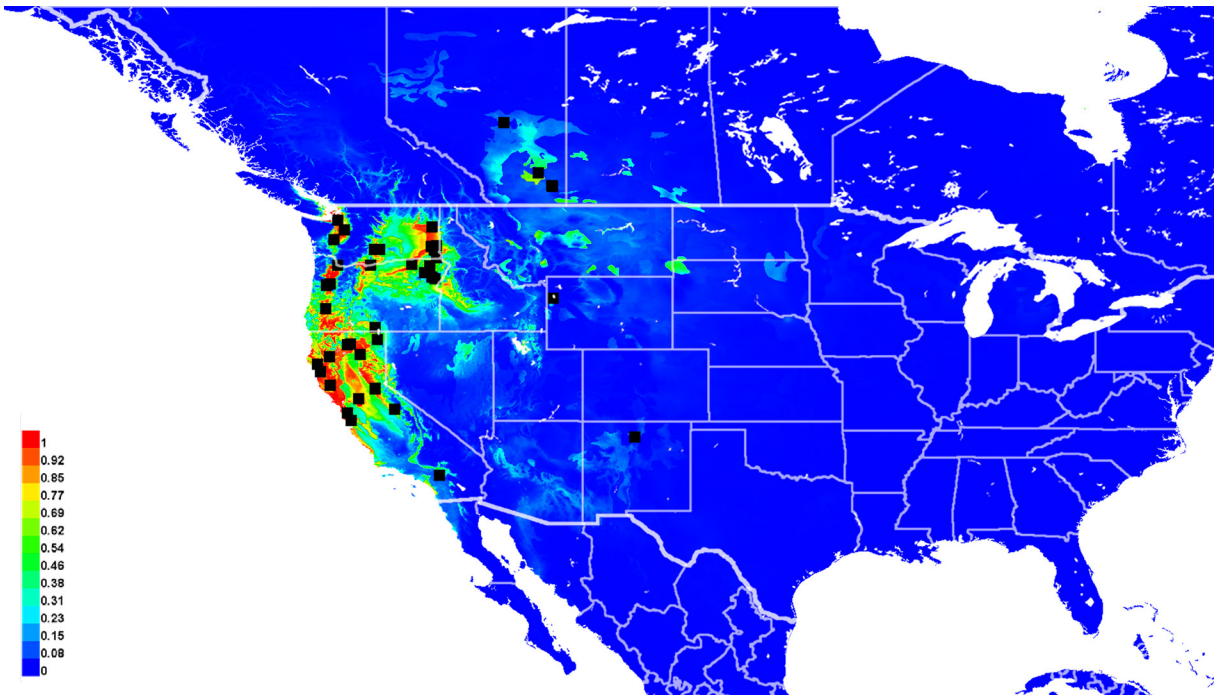


Fig. 34. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *engleri* sp. nov. (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

brown, veins brown. Legs brown, except tarsi, and protibia light brown. Metasoma dark brown with rims of terga and sterna narrowly light brown.

Pubescence. Body hair colour off-white, but more yellowish. Tomentum dense on pronotal angle, and lobe, space between pronotal lobe and tegula; moderately dense on supraclypeal area laterally, and paraocular area; very sparse on mesepisternum ventrally, and T1 basolaterally. Mesosoma covered by erect, mostly simple, short hairs (0.25–1 OD) on mesoscutum and erect, plumose, long hairs (<2 OD) on other areas. Metasomal sterna with dense, erect and sub-appressed, plumose, short (<1.5 OD) hairs. Wing hairs brown, very short and sparse.

Surface sculpturing. Clypeus polished apical; punctures irregularly sparse (IS≤2 PD) apically, becoming smaller and denser (IS≤1 PD) basally. Supraclypeal area polished; punctures dense (IS≤1 PD). Frons reticulate-rugose, becoming polished dorsally; punctures crowded (IS<0 PD). Ocellocular area polished; punctures dense (IS≤1 PD). Gena polished; punctures moderately dense (IS = 1–2 PD). Postgena lineolate. Tegula broadly impunctate, punctures present anteriorly and basally, moderately sparse (IS = 1–2 PD). Mesoscutum mostly polished, imbricate near anteriorly; punctures dense (IS≤1 PD), becoming moderately dense (IS = 1–2 PD) mesad of parapsidal line. Mesoscutellum polished; punctures dense (IS≤1 PD) marginally and on median line, sparse submedially (IS = 1–4 PD). Metanotum rugulose. Propodeal triangle with rugae moderately strong, extending about halfway toward posterior margin, weakly anastomosing medially, lateral rugae extending to dorsolateral slope of propodeum lateral face; interspace sculpture imbricate to tessellate. Preëpisternum weakly rugulose. Hypoepimeron polished, becoming rugulose dorsally; punctures dense (IS≤1 PD). Mesepisternum polished; punctures dense (IS≤1 PD) dorsally, becoming sparse (IS = 1–3 PD) ventrally, diversly punctate ventrally with minute punctures. Propodeum lateral face strongly imbricate, punctures obscure; posterior face imbricate-rugulose, but weakly strigate, punctures obscure. T1 anterior face polished, few minute punctures present laterally; dorsal surface polished, few minute punctures present laterally, sparse (IS = 3–6 PD), becoming nearly impunctate medially, in subapicolateral boss and on rim. T2 disc polished, punctures sparse (IS = 1–5 PD); rim polished, impunctate.

Structure. Head long, length/width ratio 1.06 (±0.02 SD). Face length/width ratio 0.86 (±0.03 SD). Clypeus projecting ~63% below suborbital tangent. Mandible short, reaching opposing clypeal angle. Flagellomeres short, F1 length/pedicel length ratio 0.96 (±0.08 SD); F2 length/F1 length ratio 1.22 (±0.14 SD); F2 length/F2 width ratio 1.00 (±0.03 SD). Gena/eye width ratio 0.69 (±0.08 SD). Forewing with 3 submarginal cells. Pronotal angle obtuse. Intertegular span 0.91 mm (±0.02 SD). Mesoscutum length/width ratio 0.91 (±0.06 SD). Propodeal lateral carina nearly reaching dorsolateral slope; oblique carina absent. n = 4.

Genitalia (Figs 33, 120E). Gonostylus elongate, about 2 times as long as broad, and slightly concave on outer margin, with short setae. Retrorse lobe attenuated apically, about 3 times as long as broad, covered in short setae.

Range

Cascadia bioregion, California, Oregon and Washington to Alberta, New Mexico, Wyoming (Fig. 34).

Floral hosts

ROSACEAE: *Pyrus* sp. • RANUNCULACEAE: *Ranunculus* sp.

DNA barcodes

DNA barcodes provide additional support for recognizing *L. engleri* sp. nov. as distinct from *L. macoupinense*. Minimum interspecific sequence divergence between the two species exceeds

1.5%, and mean interspecific sequence divergence exceeds 3.8%. The level of barcode divergence is comparable to other closely related species of *Lasioglossum*.

Lasioglossum* (*Hemihalictus*) *glabriventre (Crawford, 1907)
Figs 35–38, 93F, 101A–B, 109F, 110B, 120F

Halictus Vachali Crawford, 1906c: 300 (preocc. by *Halictus vachali* Bingham, 1897 = *Nomioides feai* Vachal, 1894).
Halictus glabriventris Crawford, 1907b: 21 (new name for *H. Vachali* Crawford).

Halictus glabriventris – Crawford 1907a: 184 (key).
Lasioglossum (*Evylaeus*) *glabriventre* – Michener 1951: 1108 (catalogue).
Evylaeus glabriventris – Hurd 1979: 1959 (catalogue). — Moure & Hurd 1987: 74 (catalogue).

Diagnosis

Both sexes of *L. glabriventre* can be recognized by the following combination of characters: tegula enlarged (mostly broadly punctate) and mesepisternum smooth, distinctly punctate. *Lasioglossum kincaidii* has an enlarged tegula, but the mesepisternum is coarsely rugose.

Etymology

Crawford (1907b) did not explain the epithet. The specific epithet is interpreted as a compound Latin adjective based on the roots '*glaber*' meaning 'bald, smooth' and '*venter*' referring to 'the belly'.

Type material

Holotype of *Halictus Vachali* (by monotypy; examined by photos)
UNITED STATES – **Oregon** • ♀; Corvallis; [44.57° N, 123.28° W]; 6 Jun. 1898; USNM 29424.

Specimen labels
"Corvallis / 6-6-98. Or // 26 // Type No. / 29424 / U.S.N.M. // HOLOTYPE // USNMENT / 01735684".

Type remarks

The original description states it was based on a single female, so a holotype is designated by monotypy.

Other material examined

CANADA – **Alberta** • 1 ♀; Newell Co., Dinosaur Provincial Park, Sandhill Creek Valley; 50.755833° N, 111.519167° W; 14 Jul. 2010; M. Buck leg.; PMAE • 1 ♀; Oldman River near Kipp, Sandy floodplain; 49.740556° N, 112.990278° W; 4 Jul. 2020; M. Buck leg.; PMAE • 1 ♀; Forty Mile Co., Pinhorn Provincial Grazing Reserve, Milk River 3 km E of HQ; 49.127222° N, 110.854167° W; 10 Aug. 2017; M. Buck leg.; PMAE • 1 ♀; Redcliff; 50.054722° N, 110.786667° W; 28 Jun. 2017; M. Buck leg.; PMAE • 1 ♀; Writing-On-Stone Provincial Park; [49.09° N, 111.62° W]; 9–13 Jul. 1990; M. Klassen leg.; PMAE • 1 ♀; same data as for preceding; 6–12 Jun. 1990; D. McCorquodale leg.; PMAE • 1 ♀; same data as for preceding; 26 May–6 Jun. 1990; D. McCorquodale leg.; PMAE • 1 ♀; Writing-On-Stone Provincial Park, 6 km E at bridge; [49.089° N, 111.536° W]; 13 Jul. 1982; D.E. McCorquodale leg.; PMAE • 1 ♀; Townshi Rd 102, Cranford; 49.81496° N, 112.2562° W; elev. 767 m; 1–15 Jul. 2016; S. Robinson leg.; PMAE. – **British Columbia** • 1 ♀; Blind Bay; [50.886° N, 119.398° W]; 1–30 Jun. 1987; C.A. Elsey leg.; PMAE • 1 ♀; Kalamalka Lake Provincial Park; 50.20773° N, 119.2342° W; 27–29 May 2015; D. Marks leg.; RSKM • 1 ♀; Okan, Similk; 49.17648° N, 119.76225° W; 25 Sep.–17 Oct. 2015; C. Dawson leg.; RSKM • 2 ♂♂; Okanagan Mountain Provincial Park; 49.76453° N, 119.59564° W; 28 Jul. 2016; M. Sanelli leg.; RSKM • 5 ♀♀; Okanagan-Similkameen Reg. Dist., Oliver, Ripley Lake; 49.2435° N, 119.6324° W; elev. 925 m; 13 Jul. 2008; L.R. Best leg.; PCYU • 1 ♀;

Okanagan-Similkameen Reg. Dist., Oliver, Ripley Lake; 49.2429° N, 119.6338° W; elev. 925 m; 11 Jul. 2008; L.R. Best leg.; PCYU • 1 ♀; Okanagan-Similkameen Reg. Dist., Oliver, Ripley Lake; 49.2432° N, 119.6329° W; elev. 925 m; 11 Jul. 2008; L.R. Best leg.; PCYU • 3 ♀♀; Okanagan-Similkameen Reg. Dist., Oliver, Ripley Lake; 49.2432° N, 119.6332° W; elev. 925 m; 16 Jul. 2008; L.R. Best leg.; PCYU • 9 ♀♀; Okanagan-Similkameen Reg. Dist., Oliver, Ripley Lake; 49.2432° N, 119.6329° W; elev. 925 m; 12 Jul. 2008; L.R. Best leg.; PCYU • 1 ♀; Okanagan-Similkameen Reg. Dist., Oliver, Sawmill Lake; 49.2072° N, 119.614° W; elev. 740 m; 29 Jul. 2008; L.R. Best leg.; PCYU • 1 ♀; Okanagan-Similkameen Reg. Dist., Mt Oliver, Ripley Lake; 49.2429° N, 119.6326° W; elev. 935 m; 31 Jul.–3 Aug. 2009; L.R. Best leg.; PCYU • 1 ♀; North Okanagan Reg. Dist. Lumby, Twin Creeks; 50.2499° N, 118.9593° W; elev. 500 m; 26 May 2008; L.R. Best leg.; PCYU • 1 ♀; Osoyoos; [49.0251° N, 119.4376° W]; 12 Jul.–10 Aug. 2007; Scudder leg.; RSKM • 1 ♀; Osoyoos, Osoyoos West Bench; 49.03033° N, 119.50034° W; 17 Jul.–9 Aug. 2017; D. Marks and K. Grant (J. Heron) leg.; RSKM • 1 ♀; Osoyoos, Strawberry Creek Road; 49.038471° N, 119.508261° W; 28 Jun. 2020; T. Haapalainen and K. Needham leg.; UBCZ • 1 ♀; Penticton; [49.500° N, 119.593° W]; 5 Jun. 2019; E.R. Buckell leg.; UBCZ • 2 ♂♂; Shuswap Lake, Blind Bay; [50.886° N, 119.398° W]; 31 Aug. 1986; C.A. Elsey leg.; PMAE • 1 ♀; Vernon Military Camp-DND; 50.2302° N, 119.3004° W; 6–22 May 2018; T. Ehlers and I. Zwart leg.; RSKM • 17 ♀♀; Vernon, CFB Vernon; 50.226° N, 119.302° W; 1–30 Jun. 2018; T. Ehlers leg.; RSKM • 5 ♀♀; Vernon, Kalamalka Lk PP; 50.20961° N, 119.2329° W; 29 Jun.–2 Jul. 2017; D. Marks, K. Grant and J. Heron leg.; RSKM • 5 ♀♀; Vernon, Vernon Military Camp-DND; 50.2255° N, 119.306° W; 6–22 May 2018; T. Ehlers and I. Zwart leg.; RSKM • 2 ♀♀; Vernon, Vernon Military Camp–DND; 50.2252° N, 119.3085° W; 6–22 May 2018; T. Ehlers and I. Zwart leg.; RSKM • 1 ♀; Vernon, Vernon Military Camp–DND; 50.2256° N, 119.3084° W; 6–22 May 2018; T. Ehlers and I. Zwart leg.; RSKM. – **Saskatchewan** • 1 ♀; Leader; 50.68337° N, 109.2231° W; S. Stecyk and S. MacDonald leg.; RSKM • 1 ♀; Maple Creek Golf Course; 49.9021° N, 109.4654° W; 9 Aug. 2018; RSKM.

UNITED STATES – **California** • 1 ♀; El Dorado Co., Fallen Leaf; [38.883° N, 120.073° W]; 14 Aug. 1931; O.H. Swezey leg.; UCRC • 2 ♀♀; Butte Co., 6.2 mi. NW of Jarbo Pass; [39.801° N, 121.580° W]; 1 Jul. 1963; C.A. Toschi leg.; ex *Clarkia garcilis albicaulis*; EMEC • 1 ♀; Contra Costa Co., Bethel Harbor; [38.031° N, 121.641° W]; 12 Sep. 1956; J. Powell leg.; EMEC • 1 ♀; El Dorado Co., 3 mi. S of Camino; [38.694° N, 120.674° W]; 23 Jun. 1948; K.W. Tucker leg.; ex Compositae; EMEC • 1 ♀; El Dorado Co., Pollock Hill; [38.76° N, 120.59° W]; 21 Jun. 1953; G.D. Butler leg.; ex *Chamaebatiaria millefolium*; UCRC • 2 ♀♀; El Dorado Co., Riverton; [38.771° N, 120.449° W]; 18 Jun. 1968; S. Paul Welles leg.; ex *Clarkia rhomboidea*; EMEC • 1 ♀; same data as for preceding; 18 Jun. 1968; S. Paul Welles leg.; ex *Gayophytum*; EMEC • 4 ♀♀; same data as for preceding; 11 Jun. 1968; S. Paul Welles leg.; ex *Clarkia rhomboidea*; EMEC • 1 ♀; same data as for preceding; 11 Jun. 1968; S. Paul Welles leg.; ex *Clarkia rhomboidea*; UCRC • 1 ♀; El Dorado Co., Snowline Camp; [38.747° N, 120.624° W]; 20 Jul. 1948; P.D. Hurd leg.; EMEC • 1 ♀; Fresno Co., 2 mi. W of Pine Ridge; [37.063° N, 119.397° W]; elev. 1219.2 m; 19 Jul. 1960; R.R. Snelling leg.; ex *Eriogonum*; LACM • 1 ♀; Fresno Co., Dinkey Creek; [37.086° N, 119.157° W]; 8 Aug. 1956; R.O. Schuster leg.; EMEC • 1 ♀; Fresno Co., Pinehurst; [36.695° N, 119.016° W]; elev. 1249.7 m; 24 Jun. 1960; R.R. Snelling leg.; LACM • 2 ♀♀; Fresno Co., Prather; [37.038° N, 119.514° W]; 29 Jun. 1956; R.O. Schuster leg.; EMEC • 1 ♂; same data as for preceding; 29 Jun. 1956; R.O. Schuster leg.; EMEC • 1 ♀; Fresno Co., Shaver Lake; [37.089° N, 119.318° W]; 27 Jul. 1968; J.B. Hoy leg.; EMEC • 1 ♀; same data as for preceding; 13 Jul. 1968; J.B. Hoy leg.; EMEC • 2 ♂♂; same data as for preceding; 6 Jul. 1968; J.B. Hoy leg.; EMEC • 3 ♀♀; same data as for preceding; 8 Aug. 1956; R.O. Schuster leg.; EMEC • 1 ♂; Fresno Co., Watts Valley; [36.934° N, 119.358° W]; 22 Jun. 1956; R.O. Schuster leg.; EMEC • 1 ♀; Humboldt Co., Redwood Creek at Stover Rd, Redwood Valley, N of Hwy 299; [40.97° N, 123.85° W]; elev. 198.1 m; 10 Aug. 1966; H.B. Leech leg.; CAS • 1 ♀; Inyo Co., Antelope Springs; [37.331° N, 118.087° W]; 15 Jun. 1961; C.A. Toschi leg.; ex *Cleome lutea*; EMEC • 1 ♀; Inyo Co., Lone Pine; [36.61° N, 118.06° W]; 13 May 1969; P. Welles leg.; ex *Aster*; EMEC • 3 ♀♀; Lassen Co., Hallelujah Junction; [39.775° N, 120.039° W]; 22 Jun. 1964; M.E. Irwin leg.; UCRC • 1 ♀; Lassen Co.; [40.67° N, 120.59° W]; 3 Jun. 1913;

F.W. Nunenmacher leg.; EMEC • 1 ♀; same data as for preceding; 4 Jun. 2013; EMEC • 1 ♀; Los Angeles Co., Arroyo Seco, Pasadena; [34.118° N, 118.169° W]; 9 Aug. 2017; R. May leg.; EMEC • 1 ♂; Los Angeles Co., Claremont; [34.097° N, 117.719° W]; Baker leg.; USNM • 1 ♀; Los Angeles Co., El Segundo Dunes; [33.932° N, 118.434° W]; 30 Apr. 1939; J.A. Comatook leg.; ex *Eremalche exilis* (verbatim: *Malvastrum exile*); LACM • 1 ♀; Los Angeles Co., Green Valley, 4 mi. S of Cuyamaca; [32.906° N, 116.582° W]; 8 Aug. 1951; P.H. Timberlake leg.; ex Eriogonum davidsonii; UCRC • 1 ♀; Los Angeles Co., Los Angeles; [34.054° N, 118.243° W]; 21 Apr. 1918; R. May leg.; EMEC • 1 ♀; Los Angeles Co., Mts near Claremont; [34.161° N, 117.716° W]; Baker leg.; USNM • 1 ♀; Los Angeles Co., Newhall; [34.595° N, 118.662° W]; 20 Apr. 1940; R.M. Bohart leg.; LACM • 1 ♀; Los Angeles Co., Tanbark Flat; [34.204° N, 117.760° W]; 22 Jun. 1950; P.D. Hurd leg.; EMEC • 1 ♀; Madera Co., 2 mi. N of Nipinnawasee; [37.433° N, 119.733° W]; 4 Jul. 1960; G.I. Stage and R.R. Snelling leg.; ex *Clarkia williamsonii*; EMEC • 2 ♂♂; Madera Co., Chiquito Creek, 0.25 mi. below Upper Chiquito Campground; [37.498° N, 119.409° W]; elev. 2078.7 m; 11 Aug. 1971; H.B. Leech leg.; CAS • 1 ♀; Madera Co., Oakhurst; [37.328° N, 119.649° W]; 1 Jun. 1942; EMEC • 1 ♀; Madera Co., Oakhurst cemetery; [37.333° N, 119.653° W]; 16 May 1963; J.W. MacSwain leg.; ex *Oenothera campestris*; EMEC • 2 ♀♀; Mariposa Co., 0.8 mi. S of Mormon Bar; [37.4503° N, 119.9479° W]; 16 Jun. 1959; R.W. Thorp leg.; ex *Clarkia williamsonii*; EMEC • 3 ♀♀; same data as for preceding; 16 Jun. 1959; G.I. Stage leg.; ex *Clarkia williamsonii*; EMEC • 1 ♀; same data as for preceding; 16 Jun. 1959; G.I. Stage leg.; ex *Clarkia dudleyana*; EMEC • 1 ♀; Mariposa Co., 10 mi. E of Mormon Bar; [37.462° N, 119.766° W]; 4 Jul. 1960; G.I. Stage and R.R. Snelling leg.; ex *Clarkia williamsonii*; EMEC • 1 ♀; Mariposa Co., 5.5 mi. N of Coulterville; [37.788° N, 120.197° W]; 18 Jul. 1963; R.W. Thorp leg.; ex *Clarkia dudleyana*; EMEC • 1 ♀; Mariposa Co., Yosemite; [37.833° N, 119.500° W]; 20 May 1934; O. Bryant leg.; CAS • 1 ♀; same data as for preceding; 25 May 1938; N.F. Hardman leg.; EMEC • 1 ♀; Mariposa Co.; [37.57° N, 119.90° W]; 23 May 1938; N.F. Hardman leg.; EMEC • 1 ♀; Modera Co.; [36.99° N, 120.01° W]; 21 May 1938; N.F. Hardman leg.; EMEC • 2 ♀♀; Modoc Co., 5 mi. NE of Alturas; [41.538° N, 120.474° W]; 29 May 1976; T.R. Haig leg.; CSCA • 1 ♀; Modoc Co., 9 mi. N of Adin; [41.325° N, 120.944° W]; elev. 1493.5 m; 5 Aug. 1966; UCRC • 2 ♀♀; Modoc Co., Davis Creek; [41.733° N, 120.372° W]; 14 Jul. 1922; C.L. Fox leg.; CAS • 2 ♀♀; Modoc Co., Lake City; [41.643° N, 120.217° W]; 30 Jul. 1922; C.L. Fox leg.; CAS • 1 ♀; Modoc Co., Adin Summit, 10 mi. S of Canby; [41.299° N, 120.871° W]; 13 Jun. 1964; C.W. Baker and D.R. Smith leg.; EMEC • 1 ♀; Mono Co., 7 mi. E of Bodie; [38.212° N, 118.885° W]; 2 Jul. 1964; P. Rude leg.; EMEC • 1 ♂; Mono Co., Leavitt Meadow; [38.316° N, 119.550° W]; elev. 2194.6 m; 13 Aug. 1963; H.B. Leech leg.; CAS • 1 ♀; same data as for preceding; 13 Aug. 1963; H.B. Leech leg.; CAS • 1 ♂; same data as for preceding; 11 Aug. 1960; C.A. Toschi leg.; EMEC • 1 ♀; Monterey Co., Indians Guard Staion, 17 air mi. NW of Jolon; [36.144° N, 121.392° W]; elev. 640 m; 9 May 1975; R. Wharton leg.; EMEC • 1 ♀; Monterey Co., Tassajara Hot Springs; [36.234° N, 121.550° W]; elev. 457.2 m; 26 May 1954; O. Bryant leg.; CAS • 1 ♀; Napa Co., Chiles Valley; [38.625° N, 122.371° W]; 7 May 1939; E.C. Van Dyke leg.; CAS • 1 ♂; Nevada Co., 3.5 mi. N of Truckee; [39.378° N, 120.183° W]; 8 Aug. 1963; J.W. MacSwain leg.; ex *Gayophytum heterozygum*; EMEC • 1 ♀; Nevada Co., 4 mi. N of Truckee; [39.386° N, 120.183° W]; 5 Sep. 1992; E.G. Linsley leg.; ex *Chrysothamnus viscidiflorus* var. *typicus*; EMEC • 1 ♀; Nevada Co., 7 mi. SE of Truckee; [39.254° N, 120.091° W]; 24 Jun. 1954; R.H. Goodwin leg.; EMEC • 1 ♀; Nevada Co., Boca; [39.387° N, 120.090° W]; 3 Jul. 1954; P.D. Hurd leg.; ex *Chaenactis glabriuscula* var. *lanosa*; EMEC • 1 ♀; Nevada Co., near Hobart Mills; [39.400° N, 120.185° W]; 17 Jun. 1964; M.E. Irwin leg.; UCRC • 1 ♀; Nevada Co., Sagehen near Hobart Mills; [39.43° N, 120.20° W]; 21 Jun. 1954; P.D. Hurd leg.; ex *Phacelia humilis*; EMEC • 1 ♀; same data as for preceding; 25 Jun. 1954; J.A. Powell leg.; EMEC • 1 ♀; same data as for preceding; 9 Jul. 1954; R.H. Goodwin leg.; EMEC • 1 ♀; same data as for preceding; 4 Jul. 1954; P.D. Hurd leg.; EMEC • 2 ♀♀; Placer Co., Summit; [39.313° N, 120.359° W]; elev. 2133.6 m; W.M. Giflard leg.; CAS • 2 ♀♀; Placer Co., Lake Tahoe, Carnelian Bay; [39.227° N, 120.082° W]; 24 Jun. 1954; J.A. Powell leg.; EMEC • 3 ♀♀; Plumas Co., 23 mi. SW of Quincy; [39.700° N, 121.254° W]; 2 Jul. 1963; J.W. MacSwain leg.; ex *Clarkia purpurea*; EMEC • 1 ♀; Plumas Co., 5.5 mi S of Vinton; [39.722° N, 120.175° W]; 6 Aug. 1963; J.W. MacSwain leg.; ex *Taraxia*

tanacetifolia (verbatim: *Oenothera tanacetifolia*); EMEC • 1 ♀; Plumas Co., Bucks Lake; [39.871° N, 121.184° W]; 1 Jul. 1949; J.W. MacSwain leg.; EMEC • 1 ♂; same data as for preceding; 13 Aug. 1959; J.W. MacSwain leg.; ex *Gayophytum humile* (verbatim: *Gayophytum nuttallii*); EMEC • 1 ♀; same data as for preceding; 13 Aug. 1959; J.W. MacSwain leg.; ex *Gayophytum humile* (verbatim: *Gayophytum nuttallii*); EMEC • 1 ♀; Plumas Co., Portola; [39.811° N, 120.469° W]; 24 Aug. 1976; T.R. Haig leg.; CSCA • 1 ♀; Riverside Co., 1 mi. S of Temecula; [33.477° N, 117.149° W]; 2 Jul. 1963; J. Powell leg.; EMEC • 1 ♀; same data as for preceding; 15 Jul. 1963; J. Powell leg.; EMEC • 1 ♀; Riverside Co., Bautista Canyon, T65, R2E, S18; [33.70° N, 116.85° W]; 24 Apr. 1984; F. Corcel leg.; UCRC • 1 ♀; Riverside Co., Bautista Canyon, San Bernardino National Forest (S. Valle Vista); [33.70° N, 116.85° W]; 23 May 1968; S. Frommer and R. Somerby leg.; UCRC • 1 ♀; Riverside Co., Hemet; [33.748° N, 116.972° W]; 15 Jul. 1945; Ray F. Smith leg.; EMEC • 2 ♂♂; same data as for preceding; 11–19 Aug. 1946; C. Grainger leg.; ex Goldenrod; EMEC • 1 ♀; Riverside Co., Idyllwild; [33.748° N, 116.715° W]; 25 Jun. 1928; E.C. Van Dyke leg.; CAS • 1 ♀; Riverside Co., Idyllwild, San Jacinto Mountains; [33.748° N, 116.715° W]; 12 Jun. 1939; J.G. Shanafelt leg.; LACM • 1 ♀; same data as for preceding; 20 May 1939; E.G. Linsley leg.; EMEC • 4 ♀♀; Riverside Co., Keen Camp, San Jacinto Mountains; [33.687° N, 116.704° W]; 10 Jun. 1939; E.S. Ross leg.; EMEC • 1 ♀; same data as for preceding; 10 Jun. 1939; E.G. Linsley leg.; EMEC • 1 ♀; Riverside Co., Pine Flat, San Jacinto Mountains; [33.585° N, 116.456° W]; 15 Jun. 1946; C.D. Michener leg.; ex *Cryptantha micrantha*; EMEC • 1 ♀; Riverside Co., Riverside; [33.956° N, 117.372° W]; elev. 290 m; 12 May 1926; P.H. Timberlake leg.; ex (?); UCRC • 1 ♀; same data as for preceding; 17 Apr. 1925; P.H. Timberlake leg.; ex *Eschscholzia californica* Cham; UCRC • 1 ♀; same data as for preceding; 10 Apr. 1928; P.H. Timberlake leg.; ex *Gilia achilleifolia* Benth. subsp. *multicaulis* (verbatim: *Gilia multicaulis*); UCRC • 1 ♀; same data as for preceding; 10 Apr. 1925; P.H. Timberlake leg.; ex *Heterotheca grandiflora*; UCRC • 1 ♀; same data as for preceding; 17 Mar. 1925; P.H. Timberlake leg.; ex *Eschscholzia*; UCRC • 1 ♀; same data as for preceding; 5 Mar. 1926; P.H. Timberlake leg.; ex *Cryptantha intermedia*; UCRC • 1 ♀; same data as for preceding; 15 Feb. 1935; P.H. Timberlake leg.; ex *Clarkia* (verbatim: *Godetia*); UCRC • 1 ♀; same data as for preceding; 24 Apr. 1930; P.H. Timberlake leg.; ex *Clarkia purpurea* subsp. *viminea* (verbatim: *Godetia viminea*); UCRC • 1 ♀; same data as for preceding; 6 Oct. 1935; P.H. Timberlake leg.; ex *Polygonum lapathifolium*; UCRC • 1 ♀; same data as for preceding; 6 May 1929; P.H. Timberlake leg.; ex *Gilia achilleifolia* subsp. *multicaulis* (verbatim: *Gilia multicaulis*); UCRC • 1 ♀; same data as for preceding; 7 Jul. 1929; P.H. Timberlake leg.; ex *Portulaca*; UCRC (Fig. 35) • 1 ♀; same data as for preceding; 10 May 1929; P.H. Timberlake leg.; ex *Gilia achilleifolia* subsp. *multicaulis* (verbatim: *Gilia multicaulis*); UCRC • 1 ♀; same data as for preceding; 7 Apr. 1936; P.H. Timberlake leg.; ex *Gilia achilleifolia* subsp. *multicaulis* (verbatim: *Gilia multicaulis*); UCRC • 1 ♀; same data as for preceding; 25 Apr. 1928; P.H. Timberlake leg.; ex *Cryptantha intermedia*; UCRC • 1 ♀; same data as for preceding; 28 Apr. 1938; P.H. Timberlake leg.; ex *Chaenactis glabriuscula*; UCRC • 1 ♂; same data as for preceding; 4 Oct. 1937; P.H. Timberlake leg.; ex *Phyla nodiflora* (verbatim: *Lippia filiformis*); UCRC • 1 ♂; same data as for preceding; 14 Sep. 1941; P.H. Timberlake leg.; ex *Conyza bonariensis* (verbatim: *Erigeron linifolius*); UCRC • 1 ♀; same data as for preceding; 27 Aug. 1953; P.H. Timberlake leg.; ex *Picris echioides*; EMEC • 1 ♀; Riverside Co., Tahquitz valley; [33.770° N, 116.658° W]; 23 Jul. 1928; P.H. Timberlake leg.; ex *Geranium*; UCRC • 1 ♀; San Benito Co., 6 mi. SE of Idria; [36.355° N, 120.598° W]; 28 Jun. 1954; J.D. Lattin leg.; EMEC • 1 ♀; San Benito Co., 6 mi. SE of Idria; [36.355° N, 120.598° W]; 29 Jun. 1954; J.D. Lattin leg.; EMEC • 1 ♀; San Benito Co., Idria; [36.417° N, 120.674° W]; 29 Jun. 1955; M. Wasbauer leg.; ex *Mimulus fremonti*; EMEC • 7 ♀♀; San Benito Co., Idria (gem mine); [36.336° N, 120.606° W]; 5 Jul. 1954; R.F. Smith and E.G. Linsley leg.; ex *Achillea millefolium*; EMEC • 1 ♀; same data as for preceding; 29 Jun. 1954; C.D. MacNeill leg.; EMEC • 1 ♀; same data as for preceding; 29 Jun. 1955; P.D. Hurd leg.; ex *Phacelia*; EMEC • 1 ♀; San Benito Co., Idria (Gem Mine); [36.336° N, 120.606° W]; 15 Jun. 1955; D.J. Burdick leg.; EMEC • 2 ♂♂; San Benito Co., Idria (Gem Mine); [36.336° N, 120.606° W]; 5 Jul. 1954; R.F. Smith and E.G. Linsley leg.; ex *Achillea millefolium*; EMEC • 1 ♀; San Benito Co.; [36.62° N, 121.12° W]; 24 Jun. 1968; D. Veirs leg.; EMEC • 1 ♀; San Bernardino Co., Lone Pine Canyon; [34.323° N, 117.563° W]; elev. 1371.6 m; 16 Jun. 1928; P.H. Timberlake leg.;

ex *Eriastrum virgatum* (verbatim: *Hugelia virgata*); UCRC • 1 ♀; San Bernardino Co., Lytle Creek Park; [34.095° N, 117.309° W]; 23 May 1936; P.H. Timberlake leg.; ex *Iris hartwegii*; UCRC • 1 ♀; same data as for preceding; 23 May 1936; P.H. Timberlake leg.; ex *Fragaria vesca* subsp. *californica* (verbatim: *Fragaria californica*); UCRC • • 1 ♂; San Bernardino Co., Mill Creek; [34.083° N, 116.894° W]; elev. 1890 m; 7 Aug. 1946; P.H. Timberlake leg.; ex *Eriogonum*; UCRC (Figs 36, 37A–C) • 1 ♀; San Bernardino Co., 1 mi. E of Highland; [34.110° N, 117.153° W]; 6 May 1965; M.E. Irwin leg.; UCRC • 2 ♀♀; San Bernardino Co., Lake Arrowhead, San Bernardino Mountains; [34.248° N, 117.189° W]; 9 Jul. 1956; P.D. Hurd leg.; ex *Aster*; EMEC • 2 ♂♂; same data as for preceding; 9 Jul. 1956; P.D. Hurd leg.; ex *Aster*; EMEC • 1 ♀; San Bernardino Co., Seven Oaks, San Bernardino Mountain; [34.186° N, 116.910° W]; 11 Jul. 1964; E.I. Schlinger leg.; UCRC • 1 ♀; San Bernardino Co., Sugarloaf; [34.243° N, 116.828° W]; 15 Aug. 1953; H.T. Spieth leg.; USNM • 1 ♂; same data as for preceding; 6 Jul. 1954; A.L. Melander leg.; USNM • 1 ♀; San Bernardino Co., up Santa Ana River; [34.05° N, 117.34° W]; 15 Sep. 1954; A.L. Melander leg.; EMEC • 4 ♀♀; same data as for preceding; 8 Jun. 1955; A.L. Melander leg.; USNM • 1 ♀; same data as for preceding; 29 Aug. 1956; A.L. Melander leg.; USNM • 1 ♀; San Bernardino Co., Wildwood Canyon, 5mi. E of Calimesa; [34.002° N, 116.975° W]; 11 Jun. 1968; M.E. Irwin leg.; UCRC • 2 ♀♀; San Diego Co., Mount Laguna; [32.87° N, 116.42° W]; 21 Jun. 1963; P.D. Hurd leg.; EMEC • 1 ♀; same data as for preceding; 5 Jul. 1963; H.L. Griffin leg.; EMEC • 2 ♀♀; San Diego Co., Mt Palomar; [33.363° N, 116.836° W]; 28 Jun. 1963; P.D. Hurd leg.; ex *Cryptantha intermedia*; EMEC • 2 ♀♀; San Diego Co., Warner Springs, Agua Caliente Creek; [33.279° N, 116.720° W]; elev. 944.9 m; 23–25 Aug. 1980; M. Wasbauer and P. Adams leg.; CSCA • 1 ♀; San Diego Co., William Heise County Park; [33.037° N, 116.592° W]; 28 Jul. 1982; J.C. Hall leg.; USNM • 2 ♀♀; San Diego Co.; [33.03° N, 116.77° W]; 8 Jun. 2021; SDMC • 1 ♀; San Diego Co., Warner Springs; [33.282° N, 116.634° W]; 6 Aug. 2021; EMEC • 1 ♀; San Joaquin Co., Tracy; [37.738° N, 121.434° W]; 21 Jun. 1949; Ray F. Smith leg.; EMEC • 2 ♀♀; same data as for preceding; 20 Jun. 1949; Ray F. Smith leg.; ex *Convolvulus*; EMEC • 2 ♂♂; same data as for preceding; 21 Jun. 1949; Ray F. Smith leg.; ex *Melilotus*; EMEC • 3 ♀♀; same data as for preceding; 21 Jun. 1949; Ray F. Smith leg.; ex *Melilotus*; EMEC • 4 ♀♀; same data as for preceding; 5 May 1949; ex *Brassica*; EMEC • 1 ♂; same data as for preceding; 13 Jun. 1949; J.W. MacSwain leg.; EMEC • 1 ♀; San Luis Obispo Co., 5 mi. NE of Santa Margarita; [35.441° N, 120.547° W]; 25 Jun. 1964; J.W. MacSwain leg.; ex *Oenothera*; EMEC • 1 ♀; same data as for preceding; 25 Jun. 1964; J.W. MacSwain leg.; ex *Clarkia unguiculata*; EMEC • 1 ♂; Santa Barbara Co.; 34.0225° N, 119.8728° W; 10 Oct. 2012; S. Teel leg.; BIML • 3 ♂♂; same data as for preceding; 18 Sep. 2012; S. Teel leg.; BIML • 1 ♀; Los Angeles Co., Big Pine Camp; [34.396° N, 117.734° W]; elev. 1850 m; 16 Jul. 1927; P.H. Timberlake leg.; ex *Erigeron*; UCRC • 3 ♀♀; same data as for preceding; 12 Jul. 1927; P.H. Timberlake leg.; ex *Gilia*; UCRC • 1 ♀; same data as for preceding; 16 Jul. 1927; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 13 Jul. 1927; P.H. Timberlake leg.; ex *Eriogonum*; UCRC • 1 ♀; same data as for preceding; 15 Jul. 1927; P.H. Timberlake leg.; UCRC • 1 ♀; Santa Clara Co., Mountain Home Canyon; [7.121° N, 121.796° W]; 19 Sep. 1949; A.L. Melander leg.; UCRC • 1 ♀; Santa Clara Co., San Antonio Valley; [37.344° N, 121.453° W]; 22 Jul. 1955; M. Wasbauer leg.; EMEC • 2 ♂♂; Santa Cruz Co., Laurel; [37.117° N, 121.965° W]; 2 Jul. 1956; D.J. Burdick leg.; EMEC • 1 ♀; Shasta Co., 2 mi. W of Viola; [40.518° N, 121.716° W]; 20 May 1941; C.D. Michener leg.; EMEC • 1 ♀; Shasta Co., Burney Falls; [41.012° N, 121.652° W]; E.C. Van Dyke leg.; ex *Grindelia*; CAS • 1 ♀; Shasta Co., Cassel; [40.919° N, 121.548° W]; 5 Jul. 1955; E.E. Lindquist leg.; EMEC • 1 ♀; Shasta Co., Old Station; [40.675° N, 121.431° W]; 24 Jun. 1955; E.E. Lindquist leg.; EMEC • 1 ♀; Shasta Co., Old Station; [40.673° N, 121.423° W]; 22 Jun. 1955; J.W. MacSwain leg.; EMEC • 1 ♀; Shasta Co., Redding; [40.583° N, 122.367° W]; 4 Jul. 1975; T.R. Haig leg.; CSCA • 1 ♀; same data as for preceding; 7 Aug. 1975; T.R. Haig leg.; CSCA • 1 ♀; Shasta Co., Shingletown; [40.496° N, 121.86° W]; 22 May 1941; EMEC • 1 ♀; Sierra Co., 5 mi. NW of Calpine; [39.717° N, 120.5062° W]; 31 May 1950; J.G. Rozen leg.; ex *Ranunculus*; EMEC • 1 ♀; Sierra Co.; [39.58° N, 120.53° W]; 19 Jun. 1913; F.W. Nunenmacher leg.; EMEC • 4 ♀♀; Siskiyou Co., 1 mi. SE of Bartle; [41.247° N, 121.808° W]; 8–10 Jun. 1974; R. Coville leg.; EMEC • 1 ♀; Siskiyou Co., 9 mi. N of Bartle; [41.388° N, 121.821° W]; 12–15 Jun. 1974; R. Coville leg.; EMEC • 1 ♀; Siskiyou Co., Ash

Creek Ranger Station; 9 mi. E of McCloud; [41.253° N, 121.965° W]; elev. 1066.8 m; 10–12 Jun. 1974; R. Coville leg.; EMEC • 1 ♀; same data as for preceding; 13–16 Jun. 1974; R. Coville leg.; EMEC • 1 ♀; Siskiyou Co., Brown's Lake, SW of Mt Shasta City; [41.299° N, 122.330° W]; 13–14 Jun. 1974; J. Powell leg.; EMEC • 1 ♀; Siskiyou Co., Dunsmuir; [41.22° N, 122.27° W]; Wickham leg.; USNM • 1 ♀; Siskiyou Co., Mt Shasta City; [41.328° N, 122.325° W]; 20 Jun. 1958; J. Powell leg.; EMEC • 1 ♂; Siskiyou Co., Salmon Trinity Alps Wilderness Area, Big Flat Campground; [41.017° N, 123.089° W]; elev. 1524 m; 2 Aug. 1968; H.B. Leech leg.; CAS • 1 ♀; Siskiyou Co., Shasta Springs; [41.2468° N, 122.2611° W]; 8 Jun. 1920; C.L. Fox leg.; CAS • 2 ♀♀; Sonoma Co., Pitkin Ranch, 6 mi. N of Sebastopol; [38.487° N, 122.824° W]; 25 Jul. 1965; J.W. MacSwain leg.; ex *Clarkia imbricata*; EMEC • 1 ♀; same data as for preceding; 22 Jul. 1965; J.W. MacSwain leg.; ex *Clarkia imbricata*; EMEC • 1 ♂; same data as for preceding; 25 Jul. 1965; J.W. MacSwain leg.; ex *Clarkia imbricata*; EMEC • 1 ♂; Stanislaus Co., Ceres; [37.601° N, 120.957° W]; 28 Aug. 1953; W.W. Middlekauff leg.; EMEC • 1 ♀; Trinity Co., Hayfork Ranger Station; [40.553° N, 123.165° W]; elev. 701 m; 18 May 1973; J.A. Chemsak leg.; EMEC • 1 ♀; Trinity Co., Junction City; [40.74° N, 123.06° W]; 30 Jun. 1975; T.R. Haig leg.; CSCA • 1 ♀; same data as for preceding; 21 Apr. 1977; T.R. Haig leg.; CSCA • 1 ♂; same data as for preceding; 13 Jun. 1975; T.R. Haig leg.; CSCA • 1 ♀; Tulare Co., 3 mi. W of Three Rivers; [36.437° N, 118.958° W]; 10 May 1936; P.H. Timberlake leg.; ex *Camissonia contorta* (verbatim: *Oenothera dentata*); UCRC • 1 ♀; Tulare Co., California Hot Springs; [35.880° N, 118.677° W]; 2 Jun. 1939; E.C. Van Dyke leg.; CAS • 1 ♀; Tulare Co., Badger; [36.631° N, 119.013° W]; 20 Jun. 1924; P.H. Timberlake leg.; ex *Brodiaea coronaria*; UCRC • 1 ♂; same data as for preceding; 26 Jun. 1929; P.H. Timberlake leg.; ex *Frangula californica* (verbatim: *Rhamnus californica*); UCRC • 2 ♀♀; Tuolumne Co., Berkeley Tuolumne Camp; [37.811° N, 119.944° W]; 12 Jun. 1968; S. Paul Welles leg.; ex *Clarkia rhomboidea*; EMEC • 1 ♀; same data as for preceding; 12 Jun. 1968; S. Paul Welles leg.; EMEC • 4 ♀♀; same data as for preceding; 4 Jun. 1968; S. Paul Welles leg.; ex *Clarkia rhomboidea*; EMEC • 1 ♀; Tuolumne Co., Camp Bob MacBride, Pinecrest; [37.942° N, 120.262° W]; elev. 1645.9 m; 1 Aug. 1952; R. Snelling leg.; LACM • 1 ♀; Tuolumne Co., Pinecrest; [38.189° N, 119.992° W]; 12 Jul. 1953; J.G. Rozen leg.; ex *Phacelia*; EMEC • 1 ♀; Tuolumne Co., Strawberry; [38.198° N, 120.009° W]; 24 Jun. 1953; J.G. Rozen leg.; EMEC • 1 ♀; same data as for preceding; 18 May 1953; J.G. Rozen leg.; EMEC • 2 ♀♀; same data as for preceding; 27 Aug. 1960; P.D. Hurd leg.; ex *Ericameria bloomeri* (verbatim: *Haplopappus bloomeri* subsp. *angustatus*); EMEC • 1 ♀; same data as for preceding; 29 Jul. 1960; R.W. Thorp leg.; ex *Erigeron*; EMEC • 1 ♀; same data as for preceding; 21 Jul. 1960; P.D. Hurd leg.; ex *Erigeron nudum*; EMEC • 1 ♀; same data as for preceding; 2 Aug. 1960; E. Jessen leg.; EMEC • 2 ♀♀; Tuolumne Co., Strawberry; [38.20° N, 120.01° W]; 1 Aug. 1960; C.A. Toschi leg.; EMEC • 1 ♀; Tuolumne Co., Tuolumne City; [37.961° N, 120.237° W]; 22 Jun. 1953; J.G. Rozen leg.; EMEC • 1 ♂; Tuolumne Co., Strawberry; [38.20° N, 120.01° W]; 21 Aug. 1960; P.D. Hurd leg.; ex *Eriogonum nudum*; EMEC • 1 ♀; Ventura Co., Lockwood Creek, near Stauffer P.O.; [34.730° N, 119.033° W]; 7 May 1959; P.D. Hurd leg.; ex *Phacelia fremontii*; EMEC • 3 ♀♀; Ventura Co., Lockwood Valley; [34.7325° N, 119.042° W]; 5 May 1959; P.H. Timberlake leg.; ex *Sisymbrium*; UCRC • 3 ♀♀; Ventura Co., Lockwood Creek, near Stauffer P.O.; [34.730° N, 119.033° W]; 5 May 1959; J.R. Powers leg.; ex *Descurainia sophia*; EMEC • 1 ♀; same data as for preceding; 7 May 1959; P.D. Hurd leg.; ex *Leptosiphon aureus*; EMEC • 2 ♀♀; same data as for preceding; 7 May 1959; P.D. Hurd leg.; ex *Descurainia sophia*; EMEC. – **Colorado** • 10 ♀♀; La Plata Co., Los Pinos; [37.09° N, 106.49° W]; 22 May 1999; Carl F. Baker leg.; ex *Erigeron*; USNM • 1 ♀; Larimer Co., Hewlett Gulch; [40.706° N, 105.314° W]; 1 Jul. 1983; H.E. Evans leg.; UCMC • 2 ♀♀; Montrose Co., East Portal; [39.92° N, 105.66° W]; elev. 1981.2 m; 27 Jul. 1962; U.N. Lanham leg.; UCMC • 1 ♀; Rio Grande Co., Monte Vista; 37.583333° N, 106.15° W; elev. 2331.7 m; 16 Jun. 2019; UCRC. – **Idaho** • 1 ♀; Benewah Co., Saint Maries; [47.32° N, 116.57° W]; 24 Jun. 2019; H.A. Scullen leg.; OSAC • 1 ♀; Blaine Co., Magic Reservoir; 43.3277° N, 114.3999° W; 7 Jul. 2009; F. Morrison leg.; WRME • 1 ♀; Cassia or Minidoka Co., Burley; [42.54° N, 113.79° W]; 14 Jun. 1929; ex *Solidago altissima*; USNM • 1 ♀; Twin Falls Co., Hollister; [42.35° N, 114.58° W]; 8 Jul. 1930; A. Rosea and S. Pestifer leg.; EMEC • 1 ♂; same data as for preceding; 24 Jul. 1930; EMEC. – **Montana** • 1 ♀; Missoula Co., Florence MPG Ranch; 46.6905° N, 114.0265° W; elev. 1136 m;

8–10 Jul. 2019; M. Seidensticker leg.; CBG • 2 ♀♀; Missoula Co., Florence MPG Ranch; 46.6776° N, 114.0392° W; elev. 986 m; 16–18 Jul. 2019; M. Seidensticker leg.; CBG • 1 ♀; same data as for preceding; 9–11 Jul. 2019; M. Seidensticker leg.; CBG • 1 ♀; same data as for preceding; 23–25 Jul. 2019; M. Seidensticker leg.; CBG • 1 ♀; Missoula Co., Florence MPG Ranch; 46.6819° N, 114.0288° W; elev. 1018 m; 2–4 Jul. 2019; M. Seidensticker leg.; CBG. – **Nevada** • 1 ♀; Elko Co., Wells; [41.11° N, 114.97° W]; 20 Jun. 1927; J.M. Aldrich leg.; EMEC • 1 ♀; Mineral Co., 4.5 mi. S of Schurz; [38.8812° N, 118.8117° W]; 20 Jul. 1982; W.J. Pulawski leg.; CAS • 8 ♀♀; Ormsby Co.; [39.16° N, 119.77° W]; Jul.; Baker leg.; USNM • 1 ♀; Washoe Co., 10 mi. S of Reno on hyw. 395; [39.625° N, 119.913° W]; 19 Jun. 1959; R.W. Thorp leg.; ex *Chylismia claviformis* subsp. *integrior* (verbatim: *Oenothera claviformis* var. *cruciformis*); EMEC • 1 ♀; Washoe Co., Verdi; [39.518° N, 119.989° W]; 25 Jun. 1954; J.A. Powell

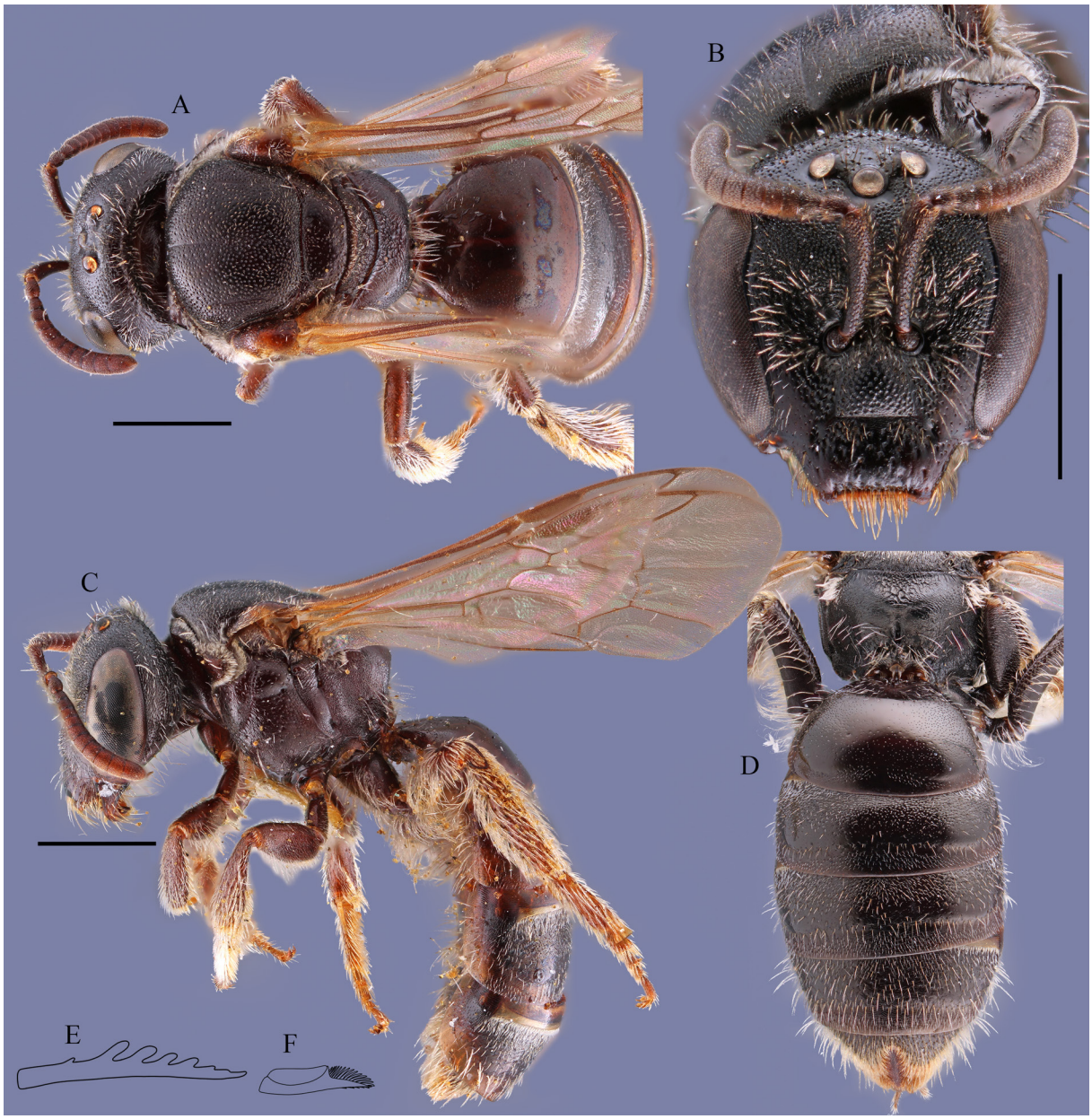


Fig. 35. *Lasioglossum* (*Hemihalictus*) *glabriventre* (Crawford, 1907), ♀ (UCRC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

leg.; EMEC. – **Oregon** • 1 ♂; Benton Co., Corvallis; [44.567° N, 123.283° W]; 28 Aug. 1931; USNM • 1 ♀; same data as for preceding; 17 Sep. 1935; G. Ferguson leg.; EMEC • 2 ♀♀; same data as for preceding; 10 May 1936; N.P. Laraon leg.; OSAC • 1 ♀; same data as for preceding; 14 Jul. 1935; OSAC • 1 ♀; same data as for preceding; 4 Jun. 1948; OSAC • 1 ♀; Crook Co., 15 mi. SE of Prineville; [44.145° N, 120.620° W]; elev. 1066.8 m; 22 May 1971; Oman leg.; OSAC • 1 ♂; Deschutes Co., Sisters; [44.2909° N, 121.5492° W]; 17 Aug. 1941; ex *Chrysothamnus*; OSAC • 1 ♀; Douglas Co., Yoncalla; [43.599° N, 123.283° W]; 26 May 1937; R.M. and G.E. Bohart leg.; CAS • 1 ♀; Grant Co., 19 mi. S of Dale; [44.713° N, 118.947° W]; 17 Jul. 1965; J. Wolf leg.; ex *Clarkia pulchella*; EMEC • 5 ♀♀; Grant Co., 9 mi. S of Dale; [44.858° N, 118.947° W]; 17 Jul. 1965; R.L. Langston leg.; ex *Clarkia pulchella*; EMEC • 2 ♀♀; Harney Co., Malheur National Wildlife Refuge, HQT; 43.2652° N, 118.8433° W; 8–9 Jul. 2010; Linda Beck leg.; OSAC • 1 ♂; Klamath Co., Algoma, Klamath Falls; [42.225° N, 121.782° W];

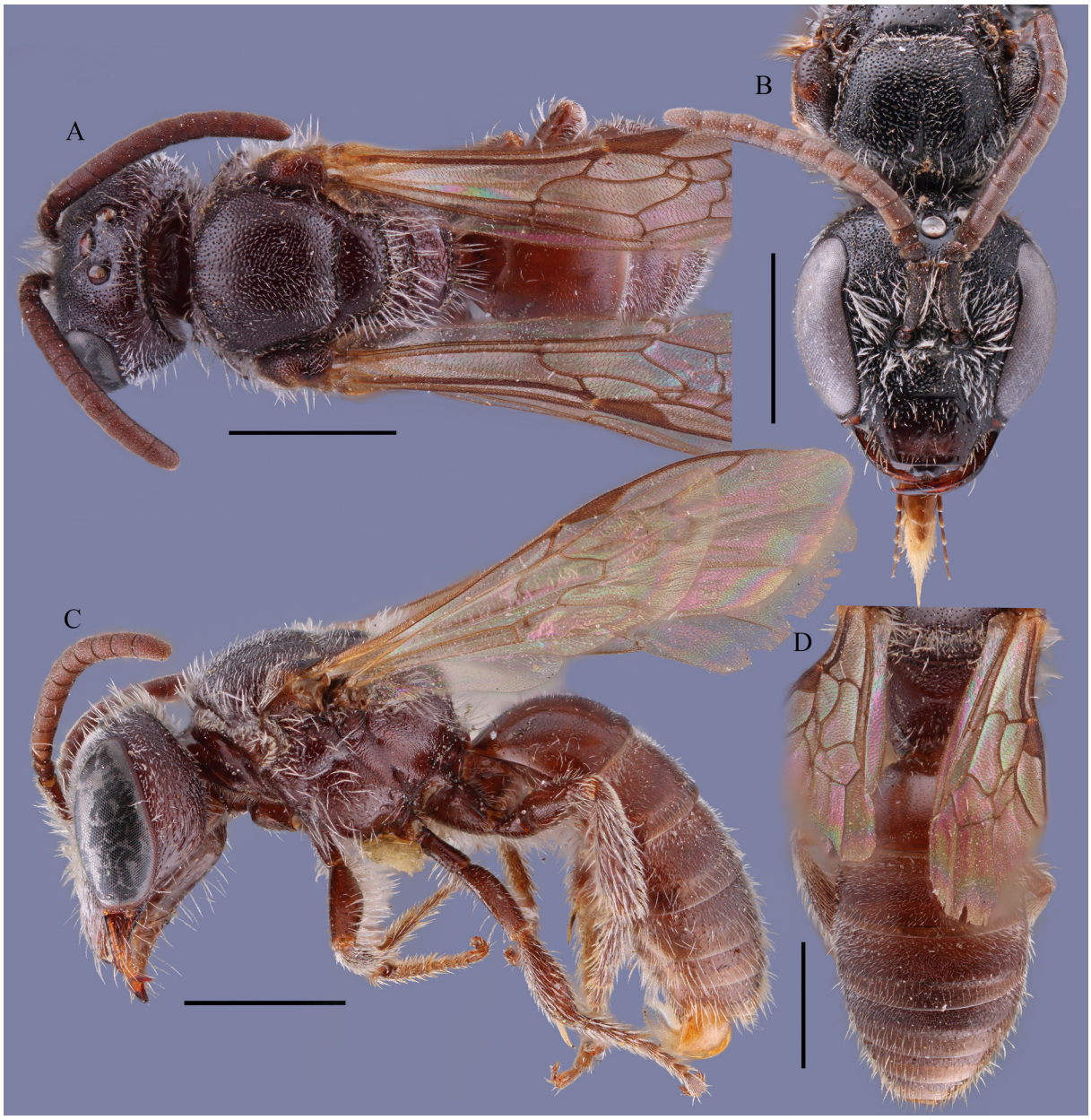


Fig. 36. *Lasioglossum* (*Hemihalictus*) *glabriventre* (Crawford, 1907), ♂ (UCRC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

23 Aug. 1958; Joe Schuh leg.; OSAC • 1 ♀; Klamath Co., Klamath Falls, Geary Ranch; [42.277° N, 121.884° W]; 10 Jun. 1958; J. Schuh leg.; OSAC • 1 ♀; Klamath Co., Klamath Lake, Alkali Pond; [42.39° N, 121.88° W]; 19 Aug. 1958; J. Schuh leg.; OSAC • 1 ♀; Lane Co., Cottage Grove; [43.798° N, 123.059° W]; 1–31 Jul. 1939; G. Moxiey leg.; LACM • 1 ♀; Lane Co., Eugene; [43.95° N, 122.88° W]; 29 May 1933; O.H. Swezey leg.; CAS • 1 ♀; Lane Co., Springfield; [41.666° N, 110.934° W]; W. Holleman leg.; EMEC • 1 ♀; Linn Co., High Cascade Mountains; [46.85° N, 121.76° W]; 20 Jul. 2009; J.C. Bridwell leg.; EMEC • 1 ♀; Milton Co.; [45.94° N, 118.39° W]; 22 Jun. 1938; K. Gray and J. Schuh leg.; OSAC • 5 ♀♀; Multnomah Co., Oxbow Meadow; 45.4844° N, 122.3015° W; 2 Jun. 2021; J.D. Engler leg.; OSAC • 1 ♀; Multnomah Co., Oxbow Meadow; 45.485° N, 122.3015° W; 23 Jul. 2021; J.D. Engler leg.; OSAC • 1 ♂; same data as for preceding; 23 Jul. 2021; J.D. Engler leg.; ex *Tarax*/*Hypochaer*; OSAC • 1 ♂; same data as for preceding; 23 Jul. 2021; J.D. Engler leg.; ex *Erigeron*; OSAC • 1 ♂; Polk Co., Grand Island; [45.127° N, 123.038° W]; 6 Aug. 1941; R.E. Rieder leg.; OSAC • 1 ♀; Union Co., Union; [45.210° N, 117.865° W]; elev. 823 m; 11 Jun. 1926; H.A. Scullen leg.; OSAC • 2 ♀♀; Wallowa Co., 5 mi. E of Minam, Wallowa Canyon Fount; [45.621° N, 117.626° W]; elev. 823 m; 21 Jul. 1929; H.A. Scullen leg.; OSAC. – **Utah** • 3 ♀♀; Duchesne Co., 5.5 mi. W of Roosevelt; [40.299° N, 110.093° W]; 20 May 1962; J.W. MacSwain leg.; EMEC • 3 ♂♂; Uinta Co.; [41.26° N,

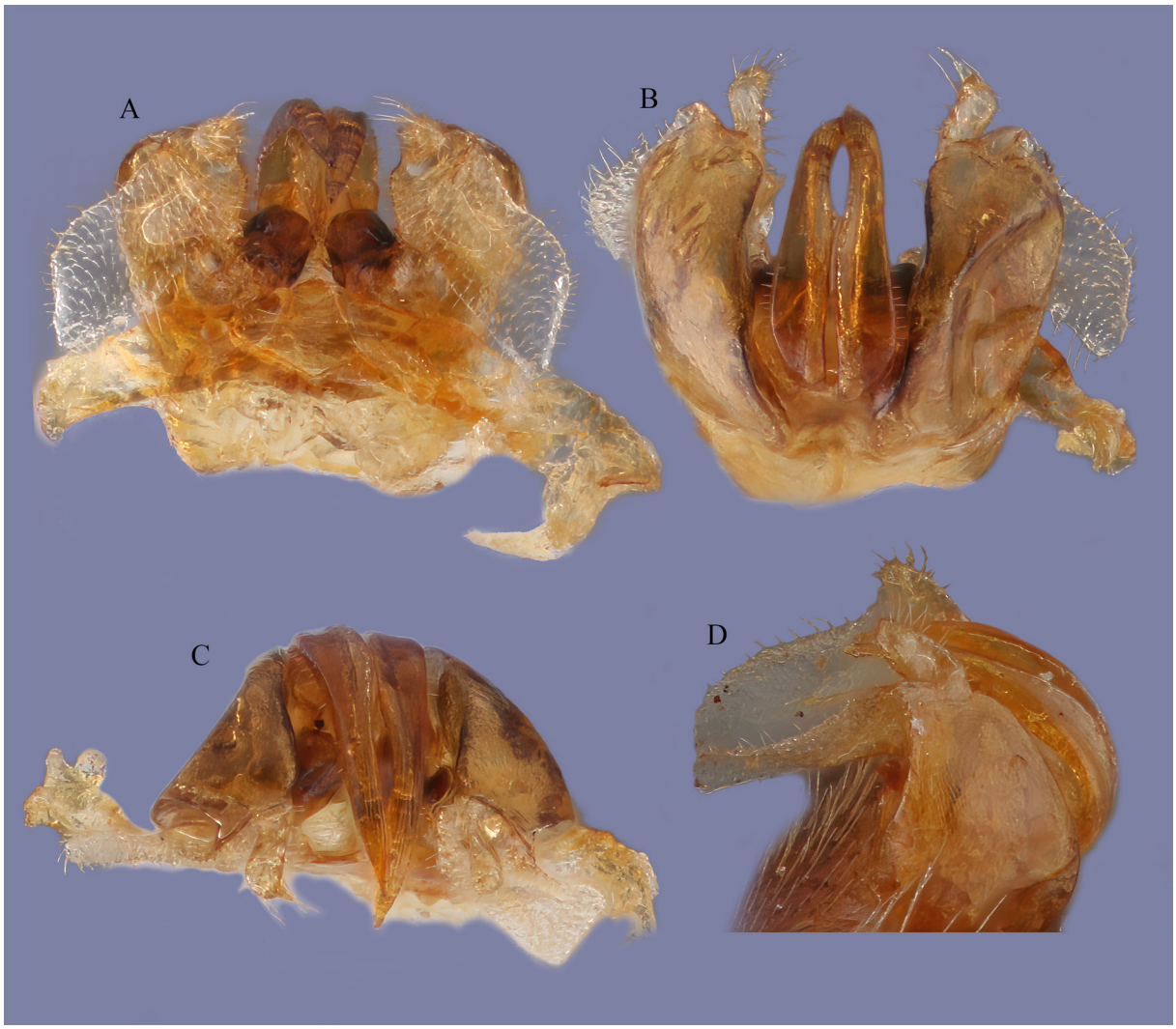


Fig. 37. Genitalia of *Lasioglossum* (*Hemihalictus*) *glabriventre* (Crawford, 1907), ♂ (UCRC). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

110.57° W]; CMNH • 1 ♂; same data as for preceding; 8 Sep. 2011; CMNH. – **Washington** • 1 ♀; Klickitat Co., Conboy Lake National Wildlife Refuge, ARN; 45.9812° N, 121.2616° W; 14 Jul. 2011; L. Wilson leg.; OSAC • 2 ♂♂; Klickitat Co., Conboy Lake National Wildlife Refuge, LRL; 45.9283° N, 121.3783° W; 11 Sep. 2012; Diedre Shirley leg.; OSAC • 1 ♀; Snohomish Co., 13 mi. E of Snohomish Pass; [47.391° N, 121.123° W]; 12 Aug. 1943; S.C. Jones leg.; ex *Solidago*; OSAC • 2 ♀♀; Stevens Co., Little Pend Oreille National Wildlife Refuge, LPO; 48.4654° N, 117.7358° W; 11–12 Jul. 2012; J. Koelsch leg.; OSAC • 4 ♀♀; same data as for preceding; 20–21 Jul. 2012; J. Koelsch leg.; OSAC • 1 ♀; Stevens Co., Little Pend Oreille National Wildlife Refuge, LPO; 48.4604° N, 117.7331° W; 16–17 Jul. 2012; J. Koelsch leg.; OSAC • 1 ♀; Stevens Co., Little Pend Oreille National Wildlife Refuge, LPO; 48.4654° N, 117.7358° W; 23 Apr. 2012; Mike Munts leg.; OSAC • 1 ♀; Spokane Co., Turnbull National Wildlife Refuge, SSA; 47.39° N, 117.51° W; 7–20 Jul. 2011; J. Bastow leg.; OSAC • 2 ♀♀; Spokane Co., Turnbull National Wildlife Refuge, SSA; 47.39° N, 117.51° W; 8–15 Jul. 2011; Mike Rule leg.; OSAC • 1 ♀; same data as for preceding; 22–28 Sep. 2011; Mike Rule leg.; OSAC • 1 ♀; Spokane Co., Turnbull National Wildlife Refuge, SSA; 47.4116° N, 117.5852° W; 17–18 May 2016; D. Cousins leg.; OSAC • 1 ♀; Spokane Co., Turnbull National Wildlife Refuge, SSA; 47.39845° N, 117.605648° W; 26–27 May 2016; M. Ploegman leg.; OSAC • 1 ♂; Whitman Co., Pullman; [46.7333° N, 117.1667° W]; 13 Sep. 2008; EMEC • 1 ♀; Whitman Co., Wanawai; [37.5369° N, 119.6564° W]; 12 Jul. 1925; C.L. Fox leg.; CAS. – **Wyoming** • 2 ♀♀; Lincoln Co., Bridger Basin; [41.66606° N, 110.9335° W]; S. Garman leg.; EMEC • 1 ♀; Natrona Co., South Fork Powder River at Hwy 20, 1.8 mi. W of Town of Powder River; [43.0316° N, 107.0227° W]; 21 Aug. 1965; H.B. Leech leg.; CAS. • 1 ♀; Park Co.; 44.9701° N, 110.6999° W; 20–21 Jun. 2012; A. Rodman leg.; BIML.

Description

Genitalia (Figs 37, 120F). Gonostylus elongate, approximately twice as long as broad, and bears short setae. Retrorse lobe broad, about 2 times as long as broad, covered in fine setae.

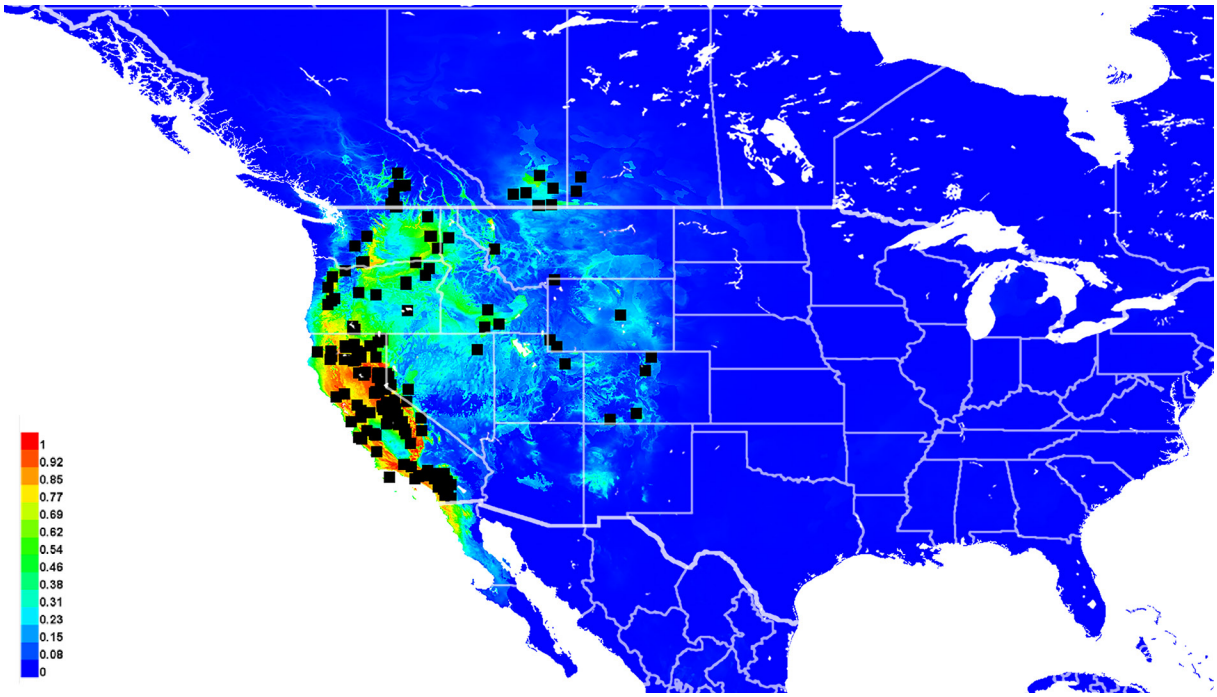


Fig. 38. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *glabriventre* (Crawford, 1907) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

Range

Canada (Alberta, British Columbia, Saskatchewan), USA (California, Colorado, Idaho, Nevada, Oregon, Utah, Washington) (Fig. 38).

Floral hosts

APIACEAE: *Perideridia gairdneri* (Hook. & Arn.) Mathias • ASTERACEAE: *Achillea millefolium* L., *Aster* sp., *Chaenactis glabriuscula* DC., *Chaenactis glabriuscula* DC. var. *lanosa* (DC.) H.M.Hall, *Chrysothamnus* sp., *Chrysothamnus viscidiflorus* (Hook.) Nutt. var. *typicus* (H.M.Hall & Clem.) Cronquist, *Conyza bonariensis* (L.) Cronquist, *Ericameria bloomeri* (A.Gray) J.F.Macbr., *Erigeron divergens* Torr. & A.Gray, *Erigeron* sp., *Grindelia* sp., *Heterotheca grandiflora* Nutt., *Picris echioides* L., *Solidago altissima* L., *Solidago* sp., *Taraxacum* sp. or *Hypochaeris* sp. • BORAGINACEAE: *Cryptantha intermedia* (A.Gray) Greene, *Cryptantha micrantha* (Torr.) I.M.Johnst. • BRASSICACEAE: *Brassica* sp., *Descurainia sophia* (L.) Webb ex Prantl, *Sisymbrium irio* L., *Sisymbrium* sp. • CAPPARACEAE: *Cleome lutea* Hook. • CONVOLVULACEAE: *Convolvulus* sp. • FABACEAE: *Melilotus* sp. • GERANIACEAE: *Geranium* sp. • HYDROPHYLLACEAE: *Phacelia fremontii* Torr., *Phacelia humilis* Torr. & A.Gray, *Phacelia* sp. • IRIDACEAE: *Iris hartwegii* Baker • LILIACEAE: *Brodiaea coronaria* (Salisb.) Engl. • MALVACEAE: *Eremalche exilis* (A.Gray) Greene • ONAGRACEAE: *Camissonia claviformis* (Torr. & Frém.) P.H.Raven subsp. *cruciformis* (Kellogg) P.H.Raven, *Camissonia campestris* (Greene) P.H.Raven subsp. *campestris*, *Camissonia sierrae* P.H.Raven, *Taraxia tanacetifolia* (Torr. & A.Gray) Piper, *Clarkia dudleyana* (Abrams) J.F.Macbr., *Clarkia gracilis* subsp. *albicaulis* (Jeps.) F.H.Lewis & M.E.Lewis, *Clarkia heterandra* (Torr.) F.H.Lewis & P.H.Raven, *Clarkia imbricata* F.H.Lewis & M.E.Lewis, *Clarkia pulchella* Pursh, *Clarkia purpurea* subsp. *viminea* (Douglas) F.H.Lewis & M.E.Lewis, *Clarkia rhomboidea* Douglas, *Clarkia* sp., *Clarkia rubicunda* (Lindl.) F.H.Lewis & M.E.Lewis, *Clarkia unguiculata* Lindl., *Clarkia williamsonii* (Durand & Hilg.) F.H.Lewis & M.E.Lewis, *Gayophytum heterozygum* F.H.Lewis & Szweyk., *Gayophytum humile* Juss., *Gayophytum* sp., *Camissonia contorta* (Douglas ex Lehm.) Kearney, *Oenothera* sp. • PAPAVERACEAE: *Eschscholzia californica* Cham., *Eschscholzia* sp. • POLEMONIACEAE: *Eriastrum virgatum* (Benth.) H. Mason, *Gilia achilleifolia* subsp. *multicaulis* (Benth.) A.D.Grant & V.E.Grant, *Gilia* sp., *Leptosiphon aureus* (Nutt.) J.M.Porter & L.A.Johnson subsp. *aureus* • POLYGONACEAE: *Eriogonum davidsonii* Greene, *Eriogonum gracile* Benth., *Eriogonum nudum* Douglas ex Benth., *Eriogonum* sp., *Polygonum lapathifolium* L. • PORTULACACEAE: *Portulaca* sp. • RANUNCULACEAE: *Ranunculus* sp. • RHAMNACEAE: *Frangula californica* (Eschsch.) A.Gray • ROSACEAE: *Chamaebatiaria millefolium* (Torr.) Maxim., *Fragaria vesca* L. subsp. *californica* (Cham. & Schltdl.) Staudt • SCROPHULARIACEAE: *Mimulus fremontii* (Benth.) A.Gray, *Scrophularia californica* Cham. & Schltdl. • VERBENACEAE: *Phyla nodiflora* (L.) Greene

Biological remarks

Lasioglossum glabriventre is a ground-nesting species. Hicks (1936) reports excavating a nest of this species in August. The nest was three inches deep and made in fine sand.

DNA barcodes

Six full DNA barcodes and two partial barcodes are available, all from British Columbia. They form a discrete cluster with little intraspecific variation.

Lasioslossum* (*Hemihalictus*) *nitidiusculum species group (Ebmer & Sakagami 1985)

Diagnosis

This group is distinguished by a combination of the following characters: the male antenna relatively long, reaching to the metasoma, much shorter in other species of *L.* (*Hemihalictus*); the propodeal triangle long, nearly as long as mesoscutellum in both sexes; and the gonostylus of the male genitalia is slender and weakly clavate (Ebmer & Sakagami 1985).

Included species

Lasioglossum diatretum (Vachal, 1904), *L. ruficorne* (Crawford, 1907), *L. synthyridis* (Cockerell, 1906), and eastern North American *L. foxii* (Robertson, 1895).

Lasioglossum diatretum (Vachal, 1904)
Figs 39, 40A–C, 41A–C, 42–45, 116A, 117C, 118A, D, G, J, 120G

Halictus diatretus Vachal, 1904: 481.
Halictus supranitens Cockerell, 1919: 289. **Syn. nov.**

Halictus diatretus – Crawford 1906c: 298–299 (key).
Lasioglossum (*Evylaeus*) *diatretum* – Michener 1951: 1108 (catalogue).
Lasioglossum (*Evylaeus*) *supranitens* – Michener 1951: 1110 (catalogue).
Evylaeus diatretus – Hurd 1979: 1959 (catalogue). — Moure & Hurd 1987: 81 (catalogue).
Evylaeus supranitens – Hurd 1979: 1962 (catalogue). — Moure & Hurd 1987: 83 (catalogue).

Diagnosis

All species in the *L. nitidiusculum* species group are very similar in appearance, with the exception of *L. synthyridis* (formerly known as *L. inconditum* (Cockerell, 1916)). Both sexes of *L. synthyridis* can be easily distinguished from other species in the group by the rugae of the propodeal triangle which reach the sharply edged posterior margin of the dorsal surface of the propodeum. In contrast, both sexes of all other species in the group have propodeal triangle with rugae that do not reach the smoothly rounded posterior margin. Females of *L. foxii* are very similar to females of *L. ruficorne*. However, females of *L. ruficorne* have the base of T2–T3 densely punctate (IS ≤ 1 PD), becoming moderately dense or moderately sparse (IS = 1–2 PD) near or on the premarginal line. In contrast, females of *L. foxii* have the base of T2–T3 densely punctate (IS ≤ 1 PD), but the punctures become noticeably sparser (IS = 2–6 PD) near the premarginal line, and punctures are comparatively smaller. Females of *L. foxii* typically have a more uniformly imbricate mesoscutum with pronounced microsculpture, whereas females of *L. ruficorne* usually have a mostly imbricate mesoscutum with a subtle weakening or, at times, a nearly polished appearance submedially. However, as a variation, *L. ruficorne* can occasionally exhibit pronounced microsculpturing on the mesoscutum as well. In some instances, particularly where the ranges of eastern North American *L. foxii* and western North American *L. ruficorne* overlap, distinguishing the two species becomes very difficult, as individuals may exhibit intermixed characters.

Females of *L. diatretum* have mostly polished mesoscutum, becoming imbricate anteriorly and medially halfway on median line, punctures moderately dense to moderately sparse (IS = 1–2 PD), becoming broadly sparse (IS = 1–3 PD) submedially. But females of *L. ruficorne* and *L. foxii* have imbricate mesoscutum with or without subtle polished area submedially and punctures dense throughout (IS ≤ 1 PD) or sparser (IS = 1–1.5 PD) submedially. Female *L. ruficorne* have more translucent yellowish tegula whereas in most of the cases, *L. diatretum* have comparatively more brownish tegula. The mesoscutum punctures in females of *L. diatretum* are slightly larger than those of *L. ruficorne* and *L. foxii*. Additionally, *L. diatretum* females possess a larger head, with a mean length of 1.83 mm (± 0.06 SD) and a mean width of 1.76 mm (± 0.04 SD). Both sexes of *L. diatretum* are generally larger than those of *L. ruficorne*. In contrast, females of *L. ruficorne* have a smaller head, with a mean length of 1.65 mm (± 0.06 SD) and a mean width of 1.60 mm (± 0.05 SD). Due to the many variations and overlapping ranges of *L. diatretum* and *L. ruficorne*, it is recommended to use a combination of characteristics to separate them. *Lasioglossum diatretum* females are easily identified when they exhibit sparser punctures on a polished mesoscutum and have brownish tegulae. However, in some cases, they may have a less polished mesoscutum with dense punctures throughout (IS ≤ 1 PD), except for moderately sparse or moderately dense punctures (IS = 1–2 PD) mesad of the parapsidal line, making them closely resemble

L. ruficorne. Similarly, *L. ruficorne* females are easily identified when they have denser punctures on a more imbricate mesoscutum and more translucent yellowish tegulae. However, in some instances, their mesoscutum may become more polished submedially, with punctures becoming sparser submedially (IS = 1–3 PD), making them closely resemble *L. diatretum*.

Males of *L. synthyridis* can be easily distinguished from other males in the *L. nitidiusculum* species group by the propodeal triangle with rugae, which reach the sharply edged posterior margin of the dorsal surface. However, males of *L. synthyridis* also possess genitalia that are very similar to those of *L. diatretum*. Both species feature a broad retrorse lobe, slightly folded in laterally, and a very long gonostylus (4–5 times as long as broad). The key difference lies in the shape of the retrorse lobe: males of *L. diatretum* have a rounded retrorse lobe at the apex, while *L. synthyridis* males exhibit a somewhat angled apex. If the genitalia are exposed, *L. diatretum* can be easily distinguished from males of *L. foxii* and *L. ruficorne*. Males of *L. foxii* and *L. ruficorne* have very slender retrorse lobes that are attenuated at the apex, along with a comparatively short gonostylus (2–3 times as long as broad) that is triangular-shaped and broad at the apex. In comparison, males of *L. foxii* and *L. ruficorne* have very similar-looking genitalia. Males of *L. foxii* can be separated from *L. diatretum* and *L. ruficorne* by the punctation pattern on T2–T3. In *L. foxii*, the punctures become sparser (IS = 1–3 PD) near the premarginal line and are entirely impunctate on the apical rim. In contrast, *L. diatretum* and *L. ruficorne* have T2–T3 densely punctate (IS ≤ 1 PD) to moderately dense (IS = 1–2 PD) up to the premarginal line, becoming nearly impunctate on the apical rim. When comparing males of *L. diatretum* and *L. ruficorne*, several distinguishing features can be observed. Males of *L. diatretum* have largely brown flagellomeres, dark brown to brown legs, and a comparatively broad abdomen, with T3–4 apical rim slightly depressed or nearly flat. In contrast, males of *L. ruficorne* have more yellowish-brown flagellomeres, legs that are brown except for the tibiae and tarsi which are largely yellowish brown, and a slender abdomen with the T3–4 apical rim distinctly depressed relative to the disc.

Etymology

Vachal (1904) did not explain the derivation of the epithet. The specific epithet is treated as a Latin adjective meaning ‘pierced with holes, carved, embossed’. The same root is used for a category of luxury, patterned vessels used by ancient Romans.

Type material

Lectotype of *Halictus diatretus* (designated by Moure & Hurd 1987; examined by JG ca 2013)
UNITED STATES – **Colorado** • ♀; NHMW.

Syntype of *Halictus supranitens* (designated herein; examined)
UNITED STATES – **Colorado** • 1 ♀; Larimer Co., Long Peak trail, above timberline; [40.254° N, 105.614° W]; 20 Jul. 1906; Cockerell leg.; USNM Type No. 27999 (Fig. 45).

Specimen labels
“Long Peak / trail, above / timber line / July 20. (Ckll) // *Halictus supranitens* Ckll. TYPE // Type No. 27999 U.S.N.M.”.

Type remarks

Cockerell (1919) did not specify the composition of the type series. Following recommendation 73F (ICZN 1999), we assume the existence of syntypes, although it may have been described from a single female.

Other material examined

CANADA – **Alberta** • 1 ♀; Pincher Creek, West Castle River; 49.3333° N, 114.4167° W; 28 Jun. 1984; Spanton and Adamski leg.; PMAE • 1 ♀; 15 km S of Three Hills, Hwy 21; 51.49484° N, 113.23214° W; elev. 702 m; 15 Jun. 2007; J. Gibbs and C. Sheffield leg.; PCYU • 1 ♀; Cypress Co., Medicine Hat, W of Gas City Campground; 50.0358° N, 110.7319° W; 1 Jun. 2016; M. Buck leg.; PMAE. – **British Columbia** • 1 ♀; Osoyoos West Bench, Osoyoos; 49.001392° N, 119.49994° W; 17 May 2017; Dawn Marks (J. Heron) leg.; RSKM • 1 ♀; Osoyoos West Bench, Osoyoos; 49.00142° N, 119.49765° W; 19–20 Jul. 2017; D. Marks and K. Grant (J. Heron) leg.; RSKM • 1 ♀; Osoyoos West Bench (Crown Land), Osoyoos; 49.01235° N, 119.4957° W; elev. 479 m; 6 Jun. 2017; J. Heron, D. Marks and K. Grant leg.; RSKM • 1 ♀; Osoyoos West Bench, Osoyoos; 49.0038° N, 119.49455° W; 17–19 Jun. 2017; D. Marks and K. Grant (J. Heron) leg.; RSKM • 1 ♂; Osoyoos Mt Kobau; 49.11363° N, 119.66677° W; 14 Aug. 2014; RSKM • 1 ♀; Okanagan-Similkameen Reg. Dist., Oliver, Ripley Lake; 49.2432° N, 119.6329° W; elev. 925 m; 12 Jul. 2008; L.R. Best leg.; PCYU • 1 ♀; Okanagan-Similkameen Reg. Dist., Oliver, Mt Baldy, McKinney Camp Rd; 49.1297° N, 119.3704° W; elev. 1140 m; 24–31 May 2010; L.R. Best leg.; PMAE • 1 ♀; Okanagan-Similkameen Reg. Dist., Mt Oliver, Ripley Lake; 49.2431° N, 119.6332° W; elev. 940 m; 5–9 Jun. 2010; L.R. Best leg.; PMAE • 3 ♀♀; same data as for preceding; 18–19 May 2010; L.R. Best leg.; PMAE • 3 ♀♀; same data as for preceding; 20–21 May 2010; L.R. Best leg.; PMAE • 1 ♀; Robinson; [49.334° N, 117.691° W]; 24 Sep. 1964; R.R. Foxlee leg.; EMEC • 1 ♀; Vernon, Rattlesnake Point; [50.201° N, 119.294° W]; 9 May 1948; E.S. Ross leg.; CAS.

MEXICO – **Baja California** • 1 ♂; 8 mi. E of Tecate, HYW 2; [32.571° N, 116.506° W]; 29 May 1980; Brown Faulkner leg.; SDMC.

UNITED STATES – **Arizona** • 1 ♂; Navajo Co., 5 mi. W of Fort Apache; [33.790° N, 110.077° W]; 21 Jun. 1957; F. Werner and G. Butler leg.; ASUHIC. – **California** • 2 ♀♀; Alameda Co., Alameda Foothills; [37.70° N, 122.1° W]; 15 Apr. or Apr. 1915; W.M. Giffard leg.; CAS • 6 ♂♂; Alpine Co., 1 mi. S of Monitor Pass; [38.660° N, 119.62° W]; elev. 2499.4 m; 22–23 Aug. 1979; M. Wasbauer and P. Adams leg.; CSCA • 1 ♀; same data as for preceding; CSCA • 1 ♀; Alpine Co., Hope Valley; [38.776° N, 119.932° W]; 29 Jun. 1957; J. Powell leg.; ex *Penstemon procerus*; EMEC • 1 ♂; same data as for preceding; 20 Aug. 1949; C.D. MacNeill leg.; EMEC • 1 ♀; Alpine Co., Kinney Reservoir; [38.555° N, 119.811° W]; 8 Jun. 1960; G.I. Stage leg.; EMEC • 1 ♀; Alpine Co., Lake Alpine; [38.477° N, 120.003° W]; 8 Jun. 1960; R.W. Thorp leg.; ex *Salix*; EMEC • 3 ♀♀; same data as for preceding; 8 Jun. 1960; G.I. Stage leg.; ex *Salix*; EMEC • 1 ♀; Alpine Co., Markleville; [38.692° N, 119.781° W]; 29 May 1957; R.P. Allen leg.; EMEC • 1 ♀; Butte Co., Pentz; [39.655° N, 121.584° W]; 5 Apr. 1928; H.H. Keifer leg.; CAS • 3 ♀♀; Butte Co., Yankee Hill; [39.739° N, 121.47° W]; 20 Mar. 1928; H.H. Keifer leg.; CAS • 3 ♂♂; Calaveras Co., Murphys; [38.137° N, 120.461° W]; 25 May 1936; F.E. Blaisdell leg.; CAS • 1 ♀; Chaffee Co., Maysville; [38.534° N, 106.171° W]; 18 Jun.or Jun. 1918; T.D.A. Cockerell leg.; CAS • 1 ♀; El Dorado Co., Blodgett Forest, 13 mi. E of Georgetown; [38.911° N, 120.661° W]; 28 May 1977; J. Powell leg.; ex *Arctostaphylos*; EMEC • 1 ♀; El Dorado Co., Blodgett Forest, 13 mi. E of Georgetown; [38.911° N, 120.596° W]; 13 Jul. 1967; J. Powell leg.; EMEC • 2 ♂♂; El Dorado Co., Blodgett Forest, 13 mi. E of Georgetown; [38.911° N, 120.596° W]; 13 Jul. 1967; J. Powell leg.; EMEC • 1 ♀; El Dorado Co., Echo Lake; [38.834° N, 120.042° W]; elev. 2270 m; 6 Apr. 1934; E.O. Essig leg.; EMEC • 1 ♀; same data as for preceding; 29 Jun. 1953; W.W. Middlekauff leg.; EMEC • 1 ♀; same data as for preceding; 3 Jul. 1953; W.W. Middlekauff leg.; EMEC • 1 ♀; El Dorado Co., Fallen Leaf; [38.883° N, 120.073° W]; 1 Jul. 1931; UCRC • 1 ♂; same data as for preceding; 19 Aug. 1931; UCRC • 1 ♂; same data as for preceding; 7 Aug. 1931; UCRC (Figs 41B, 42–43) • 1 ♀; El Dorado Co., N. end of Folsom Lake; [38.770° N, 121.107° W]; 29 Apr. 1967; A. Keuter leg.; CAS • 1 ♂; El Dorado Co., Pilot Creek; [38.929° N, 120.648° W]; 15 Jul. 1967; J. Powell leg.; EMEC • 2 ♂♂; El Dorado Co., Snowline Camp; [38.746° N, 120.627° W]; 20 Jul. 1948; P.D. Hurd leg.; EMEC • 1 ♂; same data as for preceding; 7 Jul. 1948; K.W. Tucker leg.; ex Compositae; EMEC • 2 ♀♀; Fresno Co.,

General Grant National Park; [36.747° N, 118.975° W]; 12 Jun. 1925; P.H. Timberlake leg.; ex *Ribes*; UCRC • 1 ♀; Fresno Co., Huntington Lake; [37.232° N, 119.238° W]; 5 Jul. 1917; I. McCracken leg.; ex Compositae; EMEC • 1 ♀; same data as for preceding; 7 Jul. 1919; E.P. Van Duzee leg.; CAS • 1 ♀; Fresno Co., Pine Springs Ranch, Rivers; [33.7083° N, 116.6508° W]; elev. 1595 m; 16 Mar. 1940; P.H. Timberlake leg.; ex *Arctostaphylos glauca*; UCRC • 4 ♂♂; Fresno Co., Pinehurst; [36.696° N, 119.016° W]; elev. 1250 m; 24 Jun. 1960; R.R. Snelling leg.; EMEC • 3 ♀♀; Humboldt Co., 4 mi. E of Shelter Cove; [40.033° N, 123.999° W]; 21 May 1976; J. Powell leg.; ex *Phacelia*; EMEC • 1 ♀; same data as for preceding; 21 May 1976; J. Chemsak leg.; ex *Phacelia*; EMEC • 4 ♀♀; Humboldt Co., 7 mi. SE of Shelter Cove; [39.962° N, 123.978° W]; 22 May 1976; J. Powell leg.; ex *Ceanothus incanus*; EMEC • 1 ♂; Inyo Co., Kearsarge Pass Road, 8 mi. W of Independence; [36.771° N, 118.349° W]; 29 Aug. 1979; M. Wasbauer and P. Adams leg.; EMEC • 1 ♂; Inyo Co., White Mountains, Campito Mountain; [37.499° N, 118.201° W]; 1 Aug. 1981; Brown Faulkner leg.; SDMC • 1 ♀; Kern Co., Double Mountain; [35.035° N, 118.445° W]; 9 Jul. 1955; B. Hudson leg.; EMEC • 2 ♀♀; Kern Co., Mt Pinos; [34.816° N, 119.145° W]; elev. 2438 m; 1 Jul. 1965; J. Powell leg.; EMEC • 1 ♂; same data as for preceding; 1 Jul. 1965; J. Powell leg.; EMEC • 3 ♀♀; Lassen Co., Black's Mountain; [36.149° N, 116.659° W]; 13 Jun. 1941; C.D. Michener leg.; EMEC • 1 ♀; Lassen Co., Cinder Cone; [40.493° N, 121.889° W]; 18 Jun. 1941; P.D. Hurd leg.; ex *Ribes*; EMEC • 1 ♀; Lassen Co., Cinder Cone, Lassen National Park; [40.548° N, 121.32° W]; 19 Jun. 1941; EMEC • 1 ♀; Lassen Co., Susanville; [40.416° N, 120.653° W]; 27 Jun. 1977; T.R. Haig leg.; CSCA • 2 ♂♂; Los Angeles Co., Big Pine Camp; [34.3956° N, 117.7339° W]; elev. 1850 m; 2 Aug. 1944; P.H. Timberlake leg.; UCRC (Fig. 41C) • 3 ♂♂; same data as for preceding; 2 Aug. 1944; P.H. Timberlake leg.; ex *Eriodictyon trichocalyx*; UCRC • 1 ♂; same data as for preceding; 17 Jul. 1939; P.H. Timberlake leg.; UCRC • 1 ♀; Madera Co., Bass Lake; [37.338° N, 119.582° W]; 30 May 1942; E.G. Linsley leg.; ex *Potentilla*; UCRC • 1 ♀; Madera Co., Oakhurst; [40.493° N, 121.889° W]; 1 Jun. 1942; EMEC • 1 ♂; Madera Co., Oakhurst; [37.328° N, 119.649° W]; 26 May 1942; A.J. Walz leg.; ex *Eriodictyon*; UCRC • 2 ♀♀; Madera Co., Soquel Basin; [37.053° N, 121.923° W]; 11 Jun. 1942; A.J. Walz leg.; ex *Salix*; EMEC • 1 ♀; Marin Co., Inverness; [38.1008° N, 122.857° W]; 25 Mar. 1962; C.A. Toschi leg.; EMEC • 1 ♂; Marin Co., Mill Valley; [37.9042° N, 122.5421° W]; 8–11 Oct. 1965; P.H. Arnaud Jr leg.; CAS • 1 ♀; Mariposa Co., Fish Camp; [37.476° N, 119.635° W]; 21 May 1942; EMEC • 1 ♀; Mariposa Co., Miami Ranger Station; [37.419° N, 119.745° W]; 18 May 1942; E.G. Linsley leg.; UCRC • 2 ♀♀; same data as for preceding; 4 Jun. 1942; A.J. Walz leg.; UCRC • 1 ♀; same data as for preceding; 16 May 1942; E.G. Linsley leg.; ex *Arctotaphylos*; UCRC • 2 ♀♀; same data as for preceding; 4 Jun. 1942; E.G. Linsley leg.; UCRC • 1 ♀; same data as for preceding; 22 May 1942; A.J. Walz leg.; UCRC • 1 ♀; same data as for preceding; 29 May 1942; C. Kennett leg.; EMEC • 1 ♂; Mariposa Co., Wawona; [37.547° N, 119.644° W]; 6 Jun. 1942; A.J. Walz leg.; ex *Eriogonum*; EMEC • 1 ♀; same data as for preceding; 6 Jun. 1942; A.J. Walz leg.; ex *Eriogonum*; EMEC • 1 ♂; Mariposa Co., Yosemite; [37.863° N, 119.539° W]; elev. 1180–1220 m; 12 Jun. 1928; Walter Ebeling leg.; UCRC • 1 ♀; same data as for preceding; 28 May 1921; E.C. VanDyke leg.; CAS • 1 ♀; same data as for preceding; 16 May 1934; Bryant Lot leg.; CAS • 1 ♀; same data as for preceding; 1 Jun. 1921; E.C. VanDyke leg.; CAS • 2 ♂♂; Mendocino Co., Hopland Field Station; [39.001° N, 123.08° W]; 10 Jun. 1958; W.W. Middlekauff leg.; EMEC • 1 ♀; same data as for preceding; 10 Jun. 1958; W.W. Middlekauff leg.; EMEC • 1 ♀; Mendocino Co., Ryan Creek; [39.476° N, 123.381° W]; 13 Apr. 1941; EMEC • 1 ♀; Modoc Co., 1 mi. E of Pine Creek; [41.573° N, 120.156° W]; 13 Jun. 1970; J.A. Chemsak leg.; EMEC • 2 ♀♀; Modoc Co., 5 mi. N of Davis Creek; [41.832° N, 120.371° W]; 3 Jun. 1971; ex *Lithospermum ruderale*; EMEC • 1 ♀; Modoc Co., 5.2 mi. NW of Cedarville; [41.584° N, 120.099° W]; elev. 1981 m; 13 Jun. 1969; R.R. and R.A. Snelling leg.; ex *Phacelia*; EMEC • 1 ♀; Modoc Co., Buck Creek Ranger Station; [41.870° N, 120.293° W]; elev. 1570 m; 5–7 Jun. 1970; P. Opler leg.; ex *Isatis tinctoria*; EMEC • 2 ♀♀; same data as for preceding; 5–7 Jun. 1970; J.A. Chemsak leg.; EMEC • 2 ♀♀; Modoc Co., Cedar Pass; [41.562° N, 120.269° W]; 29 Jun. 1955; J.W. MacSwain leg.; EMEC • 2 ♀♀; same data as for preceding; 29 Jun. 1955; C.L. Hogue leg.; EMEC • 1 ♀; Modoc Co., Fandango Pass; [41.802° N, 120.207° W]; elev. 1860 m; 7 Jun. 1970;

J.A. Chemsak leg.; EMEC • 1 ♀; Modoc Co., Lily Lake; [41.976° N, 120.21° W]; 11 Jul. 1957; J. Powell leg.; EMEC • 2 ♀♀; Mono Co., Blanco's Corral, White Mountains; [37.594° N, 118.228° W]; elev. 3048 m; 5 Jul. 1953; H. Nakakihara leg.; UCRC • 1 ♀; same data as for preceding; 7 Jul. 1953; J.W. MacSwain leg.; EMEC • 1 ♂; same data as for preceding; 25 Aug. 1960; L.R. Nault leg.; EMEC • 1 ♂; Mono Co., Blanco's Corral, White Mountains; [37.510° N, 118.19° W]; 25 Aug. 1960; P.D. Hurd leg.; ex *Senecio*; EMEC • 3 ♂♂; Mono Co., Bodie; [38.212° N, 119.011° W]; 21 Sep. 1958; Monke, Stange leg.; EMEC • 1 ♀; Mono Co., Fales Hot Springs; [38.351° N, 119.399° W]; elev. 2164 m; 16 Jun. 1969; R.R. and R.A. Snelling leg.; EMEC • 1 ♂; Mono Co., Leavitt Meadow; [38.336° N, 119.611° W]; 13 Aug. 1963; H.B. Leech leg.; CAS • 1 ♀; same data as for preceding; 14 Aug. 1963; H.B. Leech leg.; CAS • 1 ♀; same data as for preceding; 16 Jun. 1961; C.A. Toschi leg.; ex *Ribes viscosissimum*; EMEC • 1 ♀; Mono Co., Lee Vining; [37.961° N, 119.121° W]; 7 Mar. 1933; R.M. and G.E. Bohart leg.; CAS • 1 ♀; Mono Co., Tioga Pass-Hall Area site; [37.932° N, 119.263° W]; 18 Jul. 1969; A.R. Moldenke leg.; ex *Phacelia hastata* var. *compacta* (verbatim: *Phacelia frigida*); CAS • 1 ♂; Mono Co., 1 mi. W of Tom's Place; [37.561° N, 118.699° W]; D.D. Linsdale leg.; EMEC• 1 ♀; Mono Co., White Mountains, 3 mi. N of Inyo Co., near Naval Research Station, N. Fork of Crooked Creek; [37.659° N, 118.16° W]; elev. 3094 m; 20 Aug. 1968; H.B. Leech leg.; CAS • 1 ♂; Napa Co., Mount Saint Helena; [38.667° N, 122.638° W]; 9 Jun. 1918; E.P. Van Duzee leg.; CAS • 2 ♀♀; Nevada Co., Donner Pass; [39.314° N, 120.327° W]; 4 Jul. 1962; J. Powell leg.; EMEC • 1 ♀; Nevada Co., Russell Valley; [39.438° N, 120.133° W]; 26 Jun. 1964; M.E. Irwin leg.; UCRC • 2 ♀♀; Nevada Co., Sagehen; 39.43413° N, 120.25929° W; 22 Jun. 2019; A. Zell leg.; ex *Camassia quamash*; UCDC • 1 ♀; Nevada Co., Sagehen Creek, near Hobart Mills; [39.432° N, 120.201° W]; 7 Jul. 1964; M.E. Irwin leg.; UCRC • 1 ♀; Nevada Co., Sagehen Creek; [39.432° N, 120.201° W]; 19 Jun. 1962; R.L. Wescott leg.; EMEC • 1 ♀; Nevada Co., Truckee; [39.357° N, 120.185° W]; Ximena McGlashan leg.; EMEC • 2 ♀♀; same data as for preceding; 19 Jun. 1927; H. Van Duzee leg.; CAS • 4 ♀♀; same data as for preceding; 14 Jun. 1927; E.P. Van Duzee leg.; CAS • 1 ♀; same data as for preceding; 12 Jun. 1927; E.P. Van Duzee leg.; CAS • 1 ♀; same data as for preceding; 13 Jun. 1927; E.P. Van Duzee leg.; CAS • 1 ♀; same data as for preceding; 21 Jun. 1927; E.P. Van Duzee leg.; CAS • 3 ♀♀; Nevada Co., White Cloude Campground; [39.317° N, 120.934° W]; 30 May 1964; P.H. Arnaud Jr leg.; CAS • 4 ♀♀; same data as for preceding; 31 May 1964; P.H. Arnaud Jr leg.; CAS • 1 ♂; Placer Co., 3 mi. NE of Auburn; [38.957° N, 121.041° W]; 5 May 1958; Menke and Stange leg.; EMEC • 1 ♀; Placer Co., East end of Bear Valley; [39.236° N, 120.597° W]; 1 Jun. 1964; P.H. Arnaud Jr leg.; CAS • 1 ♀; Placer Co., Pyramid Ranger Station; [39.284° N, 120.654° W]; 2 Jun. 1963; J.W. MacSwain leg.; EMEC • 1 ♀; Placer Co., Tahoe NF, 34 km NE of Foresthill; 39.1733° N, 120.5075° W; elev. 1955 m; 8 Jun. 2009; M. Buck leg.; PMAE • 3 ♀♀; Placer Co., Summit; [39.318° N, 120.327° W]; W.M. Giffard leg.; CAS • 1 ♂; Plumas Co., Little Long Valley Creek, 6 mi. E of Spring Garden; [39.909° N, 120.533° W]; 4–10 Aug. 1977; M. Wasbauer leg.; CAS • 4 ♀♀; Riverside Co., 12 mi. NW of Oak Grove on Hwy 79; [33.470° N, 116.949° W]; 5 Apr. 1969; Saul Frommer, Suzy Frommer, Kate Reed and Marshall Reed leg.; UCRC • 1 ♂; Riverside Co., Dark Canyon, San Jacinto Mountains; [33.775° N, 116.777° W]; 6 Jun. 1939; E.S. Ross leg.; EMEC • 2 ♀♀; Riverside Co., Gavilan Hills; [33.7944° N, 117.3558° W]; elev. 620 m; 21 Mar. 1941; P.H. Timberlake leg.; ex *Rhus trilobata*; UCRC • 3 ♀♀; same data as for preceding; 19 Mar. 1936; P.H. Timberlake leg.; ex *Rhus trilobata*; UCRC • 3 ♀♀; same data as for preceding; 7 Apr. 1939; P.H. Timberlake leg.; ex *Cryptantha intermedia*; UCRC • 1 ♀; same data as for preceding; 2 Mar. 1937; P.H. Timberlake leg.; ex *Ribes indecorum*; UCRC • 1 ♀; same data as for preceding; 2 Mar. 1937; P.H. Timberlake leg.; ex *Salix vestita* (verbatim: *Salix leiolepis*); UCRC • 1 ♂; Riverside Co., Idyllwild; [33.744° N, 116.718° W]; Jul. 1936; E.S. Ross leg.; CAS • 1 ♂; Riverside Co., Idyllwild, San Jacinto Mountains; [33.744° N, 116.718° W]; 15 Jun. 1941; E.C. VanDyke leg.; CAS • 3 ♀♀; Riverside Co., Keen Camp, San Jacinto Mountains; [33.7011° N, 116.715° W]; 10 Jun. 1939; J.G. Shanafelt leg.; EMEC • 1 ♀; Riverside Co., Millard Canyon; [34.205° N, 118.166° W]; elev. 762–853 m; 26 Apr. 1969; B. Hunt leg.; ex *Salix*; UCRC • 5 ♀♀; Riverside Co., Pine Cove; [33.7586° N, 116.7389° W]; 3 Jun. 1939; P.H. Timberlake leg.; ex *Arctostaphylos pringlei* spp. *drupacea* (verbatim: *Arctostaphylos drupacea*);

UCRC • 1 ♂; Riverside Co., San Jacinto Mt Trail, San Jacinto Mts; [33.812° N, 116.679° W]; 1 Jul. 1952; J.F. Powers leg.; EMEC • 3 ♀♀; San Benito Co., Pinnacles; [36.529° N, 121.145° W]; 25 Mar. 1940; E.G. Linsley leg.; ex *Cryptantha*; EMEC • 1 ♀; San Bernardino Co., 15 km SSE of Hesperia, Hwy 173; [34.337° N, 117.259° W]; elev. 1022 m; 21 Apr. 1981; J.A. Bethke leg.; UCRC • 1 ♀; San Bernardino Co., 8 mi. N of Fontana; [34.192° N, 117.431° W]; 14 Apr. 1965; C.A. Toschi leg.; EMEC • 1 ♀; San Bernardino Co., Above Lake Arrowhead; [34.270° N, 117.17° W]; 16 Jul. 1933; UCRC • 1 ♂; San Bernardino Co., Big Bear Valley; [34.2650° N, 116.8483° W]; elev. 2055 m; 9 Aug. 1933; P.H. Timberlake leg.; UCRC • 1 ♂; same data as for preceding; 8 Aug. 1933; P.H. Timberlake leg.; ex *Eriogonum umbellatum*; UCRC • 1 ♂; San Bernardino Co., Grass Valley, San Bernardino Mountains; [34.255° N, 117.217° W]; 30 Jul. 1961; D.P. Gregory leg.; ex *Oenothera elata* subsp. *hookeri* (verbatim: *Oenothera hookeri*); UCRC • 4 ♀♀; San Bernardino Co., Mill Creek; [34.0825° N, 116.8936° W]; elev. 1830 m; 16 May 1948; P.H. Timberlake leg.; ex *Arctostaphylos patula*; UCRC • 1 ♀; same data as for preceding; 28 Apr. 1946; P.H. Timberlake leg.; ex *Arctostaphylos patula*; UCRC • 2 ♀♀; same data as for preceding; 2 Apr. 1961; P.H. Timberlake leg.; ex *Arctostaphylos patula*; UCRC • 4 ♀♀; same data as for preceding; 8 May 1949; P.H. Timberlake leg.; ex *Arctostaphylos patula*; UCRC • 1 ♀; same data as for preceding; 23 May 1948; P.H. Timberlake leg.; ex *Arctostaphylos patula*; UCRC • 4 ♀♀; same data as for preceding; 2 Apr. 1961; P.H. Timberlake leg.; ex *Arctostaphylos patula*; UCRC • 1 ♀; same data as for preceding; 3 Apr. 1961; P.H. Timberlake leg.; ex *Arctostaphylos patula*; UCRC • 1 ♀; same data as for preceding; 16 May 1948; P.H. Timberlake leg.; ex *Arctostaphylos patula*; UCRC • 2 ♀♀; San Bernardino Co., Mill Creek; [34.0806° N, 116.8875° W]; elev. 1890 m; 22 May 1940; P.H. Timberlake leg.; ex *Arctostaphylos pringlei* subsp. *drupacea* (verbatim: *Arctostaphylos drupacea*); UCRC • 3 ♀♀; same data as for preceding; 29 May 1938; P.H. Timberlake leg.; ex *Arctostaphylos pringlei* subsp. *drupacea* (verbatim: *Arctostaphylos drupacea*); UCRC • 2 ♀♀; same data as for preceding; 29 May 1938; P.H. Timberlake leg.; ex *Arctostaphylos pringlei* subsp. *drupacea* (verbatim: *Arctostaphylos drupacea*); UCRC • 2 ♀♀; same data as for preceding; 30 May 1940; P.H. Timberlake leg.; ex *Arctostaphylos pringlei* subsp. *drupacea* (verbatim: *Arctostaphylos drupacea*); UCRC • 1 ♀; San Bernardino Co., Mill Creek; [34.0825° N, 116.8936° W]; elev. 1830 m; 4 Jun. 1951; P.H. Timberlake leg.; ex *Ceanothus cordulatus*; UCRC • 1 ♀; same data as for preceding; 16 May 1938; P.H. Timberlake leg.; ex *Ceanothus cordulatus*; UCRC • 1 ♀; same data as for preceding; 27 May 1951; P.H. Timberlake leg.; ex *Eremocarya lepida* (verbatim: *Cryptantha lepida*); UCRC • 2 ♂♂; same data as for preceding; 10 Sep. 1945; P.H. Timberlake leg.; ex *Eriogonum wrightii* var. *subscaposum* (verbatim: *Eriogonum subscaposum*); UCRC • 1 ♀; San Bernardino Co., Mill Creek; [34.0781° N, 116.8786° W]; elev. 1980 m; 20 Jun. 1956; P.H. Timberlake leg.; ex *Penstemon grinnelli*; UCRC • 1 ♀; San Bernardino Co., Mill Creek; [34.0825° N, 116.8936° W]; elev. 1830 m; 22 Oct. 1950; P.H. Timberlake leg.; ex *Penstemon grinnelli*; UCRC • 1 ♀; same data as for preceding; 6 Jun. 1940; P.H. Timberlake leg.; ex *Frangula californica* (verbatim: *Rhamnus californica*); UCRC • 2 ♀♀; same data as for preceding; 16 May 1948; P.H. Timberlake leg.; ex *Ribes roezlii*; UCRC • 1 ♀; same data as for preceding; 6 Sep. 1955; P.H. Timberlake leg.; UCRC • 1 ♀; San Bernardino Co., near Crestline; [34.2403° N, 117.2894° W]; 30 Jul. 1935; P.H. Timberlake leg.; ex *Heracleum maximum* (verbatim: *Heracleum lanatum*); UCRC • 1 ♂; same data as for preceding; 30 Jun. 1935; P.H. Timberlake leg.; ex *Eriophyllum lanatum*; UCRC • 1 ♀; San Bernardino Co., Rim of the World; [34.227° N, 117.245° W]; 14 Sep. 1934; ex *Ericameria nauseosa* var. *bernardina* (verbatim: *Crysothamnus bernardinus*); UCRC • 4 ♀♀; San Bernardino Co., San Bernardino Mountains, Van Dusen Canyon, near Holcomb; [34.302° N, 116.855° W]; 1 Jun. 1969; E.I. Schlinger leg.; ex *Ribes*; EMEC • 1 ♀; San Bernardino Co., Tetley's Mountain Camp, Crestline; [34.2464° N, 117.3094° W]; elev. 1380 m; 15 May 1937; P.H. Timberlake leg.; ex *Malus*; UCRC • 2 ♂♂; San Bernardino Co., Valley of the Falls; [34.0833° N, 116.9125° W]; elev. 1745 m; 28 Aug. 1935; P.H. Timberlake leg.; UCRC • 1 ♀; San Bernardino Co., Van Dusen Canyon; [34.294° N, 116.905° W]; elev. 2150–2180 m; 1 Jun. 1969; W.A. Hunt leg.; ex Erysimum; UCRC • 1 ♀; San Bernardino Co., Van Dusen Creek, Holcomb Valley; [34.302° N, 116.893° W]; elev. 1700 m; 1 Jun. 1969; G. Goddard leg.; UCRC • 1 ♀; San Diego Co., 5 mi. N of Santa Ysabel; [33.175° N, 116.675° W]; 7 Feb. 1952; J.D. Rozen

leg.; ex *Salix*; EMEC • 1 ♀; San Diego Co., Coastal Sage site; [32.716° N, 117.256° W]; A.R. Moldenke leg.; CAS • 1 ♀; San Diego Co., Cuyamaca; [32.928° N, 116.568° W]; 19 Apr. 1950; J.W. MacSwain leg.; EMEC • 1 ♀; same data as for preceding; 19 Apr. 1950; E.G. Linsley leg.; ex *Lasthenia* (verbatim: *Baeria*); EMEC • 1 ♀; San Diego Co., Cuyamaca Rancho State Park; [32.933° N, 116.567° W]; 10 Jun. 1964; L.D. Anderson leg.; UCRC • 2 ♀♀; San Diego Co., Laguna Mountains; [32.840° N, 116.438° W]; 3 May 1946; John S. Perry leg.; UCRC • 1 ♀; San Diego Co., Mt Laguna; [32.867° N, 116.42° W]; 21 Jun. 1963; J. Powell leg.; EMEC • 1 ♀; same data as for preceding; 21 Jun. 1963; P.D. Hurd leg.; EMEC • 1 ♂; same data as for preceding; 5 Jul. 1963; R.L. Langston leg.; EMEC • 1 ♀; San Diego Co., Mt Laguna site; [32.867° N, 116.42° W]; A.R. Moldenke leg.; CAS • 1 ♀; San Diego Co., Mt Palomar; [33.363° N, 116.836° W]; 28 Jun. 1963; P.D. Hurd leg.; ex *Cryptantha intermedia*; EMEC • 1 ♀; San Diego Co., Ramona; [40.493° N, 121.889° W]; 19 Apr. 1950; E.G. Linsley leg.; ex *Cryptantha*; EMEC • 1 ♀; Santa Clara Co., 1 mi. E of Mt Hamilton; [37.341° N, 121.625° W]; 6 May 1957; Don Burdick leg.; EMEC • 1 ♀; Santa Clara Co., Isabel Creek. Mt Hamilton; [37.3573° N, 121.6549° W]; 1 May 1956; D.J. Burdick leg.; EMEC • 1 ♀; Santa Clara Co., San Antonio R.S.; [37.47° N, 121.81° W]; 11 Mar. 1948; P.D. Hurd leg.; EMEC • 1 ♀; Shasta Co., 4 mi. S of Hat Lake; [40.77° N, 121.516° W]; 5 Jun. 1941; P.D. Hurd leg.; ex *Wyethia*; EMEC • 6 ♀♀; Shasta Co., Castle Rock State Park; [37.231° N, 122.096° W]; 3 May 1953; J.D. Lattin leg.; EMEC • 1 ♀; Shasta Co., Hat Lake; [40.509° N, 121.466° W]; 20 Jun. 1941; P.D. Hurd leg.; ex *Ribes*; EMEC • 3 ♀♀; same data as for preceding; 3 Jun. 1944; P.D. Hurd leg.; ex *Salix*; EMEC • 1 ♀; Shasta Co., Hat Lake; [40.493° N, 121.889° W]; 14 Jun. 1941; P.D. Hurd leg.; ex *Salix*; EMEC • 2 ♀♀; Shasta Co., Hat Lake; [40.509° N, 121.466° W]; 3 Jun. 1944; C.D. Michener leg.; ex *Arctostaphylos*; EMEC • 6 ♀♀; same data as for preceding; 14 Jun. 1941; C.D. Michener leg.; ex *Salix*; EMEC • 4 ♀♀; same data as for preceding; 3 Jun. 1941; C.D. Michener leg.; ex *Salix*; EMEC • 2 ♀♀; same data as for preceding; 3 Jun. 1941; P.D. Hurd leg.; ex *Salix*; EMEC • 1 ♀; same data as for preceding; 4 Jun. 1941; P.D. Hurd leg.; EMEC • 1 ♀; same data as for preceding; 14 Jun. 1941; C.W. Anderson leg.; ex *Ribes*; EMEC • 2 ♀♀; same data as for preceding; 14 Jun. 1941; C.W. Anderson leg.; ex *Ribes cereum*; EMEC • 1 ♀; Shasta Co., Lassen National Park, Hat Lake; [40.509° N, 121.466° W]; 14 Jun. 1941; C.W. Anderson leg.; ex *Ribes cereum*; EMEC • 1 ♀; Shasta Co., Mountains west of Nieubieber; [41.117° N, 121.35° W]; 4 Jun. 1938; E.C. VanDyke leg.; CAS • 1 ♀; Shasta Co., Shingletown; [40.493° N, 121.889° W]; 7 Jun. 1941; P.D. Hurd leg.; EMEC • 1 ♂; same data as for preceding; 2 Jun. 1941; C.D. Michener leg.; EMEC • 1 ♀; same data as for preceding; 21 Jun. 1941; EMEC • 1 ♀; same data as for preceding; 28 May 1941; E.G. Linsley leg.; EMEC • 2 ♀♀; Shasta Co., Viola; [40.518° N, 121.678° W]; 18 May 1941; C.D. Michener leg.; EMEC • 3 ♀♀; same data as for preceding; 19 May 1941; C.D. Michener leg.; ex *Salix*; EMEC • 2 ♀♀; same data as for preceding; 19 May 1941; P.D. Hurd leg.; EMEC • 2 ♀♀; same data as for preceding; 18 May 1941; C.D. Michener leg.; ex *Taraxacum officinale* (verbatim: *Taraxacum vulgare*); EMEC • 2 ♀♀; same data as for preceding; 18 May 1941; C.D. Michener leg.; EMEC • 3 ♀♀; Shasta Co.; [40.75° N, 122.12° W]; 2 May 1913; F.W. Nunenmacher leg.; EMEC • 1 ♀; Sierra Co., Carmen; 39.69693° N, 120.45803° W; 7 Jun. 2019; M. Page leg.; ex *Camassia quamash*; UCDC • 1 ♀; Sierra Co., Gold Lake; [39.672° N, 120.66° W]; 13 Jul. 1921; C.L. Fox leg.; CAS • 1 ♂; same data as for preceding; 23 Jul. 1921; C.L. Fox leg.; CAS • 1 ♀; same data as for preceding; 14 Jul. 1921; C.L. Fox leg.; CAS • 1 ♀; Sierra Co., Harvey South; 39.69379° N, 120.43872° W; 3 Jun. 2019; M. Page leg.; ex *Camassia quamash*; UCDC • 1 ♀; same data as for preceding; 7 Jun. 2019; D. Deterding leg.; ex *Camassia quamash*; UCDC • 1 ♀; Sierra Co., Holcomb; 39.48892° N, 120.26687° W; 15 Jun. 2019; A. Zell leg.; ex *Camassia quamash*; UCDC • 1 ♀; Sierra Co., Mitchell; 39.47896° N, 120.28642° W; 1 Jul. 2019; M. Page leg.; ex *Penstemon rydbergii*; UCDC • 1 ♀; Siskiyou Co., 1 mi. SE of Bartle; [41.249° N, 121.805° W]; 7–9 Jun. 1974; R. Coville leg.; EMEC • 1 ♀; same data as for preceding; 7–9 Jun. 1974; L. Green leg.; EMEC • 1 ♀; Siskiyou Co., Ash Creek Ranger Station; [41.270° N, 121.944° W]; 7–9 Jun. 1974; J. Sorensen leg.; EMEC • 1 ♀; Siskiyou Co., Ash Creek Ranger Station; [41.27° N, 121.944° W]; elev. 1067 m; 7–9 Jun. 1974; D. Green leg.; ex Trifolium; EMEC • 1 ♀; Siskiyou Co., Castle Lake; [41.228° N, 122.384° W]; 22 Jul. 1958; J. Powell leg.; EMEC • 4 ♂♂; Siskiyou Co., Headwaters E. Fork of S. Fork Salmon River, Cecilville-Callahan

Road; [41.222° N, 123.05° W]; elev. 1829 m; 31 Jul. 1968; H.B. Leech leg.; CAS • 2 ♂♂; same data as for preceding; 30 Jul. 1968; H.B. Leech leg.; CAS • 3 ♀♀; same data as for preceding; 30 Jul. 1968; H.B. Leech leg.; CAS • 1 ♂; Siskiyou Co., McBride Springs; [41.353° N, 122.282° W]; elev. 1585 m; 10–14 Jun. 1974; J. Chemsak and J. Doyen leg.; EMEC • 1 ♀; same data as for preceding; 10–14 Jun. 1974; R. Coville leg.; EMEC • 5 ♀♀; same data as for preceding; 10–14 Jun. 1974; L. Green leg.; EMEC • 5 ♂♂; Siskiyou Co., Road to Taylor Lake S of Sawyers, Bar-Etna Road; [41.256° N, 123.086° W]; elev. 1737 m; 28 Jul. 1968; H.B. Leech leg.; CAS • 5 ♀♀; same data as for preceding; 28 Jul. 1968; H.B. Leech leg.; CAS • 1 ♂; Siskiyou Co., Shasta Springs; [41.247° N, 122.261° W]; 17 Jun. 1920; C.L. Fox leg.; CAS • 1 ♀; Sonoma Co., Trinity P.O.; [38.293° N, 122.452° W]; 3 Apr. 1937; R.M. and G.E. Bohart leg.; CAS • 1 ♀; Stanislaus Co., Del Puerto Canyon; [37.477° N, 121.23° W]; 2 Apr. 1961; R.R. and M.D. Snelling leg.; OSAC • 2 ♂♂; Trinity Co., Carrville; [40.859° N, 122.705° W]; elev. 732–762 m; 9 Jun. 1984; E.C. VanDyke leg.; CAS • 2 ♀♀; Tulare Co., 2 mi. E of Johnsondale; [35.970° N, 118.498° W]; 27 Apr. 1964; C.A. Toschi leg.; EMEC • 1 ♀; same data as for preceding; 27 Apr. 1964; P. Rude leg.; ex *Salix*; EMEC • 4 ♀♀; same data as for preceding; 27 Apr. 1964; C.A. Toschi leg.; ex *Prunus subcordata*; EMEC • 8 ♀♀; same data as for preceding; 27 Apr. 1964; J. Powell leg.; ex *Prunus subcordata*; EMEC • 1 ♀; Tulare Co., Giant Forest; [36.5625° N, 118.75139° W]; elev. 2130 m; 12 Jun. 1939; P.H. Timberlake leg.; ex *Arctostaphylos patula*; UCRC • 1 ♀; Tulare Co., Portuguese Pass; [35.800° N, 118.582° W]; elev. 2234 m; 14 Jun. 1961; G.I. Stage and R.R. Snelling leg.; EMEC • 1 ♂; Tulare Co., Redwood Meadows; [36.541° N, 118.635° W]; 3 Aug. 1923; C.L. Fox leg.; CAS • 2 ♀♀; Tulare or Fresno Co., General Grant National Park; [36.747° N, 118.975° W]; 26 Jun. 1929; P.H. Timberlake leg.; ex *Senecio lugens*; UCRC • 1 ♀; Tuolumne Co., 2 mi. W of Sonora Pass; [38.323° N, 119.682° W]; 16 Aug. 1959; G.I. Stage and R.R. Snelling leg.; ex *Angelica capitellata* (verbatim: *Sphenosciadium capitellatum*); EMEC • 2 ♂♂; Tuolumne Co., 4 mi. W of Sonora Pass; [38.327° N, 119.71° W]; 8 Aug. 1959; G.I. Stage and R.R. Snelling leg.; EMEC • 1 ♀; Tuolumne Co., 5 mi. NW of Columbia; [38.085° N, 120.467° W]; 6 May 1953; R.R. Snelling leg.; ex *Eriodictyon californicum*; EMEC • 3 ♀♀; Tuolumne Co., Buck Meadows – Mather site; [37.820° N, 120.067° W]; A.R. Moldenke leg.; CAS • 6 ♀♀; Tuolumne Co., Chinese Camp; [37.87° N, 120.433° W]; 2 Apr. 1960; R.R. Snelling leg.; EMEC • 1 ♀; Tuolumne Co., Chipmunk Flat; [38.324° N, 119.693° W]; 13 Jun. 1962; C.A. Toschi leg.; EMEC • 1 ♀; same data as for preceding; 9 Aug. 1966; J.W. MacSwain leg.; ex *Ranunculus*; EMEC • 1 ♀; Tuolumne Co., Columbia; [38.036° N, 120.401° W]; 2 Apr. 1960; R.R. and M.D. Snelling leg.; ex *Ceanothus*; EMEC • 1 ♀; Tuolumne Co., Lyons Reservoir; [38.046° N, 120.153° W]; 3 Jun. 1963; P.H. Arnaud Jr leg.; CAS • 1 ♀; Tuolumne Co., Pinecrest; [38.192° N, 119.994° W]; 18 Jul. 1953; J.G. Rozen leg.; EMEC • 7 ♂♂; Tuolumne Co., Pinecrest; [38.192° N, 119.995° W]; 20 Jul. 1929; P.H. Timberlake leg.; ex *Solidago velutina* subsp. *californica* (verbatim: *Solidago californica*); UCRC • 1 ♀; Tuolumne Co., Sonora Pass; [38.328° N, 119.637° W]; 9 Aug. 2000; John M. Burns leg.; EMEC • 1 ♀; Tuolumne Co., Strawberry; [38.200° N, 120.005° W]; 18 Jun. 1957; J.W. MacSwain leg.; EMEC • 1 ♀; same data as for preceding; 15 Jun. 1957; John M. Burns leg.; EMEC • 1 ♀; same data as for preceding; 18 Jun. 1951; R.W. Morgan leg.; EMEC • 3 ♀♀; Tuolumne Co., Tuolumne City; [37.962° N, 120.242° W]; 23 Mar. 1966; J. Powell leg.; EMEC • 1 ♀; Ventura Co., Chuchupate River Station; [34.8078° N, 119.0117° W]; elev. 1610 m; 8 May 1959; P.H. Timberlake leg.; ex *Sisymbrium*; UCRC • 1 ♀; Ventura Co., Mt Pinos; [34.816° N, 119.145° W]; elev. 2286 m; 8 May 1959; J.R. Powers leg.; EMEC. – **Colorado** • 2 ♀♀; Archuleta Co., 14 mi. WSW of Pagosa Springs; [37.191° N, 107.245° W]; 29 May 1977; U. Lanham and P. Byron leg.; ex *Prunus virginiana*; UCMC • 1 ♀; same data as for preceding; 27 May 1977; U. Lanham and P. Byron leg.; ex *Amelanchier*; UCMC • 2 ♀♀; same data as for preceding; 27 May 1977; U. Lanham and P. Byron leg.; ex *Prunus virginiana*; UCMC • 1 ♀; Boulder Co., 1 mi. NW of Boulder; [40.027° N, 105.286° W]; 17 Apr. 1963; U.N. and C.C. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Boulder Co., 1 mi. SW of Boulder; [40.003° N, 105.285° W]; 17 Apr. 1963; U.N. and C.C. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Boulder Co., 1 mi. W of Gold Hill; [40.063° N, 105.429° W]; 4 Jun. 1963; U.N. Lanham and B. Vogel leg.; ex *Euphorbia esula* (verbatim: *Esula*); UCMC • 8 ♀♀; Boulder Co., 2 mi. E of Ward; [40.072° N, 105.471° W]; 31 May 1963;

U.N. Lanham and B. Vogel leg.; ex *Barbarea*; UCMC • 1 ♀; Boulder Co., 2 mi. SW of Boulder; [39.994° N, 105.297° W]; elev. 1981 m; 18 May 1963; U.N. Lanham leg.; UCMC • 1 ♀; Boulder Co., 2 mi. W of Boulder; [40.015° N, 105.308° W]; elev. 1676 m; 22 May 1963; U.N. Lanham and B. Nielsen leg.; UCMC • 1 ♀; same data as for preceding; 18 May 1963; U.N. Lanham *et al*. leg.; UCMC • 2 ♀♀; Boulder Co., 4 km N of Lyons; 40.24847° N, 105.29742° W; elev. 1705 m; 19 May 2007; C. Sheffield and J. Gibbs leg.; RSKM • 3 ♀♀; Boulder Co., 4 mi. N of Boulder; [40.073° N, 105.271° W]; elev. 1676 m; 21 May 1980; U. Lanham and P. Robinson leg.; ex *Physaria belli*; UCMC • 1 ♀; same data as for preceding; 23 May 1980; U.N. Lanham leg.; ex *Physaria belli*; UCMC • 4 ♀♀; same data as for preceding; 25 May 1980; K. Noff leg.; ex *Physaria belli*; UCMC • 1 ♀; same data as for preceding; 25 May 1980; P. Robinson leg.; ex yellow crucifer; UCMC • 2 ♀♀; same data as for preceding; 10 May 1980; U.N. Lanham leg.; ex *Physaria belli*; UCMC • 7 ♀♀; Boulder Co., 4 mi. SW of Boulder; [39.974° N, 105.324° W]; elev. 2042 m; 11 May 1963; B. Vogel leg.; ex *Ribes*; UCMC • 6 ♀♀; Boulder Co., 4 mi. W of Boulder; [40.015° N, 105.347° W]; elev. 1676 m; 25 May 1980; K. Noff leg.; ex *Physaria belli*; UCMC • 1 ♀; Boulder Co., 5 mi. N of Boulder; [40.089° N, 105.27° W]; 9 May 1939; Rodeck and Lanham leg.; UCMC • 2 ♀♀; Boulder Co., 5 mi. NW of Boulder; [40.066° N, 105.337° W]; 31 May 1963; U.N. Lanham and B. Vogel leg.; ex *Barbarea*; UCMC • 4 ♀♀; same data as for preceding; 31 May 1963; U.N. Lanham and B. Vogel leg.; ex *Prunus virginiana*; UCMC • 1 ♀; same data as for preceding; 31 May 1963; U.N. Lanham and B. Vogel leg.; ex *Crataegus*; UCMC • 1 ♀; Boulder Co., 6 mi. N of Boulder; [40.103° N, 105.27° W]; elev. 2103 m; 21 Apr. 1981; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Boulder Co., 6 mi. NW of Boulder; [40.077° N, 105.351° W]; elev. 1829 m; 22 May 1981; U. Lanham leg.; ex *Physaria vitulifera*; UCMC • 1 ♂; Boulder Co., 6 mi. S of Ward; [40.0119° N, 105.5056° W]; elev. 2710 m; 1 Jul. 1939; P.H. Timberlake leg.; ex *Potentilla glandulosa*; UCRC • 3 ♀♀; Boulder Co., Allenspark; [40.194° N, 105.526° W]; 19 Jun. 1963; U.N. Lanham leg.; ex *Prunus virginiana*; UCMC • 1 ♀; same data as for preceding; 19 Jun. 1963; U.N. Lanham leg.; ex *Barbarea*; UCMC • 1 ♂; Boulder Co., Beaver Reservoir; [40.1206° N, 105.5228° W]; elev. 2800 m; 1 Jul. 1939; P.H. Timberlake leg.; ex *Drymocallis glandulosa* (verbatim: *Potentilla glandulosa*); UCRC • 1 ♀; Boulder Co., Boulder; [40.02° N, 105.27° W]; 14 May 1939; R. Bauer leg.; UCMC • 1 ♀; same data as for preceding; 13 May 1913; M.M. Ellis leg.; UCRC • 1 ♀; same data as for preceding; 22 May 1913; M.M. Ellis leg.; UCRC • 1 ♀; same data as for preceding; 28 Apr. 1913; M.D. Ellis leg.; ex *Prunus*; UCRC • 1 ♀; same data as for preceding; 6 May 1913; M.D. Ellis leg.; ex *Malus*; UCRC • 2 ♀♀; same data as for preceding; 24 May 1913; M.D. Ellis leg.; UCRC • 1 ♀; same data as for preceding; 23 May 1913; M.D. Ellis leg.; UCRC • 1 ♀; same data as for preceding; 28 Apr. 1913; M.D. Ellis leg.; ex *Ribes*; UCRC • 1 ♀; same data as for preceding; 21 May 1913; M.D. Ellis leg.; UCRC • 1 ♀; same data as for preceding; 4 May 1906; S.G. Robins(?) leg.; UCRC • 1 ♀; same data as for preceding; 20 May 1933; H.W. Campbell leg.; ex *Taraxacum*; UCRC • 1 ♀; same data as for preceding; 17 May 1933; H.W. Campbell leg.; ex *Taraxacum;* UCRC • 1 ♀; same data as for preceding; 2 Apr. 1933; H.W. Campbell leg.; UCRC • 1 ♀; same data as for preceding; May 1920(?); Backer(?) leg.; UCRC • 1 ♀; same data as for preceding; 12 May 1922; M. Pope leg.; UCRC • 1 ♀; same data as for preceding; 20 May 1922; M. Pope leg.; UCRC • 1 ♀; same data as for preceding; 12 May 1922; D.W. MaC(?) leg.; UCRC • 1 ♀; same data as for preceding; 21 May 1922; E.M. Foster leg.; UCRC • 1 ♀; same data as for preceding; 31 May 1980; P. Robinson leg.; ex *Senecio*; UCMC • 1 ♀; same data as for preceding; 23 May 1978; U. Lanham leg.; ex *Prunus virginiana*; UCMC • 1 ♀; same data as for preceding; 16 May 1965; U.N. Lanham leg.; ex *Ribes*; UCMC • 1 ♀; same data as for preceding; 16 May 1965; U.N. Lanham leg.; ex *Malus*; UCMC • 1 ♀; same data as for preceding; 3 Jun. 1938; U. Lanham leg.; UCMC • 1 ♀; same data as for preceding; 17 May 1963; U.N. Lanham leg.; ex *Prunus virginiana*; UCMC • 1 ♀; same data as for preceding; 24 Apr. 1974; U.N. Lanham leg.; UCMC • 3 ♀♀; same data as for preceding; 30 Apr. 1925; C.H. Hicks leg.; UCMC • 1 ♀; same data as for preceding; 8 May 1925; C.H. Hicks leg.; UCMC • 1 ♀; same data as for preceding; 12 May 1925; C.H. Hicks leg.; UCMC • 3 ♀♀; same data as for preceding; 4 May 1925; C.H. Hicks leg.; UCMC • 1 ♀; same data as for preceding; 17 May 1925; C.H. Hicks leg.; UCMC • 1 ♀; same data as for preceding; 14 Apr. 1907; S.A. Rohwer leg.; ex *Rubus*;

EMEC • 2 ♀♀; same data as for preceding; 14 May 1907; S.A. Rohwer leg.; ex *Ribes*; MCZ • 1 ♀; same data as for preceding; 16 May 1907; S.A. Rohwer leg.; ex *Ribes* (cultivated); MCZ • 1 ♀; same data as for preceding; 12 Apr; Beanutt leg.; ex *Taraxacum*; MCZ • 1 ♀; same data as for preceding; 21 May; T.D.A. Cockerell leg.; ex *Rubus deliciosus*; CAS • 1 ♀; same data as for preceding; 21 May; T.D.A. Cockerell leg.; ex *Rubus deliciosus*; CMNH • 1 ♀; same data as for preceding; 20 Apr; W.P. Cockerell leg.; ex *Claytonia perfoliata*; CMNH • 1 ♀; same data as for preceding; 20 Apr.; T.D.A. Cockerell leg.; ex *Clematis hirsutissima* (verbatim: *Pulsatilla hirsutissima*); CMNH • 1 ♀; Boulder Co., near Boulder; [40.01° N, 105.27° W]; 2 May 1974; U.N. Lanham leg.; UCMC • 1 ♀; Boulder Co., White Rocks; [40.062° N, 105.132° W]; 4 May 1925; C.H. Hicks leg.; UCMC • 3 ♀♀; Chaffee Co., Maysville; [38.534° N, 106.171° W]; 18 Jun.; M. Stach leg.; CAS • 1 ♀; Chaffee Co., Poncha Pass; [38.534° N, 106.171° W]; 20 Jun. 1933; M. Stach leg.; CAS • 1 ♀; same data as for preceding; 20 Jun. 1933; W. Steele leg.; CAS • 1 ♀; same data as for preceding; 20 Jun. 1933; C.A. Wagner leg.; CAS • 7 ♀♀; Chaffee Co., Poncha Springs; [38.512° N, 106.077° W]; 24 May 1977; U. Lanham and P. Byron leg.; ex *Taraxacum*; UCMC • 1 ♀; Conejos Co., 9 mi. W of Capulin; [37.283° N, 106.276° W]; 25 May 1977; U. Lanham and P. Byron leg.; ex *Ribes*; UCMC • 4 ♀♀; same data as for preceding; 12 May 1974; U.N. Lanham leg.; ex *Salix* ; UCMC • 4 ♀♀; same data as for preceding; 12 May 1974; U.N. Lanham leg.; ex *Ribes*; UCMC • 1 ♂; Custer Co., 6 mi. NNW of San Isabel; [38.159° N, 105.153° W]; 3 Jul. 1975; U.N. Lanham leg.; ex *Prunus virginiana* var. *demissa* (verbatim: *Prunus melanocarpus*); UCMC • 1 ♀; Delta Co., Grand Mesa; [39.040° N, 107.95° W]; 8 Jul. 1938; R. Bauer leg.; UCMC • 1 ♂; Delta Co., Lands End, Grand Mesa; [39.026° N, 108.223° W]; 28 Jul. 1962; U.N. Lanham *et al*. leg.; UCMC • 1 ♀; Dolores Co., 6 mi. E of Cahone; [37.690° N, 108.771° W]; elev. 2500 m; 28 May 1977; U. Lanham and P. Byron leg.; ex *Amelanchier*; UCMC • 1 ♀; Douglas Co., 10 mi. NE of Deckers; [39.360° N, 105.095° W]; elev. 2134 m; 6 May 1964; U.N. Lanham leg.; ex *Salix*; UCMC • 4 ♀♀; Douglas Co., 10 mi. SSE of Franktown; [39.257° N, 104.679° W]; 26 Apr. 1963; U.N. Lanham leg.; ex *Salix*; UCMC (Fig. 39) • 1 ♀; same data as for preceding; 5 May 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 17 ♀♀; Douglas Co., 5 mi. SSW of Franktown; [39.324° N, 104.789° W]; 12 Apr. 1963; U.N. Lanham *et al*. leg.; ex *Salix*; UCMC (Fig. 40A) • 5 ♀♀; same data as for preceding; 26 Apr. 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; same data as for preceding; 7 May 1964; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Elbert Co., Running Creek Field Station; [39.502° N, 104.561° W]; Susan Condie leg.; WRME • 1 ♀; Grand Co., 2 mi. E of Hot Sulfur Springs; [40.074° N, 106.065° W]; 20 Jun. 1963; B. Vogel leg.; ex *Prunus virginiana*; UCMC • 4 ♀♀; Grand Co., 2 mi. S of Kremmling; [40.030° N, 106.391° W]; elev. 2286 m; 20 May 1964; U.N. Lanham leg.; ex *Salix*; UCMC • 3 ♀♀; Huerfano Co., 20 mi. W of Walsenberg; [37.623° N, 105.144° W]; 24 Apr. 1963; B. Vogel and S.M. Sutton leg.; ex *Salix*; UCMC • 2 ♀♀; Huerfano Co., 3 mi. W of Walsenburg; [37.618° N, 104.836° W]; 30 Apr. 1981; U.N. Lanham leg.; ex *Ribes*; UCMC • 7 ♀♀; same data as for preceding; 30 Apr. 1981; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Jefferson Co., 10 mi. SE of Bailey; [39.299° N, 105.345° W]; 12 Jun. 1963; U.N. Lanham leg.; ex *Prunus virginiana*; UCMC • 1 ♀; Jefferson Co., Morrison; [39.653° N, 105.191° W]; 6 Jun. 1952; R.S. Beal leg.; EMEC • 1 ♀; Jefferson Co., Plainview; [39.8958° N, 105.2788° W]; 6 Apr. 1963; B. Vogel and S.M. Sutton leg.; ex *Pulsatilla nuttalliana* (verbatim*: Anemone patens*); UCMC • 1 ♀; Jefferson Co., Plainview, 13 mi. N of Golden; [39.944° N, 105.221° W]; 23 May 1962; J.W. MacSwain leg.; ex *Crepis runcinata*; EMEC • 1 ♂; La Plata Co., 16.2 mi. W of Durango; [37.3256° N, 108.1328° W]; elev. 2415 m; 27 Aug. 1967; P.H. Timberlake leg.; ex yellow Composite; UCRC • 4 ♀♀; La Plata Co., Durango; [37.275° N, 107.881° W]; 21 May 1953; R.S. Beal leg.; EMEC • 1 ♀; Larimer Co., 10 mi. SW of Loveland; [40.339° N, 105.249° W]; 26 May 1980; U.N. Lanham leg.; ex *Physaria belli*; UCMC • 1 ♀; same data as for preceding; 26 May 1980; F. Robinson leg.; ex *Physaria belli*; UCMC • 1 ♀; same data as for preceding; 26 May 1980; F. Robinson leg.; UCMC • 1 ♀; Larimer Co., 10 mi. WSW of Loveland; [40.339° N, 105.249° W]; elev. 1981 m; 15 May 1963; U.N. Lanham leg.; ex *Ribes*; UCMC • 3 ♀♀; same data as for preceding; 15 May 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 2 ♀♀; Larimer Co., 13 mi. WSW of Loveland; [40.321° N, 105.302° W]; elev. 1981 m; 30 Apr. 1963; U.N. Lanham leg.;

ex *Salix*; UCMC • 12 ♀♀; Larimer Co., 14 mi. W of Fort Collins; [40.585° N, 105.351° W]; elev. 2012 m; 6 May 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Larimer Co., 16 mi. N of Fort Collins; [40.817° N, 105.084° W]; 10 May 1963; U. Lanham leg.; ex *Salix*; UCMC • 3 ♀♀; Larimer Co., 16 mi. WNW of Fort Collins; [40.671° N, 105.367° W]; elev. 2134 m; 9 May 1963; U.N. Lanham leg.; UCMC • 1 ♀; same data as for preceding; 9 May 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Larimer Co., 7 mi. W of Berthoud; [40.304° N, 105.214° W]; elev. 1676 m; 15 May 1963; U. Lanham leg.; ex *Salix*; UCMC • 2 ♀♀; same data as for preceding; 15 May 1963; U. Lanham leg.; ex *Rhus trilobata*; UCMC • 4 ♀♀; Larimer Co., 8 mi. WSW of Loveland; [40.352° N, 105.209° W]; elev. 1676 m; 30 Apr. 1963; U.N. Lanham leg.; ex Prunus; UCMC • 1 ♂; Larimer Co., Glacier View Meadows; [40.737° N, 105.422° W]; 2 Sep. 1984; H.E. and M.A. Evans leg.; UCMC • 1 ♀; Larimer Co., Hewlett Gulch; [40.655° N, 105.345° W]; 29 Jun. 1979; H.E. Evans leg.; UCMC • 1 ♀; same data as for preceding; 28 Jun. 1984; H.E. Evans leg.; UCMC • 5 ♀♀; Larimer Co., RMNP Moraine Park; [40.353° N, 105.598° W]; elev. 2286 m; 12 Jun. 1963; S.M. Sutton leg.; UCMC • 1 ♀; Larimer Co., Virginia Dale; [40.951° N, 105.346° W]; 10 May 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Larimer Co.; 40.4302° N, 105.5076° W; 5 Aug. 2010; C. Whitten leg.; BIML • 2 ♀♀; Larimer Co.; 40.4012° N, 105.6278° W; 5 Aug. 2010; C. Flynn leg.; BIML (Fig. 40B) • 1 ♀; Mesa Co., 17 mi. SW of Whitewater; [38.754° N, 108.693° W]; 18 May 1963; C.J. McCoy and B. Vogel leg.; ex *Taraxacum*; UCMC • 1 ♀; Mesa Co., Colorado National Monument; [39.051° N, 108.692° W]; elev. 1463 m; 2 May 1963; B. Vogel and C.J. McCoy leg.; UCMC • 1 ♀; same data as for preceding; 16 May 1985; U. Lanham and M. Weissmann leg.; ex *Lepidium montanum*; UCMC • 1 ♀; Mesa Co., Mud Springs, Pinyon Mesa; [38.904° N, 108.739° W]; 22 Jun. 1963; C.J. McCoy and B. Vogel leg.; UCMC • 1 ♀; Mesa Co., Vega Res; [39.222° N, 107.786° W]; 16 Jun. 1977; E. Byron leg.; ex *Prunus virginiana*; UCMC • 1 ♀; Moffat Co., 12 mi. N of Dinosaur; [40.414° N, 109.008° W]; elev. 2438 m; 24–25 May 1974; U.N. Lanham leg.; ex *Cercocarpus ledifolius*; UCMC • 1 ♂; Moffat Co., 15 mi. NE of Craig; [40.669° N, 107.345° W]; 3 Aug. 1979; U.N. Lanham leg.; ex *Solidago*; UCMC • 1 ♀; Moffat Co., 23 mi. SW of Maybell; [40.285° N, 108.404° W]; elev. 1829 m; 26 May 1974; U.N. Lanham leg.; UCMC • 1 ♀; Montezuma Co., 10 mi. NW of Dolores; [37.577° N, 108.626° W]; 28 May 1977; U. Lanham and P. Byron leg.; ex *Amelanchier*; UCMC • 1 ♀; Montezuma Co., 10 mi. NW of Dolores; [37.577° N, 108.626° W]; 28 May 1977; U. Lanham and P. Byron leg.; ex *Amelanchier*; UCMC • 1 ♀; Montezuma Co., 11 mi. NW of Dolores; [37.587° N, 108.639° W]; 28 May 1977; U. Lanham and P. Byron leg.; ex *Prunus virginiana*; UCMC • 3 ♀♀; Montrose Co., 1 mi. S of Buckeye Reservoir; [38.360° N, 108.931° W]; 19 May 1963; B. Vogel and C.J. McCoy leg.; ex *Amelanchier*; UCMC • 2 ♀♀; Montrose Co., 17 mi. SSW of Naturita; [38.101° N, 108.673° W]; elev. 1981 m; 29 May 1977; U. Lanham and P. Byron leg.; ex *Cardaria*; UCMC • 1 ♀; Montrose Co., Buckeye Reservoir; [38.438° N, 109.041° W]; 19 May 1966; B. Vogel and C.J. McCoy leg.; ex *Taraxacum*; UCMC • 1 ♀; Montrose Co., Gunnison River Portal; [38.524° N, 107.65° W]; 26 Jun. 1963; C.J. and P.K. McCoy leg.; UCMC • 1 ♀; Pueblo Co., Colorado City; [37.945° N, 104.836° W]; elev. 1829 m; 20 May 1975; U. Lanham leg.; ex *Rhus trilobata*; UCMC • 1 ♀; San Miguel Co., 9 mi. NE of Placerville; [38.108° N, 107.936° W]; 25 Jun. 1963; B. Vogel, C.J. and P.K. McCoy leg.; ex *Prunus virginiana*; UCMC • 1 ♂; Teller Co., 7 mi. W of Woodland Park, South Meadows Camp; [39.064° N, 105.093° W]; elev. 2438 m; 21–28 Jul. 1977; S. and J. Peck leg.; ex *Salix*; EMEC • 1 ♀; Teller Co., Florissant; [38.946° N, 105.29° W]; 11 Jun. 1907; A. Hoburn leg.; ex *Ribes* ?; UCRC. – **Idaho** • 1 ♂; Bannock Co., Pocatello; [42.86° N, 112.45° W]; 18 Jun. 1958; UCRC • 1 ♀; Benewah Co., St Maries; [47.314° N, 116.563° W]; 24 Jun. 1919; H.A. Scullen leg.; OSAC • 1 ♀; Bingham Co., Blackfoot; [43.191° N, 112.345° W]; 21 Jun. 1932; Louise Ireland leg.; CAS • 1 ♀; Latah Co., Moscow Mountains; [46.803° N, 116.869° W]; elev. 975 m; 3 Jun. 1970; Paul Oman leg.; OSAC • 1 ♀; same data as for preceding; 27 Jul. 1925; C.L. Fox leg.; OSAC • 1 ♂; same data as for preceding; 27 Jul. 1925; C.L. Fox leg.; CAS • 1 ♀; same data as for preceding; 27 Jul. 1925; C.L. Fox leg.; CAS • 2 ♂♂; same data as for preceding; 27 Jul. 1925; C.L. Fox leg.; CAS • 1 ♀; Valley Co., near Smiths Ferry, Hwy 55; 44.29777° N, 116.08869° W; 28 May 2007; J. Gibbs and C. Sheffield leg.; PCYU. – **Montana** • 1 ♀; Carbon Co., 3 mi. SSE of Roscoe; [45.321° N, 109.26° W]; elev. 1646 m; 21 Jun. 1981;

U.N. Lanham leg.; UCMC • 2 ♀♀; Carbon Co., E. of Rosebud Lake; [45.197° N, 109.636° W]; 21 Jun. 1962; B. Vogel leg.; ex *Lupinus argenteus*; UCMC • 1 ♀; Fergus Co., Big Snowy Mountains; [46.640° N, 109.18° W]; elev. 2560 m; 5 Aug. 1961; B. Vogel leg.; UCMC • 2 ♀♀; Gallatin Co., Hwy 286; 44.80887° N, 111.24994° W; elev. 2014 m; 23 Jun. 2007; J. Gibbs, C. Sheffield leg.; PCYU • 1 ♀; Mineral Co., 3 mi. SE of DeBorgia; [47.366° N, 115.303° W]; 8 Jun. 1963; D.R. Smith leg.; OSAC • 1 ♀; Missoula Co., Florence MPG Ranch; 46.7093° N, 114.0038° W; elev. 1359 m; 20–22 May 2019; M. Seidensticker leg.; CBG • 1 ♀; Missoula Co., Florence MPG Ranch; 46.6901° N, 113.9847° W; elev. 1380 m; 16–18 Jul. 2019; M. Seidensticker leg.; CBG. – **Nevada** • 1 ♀; Clark Co., Kyle Canyon Campground, Spring Mountains; [36.270° N, 115.653° W]; elev. 2133 m; 15 May 1971; P.H. and M.M. Arnaud leg.; CAS • 2 ♀♀; Elko Co., Secret Pass, Ruby Mountains; [40.815° N, 115.198° W]; elev. 1981 m; 19 Jun. 1955; C.D. MacNeill leg.; EMEC • 1 ♀; Eureka Co., 3 mi. W of Eureka; [39.512° N, 116.016° W]; 24 Jun. 1968; J.T. Doyen and B. Manion leg.; EMEC • 1 ♀; Washoe Co., Reno; [39.530° N, 119.814° W]; 27 Jun. 1927; E.P. Van Duzee leg.; CAS • 1 ♀; White Pine Co., Lehman Creek, 6 mi. E of Baker; [39.012° N, 114.012° W]; 24 Jun. 1968; J.T. Doyen and B. Manion leg.; EMEC • 1 ♂; White Pine Co., 22 mi. W of Ely; [39.246° N, 115.299° W]; 20 Jul. 1958; E.G. Linsley and J.W. MacSwain leg.; EMEC (Fig. 41A) • 1 ♀; Kings Canyon Ranch, Carson City; [39.161° N, 119.799° W]; elev. 1524 m; 23 Jun. 1964; D. Bolinger leg.; OSAC. – **New Mexico** • 2 ♂♂; Bernalillo Co., Juan Tabo, Sandia Mountains; [35.205° N, 106.499° W]; elev. 2134 m; 8 Jul. 1945; W.O. Griesel leg.; EMEC • 1 ♀; Bernalillo or Sandoval Co., Sandia Mountain; [35.208° N, 106.407° W]; (?); UCRC • 1 ♀; Santa Fe Co., 20 mi. W of Santa Fe; [35.686° N, 106.293° W]; 28 Apr. 1981; U.N. Lanham leg.; UCMC • 1 ♀; Socorro Co., 10 mi. W of Socorro; [34.044° N, 107.068° W]; 28 Mar. 1963; U.N. Lanham leg.; UCMC. – **Oregon** • 7 ♂♂; Baker Co., Cornucopia; [45.008° N, 117.192° W]; elev. 2210 m; 24 Jul. 1936; E.A. Scullen leg.; OSAC • 1 ♀; same data as for preceding; 24 Jul. 1936; R.E. Rieder leg.; OSAC • 1 ♀; same data as for preceding; 24 Jul. 1936; H.A. Scullen leg.; OSAC • 3 ♀♀; Benton Co., Corvallis; [44.564° N, 123.262° W]; 8 May 1936; G. Ferguson leg.; OSAC • 1 ♀; same data as for preceding; 28 Apr. 1936; G. Ferguson leg.; OSAC • 1 ♀; same data as for preceding; 11 May 1925; OSAC • 1 ♀; same data as for preceding; 6 Jul. 1931; OSAC • 1 ♀; same data as for preceding; 9 Jun. 1932; OSAC • 1 ♀; same data as for preceding; 10 Apr. 1929; H.A. Scullen leg.; OSAC • 1 ♀; same data as for preceding; 24 Mar. 1926; H.A. Scullen leg.; OSAC • 1 ♀; same data as for preceding; 14 Mar. 1926; H.A. Scullen leg.; OSAC • 1 ♀; same data as for preceding; 1 Jul. 1931; Joe Schuh leg.; OSAC • 1 ♀; Benton Co., Marys Peak Summit; [44.504° N, 123.553° W]; 4 Jul. 1941; G.R. Ferguson leg.; OSAC • 1 ♀; Benton Co., Monroe; [44.314° N, 123.297° W]; just May 24; J.E. Davis leg.; OSAC • 2 ♀♀; Columbia Co., Scappoose; [45.757° N, 122.878° W]; 23 Apr. 1938; K. Gray and J. Schuh leg.; OSAC • 2 ♀♀; same data as for preceding; 1 May 1937; OSAC • 2 ♀♀; same data as for preceding; 5–6 May 1937; OSAC • 1 ♀; same data as for preceding; 6 May 1937; OSAC • 2 ♀♀; Columbia Co., St Helens – Scappoose; [45.808° N, 122.847° W]; 6 May 1938; OSAC • 1 ♀; Columbia Co., St Helens to Scappoose; [45.808° N, 122.847° W]; 28 Apr. 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; Crook Co., 5 mi. E of Ochoco Ranger Station; [44.396° N, 120.37° W]; 3 May 1939; K. Gray and J. Schuh leg.; OSAC • 1 ♂; Crook Co., Milton; [44.349° N, 120.906° W]; 23 Jun. 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; Deschutes Co., Camp Abbot; [43.868° N, 121.442° W]; 21 May 1944; Paul H. Arnaud leg.; CAS • 1 ♀; Douglas Co., Yoncalla; [43.596° N, 123.283° W]; 26 May 1937; R.M. and G.E. Bohart leg.; CAS • 1 ♀; Grant Co., Strawberry Lake to Straw Lake; [44.380° N, 118.678° W]; elev. 2073–2134 m; 16 Jul. 1936; H.A. Scullen leg.; OSAC • 1 ♀; Harney Co., 17 mi. N of French-Glen; [43.052° N, 118.918° W]; 19 May 1956; J.D. Lattin leg.; OSAC • 1 ♀; Harney Co., 3 mi. S of Fish Lake, Steens Mountain; [42.614° N, 118.596° W]; 3 Jul. 1947; P. Ellerton leg.; PMAE • 1 ♀; Harney Co., Buena Vista Ranch, Blitzen Valley; [43.272° N, 118.853° W]; 19 Apr. 1936; S.G. Jewett leg.; OSAC • 1 ♀; Harney Co., Fish Lake, Steens Mountains; [42.729° N, 118.653° W]; elev. 2195 m; 8 Jul. 1947; J. Ellertson leg.; OSAC (Fig. 40C) • 1 ♀; same data as for preceding; 4 Jul. 1947; F. Ellerton leg.; OSAC • 6 ♀♀; same data as for preceding; 11 Jul. 1927; H.A. Scullen leg.; OSAC • 1 ♀; same data as for preceding; 14 Jul. 1953; J.E. Davis leg.; OSAC • 1 ♀; Harney Co., Malheur National Wildlife Refuge, SBV; 42.8188° N, 118.8688° W; 17 Apr.

2012; J.D. Engler leg.; OSAC • 1 ♀; Hood River Co., Homestead Inn, Mt Hood; [45.413° N, 121.592° W]; 30 Jun. 1927; E.C. VanDyke leg.; CAS • 1 ♀; Hood River Co., Hood River; [45.705° N, 121.522° W]; 12 Jun. 1924; E.C. VanDyke leg.; CAS • 2 ♂♂; Hood River Co., Mt Hood Ghostridge; [45.411° N, 121.652° W]; elev. 1829 m; 30 Jul. 1921; A.L. Melander leg.; UCRC • 1 ♀; Jackson Co., 1.5 mi. NE of Mt Ashland Ski Bowl; [42.097° N, 122.684° W]; 4 Jul. 1970; P. Rude leg.; EMEC • 1 ♀; Jackson Co., Buckhorn Mineral Springs, 11 mi. ESE of Ashland. Emmigrant Creek; [42.133° N, 122.511° W]; elev. 853 m; 19 May 1960; J.D. Lattin leg.; OSAC • 1 ♀; Jackson Co., Little Squaw Lake, 7 mi. E of Copper; [42.098° N, 123.109° W]; elev. 975 m; 22 May 1964; J.D. Lattin leg.; OSAC • 2 ♀♀; Jefferson Co., Suttle Lake; [44.423° N, 121.747° W]; 2 May 1939; Schuh and Gray leg.; OSAC • 1 ♀; Jefferson Co., Suttle Lake; [44.426° N, 121.728° W]; 2 May 1939; K. Gray and J. Schuh leg.; OSAC • 2 ♀♀; Klamath Co., Eagle Ridge, Klamath Lake; [42.249° N, 121.968° W]; 19 May 1924; C.L. Fox leg.; CAS • 1 ♀; same data as for preceding; 23 May 1924; C.L. Fox leg.; CAS • 1 ♀; same data as for preceding; 15 May 1924; C.L. Fox leg.; CAS • 1 ♀; Klamath Co., Klamath Falls; [42.225° N, 121.782° W]; 9 May 1924; C.L. Fox leg.; CAS • 2 ♀♀; same data as for preceding; 7 May 1924; C.L. Fox leg.; CAS • 4 ♀♀; Klamath Co.; [42.68° N, 121.65° W]; 18 May 1913; F.W. Nunenmacher leg.; EMEC • 1 ♀; Lake Co., Hart Mountain Antelope Refuge; [42.549° N, 119.642° W]; 24 Apr. 1954; Otto C. Nelson leg.; ex Currant; OSAC • 1 ♀; Lake Co., Lakeview; [42.188° N, 120.346° W]; 6 May 1954; Otto C. Nelson leg.; ex *Prunus*; OSAC • 1 ♀; Lake Co., Picture Rock Pass; [43.048° N, 120.799° W]; 19 Apr. 1950; Black and Davis leg.; OSAC • 1 ♀; Lane Co., Alder Springs, McKenzie Pass; [44.179° N, 121.913° W]; elev. 922 m; 30 Jun. 1927; H.A. Scullen leg.; OSAC • 3 ♀♀; Lane Co., White Brunch Meadow, Three Sisters, Frog Camp; [44.215° N, 121.858° W]; elev. 1676 m; 19 Jul. 1927; H.A. Scullen leg.; OSAC • 2 ♀♀; Lincoln Co., Alsea Mountain, 15 mi. W of Corvallis; [44.564° N, 123.566° W]; 16 Mar. 1936; K. Gray and J. Schuh leg.; OSAC • 4 ♀♀; same data as for preceding; 17 Mar. 1936; K. Gray and J. Schuh leg.; ex *Salix*; OSAC • 1 ♂; Multnomah Co., Laurelhurst St Prk; [45.521° N, 122.627° W]; 20 Jun. 1962; C.A. Toschi leg.; EMEC • 1 ♂; Umatilla Co., 8 mi. W of Meacham; [45.507° N, 118.586° W]; elev. 1646 m; 19 Jul. 1929; H.A. Scullen leg.; ex *Holodiscus discolor*; OSAC • 2 ♀♀; Umatilla Co., Cabbage Hill, E. of Pendleton; [45.555° N, 118.611° W]; 8 Jun. 1955; Paul O. Ritcher leg.; OSAC • 1 ♀; Umatilla Co., Meacham; [45.506° N, 118.421° W]; elev. 1122 m; 8 May 1927; H.A. Scullen leg.; OSAC • 1 ♀; Umatilla Co., Milton; [45.934° N, 118.391° W]; 22 Jun. 1938; K. Gray and J. Schuh leg.; OSAC • 2 ♂♂; same data as for preceding; 22 Jun. 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; Umatilla Co., Weston; [45.813° N, 118.425° W]; 28 Apr. 1939; K. Gray and J. Schuh leg.; OSAC • 1 ♀; same data as for preceding; 29 Apr. 1939; K. Gray leg.; ex *Brassica*; OSAC • 6 ♀♀; Umatilla Co., Wild Horses Mountain, Athena; [45.802° N, 118.481° W]; 14 May 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; Union Co., 20 mi. SW of LaGrande; [45.119° N, 118.377° W]; elev. 1219–1524 m; 11 May 1930; OSAC • 2 ♂♂; Union Co., La Grande; [45.323° N, 118.088° W]; 20 Jul. 1929; H.A. Scullen leg.; ex *Convolvulus*; OSAC • 1 ♀; Wasco Co., The Dalles; [45.601° N, 121.185° W]; 2 May 1927; H.A. Scullen leg.; OSAC • 1 ♀; same data as for preceding; 24 May 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♂; Wheeler Co., Twickenham; [44.747° N, 120.176° W]; 24 Jun. 1948; J.E. Davis leg.; OSAC. – **Texas** • 1 ♂; Patricio Co., Welder Preserve, 7 mi. NE of Sinton; [28.105° N, 97.438° W]; 25 Apr. 1977; M. Wasbauer and T. Eichlis leg.; EMEC. – **Utah** • 1 ♂; Cache Co., Logan Canyon; [41.78° N, 111.644° W]; 17 Jul. 1958; E.G. Linsley leg.; ex *Asclepias*; EMEC • 1 ♀; Cache Co., Millville; [41.685° N, 111.822° W]; 23 May 1964; G.F. Knowlton leg.; SEMC • 1 ♀; Cache Co., Providence; [41.706° N, 111.818° W]; 24 May 1964; G.F. Knowlton leg.; ex *Daucus*; SEMC • 1 ♀; same data as for preceding; 4 May 1965; G.F. Knowlton leg.; ex Umbelliferae; SEMC • 1 ♀; Cache Co., Smithfield; [41.836° N, 111.838° W]; 12 May 1963; G.F. Knowlton leg.; SEMC • 1 ♀; Iron Co., Parowan Canyon; [37.835° N, 112.819° W]; 4 Mar. 1963; ex *Salix*; UCRC • 1 ♀; Salt Lake Co., Salt Lake; [40.761° N, 111.891° W]; 4 May 1913; P.H. Timberlake leg.; UCRC • 4 ♀♀; same data as for preceding; 4 May 1913; P.H. Timberlake leg.; ex *Salix*; UCRC • 1 ♀; same data as for preceding; 17 May 1913; P.H. Timberlake leg.; UCRC • 1 ♀; Salt Lake Co., Salt Lake City; [40.761° N, 111.891° W]; 31 May 1928; W.W. Jones leg.; UCRC • 1 ♀; same data as for preceding; 12 Jun. 1941;

CAS • 1 ♀; Uintah Co., 6 mi. NW of Vernal; [40.517° N, 109.609° W]; 1 Jun. 1977; U. Lanham and P. Byron leg.; ex *Amelanchier*; UCMC • 6 ♀♀; Uintah Co., 8 mi. NW of Vernal; [40.537° N, 109.636° W]; 1 Jun. 1977; U. Lanham and P. Byron leg.; ex *Taraxacum*; UCMC • 1 ♂; Uintah Co.; [40.455° N, 109.528° W]; CMNH • 1 ♂; Utah Co., 4 mi. N of Teat Mountain; [40.081° N, 111.366° W]; E.G. Linsley leg.; EMEC • 1 ♂; Utah Co., Aspen Grove; [40.404° N, 111.605° W]; 1 Aug. 1938; H.P. Chandler leg.; CAS • 1 ♀; Utah Co., Provo; [40.234° N, 111.659° W]; H. Chandler leg.; CAS • 2 ♀♀; Utah Co., Provo Canyon; [40.355° N, 111.575° W]; 22 May 1960; S.C. Bromley leg.; EMEC. – **Washington** • 1 ♂; Asotin Co., Fields Spring State Park, S of Antone; [46.087° N, 117.172° W]; 28 Jul. 1985; Finnamore and Thormin leg.; PMAE • 1 ♂; Chelan or King Co., White Rock Spring, Steven Pass, Cascade Mountains; [47.744° N, 121.089° W]; 30 Jul. 1930; E.C. VanDyke leg.; CAS • 1 ♀; Klickitat Co., Conboy Lake National Wildlife Refuge, LRL; 45.9283° N, 121.3783° W; 25–26 May 2012; Diedre Shirley leg.; OSAC • 1 ♀; same data as for preceding; 5–6 May 2011; L. Wilson leg.; OSAC • 1 ♀; Stevens Co., Little Pend Oreille National Wildlife Refuge, LPO; 48.4654° N, 117.7358° W; 20–21 Jul. 2012; J. Koelsch leg.; OSAC. – **Wyoming** • 3 ♀♀; Albany Co., 3 mi. S of Woods Landing; [41.085° N, 105.997° W]; 15 May 1978; U. Lanham leg.; ex *Salix*; UCMC • 5 ♀♀; same data as for preceding; 16 May 1978; U. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Albany Co., National Forest Boundary W. of Woods Landing; [41.185° N, 106.072° W]; 13 Jun. 1978; U. Lanham leg.; ex *Prunus virginiana*; UCMC • 1 ♀; Carbon Co., 18 air mi. SE of Saratoga; [41.270° N, 106.562° W]; 30 Jun. 1982; W.J. Pulawski leg.; CAS • 1 ♂; Lincoln Co., Bridger Basin; [41.666° N, 110.934° W]; S. Garman leg.; EMEC • 1 ♀; Lincoln Co.; 41.8650° N, 110.7653° W; 4 Jun. 2013; BIML • 1 ♀; same data as for preceding; 17–18 Jul. 2012; P. Knecht and C. Bossi leg.; BIML • 1 ♀; Lincoln Co.; 41.8704° N, 108.7772° W; 13 May 2013; BIML • 1 ♀; same data as for preceding; 20–21 Sep. 2011; BIML • 1 ♂; Sweetwater Co., 25 mi. S of Bitter Creek; [41.185° N, 108.555° W]; EMEC • 1 ♀; Teton Co., Grand Teton National Park; [43.790° N, 110.681° W]; 23 Jun. 1938; E.C. VanDyke leg.; CAS • 1 ♀; Teton Co., Jenny Lake, Grand Teton; [43.754° N, 110.72° W]; 25 Jun. 1938; E.C. VanDyke leg.; CAS

Redescription

Female

Body measurements. Length 7.58 mm (±0.30 SD). Head length 1.86 mm (±0.06 SD). Face length 1.54 mm (±0.03 SD). Head width 1.76 mm (±0.04 SD). Wing length 5.62 mm (±0.31 SD). n = 5.

Colouration. Head and mesosoma black. Clypeus apex black. Labrum black to dark brown. Mandible black to dark brown basally, becoming light brown medially and reddish brown apically. Flagellum dark brown to brown dorsally, light brown ventrally. Pronotal lobe dark brown. Tegula light brown, with brown base. Wing membrane faintly brown, veins light brown. Legs brown. Metasoma black to dark brown with rims of terga and sterna broadly light brown.

Pubescence. Body hair colour off-white. Tomentum dense on pronotal angle, and lobe, space between pronotal lobe and tegula; very sparse or sometimes absent on T2–T3 basolaterally. Mesosoma covered by erect plumose hairs (1–2.5 OD) and sub-appressed simple short hairs (<0.5 OD). Metafemoral scopa with dense plumose hairs. Wing hairs brown, very short and sparse.

Surface sculpturing. Clypeus polished, becoming weakly imbricate in the basal third; punctures irregularly sparse (IS≤2 PD) apically, becoming smaller and denser (IS≤1 PD) basally. Supraclypeal area polished, becoming imbricate posterolaterally; punctures sparse (IS = 1–3 PD) anteromedially, becoming dense (IS≤1 PD) posterolaterally. Frons reticulate-punctate; punctures crowded (IS = 0 PD). Ocellocular area polished; punctures dense (IS<1 PD). Gena polished and weakly lineolate posteriorly; punctures sparse (IS = 1–3 PD), becoming obscure posteriorly. Postgena polished, but weakly lineolate adjacent to hypostomal carina and posteriorly. Tegula broadly impunctate, minute punctures present anteriorly. Mesoscutum mostly polished, transitioning to imbricate anteriorly and medially halfway

on median line; punctures moderately dense to moderately sparse (IS = 1–2 PD), becoming broadly sparse (IS = 1–3 PD) submedially, diversopunctate. Mesoscutellum polished; punctures dense (IS < 1 PD) marginally and on median line, sparse submedially (IS = 1–6 PD). Metanotum rugulose laterally, ruguloso-punctate medially with punctures crowded (IS = 0 PD). Propodeal triangle with rugae moderately strong, reaching ¾ towards posterior margin, anastomosing medially and weakly so laterally, lateral rugae not extending to dorsolateral slope of propodeum lateral face; interspace sculpture imbricate to tessellate. Preëpisternum weakly rugulose. Hypoepimeron imbricate to weakly rugulose; impunctate. Mesepisternum finely rugulose, imbricate ventrally; impunctate. Propodeum lateral face strongly imbricate, punctures obscure; posterior face polished to weakly imbricate, with punctures moderately dense anteriorly (IS = 1–2 PD), becoming irregularly sparser posteriorly (IS < 3 PD). T1 anterior face



Fig. 39. *Lasioglossum* (*Hemihalictus*) *diatretum* (Vachal, 1904), ♀ (UCMC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

polished, punctures present laterally, sparse (IS = 1–6 PD); dorsal surface polished, punctures present laterally, sparse (IS = 1–3 PD), becoming sparser (IS = 1–6 PD) and fine towards premarginal line and nearly impunctate medially; rim weakly coriarious, punctures sparse (IS = 1–3 PD). T2 disc coriarious to polished, with punctures densely spaced basally (IS ≤ 1 PD), becoming sparser apically (IS = 1–4 PD); rim coriarious, with minute and sparse punctures (IS = 1–3 PD), becoming impunctate narrowly after laterally premarginal line.

Structure. Head long, length/width ratio 1.06 (±0.03 SD). Face length/width ratio 0.88 (±0.01 SD). Clypeus projecting ~80% below suborbital tangent. Mandible short, extending just past the opposing clypeal angle. Eyes convergent below, UOD/LOD ratio 1.05 (±0.03 SD). Ocelli normal. Gena/eye width ratio 0.72 (±0.08 SD). Pronotal angle obtuse. Intertegular span 1.00 mm (±0.05 SD). Mesoscutum length/width ratio 0.90 (±0.03 SD); mesoscutum/scutellum length ratio 2.78 (±0.14 SD); scutellum/metanotum length ratio 1.84 (±0.11 SD); metanotum/propodeal triangle length ratio 0.66 (±0.06 SD). Protibial spur with apical serrations shorter than width of malus; malus extending beyond the velum, nearly ¾ the length of velum. Inner metatibial spur pectinate, teeth 3–5, basal teeth longer than width of rachis. Propodeal triangle posterior margin rounded onto posterior propodeal surface. Propodeal lateral carina not reaching dorsal margin, oblique carina absent.

Variation. The tegula colour varies from light brown to brown. Occasionally, the rims of the metasomal terga become darker, lacking the typical pronounced broad light-brown rims. The ocellocular area is sometimes weakly rugulose, with crowded punctures (IS = 0 PD). The mesoscutum exhibits variation

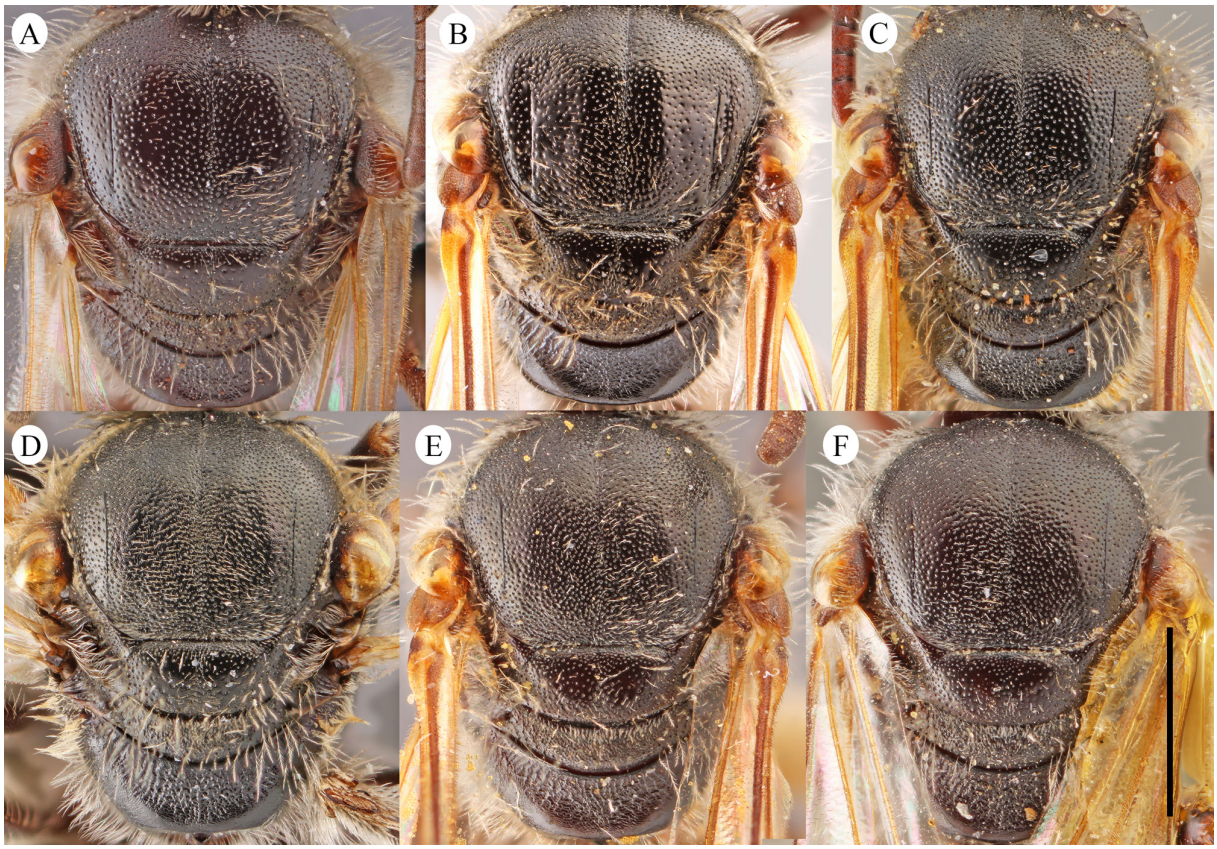


Fig. 40. Dorsal view of mesosoma of female *Lasioglossum* (*Hemihalictus*) species. **A–C**. *L. diatertum* (Vachal, 1904). **D–F**. *L. ruficorne* (Crawford, 1907). **A**. UCMC. **B**. USGS. **C**. OSAC. **D**. RSKM. **E–F**. EMEC. Scale bars = 1 mm.

in puncture density and the extent of the polished area. In some individuals, the mesoscutum is polished only submedially, with dense punctures throughout (IS ≤ 1 PD), except for moderately sparse or moderately dense punctures (IS = 1–2 PD) mesad of the parapsidal line. Occasionally, the punctures can even become more broadly sparse submedially (IS = 3–6 PD). In some specimens, the hypoepimeron appears to have a few shallow, obscure punctures. Sometimes, the punctures on the posterior face of the propodeum are very obscure and more crowded. In some instances, these punctures may extend onto the dorsolateral slope, but they can only be observed from the posterior view of the bee. In some specimens, the mandible reaches the opposing clypeal angle but does not extend beyond it.

Male

Bosy measurements. Length 6.78 mm (± 0.38 SD). Head length 1.71 mm (± 0.10 SD). Face length 1.43 mm (± 0.08 SD). Head width 1.59 mm (± 0.08 SD). Wing length 4.83 mm (± 0.39 SD). n = 5.

Colouration. Head and mesosoma black. Clypeus apical half yellow. Labrum brown. Mandible dark brown basally, becoming yellow medially and reddish brown apically. Flagellum dark brown to brown dorsally, light brown ventrally. Pronotal lobe brown. Tegula light brown, with brown base. Wing membrane faintly brown, veins brown. Legs dark brown to brown, except slightly light brown tarsi. Metasoma dark brown with rims of terga and sterna narrowly lighter.

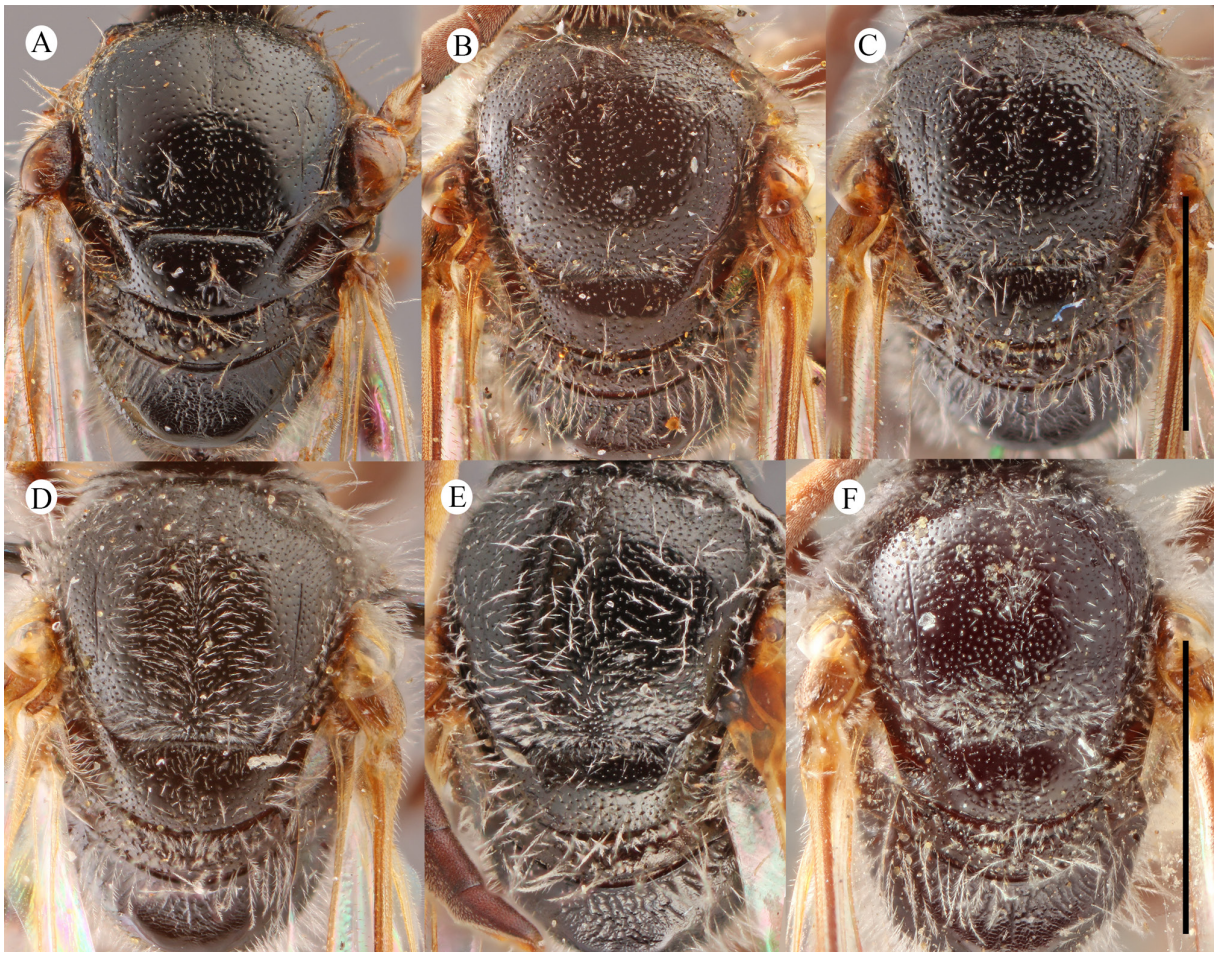


Fig. 41. Dorsal view of mesosoma of male *Lasioglossum* (*Hemihalictus*) species. **A–C**. *L. diatertum* (Vachal, 1904). **D–F**. *L. ruficorne* (Crawford, 1907). **A, D**. EMEC. **B–C, F**. UCRC. **E**. PMAE. Scale bars = 1 mm.

Pubescence. Body hair colour off-white. Tomentum dense on paraocular area, clypeus basally, supraclypeal area laterally, pronotal angle, and lobe, space between pronotal lobe and tegula. Mesosoma covered by erect plumose hairs (1–2.5 OD) and sub-appressed simple short hairs (< 0.5 OD). Metasomal sterna with dense, erect and sub-appressed, plumose, short (< 1.5 OD) hairs. Wing hairs brown, very short and sparse.

Surface sculpturing. Clypeus polished; punctures irregularly sparse (IS ≤ 2 PD) apically, becoming smaller and denser (IS ≤ 1 PD) basally. Supraclypeal area polished; punctures dense (IS ≤ 1 PD). Frons reticulate-punctate; punctures crowded (IS = 0 PD). Ocellocular area weakly rugulose, with crowded punctures (IS = 0 PD). Gena polished and weakly lineolate posteriorly; punctures moderately sparse (IS = 1–2 PD), becoming obscure posteriorly. Postgena lineolate. Tegula broadly impunctate.

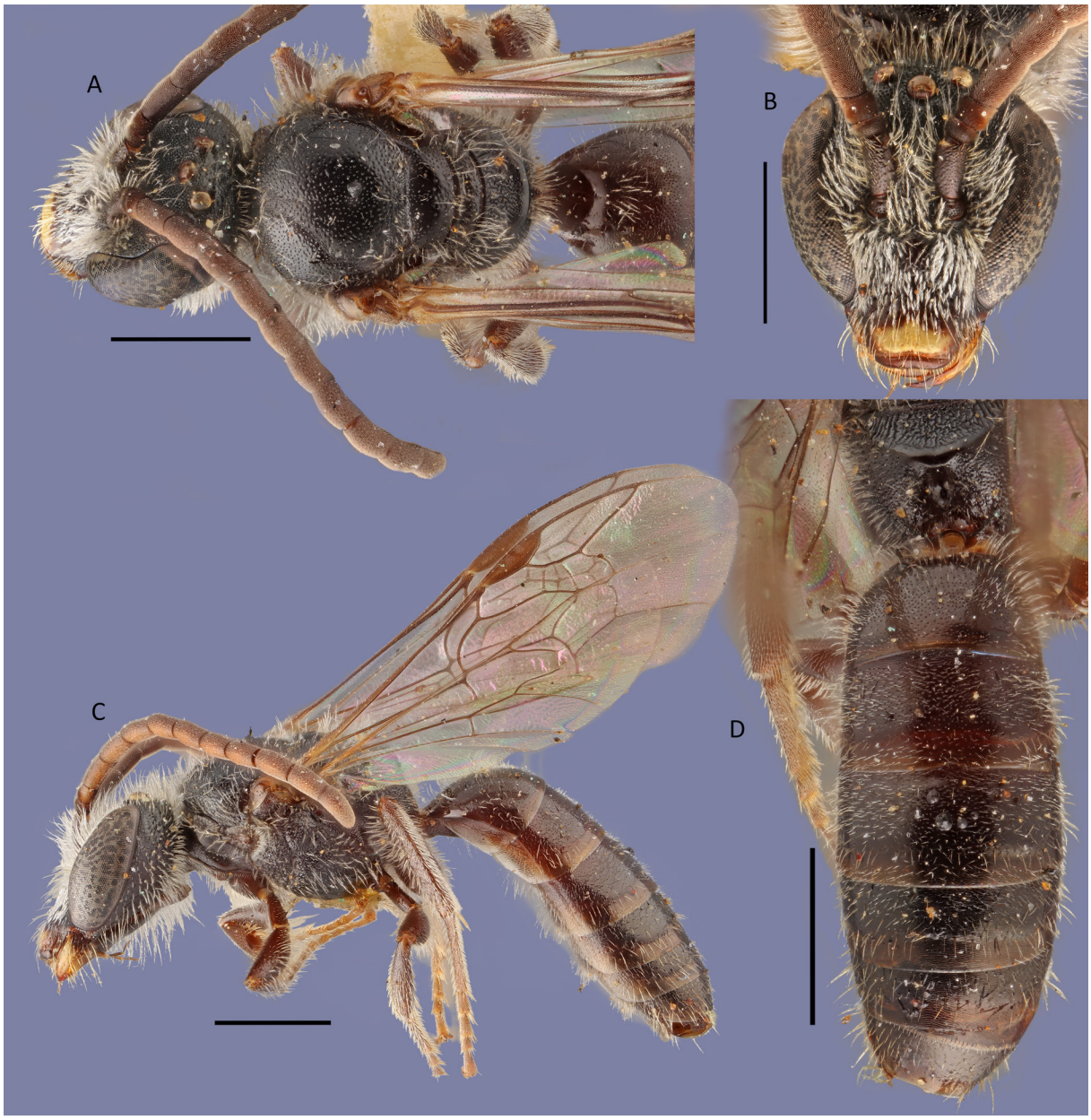


Fig. 42. *Lasioglossum* (*Hemihalictus*) *diatretum* (Vachal, 1904), ♂ (UCRC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

Mesoscutum mostly polished, slightly imbricate anteriorly; punctures dense (IS≤1 PD), becoming sparse (IS = 1–4 PD) mesad of parapsidal line, diversopunctate. Mesoscutellum polished; punctures dense (IS≤1 PD) marginally and on median line, sparse submedially (IS = 1–4 PD). Metanotum rugulose. Propodeal triangle with rugae moderately strong, reaching ¾ towards posterior margin, anastomosing medially and weakly so laterally, lateral rugae not extending to dorsolateral slope of propodeum lateral face; interspace sculpture imbricate to tessellate and becoming polished posteriorly on posterior margin. Preëpisternum weakly rugulose. Hypoepimeron imbricate to weakly rugulose; punctures crowded (IS = 0 PD). Mesepisternum reticulate-punctate with crowded punctures, becoming imbricate ventrally where the punctures become obscure or impunctate. Propodeum lateral face strongly imbricate, and becoming rugulose dorsolateral slope, punctures obscure; posterior face weakly rugulose-imbricate,

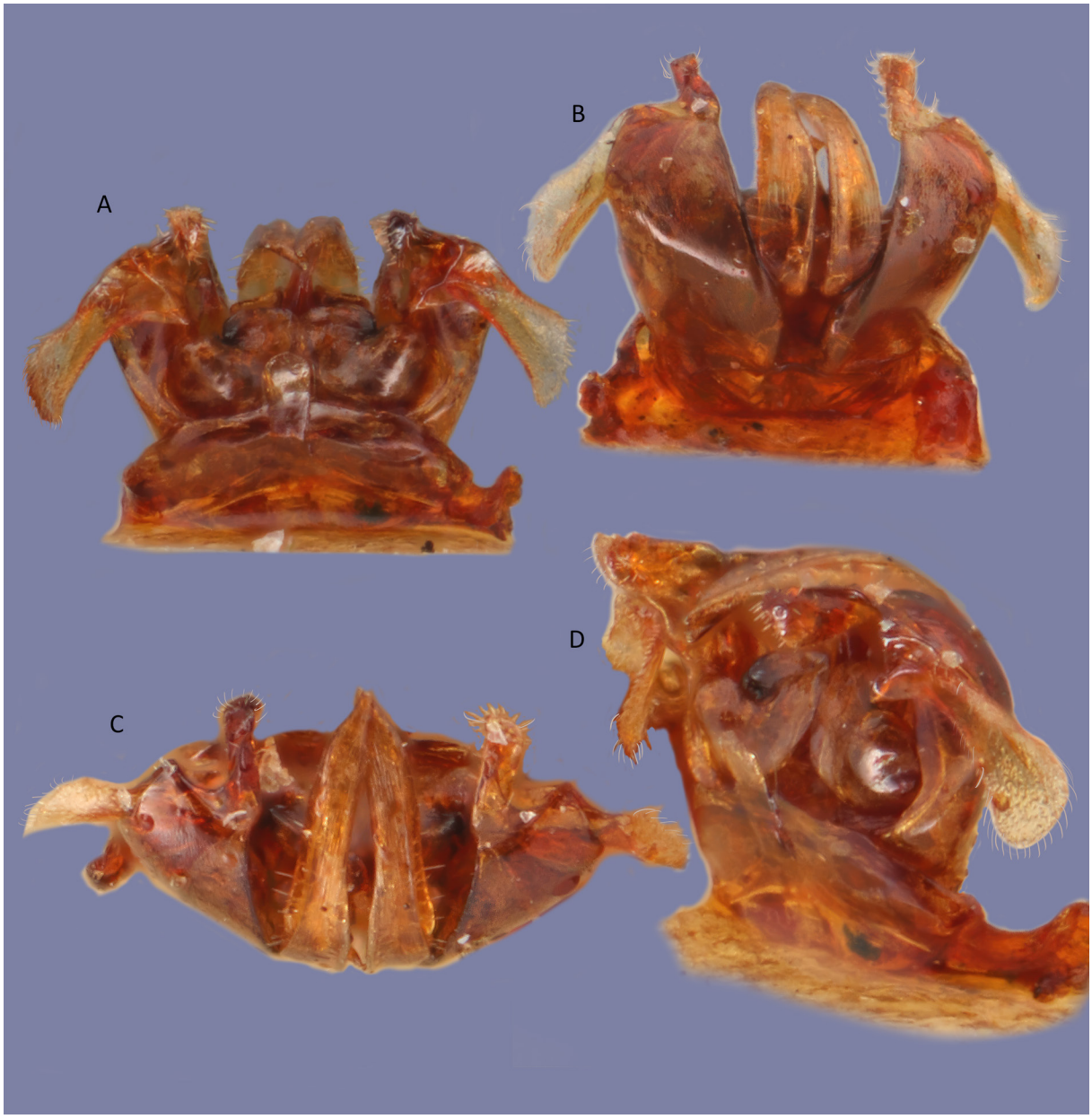


Fig. 43. Genitalia of *Lasioglossum* (*Hemihalictus*) *diatretum* (Vachal, 1904), ♂ (UCRC). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

with dense punctures anteriorly (IS < 1 PD). T1 anterior face polished, few scattered punctures present laterally; dorsal surface polished, punctures present laterally, sparse (IS = 1–3 PD), becoming sparser (IS = 1–5 PD) medially and on subapicolateral boss; rim polished, punctures sparse (IS = 1–3 PD) and becoming impunctate laterally and apically. T2 disc weakly coriarious basally, becoming polished apically, with moderately sparse punctures (IS = 1–2 PD); rim polished, with minute, sparse punctures (IS = 1–4 PD), becoming impunctate apically.

Structure. Head long, length/width ratio 1.08 (±0.03 SD). Face length/width ratio 0.90 (±0.02 SD). Clypeus projecting ~64% below suborbital tangent. Mandible short, reaching opposing clypeal angle. Flagellomeres long, F1 length/pedicel length ratio 1.20 (±0.15 SD); F2 length/F1 length ratio 2.65 (±0.14 SD); F2 length/F2 width ratio 1.61 (±0.05 SD). Gena/eye width ratio 0.58 (±0.03 SD). Forewing with 3 submarginal cells. Pronotal angle obtuse. Intertegular span 0.78 mm (±0.11 SD). Mesoscutum length/width ratio 1.02 (±0.13 SD). Propodeal lateral carina not reaching dorsal margin, oblique carina absent. n = 5.

Variation. Typically, there is a slight brown-to-light-brown gradient between the tibia and basitarsus. However, this gradient can rarely become more pronounced, as seen in the legs of male *L. ruficorne*. In some individuals, the mesoscutum punctures become more broadly sparse submedially (IS = 2–5 PD) submedially. The punctures on the hypoepimeron are obscure in some specimens. Sometimes, the mesepisternum exhibits reticulate-rugulose or rugulose sculpturing dorsally, with punctures that are difficult to observe.

Genitalia (Figs 43, 120G). Gonostylus elongate and truncated, about 4 times as long as broad, with short setae. Retrorse lobe broad, about 3 times as long as broad, covered in short setae.

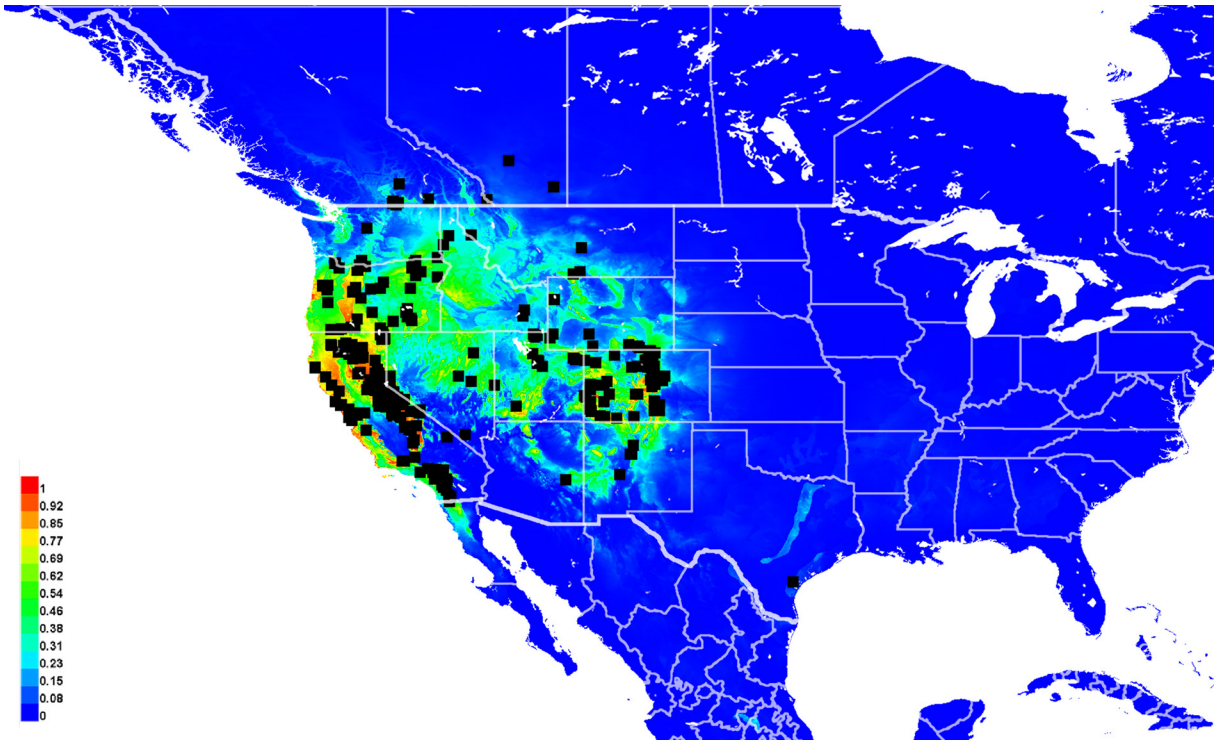


Fig. 44. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *diatretum* (Vachal, 1904) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

Range

Canada (Alberta, British Columbia), Mexico (Baja California), USA (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, Wyoming) (Fig. 44).

Floral hosts

ANACARDIACEAE: *Rhus trilobata* Nutt. • APIACEAE: *Angelica capitellata* (A.Gray) Spalik, Reduron & S.R.Downie, *Daucus* sp., *Heracleum maximum* W.Bartram • ASCLEPIADACEAE: *Asclepias* sp. • ASTERACEAE: *Crepis runcinata* (E.James) Torr. & A.Gray, *Ericameria nauseosa* var. *bernardina* (H.M.Hall) G.L.Nesom & G.I.Baird, *Eriophyllum lanatum* (Pursh) J.Forbes, *Lasthenia*

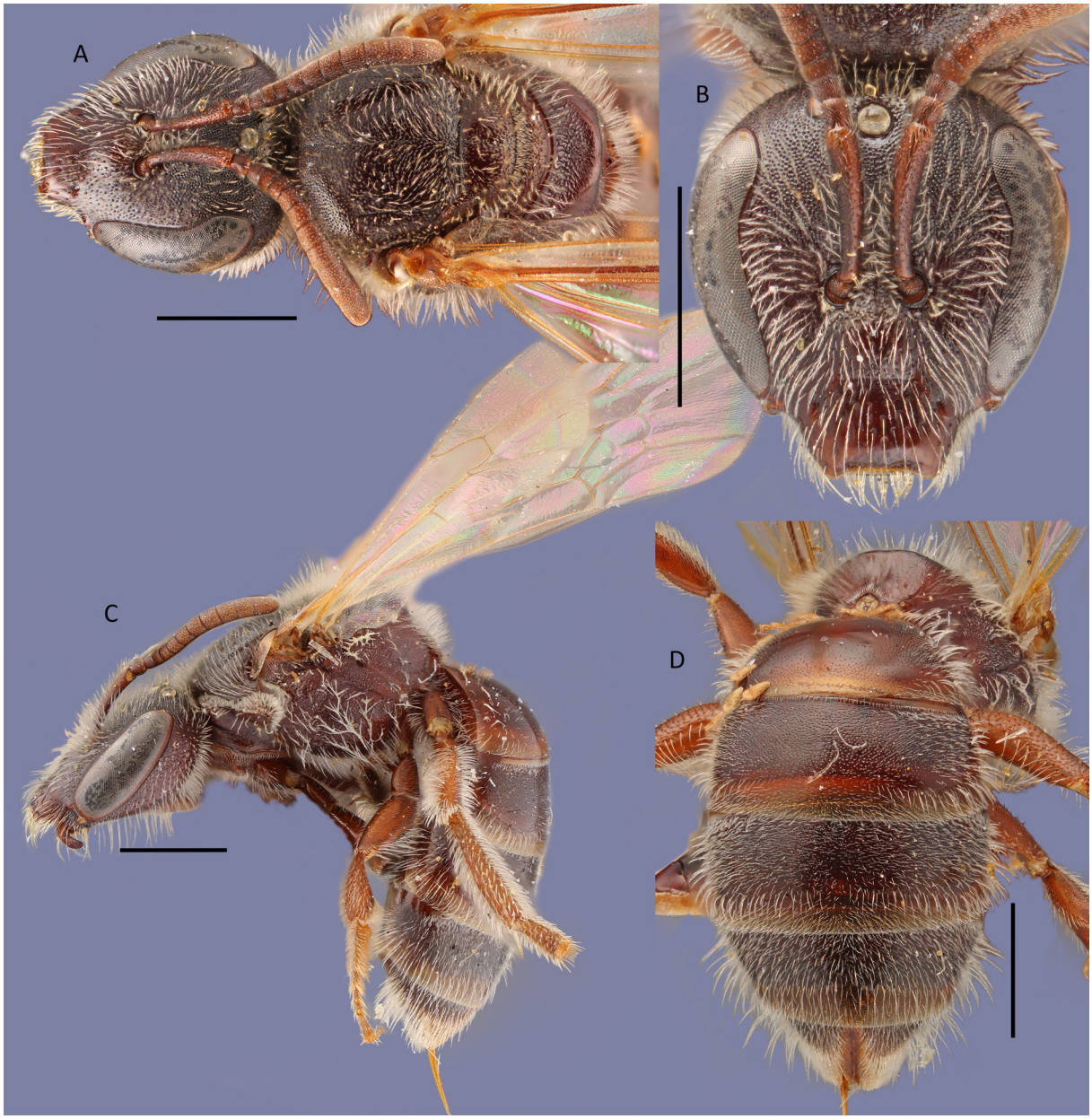


Fig. 45. *Halictus supranitens* Cockerell, 1919, syntype, ♀, junior synonym of *L. diatretum* (Vachal, 1904) (USNM Type No. 27999). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

sp., *Senecio lugens* Richardson, *Senecio* sp., *Solidago velutina* subsp. *californica* (Nutt.) Semple, *Solidago* sp., *Taraxacum officinale* F.H.Wigg., *Taraxacum* sp., *Wyethia* sp. • BORAGINACEAE: *Cryptantha intermedia* (A.Gray) Greene, *Cryptantha* sp., *Eremocarya lepida* (A.Gray) Greene, *Lithospermum ruderale* Douglas ex Lehm. • BRASSICACEAE: *Barbarea* sp., *Brassica* sp., *Cardaria* sp., *Erysimum* sp., *Isatis tinctoria* L., *Lepidium montanum* Nutt., *Physaria bellii* G.A.Mulligan, *Physaria vitulifera* Rydb., *Sisymbrium* sp. • CONVOLVULACEAE: Convolvulus sp. • ERICACEAE: *Arctostaphylos glauca* Lindl., *Arctostaphylos patula* Greene, *Arctostaphylos pringlei* subsp. *drupacea* (Parry) P.V.Wells, *Arctostaphylos* sp. • EUPHORBIACEAE: *Euphorbia esula* L. • FABACEAE: *Lupinus argenteus* Pursh, *Trifolium* sp. • GROSSULARIACEAE: *Ribes cereum* Douglas, *Ribes indecorum* Eastw., *Ribes roezlii* Regel, *Ribes* sp., *Ribes viscosissimum* Pursh • HYDROPHYLLACEAE: *Eriodictyon californicum* (Hook. & Arn.) Torr., *Eriodictyon* sp., *Eriodictyon trichocalyx* A.Heller, *Phacelia hastata* var. *compacta* (Brand) Cronquist (verbatim: *Phacelia frigida*), *Phacelia* sp. • LILIACEAE: *Camassia quamash* (Pursh) Greene • ONAGRACEAE: *Oenothera elata* subsp. *hookeri* (Torr. & A.Gray) W.Dietr. & W.L.Wagner • POLYGONACEAE: *Eriogonum* sp., *Eriogonum umbellatum* Torr., *Eriogonum wrightii* var. *subscaposum* S.Watson • PORTULACACEAE: *Claytonia perfoliata* Donn ex Willd. • RANUNCULACEAE: *Clematis hirsutissima* Pursh, *Pulsatilla nuttalliana* (DC.) Bercht. & J.Presl • RHAMNACEAE: *Ceanothus cordulatus* Kellogg, *Ceanothus incanus* Torr. & A.Gray, *Ceanothus* sp., *Frangula californica* (Eschsch.) A.Gray, *Ranunculus* sp. • ROSACEAE: *Amelanchier* sp., *Cercocarpus ledifolius* Nutt., *Crataegus* sp., *Holodiscus discolor* (Pursh) Maxim., *Malus* sp., *Drymocallis glandulosa* (Lindl.) Rydb., *Potentilla* sp., *Prunus* sp., *Prunus subcordata* Benth., *Prunus virginiana* var. *demissa* (Nutt.) Torr., *Prunus virginiana* L., *Rubus deliciosus* Torr., *Rubus* sp. • SALICACEAE: *Salix* sp., *Salix vestita* Pursh • SCROPHULARIACEAE: *Penstemon grinnellii* Eastw., *Penstemon procerus* Douglas ex Graham, *Penstemon rydbergii* A.Nelson

DNA barcodes

DNA barcodes of *L. diatretum* form a single cluster based on sequences from Alberta, British Columbia, Saskatchewan, Colorado, Idaho, Montana.

Lasioglossum ruficorne (Crawford, 1907)
Figs 40D–F, 41D–F, 46–51, 108A, 109E, 118B, E, H, K, 120H

Halictus ruficornis Crawford, 1907c: 192.
Halictus vaporellus Cockerell, 1910: 366. **Syn. nov.**
Halictus pulveris Cockerell, 1930: 7. **Syn. nov.**

Halictus ruficornis – Crawford 1907a: 187 (key).
Lasioglossum (*Evylaeus*) *pulveris* – Michener 1951: 1110 (catalogue).
Lasioglossum (*Evylaeus*) *ruficorne* – Michener 1951: 1110 (catalogue).
Lasioglossum (*Evylaeus*) *vaporellum* – Michener 1951: 1110 (catalogue).
Evylaeus pulveris – Hurd 1979: 1961 (catalogue). — Moure & Hurd 1987: 81 (catalogue).
Evylaeus ruficornis – Hurd 1979: 1961 (catalogue). — Moure & Hurd 1987: 82 (catalogue).
Evylaeus vaporellus – Hurd 1979: 1962 (catalogue). — Moure & Hurd 1987: 84 (catalogue).

Etymology

Crawford (1907c) did not explain the epithet. The specific epithet is treated as a compound Latin adjective, likely derived from '*rufus'* and '*cornis*', meaning 'red horned'.

Diagnosis

Refer to *L. diatretum* diagnosis.

Type material

Lectotype of *Halictus ruficornis* (designated herein; examined)
UNITED STATES – **Nevada** • ♂; Carson City; [39.16 ° N, 119.78 ° W]; Jul.; Baker leg.; USNM.

Specimen labels
"OrmsbyCo. Nev. / July. Baker // 4688 // Type / No.12049 / U.S.N.M. // *Halictus* / ♂ *ruficornis* / Cwfd. Type // LECTOTYPE // USNMENT / 01735683".

Paralectotype of *Halictus ruficornis* (designated herein; examined)
UNITED STATES – **Nevada** • 1 ♂; Carson City; [39.16 ° N, 119.78 ° W]; Jul.; Baker leg.; USNM.

Specimen labels
"Ormsby Co. Nev. / July. Baker // 5029 // Paratype / No. 12049 / U.S.N.M. // *Halictus* / ♂ *ruficornis* / Cwfd. Paratype".

Syntype of *Halictus vaporellus* (designated herein; examined)
UNITED STATES – **Colorado** • 1 ♀; Routt Coson Co., Steamboat Springs; [40.50 ° N, 106.83 ° W]; Jul.; Cockerell leg.; USNM (Type No. 23324) (Fig. 51).

Specimen labels
"Steamboat Spgs. / Colo. May 27. (Ckll) // TypeNo. / 23324 / U.S.N.M. // *Halictus* / *vaporellus* / Ckll. TYPE. // USNMENT 01735685".

Syntype of *Halictus pulveris* (examined by photos)
UNITED STATES – **Colorado** • 1 ♀; Montezuma Co., Mesa Verde; [37.183° N, 108.500° W]; 3–7 Jul. 1919; elev. 2011.7 m; Cockerell leg.; AMNH IZC 00323614 (Fig. 50).

Specimen labels
"Mesa Verde, Colo. / July 3–7, '19 / F4371. // About 37° 11'N. / 108° 30' W. / About 6600 ft. // *Halictus* / *pulveris* / Ckll. TYPE // AMNH_IZC 00323614".

Material examined

CANADA – **Alberta** • 1 ♀; Cypress Co., Medicine Hat; [50.041° N, 110.677° W]; 24 Apr. 1926; Owen Bryant leg.; CAS • 1 ♀; Cypress Co., Medicine Hat, near Gas City Campground; 50.039° N, 110.726° W; 29 May 2014; M. Buck leg.; PMAE • 1 ♀; same data as for preceding; 31 May–4 Jun. 2016; M. Buck leg.; PMAE • 4 ♀♀; same data as for preceding; 31 May–4 Jun. 2016; M. Buck leg.; PMAE • 1 ♀; same data as for preceding; 1 Jun. 2016; M. Buck leg.; PMAE • 1 ♂; Forty Mile Co., Manyberries; [49.402° N, 110.693° W]; 7 Aug. 1981; D.B. McCorquodale leg.; PMAE • 2 ♂♂; Newell Co., Dinosaur Provincial Park, Sandhill Creek Valley; 50.7558° N, 111.5192° W; 14–15 Jul. 2010; Buck and Huele leg.; PMAE • 3 ♂♂; Warner Co., Writing-On-Stone Provincial Park; [49.0819° N, 111.6169° W]; 1 Aug. 1990; M. Klassen leg.; PMAE • 1 ♂; Warner Co., Writing-On-Stone Provincial Park; [49.0819° N, 111.6169° W]; 8 Aug. 1990; M. Klassen leg.; PMAE • 6 ♂♂; same data as for preceding; 18–25 Jul. 1990; M. Klassen leg.; PMAE • 1 ♀; same data as for preceding; 26 May–6 Jun. 1990; D. McCorquodale leg.; PMAE • 1 ♀; same data as for preceding; 5–13 Jul. 1990; M. Klassen leg.; PMAE • 5 ♂♂; same data as for preceding; 5–13 Jul. 1990; M. Klassen leg.; PMAE • 1 ♂; Warner Co., Writing-On-Stone Provincial Park; [49.0819° N, 111.6169° W]; 30 Aug.–10 Sep. 1990; M. Klassen leg.; PMAE • 1 ♂; same data as for preceding; 16–25 Jul. 1990; M. Klassen leg.; PMAE • 2 ♂♂; Warner Co., Writing-On-Stone Provincial Park; [49.0819° N, 111.6169° W]; 16 Jul. 1990; M. Klassen leg.; PMAE • 1 ♀; Drumheller; 51.465° N, 112.71° W; 8 Jun. 2013; R. Poulin leg.; RSKM • 2 ♀♀; Lethbridge, Gold Canyon; 49.6547° N, 112.8197° W; 3 Jul. 2020; M. Buck leg.; PMAE. – **British Columbia** • 1 ♀;

Central Interior, Prince George; 53.9294° N, 122.75° W; elev. 572 m; 12 Jun. 2022; A. White leg.; CBG • 1 ♂; East Kootenay B, Kikomun Creek Provincial Park; 49.25366° N, 115.23547° W; 12 Jul.–19 Aug. 2021; S. Achal and H. Bates (J. Heron) leg.; RSKM • 1 ♂; East Kootenay B, Kikomun Creek Provincial Park; 49.25364° N, 115.23608° W; 14 Jun.–12 Jul. 2021; S. Achal and H. Bates (J. Heron) leg.; RSKM • 1 ♀; Kamloops; [50.675° N, 120.327° W]; 17 Apr. 1943; E.R. Buckell leg.; EMEC • 1 ♀; same data as for preceding; 13 Apr. 1943; G.J. Spencer leg.; EMEC • 6 ♀♀; Kamloops; [50.675° N, 120.327° W]; 1 May 1932; Owen Bryant leg.; CAS • 1 ♀; Okanagan-Similkameen Reg. Dist., Camp McKinney Road, Sandy Cut; 49.1135° N, 119.3406° W; elev. 1190 m; 26 Apr.–3 May 2009; L.R. Best leg.; PCYU • 1 ♀; Okanagan-Similkameen Reg. Dist., Mt Kruger, Strawberry Creek Road; 49.0359° N, 119.5007° W; elev. 390 m; 21 Apr. 2009; L.R. Best leg.; PCYU• 5 ♀♀; Okanagan-Similkameen; 49.16569° N, 119.73643° W; 28 Aug.–9 Sep. 2015; D. Marks leg.; RSKM (Fig. 40D) • 1 ♀; Okanagan-Similkameen, SOGPA, Nighthawk Road; 49.01614° N, 119.67998° W; 14 Jun.–16 Jul. 2021; H. Singh and T. McGratton (JH) leg.; RSKM • 1 ♀; Osoyoos, Haynes Ecol. Res; [49.083° N, 119.515° W]; 20 May 1987; S.G. Cannings leg.; EMEC • 1 ♀; Osoyoos, Osoyoos West Bench; 49.00142° N, 119.49765° W; 19–20 Jul. 2017; D. Marks and K. Grant (J. Heron) leg.; RSKM • 1 ♀; Osoyoos, Osoyoos West Bank; 49.028954° N, 119.496864° W; 19 May–8 Jul. 2016; C. Dawson and M. Senelli leg.; RSKM • 1 ♀; Osoyoos, Osoyoos West Bench; 49.02871° N, 119.49376° W; 14 Jun.–17 Jul. 2017; D. Marks and K. Grant (J. Heron) leg.; RSKM • 1 ♀; Osoyoos, Osoyoos West Bench; 49.00233° N, 119.49658° W; 19 Jun.–20 Jul. 2017; D. Marks and K. Grant (J. Heron) leg.; RSKM • 1 ♀; Osoyoos, Osoyoos West Bench; 49.01193° N, 119.4951° W; 12 Jul.–8 Aug. 2017; D. Marks and K. Grant (J. Heron) leg.; RSKM • 1 ♂; Osoyoos, Osoyoos West Bench; 49.03033° N, 119.50034° W; 17 Jul.–9 Aug. 2017; D. Marks and K. Grant (J. Heron) leg.; RSKM • 2 ♀♀; Osoyoos, Strawberry Creek Road; 49.038471° N, 119.508261° W; 28 Jun. 2020; T. Haapalainen and K. Needham leg.; EMEC • 1 ♀; Oliver; [49.183° N, 119.551° W]; 26 May 1945; D. Black leg.; EMEC • 1 ♀; Penticton; [49.499° N, 119.594° W]; 20 May 1919; E.R. Buckell leg.; CUIC • 1 ♀; Petitot River, Liard Hwy; [59.99° N, 123.1° W]; 26 Jun. 1985; B.A. Macdonald leg.; EMEC • 1 ♀; Robson; [49.334° N, 117.691° W]; 3 May 1957; R.R. Foxlee leg.; EMEC • 17 ♂♂; Shore, Shuswap Lake, near Salmon Arm; [50.700° N, 119.283° W]; 13 Jul. 1949; H.B. Leech leg.; CAS • 1 ♂; Columbia Shuswap, Shuswap Lake Shore, Salmon Arm; [50.7049° N, 119.2874° W]; 13 Jul. 1949; H.B. Leech leg.; EMEC • 1 ♀; Vernon; [50.267° N, 119.272° W]; 3 May 1928; P.N. Vroom leg.; EMEC • 1 ♀; Vernon, CFB Vernon; 50.226° N, 119.302° W; Jun. 2018; T. Ehlers leg.; RSKM. – **Saskatchewan** • 1 ♀; RM of Val Marie, Grasslands National Park; 49.1361° N, 107.6306° W; 8 Jul. 2010; N. de Silva leg.; PMAE.

MEXICO – **Baja California** • 1 ♂; Ensenada Co., Sierra San Pedro Martir, La Encantada; [30.98° N, 115.392° W]; elev. 2134 m; 31 May 1958; J. Powell leg.; EMEC • 1 ♂; Sierra San Pedro Mártir, slope NE of Vallecitos; [31.05° N, 115.45° W]; 14 Jul. 1980; Brown Faulkner leg.; SDMC. – **Sonora** • 1 ♀; Alamos Municipality Co., San Bernardo, Rio Mayo; [27.4138° N, 108.8621° W]; 17 Aug. 1935; EMEC.

UNITED STATES – **Arizona** • 2 ♂♂; Apache Co., Subalpine meadow, White Mountains; [33.850° N, 109.57° W]; A.R. Moldenke leg.; CAS • 1 ♂; Apache Co., White Mountains; [33.850° N, 109.4° W]; 7 Jul. 1933; Parker leg.; CAS • 1 ♀; Cochise Co., 3 mi. SW of Portal, along Cave Creek ; 31.88687° N, 109.17358° W; elev. 1550 m; 25–30 Jun. 1987; SEMC • 1 ♀; Cochise Co., Chiricahua Mountains; [31.883° N, 109.208° W]; 9 Mar. 1917; V.W. Owen leg.; CAS • 1 ♂; Cochise Co., Mountain meadows, Chiricahua Mountains; [31.883° N, 109.208° W]; J.L. Neff and A.R. Moldenke leg.; CAS • 1 ♂; same data as for preceding; J.L. Neff leg.; CAS • 1 ♀; Cochise Co., Ramsey Canyon, 12 km S of Sierra Vista; [31.446° N, 110.303° W]; 22 Jun. 1987; B. Brown leg.; PMAE • 1 ♀; Cochise Co., S of Sierra Vista, Ramsey Canyon, Mile High Preserve; [31.488° N, 110.408° W]; elev. 1700 m; 1–8 Oct. 1986; B. Brown leg.; PMAE • 1 ♂; Coconino or Mohave Co., Grand Canyon; [36.300° N, 112.75° W]; elev. 2134 m; 22 Jun. 1925; A.A. Nichol leg.; ASUHIC • 2 ♀♀; Gila Co., Parker Creek; [33.747° N, 110.983° W]; 19 Apr. 1947; SEMC • 1 ♀; same data as for preceding; 2 May 1947; SEMC • 1 ♀; Graham Co.,

Marijilda Canyon, Graham Mountains; [32.701° N, 109.785° W]; 7 Apr. 1961; J.C. Bequaert leg.; ex *Phacelia distans*; ASUHIC • 1 ♀; Maricopa Co., 15 mi. E of Gila Bend; [32.945° N, 112.459° W]; 16 Feb. 1953; E.I. Schlinger leg.; EMEC • 1 ♂; Maricopa Co., 15 mi. W of Chandler; [33.306° N, 112.101° W]; 9 Jun. 1961; G.D. Butler leg.; ex *Heliotropium*; ASUHIC • 1 ♂; Maricopa Co., Gila Bend; [32.945° N, 112.717° W]; 11 May 1978; E.G. and J.M. Linsley leg.; ex *Parkinsonia microphylla* (verbatim: *Cercidium microphyllum*); EMEC • 1 ♂; same data as for preceding; 10 May 1978; E.G. and J.M. Linsley leg.; ex *Parkinsonia microphylla* (verbatim: *Cercidium microphyllum*); CUIC • 1 ♀; Maricopa Co., Granite Reef Dam; [33.516° N, 111.691° W]; 30 Mar. 1959; R.S. Beal leg.; ex *Salix* (verbatim: *Salix catkins*); ASUHIC • 1 ♂; Maricopa Co., Phoenix; [33.450° N, 112.07° W]; 20 Apr. 1933; R.H. Crandall leg.; ASUHIC • 1 ♀; Maricopa Co., Tortilla Flat; [33.530° N, 111.388° W]; 11 Apr. 1966; F.F. Hasbrouck leg.; ex *Baileya multiradiata*; ASUHIC • 4 ♀♀; Mohave Co., Peach Springs, N of Colorado River; 35.76667° N, 113.3717° W; 18 Mar. 2000; D. Brzoska leg.; ex *Chrysothamnus*; SEMC • 1 ♂; Mojave Co., Hualapai Mountains, S of Kingman; [35.078° N, 113.974° W]; elev. 1900 m; 30 Jul. 1965; M.E. Irwin leg.; UCRC • 3 ♂♂; same data as for preceding; 30 Jul. 1965; E.I. Schlinger leg.; UCRC • 2 ♂♂; Navajo Co., 23 mi. W of Winslow; [35.024° N, 111.103° W]; 3 Jul. 1953; E.S. Ross leg.; CAS • 1 ♂; Navajo Co., 5 mi. W of Fort Apache; [33.790° N, 110.077° W]; 21 Jun. 1957; F. Werner and G. Butler leg.; ASUHIC • 1 ♂; Navajo Co., Jadito Trading Post; [35.767° N, 110.133° W]; 28 Jun. 1966; J.H. Davidson, J.M. Davidson and M.A. Cazier leg.; ex *Poliomintha incana*; ASUHIC • 1 ♂; Navajo Co., Show Low; [34.253° N, 110.03° W]; 22 Aug. 1973; G. and K. Eickwort leg.; CUIC • 1 ♀; Pima Co., 37 mi. SW of Tucson; [31.842° N, 111.42° W]; 19–20 Mar. 1961; R.H. Painter leg.; ASUHIC • 1 ♀; Pima Co., Catalina Mountains; [32.430° N, 110.705° W]; 24 Mar. 1956; A.D. Telford leg.; ASUHIC • 1 ♂; Pima Co., Catalina Mountains, 19 mi. along Hitchhiker Highway; [32.488° N, 110.447° W]; 9 Jul. 1957; F. Werner leg.; ex *Ceanothus*; ASUHIC • 4 ♂♂; Pima Co., Catalina Mountains, 24 mi. along Hitchhiker Highway; [32.539° N, 110.387° W]; 21 Jul. 1957; F. Werner leg.; ASUHIC • 1 ♂; Pima Co., Catalina Mountains, 26 mi. along Hitchhiker Highway; [32.559° N, 110.362° W]; 9 Jun. 1956; F.G. Werner and G.D. Butler leg.; ASUHIC • 1 ♀; Pima Co., Catalina Mountains, 5 miles along Hitchcock Highway; [32.344° N, 110.617° W]; 17 Apr. 1955; G.D. Butler, F.G. Werner leg.; ex *Fendlera*; ASUHIC • 2 ♀♀; same data as for preceding; 10 Apr. 1955; G.D. Butler leg.; ex *Salix*; ASUHIC • 2 ♀♀; same data as for preceding; 9 Apr. 1955; G.D. Butler and GF.G. Werner leg.; ex *Fendlera*; ASUHIC • 3 ♀♀; same data as for preceding; 10 Apr. 1955; G.D. Butler leg.; ex *Salix*; ASUHIC • 1 ♀; same data as for preceding; 24 Mar. 1956; W. Nutting leg.; ASUHIC • 1 ♂; Pima Co., Desert Scrub Site, Santa Catalina Mountains; [32.350° N, 110.7° W]; J.L. Neff leg.; CAS • 1 ♂; Pima Co., Mt Lemmon, Santa Catalina Mountains; [32.442° N, 110.788° W]; 28 Jul. 1924; E.P. Van Duzee leg.; CAS • 1 ♂; Pima Co., Mt Lemmon, Santa Catalina Mountains; [32.442° N, 110.788° W]; elev. 2790 m; 1 Aug. 1992; L. Packer leg.; PCYU • 33 ♂♂; Pima Co., *Quercus*/*Pinus* Forest, Santa Catalina Mountains; [32.416° N, 110.7° W]; J.L. Neff leg.; CAS • 1 ♂; Pima Co., S slope of Kitt Peak, Quinlan Mountains; [31.961° N, 111.6° W]; 22 Apr. 1961; M.L. Noller leg.; ex Compositae; ASUHIC • 2 ♂♂; Pima Co., Saguaro Park; [32.183° N, 110.613° W]; 9 May 1942; A.L. Melander leg.; UCRC • 3 ♂♂; Pima Co., Santa Catalina Mountains; [32.443° N, 110.788° W]; 10 Jun. 1938; Bryant Lot leg.; CAS • 1 ♀; same data as for preceding; 10 May 1938; Bryant Lot leg.; CAS • 1 ♂; Pima Co., Tucson; [32.222° N, 110.926° W]; 4 May 1942; A.L. Melander leg.; UCRC • 1 ♂; same data as for preceding; 14 May 1961; R.H. and E.M. Painter leg.; ASUHIC • 2 ♂♂; same data as for preceding; 9 May 1953; G.D. Butler leg.; ex *Lobularia maritima*; ASUHIC • 1 ♂; same data as for preceding; 30 Apr. 1953; G.D. Butler leg.; ASUHIC • 1 ♀; Pima Co., Tucson (A-Mt); [32.213° N, 110.995° W]; 27 Mar. 1954; R.H. Painter leg.; ex *Larrea tridentata*; ASUHIC • 2 ♂♂; Pima Co., Tucson Mountains; [32.224° N, 111.117° W]; 27 Mar. 1954; G.D. Butler leg.; ASUHIC • 1 ♀; same data as for preceding; 27 Mar. 1954; G.D. Butler leg.; ASUHIC • 1 ♂; Pinal Co., B. Thompson Arboretum, Superior; [33.279° N, 111.159° W]; 3 May 1953; G.D. Butler leg.; ex *Opuntia*; ASUHIC • 3 ♀♀; Pinal Co., Coolidge; [32.977° N, 111.517° W]; 28 Feb. 1956; G.D. Butler leg.; ex *Sphaeralcea*; ASUHIC • 1 ♂; Pinal Co., Mammoth; [32.722° N, 110.64° W]; 3 May 1956; F. Werner and G. Butler leg.; ASUHIC • 1 ♀; Pinal Co., Peppersauce Canyon, northern foothills of the

Santa Catalina Mountains; [32.520° N, 110.7° W]; 11 Apr. 1961; J.C. Bequaert leg.; ASUHIC • 1 ♀; Santa Cruz Co., 4 mi. SW of Patagonia; [31.500° N, 110.801° W]; 19 Feb. 1963; M.L. Noller leg.; ex *Barkleyanthus salicifolius* (verbatim: *Senecio salignus*); ASUHIC • 3 ♀♀; Santa Cruz Co., Patagonia; 31.8833° N, 111.2833° W; 24 Mar. 1994; B.V. Brown and E. Wilk leg.; RSKM • 1 ♀; same data as for preceding; 20 Mar. 1994; E. Wilk, B. Brown leg.; RSKM • 2 ♀♀; Santa Cruz Co., Patagonia; [31.883° N, 111.283° W]; 26 Mar. 1955; G.D. Butler and F.G. Werner leg.; ex *Barkleyanthus salicifolius* (verbatim: *Senecio salignus*); ASUHIC • 1 ♂; Santa Cruz Co., Sycamore Canyon; [31.365° N, 110.774° W]; J.L. Neff leg.; CAS • 1 ♀; Yavapai Co., 3 mi. S of Camp Verde; [34.520° N, 111.854° W]; 26 Mar. 1959; F.G. Werner leg.; ASUHIC • 2 ♂♂; Yavapai Co., Prescott; [34.539° N, 112.468° W]; elev. 1640 m; 27 Jul. 1932; P.H. Timberlake leg.; ex *Asclepias tuberosa*; UCRC (Fig. 41F) • 1 ♂; same data as for preceding; 28 Jul. 1932; P.H. Timberlake leg.; ex *Ceanothus*; UCRC • 1 ♂; same data as for preceding; 27 Jul. 1932; P.H. Timberlake leg.; ex *Frangula californica* subsp. *tomentella* (verbatim: *Rhamnus tomentella*); UCRC • 1 ♂; Yuma Co., 2 mi. S of Stone Cabin; [33.231° N, 114.241° W]; 12 May 1978; E.G. Linsley and J.M. Linsley leg.; ex *Parkinsonia microphylla* (verbatim: *Cercidium microphyllum*); EMEC (Fig. 41D). – **California** • 1 ♀; Alameda Co., Livermore; [37.6819° N, 121.7681° W]; 14 Mar. 1937; G. Ferguson leg.; OSAC • 1 ♀; Alameda Co., Tesla; [40.493° N, 121.889° W]; 21 Apr. 1953; W.F. Ehrhardt leg.; EMEC • 1 ♀; Alpine Co., 3 mi. W of Monitor Pass; [38.645° N, 119.695° W]; 22 Jun. 1962; C.D. MacNeill leg.; CAS • 1 ♀; Colusa Co., 9.5 mi. E of Hough Springs; [39.161° N, 122.434° W]; 20 May 1963; P.H. Raven leg.; ex *Clarkia modesta*; EMEC • 1 ♀; Contra Costa Co., Antioch; [38.002° N, 121.807° W]; 23 Oct. 1938; J.W. MacSwain leg.; EMEC • 1 ♀; Contra Costa Co., Walnut Creek; [37.908° N, 122.067° W]; 7 Mar. 1937; ex *Salix vestita* (verbatim: *Salix leiolepis*); UCRC • 1 ♂; El Dorado Co., Lake Tahoe; [39.227° N, 120.082° W]; 6–8 Mar. 1925; J.D. Gunder leg.; CAS • 1 ♀; Fresno Co., 13 mi. W of Coalinga; [36.139° N, 120.592° W]; 3 Nov. 1955; R.R. Snelling leg.; EMEC • 9 ♀♀; Fresno Co., Ciervo Hills, 18 air mi. SW of Mendota; [36.567° N, 120.611° W]; 16 Mar. 1975; J. Powell and P. Rude leg.; ex *Phacelia tanacetifolia*; EMEC • 19 ♀♀; same data as for preceding; 18 Mar. 1975; J. Powell and P. Rude leg.; ex *Phacelia tanacetifolia*; EMEC • 1 ♀; same data as for preceding; 18 Mar. 1975; J.T. Doyen leg.; EMEC • 6 ♀♀; same data as for preceding; 18 Mar. 1975; J. Powell and P. Rude leg.; EMEC • 2 ♂♂; Glenn Co., Black Butte; [39.726° N, 122.872° W]; elev. 1981–2255 m; 14 Jun. 1972; D.F. Veirs leg.; EMEC • 1 ♂; Glenn Co., Plaskett Meadows; [39.727° N, 122.843° W]; elev. 1920 m; 14 Jun. 1972; J. Doyen leg.; EMEC • 1 ♂; same data as for preceding; 14 Jun. 1972; J. Doyen leg.; ex *Allium siskiyouense*; EMEC • 3 ♂♂; same data as for preceding; 14 Jun. 1972; J. Doyen leg.; ex *Calyptridium umbellatum*; EMEC • 2 ♀♀; Imperial Co., 1.6 mi. S of Truckhaven; [33.2789° N, 115.9639° W]; elev. -25 m; 12 Feb. 1952; P.H. Timberlake leg.; ex *Astragalus crotalariae*; UCRC • 2 ♀♀; Inyo Co., 2 mi. W of Westgard Pass; [37.300° N, 118.19° W]; 16 May 1969; J.T. Doyen leg.; ex *Prunus andersonii*; EMEC • 2 ♂♂; Inyo Co., Big Pines; [37.166° N, 118.289° W]; 2 Aug. 1944; A.L. Melander leg.; UCRC • 1 ♂; Inyo Co., Darwin Falls; [36.320° N, 117.525° W]; 14 May 1969; J. Powell leg.; EMEC • 1 ♂; Inyo Co., Darwin Falls; [36.32° N, 117.525° W]; 14 May 1969; A. Rude leg.; EMEC • 1 ♀; Inyo Co., Glacier Lodge, Big Pine; [37.124° N, 118.438° W]; 23 Jun. 1937; E.C. VanDyke leg.; CAS • 3 ♀♀; Inyo Co., Goodale Creek, N. of Lone Pine; [36.716° N, 118.124° W]; 3 Apr. 1953; H.B. Leech leg.; ex *Salix* exigua; CAS • 1 ♀; Inyo Co., Mazourka Canyon, 8 mi. NE of Independence; [36.874° N, 118.091° W]; 11 May 1969; J.A. Chemsak leg.; EMEC • 4 ♀♀; same data as for preceding; 11 May 1969; P.A. Opler leg.; EMEC • 1 ♀; same data as for preceding; 11 May 1969; P.A. Rude leg.; EMEC • 1 ♀; same data as for preceding; 11 May 1969; J. Powell leg.; EMEC • 1 ♀; Inyo Co., Panamint Mountains; [36.113° N, 117.151° W]; 29 May 1937; N.W. Frazier leg.; EMEC • 2 ♂♂; Inyo Co., Surprise Canyon; [36.113° N, 117.151° W]; 5 May 1961; P.M. Marsh leg.; UCDC • 1 ♀; Inyo Co., Surprise Canyon, Panamint Mountains; [36.1150° N, 117.1428° W]; 24 Apr. 1957; P.D. Hurd leg.; ex *Cryptantha utahensis*; EMEC • 4 ♀♀; same data as for preceding; 24 Apr. 1957; P.D. Hurd leg.; ex *Encelia farinosa*; EMEC • 2 ♂♂; same data as for preceding; 24 Apr. 1957; P.D. Hurd leg.; ex *Encelia farinosa*; EMEC • 1 ♀; same data as for preceding; 24 Apr. 1957; G.I. Stage leg.; ex *Encelia farinosa*; EMEC • 1 ♂; same data as for preceding; 24 Apr. 1957; P.D. Hurd leg.; ex *Encelia farinosa*; UCDC •

2 ♀♀; same data as for preceding; 24 Apr. 1957; P.H. Timberlake leg.; ex *Encelia farinosa*; UCRC • 1 ♂; same data as for preceding; 24 Apr. 1957; P.H. Timberlake leg.; ex *Encelia farinosa*; UCRC • 1 ♀; same data as for preceding; 24 Apr. 1957; P.D. Hurd leg.; ex *Eriogonum inflatum*; EMEC • 1 ♀; same data as for preceding; 24 Apr. 1957; G.I. Stage leg.; ex *Eucnide urens*; EMEC • 1 ♂; same data as for preceding; 24 Apr. 1957; P.D. Hurd leg.; ex *Larrea*; EMEC • 1 ♂; same data as for preceding; 24 Apr. 1957; P.D. Hurd leg.; ex *Larrea tridentata* (verbatim: *Larrea glutinosa*); EMEC • 3 ♂♂; same data as for preceding; 24 Apr. 1957; G.I. Stage leg.; ex *Lepidium fremontii*; EMEC • 2 ♂♂; same data as for preceding; 24 Apr. 1957; P.D. Hurd leg.; ex *Lepidium fremontii*; EMEC • 7 ♂♂; same data as for preceding; 24 Apr. 1957; G.I. Stage leg.; ex *Lepidium fremontii*; EMEC • 3 ♂♂; same data as for preceding; 24 Apr. 1957; P.H. Timberlake leg.; ex *Lepidium fremontii*; UCRC • 1 ♀; same data as for preceding; 24 Apr. 1957; J. Powell leg.; ex *Lepidium fremontii*; EMEC • 1 ♀; same data as for preceding; 24 Apr. 1957; P.D. Hurd leg.; ex *Phacelia calthifolia*; EMEC • 2 ♀♀; same data as for preceding; 24 Apr. 1957; G.I. Stage leg.; ex *Salvia dorrii* var. *incana* (verbatim: *Salvia carnosa*); EMEC • 1 ♂; same data as for preceding; 24 Apr. 1957; G.I. Stage leg.; ex *Sphaeralcea ambigua*; EMEC • 3 ♀♀; same data as for preceding; 24 Apr. 1957; J. Powell leg.; ex *Stanleya pinnata*; EMEC • 1 ♀; same data as for preceding; 25 Apr. 1957; P.H. Timberlake leg.; ex *Stanleya pinnata*; UCRC • 5 ♂♂; same data as for preceding; 24 Apr. 1957; G.I. Stage leg.; EMEC • 1 ♀; same data as for preceding; 29 Apr. 1945; J.C. Hall leg.; UCRC • 3 ♀♀; same data as for preceding; 24 Apr. 1957; J. Powell leg.; EMEC • 1 ♀; Inyo Co., Tuttle Creek, 2 mi. SW of Lone Pine; [36.58° N, 118.095° W]; 14 May 1969; P.A. Rude leg.; EMEC • 1 ♂; Inyo Co., Wildrose Canyon, Panamint Mts; [36.172° N, 117.26° W]; 27 May 1959; Truxal and Martin leg.; EMEC • 1 ♀; Inyo Co., Wyman Canyon (Vic. Deep Springs); [37.387° N, 117.979° W]; 9 Apr. 1970; Suzy Frommer leg.; ex *Salix*; UCRC • 1 ♀; Inyo Co., Wyman Canyon, White Mountains; [37.409° N, 117.982° W]; 10 Jul. 1967; Saul and Suzy Frommer leg.; EMEC • 2 ♀♀; Inyo or San Bernardino Co., Death Valley; [36.532° N, 116.933° W]; 28 Mar. 1940; CAS • 3 ♀♀; Kern Co., 16 mi. S of Weldon; [35.432° N, 118.277° W]; 26 Apr. 1964; P. Rude leg.; ex *Salix*; EMEC • 1 ♀; Kern Co., 3 mi. W of Wofford Heights; [35.711° N, 118.511° W]; 29 Apr. 1964; C.A. Toschi leg.; EMEC • 1 ♂; Kern Co., 4 mi. W of Frazier Park; [34.825° N, 119.015° W]; 20 Jul. 1963; J. Powell leg.; EMEC • 15 ♀♀; Kern Co., Caliente; [35.291° N, 118.629° W]; elev. 400 m; 24 Mar. 1932; P.H. Timberlake leg.; ex *Cleome isomeris* (verbatim: *Isomeris arborea*); UCRC • 2 ♀♀; Kern Co., Canebrake Creek, 3 mi. W of Walker Pass; [35.661° N, 118.079° W]; 30 Apr. 1964; J. Powell leg.; ex *Plagiobothrys nothofulvus*; EMEC • 1 ♀; Kern Co., Frazier Park; [34.815° N, 118.947° W]; 3 May 1959; G.I. Stage leg.; ex *Oenothera*; EMEC • 1 ♀; Kern Co., Frazier Park; [34.822° N, 118.945° W]; 4 May 1958; EMEC • 1 ♀; Kern Co., Indian Wells Can., W. off Hwy 6, 2 mi. W of Inyo/Kern turnoff; [36.048° N, 117.986° W]; 12 Apr. 1960; C.A. Toschi leg.; EMEC • 3 ♂♂; Kern Co., Mt Pinos; [34.816° N, 119.145° W]; elev. 2438 m; 1 Jul. 1965; J. Powell leg.; EMEC • 1 ♂; same data as for preceding; 1 Jul. 1965; E.M. Omi leg.; EMEC • 1 ♀; Kern Co., Short Canyon, 6 mi. W of Inyokern; [35.644° N, 117.921° W]; 10 Apr. 1960; J.W. MacSwain leg.; EMEC • 2 ♀♀; Kern Co., Walker Pass; [35.6628° N, 118.027° W]; 26 Apr. 1949; E.G. Linsley, J.W. MacSwain and R.F. Smith leg.; ex *Salix*; EMEC • 1 ♀; Lake Co., 10 mi. E of Clearlake Oaks; [39.027° N, 122.484° W]; 11 May 1961; J. Powell leg.; EMEC • 1 ♀; Lake Co., Lake Pillsbury; [39.430° N, 122.95° W]; 4 Apr. 1962; J. Powell leg.; EMEC • 2 ♂♂; Lassen Co., 10 mi. S of Ravendale; [40.652° N, 120.367° W]; 5 Feb. 1964; R.C. Dickson leg.; UCRC • 7 ♀♀; Lassen Co., 3.5 mi. S of Ravendale; [40.746° N, 120.365° W]; 20 Jun. 1959; G.I. Stage leg.; ex *Taraxia tanacetifolia* (verbatim: *Oenothera tanecetifolia*); EMEC • 26 ♀♀; Lassen Co., 6 mi. SE of Doyle; [39.965° N, 120.024° W]; 5 Jun. 1970; P.A. Rude leg.; ex *Sisymbrium*; EMEC • 1 ♂; Lassen Co., Hallelujah Junction; [39.775° N, 120.039° W]; 2 Jul. 1954; M.E. Irwin leg.; UCRC • 1 ♀; same data as for preceding; 22 Jun. 1964; M.E. Irwin leg.; UCRC • 1 ♂; same data as for preceding; 4 Jul. 1949; J.E. Gillaspy leg.; EMEC • 1 ♀; Lassen Co.; [40.67° N, 120.59° W]; 3 Jun. 1913; F.W. Nunenmacher leg.; EMEC • 2 ♀♀; Los Angeles Co., 2 mi. S of Pearblossom; [34.469° N, 117.911° W]; elev. 1067 m; 7 May 1965; R.R. Snelling leg.; EMEC (Fig. 40F) • 1 ♀; Los Angeles Co., 5 mi. S of Pearblossom; [34.433° N, 117.909° W]; 23 Apr. 1956; E.G. Linsley leg.; ex *Tamarix gallica*; EMEC • 1 ♀; Los Angeles Co., 6 mi. SE of

Pearblossom; [34.451° N, 117.831° W]; elev. 1067 m; 16 Mar. 1972; R.R. Snelling leg.; EMEC • 24 ♂♂; Los Angeles Co., Big Pine Camp; [34.3956° N, 117.7339° W]; elev. 1850 m; 2 Aug. 1944; P.H. Timberlake leg.; ex *Eriodictyon trichocalyx*; UCRC (Fig. 47) • 1 ♀; Los Angeles Co., Little Rock; [34.517° N, 117.993° W]; 12 Apr. 1936; R.M. Bohart and G.E. Bohart leg.; CAS • 1 ♀; Los Angeles Co., Westwood Hills; [34.056° N, 118.43° W]; 27 Jul. 1935; E.G. Linsley leg.; UCRC • 1 ♂; Madera Co., Buck Creek; [37.542° N, 119.487° W]; 20 Jul. 1922; C.L. Fox leg.; CAS • 1 ♀; Mariposa Co., Miami Ranger Station; [37.419° N, 119.745° W]; 20 May 1942; E.G. Linsley leg.; UCRC • 1 ♀; same data as for preceding; 4 Jun. 1942; EMEC • 1 ♀; Mendocino Co., Ryan Creek; [39.476° N, 123.381° W]; 13 Apr. 1941; EMEC • 1 ♀; Merced Co., Snelling; [37.519° N, 120.439° W]; 18 Apr. 1939; J.J. duBois leg.; ex *Salix*; EMEC • 1 ♀; Modoc Co., 15 mi. E of Cedarville; [41.529° N, 119.881° W]; 3 Jul. 1935; Joe Schuh leg.; OSAC • 1 ♀; Modoc Co., 5.2 mi. NW of Cedarville; [41.584° N, 120.099° W]; elev. 1981 m; 13 Jun. 1969; R.R. and R.A. Snelling leg.; ex *Phacelia*; EMEC • 1 ♀; Modoc Co., 6 mi. NW of Cedarville; [41.591° N, 120.09° W]; 22 May 1955; J.W. MacSwain leg.; EMEC • 1 ♀; Modoc Co., Buck Creek Ranger Station; [41.870° N, 120.293° W]; elev. 1570 m; 5–7 Jun. 1970; P. Opler leg.; ex *Isatis tinctoria*; EMEC • 1 ♀; same data as for preceding; 5–7 Jun. 1970; J.T. Doyen leg.; ex *Cirsium cymosum*; EMEC • 1 ♂; Mono Co., 1 mi. W of Tom's Place; [37.561° N, 118.699° W]; D.D. Linsdale leg.; EMEC • 3 ♂♂; Mono Co., 4 mi. E of Monitor Pass; [38.677° N, 119.55° W]; 15 Jul. 1966; P.A. Rude leg.; EMEC • 1 ♂; Mono Co., 4 mi. SW of Tom's Place; [37.520° N, 118.733° W]; 13 Jul. 1961; H.V. Daly leg.; EMEC • 2 ♂♂; Mono Co., 8 mi. NW of Bridgeport; [38.337° N, 119.336° W]; 9 Sep. 1957; J.A. Chemsak leg.; ex *Chrysothamnus*; EMEC • 1 ♀; Mono Co., Bodie; [38.216° N, 119.01° W]; 13 Jul. 1937; Dr John A. Comstock leg.; EMEC • 1 ♀; Monterey Co., Tassajara Hot Springs; [36.237° N, 121.558° W]; elev. 457 m; 26 May 1954; Owen Bryant leg.; CAS • 1 ♀; Nevada Co., Sagehen Creek, near Hobart Mills; [39.432° N, 120.201° W]; 16 Jul. 1964; M.E. Irwin leg.; UCRC • 1 ♀; Riverside Co., 2 mi. N of Palm Springs; [33.8742° N, 116.5056° W]; elev. 175 m; 7 Mar. 1936; P.H. Timberlake leg.; ex *Larrea tridentata* var. *tridentata* (verbatim: *Larrea divaricata*); EMEC • 4 ♀♀; same data as for preceding; 7 Mar. 1936; P.H. Timberlake leg.; ex *Larrea tridentata* var. *tridentata* (verbatim: *Larrea divaricata*); UCRC • 1 ♀; Riverside Co., 2 mi. S of Oasis; [33.4319° N, 116.0669° W]; elev. -35 m; 8 Mar. 1936; P.H. Timberlake leg.; ex *Larrea tridentata* var. *tridentata* (verbatim: *Larrea divaricata*); EMEC (Fig. 40E) • 1 ♀; same data as for preceding; 8 Mar. 1936; P.H. Timberlake leg.; ex *Condea emoryi* (verbatim: *Hyptis emoryi*); EMEC • 5 ♀♀; same data as for preceding; 8 Mar. 1936; P.H. Timberlake leg.; ex *Larrea tridentata* var. *tridentata* (verbatim: *Larrea divaricata*); UCRC • 1 ♂; Riverside Co., 3 mi. E of Ribbonwood; [33.570° N, 116.447° W]; 17 May 1963; E.I. Schlinger leg.; ex *Yucca*; UCRC • 1 ♀; Riverside Co., 3 mi. E of Ribbonwood; [33.57° N, 116.447° W]; 17 May 1963; E.I. Schlinger leg.; ex *Yucca*; EMEC • 1 ♀; Riverside Co., Andreas Canyon, near Palm Springs; [33.7614° N, 116.5522° W]; elev. 290 m; 23 Feb. 1929; P.H. Timberlake leg.; UCRC • 4 ♀♀; same data as for preceding; 5 Mar. 1933; P.H. Timberlake leg.; ex *Prunus fremontii*; UCRC • 1 ♀; same data as for preceding; 5 Mar. 1933; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 3 ♀♀; same data as for preceding; 22 Feb. 1939; P.H. Timberlake leg.; ex *Cleome isomeris* (verbatim: *Isomeris arborea*); UCRC • 1 ♀; same data as for preceding; 24 Mar. 1933; P.H. Timberlake leg.; ex *Larrea tridentata*; UCRC • 1 ♀; Riverside Co., Berdoo Canyon; [33.805° N, 116.176° W]; 5 Mar. 1968; J.C. Hall leg.; ex *Poppy*; UCRC • 4 ♀♀; Riverside Co., Colorado Desert, 5 mi. N of Palm Springs; [33.9175° N, 116.5017° W]; elev. 240 m; 7 Mar. 1934; P.H. Timberlake leg.; ex *Cleome isomeris* (verbatim: *Isomeris arborea*); UCRC • 16 ♀♀; Riverside Co., Colorado Desert, Varner Road, 5 mi. NW of Indio; [33.7667° N, 116.3208° W]; elev. 40 m; 18 Feb. 1928; P.H. Timberlake leg.; ex *Sisymbrium*; UCRC • 1 ♀; Riverside Co., Deep Canyon; [33.713° N, 116.365° W]; 24 Feb. 1964; M.E. Irwin leg.; ex *Encelia*; UCRC • 1 ♀; same data as for preceding; 1 Apr. 1964; E.I. Schlinger leg.; ex *Hyptis*; UCRC • 2 ♀♀; same data as for preceding; 27 Feb. 1963; E.I. Schlinger leg.; UCRC • 1 ♀; same data as for preceding; 24 Feb. 1964; M.E. Irwin leg.; UCRC • 2 ♀♀; same data as for preceding; 6 Mar. 1963; R.C. Dickson leg.; UCRC • 1 ♀; same data as for preceding; 15 Mar. 1963; E.I. Schlinger leg.; ex *Hyptis*; UCRC • 2 ♀♀; Riverside Co., Devil's Garden; [34.0269° N, 116.6° W]; elev. 910 m; 24 Feb. 1967; P.H. Timberlake leg.; ex *Cleome isomeris*

(verbatim: *Isomeris arborea*); UCRC • 1 ♂; Riverside Co., Gavilan Hills; [33.7944° N, 117.3558° W]; elev. 620 m; 14 Apr. 1965; G.R. Ballmer leg.; UCRC • 1 ♀; same data as for preceding; 6 Feb. 1940; P.H. Timberlake leg.; ex *Salix vestita* (verbatim: *Salix leiolepis*); UCRC • 1 ♀; same data as for preceding; 6 Feb. 1940; P.H. Timberlake leg.; ex *Ribes indecorum*; UCRC • 1 ♀; same data as for preceding; 16 Mar. 1938; P.H. Timberlake leg.; ex *Ribes indecorum*; UCRC • 1 ♀; Riverside Co., La Quinta; [33.6725° N, 116.3036° W]; elev. 15 m; 17 Feb. 1935; P.H. Timberlake leg.; ex *Condea emoryi*; UCRC • 2 ♀♀; Riverside Co., Lost Palms Canyon; [33.715° N, 115.748° W]; 9 Apr. 1935; R.C. Dick leg.; UCRC • 1 ♀; Riverside Co., near Palm Canyon; [33.7350° N, 116.5361° W]; elev. 250 m; 13 Mar. 1932; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 15 Jun. 1941; P.H. Timberlake leg.; ex *Cleome isomeris* (verbatim: *Isomeris arborea*); UCRC • 1 ♀; Riverside Co., P.L. Boyd Desert Research Center. 3.5 mi. S of Palm Desert; [33.648° N, 116.377° W]; 4–6 May 1970; S. Frommer and R. Worley leg.; UCRC • 1 ♀; same data as for preceding; 25–27 Mar. 1978; UCRC • 1 ♀; Riverside Co., Palm Canyon; [33.747° N, 116.548° W]; 10 Feb. 1952; ASUHIC • 1 ♀; Riverside Co., Palm Springs; [33.829° N, 116.547° W]; 26 Feb. 1935; A.L. Melander leg.; UCRC • 1 ♀; Riverside Co., Railroad Canyon, 4 mi. E of Elsinore; [33.673° N, 117.202° W]; 17 Apr. 1965; C. Slobodchikoff leg.; EMEC • 1 ♀; Riverside Co., Riverside; [33.9556° N, 117.3722° W]; elev. 290 m; 4 Mar. 1926; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 4 ♀♀; same data as for preceding; 6 Mar. 1926; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 11 Mar. 1926; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 31 Mar. 1926; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 1 Apr. 1929; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 7 Feb. 1930; P.H. Timberlake leg.; ex *Sinapis alba* or *Brassica alba* (verbatim: *Brassica alba*); UCRC • 1 ♀; same data as for preceding; 12 Feb. 1930; P.H. Timberlake leg.; ex *Sisymbrium*; UCRC • 1 ♀; same data as for preceding; 3 Apr. 1930; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 4 Apr. 1930; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 23 Mar. 1933; P.H. Timberlake leg.; ex *Sisymbrium*; UCRC • 1 ♀; same data as for preceding; 23 Feb. 1934; P.H. Timberlake leg.; ex *Viburnum tinus*; UCRC • 1 ♀; same data as for preceding; 22 Jun. 1935; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 4 Apr. 1939; P.H. Timberlake leg.; ex *Ellisia*; UCRC • 1 ♀; same data as for preceding; 23 Feb. 1940; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 2 ♀♀; same data as for preceding; 27 Feb. 1940; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 1 ♀; same data as for preceding; 28 Feb. 1940; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 1 ♀; same data as for preceding; 1 Mar. 1940; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 1 ♀; same data as for preceding; 1 Mar. 1940; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 2 ♀♀; same data as for preceding; 1 Mar. 1940; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 1 ♀; same data as for preceding; 1 Mar. 1940; P.H. Timberlake leg.; ex *Cryptantha intermedia*; UCRC • 1 ♀; same data as for preceding; 5 Mar. 1940; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 1 ♀; same data as for preceding; 8 Mar. 1940; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 2 ♀♀; same data as for preceding; 17 Mar. 1941; P.H. Timberlake leg.; UCRC • 3 ♀♀; same data as for preceding; 5 Apr. 1948; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; Riverside Co., San Jacinto River – North Fork at Hwy 74; [33.7303° N, 116.8097° W]; elev. 640 m; 22 Feb. 1936; P.H. Timberlake leg.; ex *Salix exigua* var. *hindsiana* (verbatim: *Salix hindsiana*); UCRC • 1 ♂; Riverside Co., Santa Rosa Mountain, San Jacinto Mountains; [33.820° N, 116.675° W]; elev. 2286 m; 31 May 1940; C.D. Michener leg.; ex *Eremocarya micrantha* (verbatim: *Cryptantha micrantha*); EMEC • 4 ♂♂; Riverside Co., Santa Rosa Peak, Santa Rosa Mountains; [33.5408° N, 116.4656° W]; elev. 2286 m; 8 Jun. 1940; P.H. Timberlake leg.; ex *Eremocarya micrantha* (verbatim: *Cryptantha micrantha*); UCRC • 1 ♀; Riverside Co., Snow Creek, 5 mi. N of Palm Springs; [33.8989° N, 116.6431° W]; elev. 340 m; 24 Feb. 1954; P.H. Timberlake leg.; ex *Cleomella arborea* (verbatim: *Isomeris arborea*); UCRC • 1 ♀; Riverside Co., Soboba Hot Springs; [33.800° N, 116.929° W]; elev. 500 m; 22 Jul. 1936; P.H. Timberlake leg.; ex *Baccharis salicifolia* (verbatim: *Baccharis viminea*); EMEC • 1 ♀; Riverside Co., Thousand Palms; [33.8178° N, 116.3944° W]; elev.

70 m; 27 Mar. 1941; P.H. Timberlake leg.; ex *Hyptis emoryi*; UCRC • 1 ♀; Riverside Co., Whitewater Canyon; [33.9878° N, 116.6561° W]; elev. 670 m; 24 Feb. 1954; P.H. Timberlake leg.; ex *Salix exigua*; UCRC • 3 ♀♀; Routt Co., 3 mi. E of Phippsburg; [40.232° N, 106.886° W]; 8 May 1954; R.S. Beal leg.; EMEC • 1 ♀; San Benito Co., 1 mi. S of Hernandez; [36.445° N, 120.967° W]; 25 May 1956; P.D. Hurd leg.; ex *Emmenanthe penduliflora*; EMEC • 1 ♀; San Benito Co., 5 mi. S of Bitterwater; [36.308° N, 121.001° W]; 31 Mar. 1959; C.W. O'Brien leg.; EMEC • 1 ♀; San Benito Co., Panoche Hills; [36.617° N, 120.851° W]; 10 Apr. 1938; M.C. Van Duzee leg.; CAS • 1 ♀; same data as for preceding; 10 Apr. 1938; E.C. VanDyke leg.; CAS • 4 ♀♀; San Bernardino Co., 15 km SSE of Hesperia, Hwy 173; [34.337° N, 117.259° W]; elev. 1022 m; 21 Apr. 1981; James A. Bethke leg.; UCRC • 2 ♀♀; same data as for preceding; 21 Apr. 1981; Gordon Pratt leg.; UCRC • 6 ♀♀; San Bernardino Co., 15 mi. S of Needles; [34.628° N, 114.615° W]; 31 Mar. 1959; P.H. Raven leg.; ex *Oenothera brevipes*; EMEC • 1 ♀; San Bernardino Co., 25 mi. Sof Ivanpah; [34.967° N, 115.284° W]; 13 Oct. 1958; J.A. Chemsak leg.; ex *Chrysothamnus*; EMEC • 1 ♀; San Bernardino Co., 7 Oaks; [34.186° N, 116.914° W]; 20 Jun. 1945; A.L. Melander leg.; UCRC • 1 ♂; San Bernardino Co., Big Bear Valley; [34.263° N, 116.822° W]; 8 Aug. 1953; P.H. Timberlake leg.; ex *Eriogonum umbellatum*; UCRC • 1 ♀; San Bernardino Co., Black Canyon Mojave Desert; [35.1336° N, 117.2614° W]; elev. 770 m; 7 Oct. 1935; P.H. Timberlake leg.; UCRC • 1 ♀; San Bernardino Co., Cactus Flat; [34.324° N, 116.815° W]; 28 Apr. 1950; T.F. Leigh leg.; EMEC • 1 ♂; San Bernardino Co., Cajon Pass; [34.3258° N, 117.45° W]; elev. 1067 m; 26 May 1941; P.H. Timberlake leg.; ex *Prunus ilicifolia*; UCRC • 1 ♀; San Bernardino Co., Camp Angelus; [34.209° N, 118.141° W]; 26 May 1947; A.L. Melander leg.; UCRC • 1 ♂; San Bernardino Co., Clark Mountain; [35.5192° N, 115.5836° W]; elev. 1981 m; 8 Jul. 1936; P.H. Timberlake leg.; ex *Agave utahensis* var. *nevadensis* (verbitim: *Agave nevadensis*); UCRC • 1 ♂; San Bernardino Co., Clark Mountain; [35.5217° N, 115.6428° W]; elev. 1372 m; 8 Jul. 1936; P.H. Timberlake leg.; ex *Eriogonum inflatum*; UCRC • 1 ♂; San Bernardino Co., Granite Pass; [34.812° N, 115.61° W]; elev. 1160–1280 m; 26 Apr. 1968; J. Devol leg.; UCRC • 1 ♂; same data as for preceding; 27 Apr. 1968; R. Hobza leg.; ex *Eriogonum fasciculatum*; UCRC • 1 ♂; San Bernardino Co., Granite Pass, near Kelso; [34.812° N, 115.611° W]; 27 Apr. 1968; H.E. Evans leg.; MCZ • 1 ♂; San Bernardino Co., Little Morongo Canyon; [33.989° N, 116.525° W]; 1 May 1967; J.C. Hall leg.; UCRC • 1 ♀; San Bernardino Co., Lone Pine Canyon; [34.3217° N, 117.5581° W]; elev. 1450 m; 16 Jun. 1928; P.H. Timberlake leg.; UCRC • 1 ♂; San Bernardino Co., March's Ranch Rd 2 mi. E of Baldwin Lake; [34.268° N, 116.831° W]; elev. 1525–1830 m; 25 May 1968; R. Hobza leg.; ex *Haplopappus*; UCRC • 1 ♀; San Bernardino Co., Morongo Valley; [34.046° N, 116.581° W]; 20 Apr. 1957; R.R. Snelling and M.D. Stage leg.; ex *Gilia*; EMEC • 1 ♀; same data as for preceding; 15 Oct. 1934; ex *Gutierrezia microcephala* (verbatim: *Gutierrezia lucida*); UCRC • 1 ♂; San Bernardino Co., mouth of Deep Creek; [34.3414° N, 117.235° W]; elev. 910 m; 5 May 1936; P.H. Timberlake leg.; ex *Eriodictyon trichocalyx*; EMEC • 1 ♀; same data as for preceding; 5 May 1936; P.H. Timberlake leg.; ex *Eriodictyon trichocalyx*; UCRC • 3 ♂♂; same data as for preceding; 5 May 1936; P.H. Timberlake leg.; ex *Eriodictyon trichocalyx*; UCRC • 2 ♂♂; San Bernardino Co., Phelan. Vic. Sheep Creek Rd; [34.429° N, 117.573° W]; 4 May 1966; Saul Frommer leg.; UCRC • 2 ♀♀; San Bernardino Co., Providence Mountains, Bonanza King Mine; [34.981° N, 115.506° W]; 16 Mar. 1967; D.C. Rentz leg.; EMEC • 1 ♀; San Bernardino Co., Tetley's Mountain Camp, Crestline; [34.2464° N, 117.3094° W]; elev. 1380 m; 15 May 1937; P.H. Timberlake leg.; ex *Malus*; UCRC • 1 ♀; same data as for preceding; 15 May 1937; E.G. Linsley leg.; ex *Malus*; CAS • 1 ♂; San Bernardino Co., Valley of the Falls; [34.088° N, 116.929° W]; 28 Aug. 1935; P.H. Timberlake leg.; ex *Eriogonum wrightii* var. *subscaposum* (verbatim: *Eriogonum subscaposum*); UCRC • 1 ♀; San Diego Co., 15 mi. SE of Borrego; [33.052° N, 115.851° W]; 5 Feb. 1952; J.G. Rozen leg.; EMEC • 1 ♀; San Diego Co., 20 mi. SE of Borrego; [33.066° N, 116.058° W]; 4 Feb. 1952; J.G. Rozen leg.; EMEC • 2 ♀♀; San Diego Co., 6 mi. SW of Borrego; [33.175° N, 116.33° W]; 4 Feb. 1952; J.G. Rozen leg.; EMEC • 1 ♀; San Diego Co., Borrego; [33.223° N, 116.334° W]; 6 Feb. 1952; J.G. Rozen leg.; EMEC • 1 ♂; same data as for preceding; 31 Mar. 1953; P.D. Hurd leg.; ex *Cryptantha barbigera*; EMEC • 1 ♀; same data as for preceding; 31 Mar. 1952; P.D. Hurd leg.; ex *Phacelia*; EMEC • 1 ♀; San Diego Co.,

Borrego; [33.247° N, 116.372° W]; 27 Feb. 1950; G.H. Sperry and J.L. Sperry leg.; UCRC • 5 ♀♀; San Diego Co., Borrego Palm Canyon; [33.272° N, 116.407° W]; 31 Jan. 1965; G.R. Ballmer leg.; UCRC • 1 ♀; San Diego Co., Borrego Palm Canyon; [33.2881° N, 116.4472° W]; elev. 595 m; 29 Mar. 1936; P.H. Timberlake leg.; ex *Larrea tridentata* var. *tridentata* (verbatim: *Larrea divaricata*); UCRC • 1 ♀; San Diego Co., Borrego-Clark Lake, N End; [33.331° N, 116.273° W]; 23 Mar. 1978; Wasbauer, Slansky Adams leg.; CSCA • 1 ♂; San Diego Co., Clark Dry Lake, Borrego State Park; [33.331° N, 116.273° W]; 31 Mar. 1977; M. Wasbauer, J. Slansky leg.; CSCA • 1 ♀; San Diego Co., Coronado Beach; [32.680° N, 117.178° W]; 3 Apr. 1918; J.I. Carlson leg.; CAS • 1 ♀; San Diego Co., Cuyamaca; [32.928° N, 116.568° W]; 19 Apr. 1950; E.G. Linsley leg.; ex *Lasthenia* (verbatim: *Baeria*); EMEC • 1 ♀; San Diego Co., McCain Valley; [32.672° N, 116.237° W]; 3 May 1980; Brown Faulkner leg.; SDMC • 1 ♂; same data as for preceding; 3 May 1980; Brown Faulkner leg.; SDMC • 3 ♀♀; San Diego Co., Descanso; [32.859° N, 116.614° W]; 30 Mar. 1961; P.D. Hurd leg.; ex *Salix*; EMEC • 1 ♂; San Diego Co., Mt Laguna; [32.867° N, 116.42° W]; 21 Jun. 1963; P.D. Hurd leg.; EMEC • 2 ♂♂; same data as for preceding; 5 Jul. 1963; P.D. Hurd leg.; ex *Heliomeris multiflora* (verbatim: *Viguiera multiflora*); EMEC • 1 ♂; San Diego Co., Sentenac Canyon; [33.129° N, 116.432° W]; 22 Mar. 1953; R. Mackie leg.; SDMC • 1 ♂; San Luis Obispo Co., La Panza Camp; [35.354° N, 120.263° W]; 25 Apr. 1968; J. Doyen leg.; ex *Rhamnus crocea*; EMEC • 1 ♂; Santa Barbara Co., Cachuma Campground, Los Padres National Forest; [34.575° N, 119.957° W]; 24–25 May 1976; C. George and R.R. Snelling leg.; ex *Frangula californica* (verbatim: *Rhamnus californica*); EMEC • 1 ♀; Santa Barbara Co., Cuyama; [34.931° N, 119.615° W]; 18 Mar. 1958; R.P. Allen leg.; EMEC • 1 ♂; Santa Clara Co., Mt Hamilton; [37.342° N, 121.643° W]; 25 May 1950; P.D. Hurd leg.; ex *Eriodictyon*; EMEC • 1 ♀; Santa Clara Co., San Antonio Valley; [40.493° N, 121.889° W]; 11 Mar. 1948; P.D. Hurd leg.; EMEC • 1 ♀; Santa Clara Co., Stanford University; [37.428° N, 122.17° W]; 28 Mar. 1916; EMEC • 2 ♀♀; Shasta Co., Hat Lake; [40.509° N, 121.466° W]; 14 Jun. 1941; P.D. Hurd leg.; ex *Salix*; EMEC • 1 ♀; Shasta Co., Shasta Springs; [41.252° N, 122.275° W]; 6 Jun. 1920; C.L. Fox leg.; CAS • 2 ♀♀; Shasta Co., Shingletown; [40.493° N, 121.889° W]; 21 Jun. 1941; EMEC • 2 ♀♀; Shasta Co., Viola; [40.518° N, 121.678° W]; 19 May 1941; C.D. Michener leg.; ex *Salix*; EMEC • 2 ♀♀; Sierra Co., Gold Lake; [39.672° N, 120.66° W]; 14 Jul. 1921; C.L. Fox leg.; CAS • 1 ♀; same data as for preceding; 21 Jul. 1921; C.L. Fox leg.; CAS • 2 ♀♀; Stanislaus Co., Adobe Creek W; [37.396° N, 121.375° W]; 7–9 Mar. 1956; Don Burdick leg.; ex *Salix*; EMEC • 1 ♀; Stanislaus Co., Del Puerto Canyon; [37.477° N, 121.23° W]; 11 May 1948; Ray F. Smith leg.; ex *Eriodictyon*; EMEC • 1 ♀; same data as for preceding; 2 Apr. 1961; R.R. Snelling and M.D. Snelling leg.; EMEC • 1 ♀; Stanislaus Co., Del Puerto Canyon, 21 mi. W of Patterson; [37.470° N, 121.511° W]; 12 Mar. 1966; R. Langston leg.; ex *Salix*; EMEC • 1 ♂; Stanislaus Co., Del Puerto Canyon, W of Patterson; [37.488° N, 121.207° W]; 19 May 1950; T.F. Leigh leg.; EMEC • 3 ♀♀; Stanislaus Co., Westley; [37.548° N, 121.201° W]; 1 Apr. 1948; P.D. Hurd leg.; ex *Brassica*; EMEC • 1 ♀; Trinity Co., 5 mi. SE of Peanut; [40.307° N, 123.278° W]; 21 May 1973; J. Doyen leg.; EMEC • 3 ♀♀; Tulare Co., 2 mi. E of Johnsondale; [35.970° N, 118.498° W]; 27 Apr. 1964; C.A. Toschi leg.; ex *Prunus subcordata*; EMEC • 1 ♀; same data as for preceding; 27 Apr. 1964; J. Powell leg.; ex *Arctostaphylos*; EMEC • 1 ♀; Tuolumne Co., Chinese Camp; [37.870° N, 120.433° W]; 2 Apr. 1960; R.R. Snelling leg.; ex *Ranunculus*; EMEC • 2 ♀♀; Ventura Co., Chuchupate Ranger Station, base, Frazier Mountain; [34.808° N, 119.012° W]; 5 May 1959; P.D. Hurd leg.; ex *Descurainia sophia*; EMEC • 1 ♂; same data as for preceding; 5 May 1959; P.D. Hurd leg.; ex *Descurainia sophia*; EMEC • 1 ♂; same data as for preceding; 7 May 1959; J. Powell leg.; ex *Descurainia sophia*; EMEC • 1 ♀; Ventura Co., Lockwood Creek; [34.7331° N, 119.0958° W]; elev. 1555 m; 5 Mar. 1959; P.H. Timberlake leg.; ex *Sisymbrium*; UCRC • 1 ♀; Ventura Co., Lockwood Creek, near Stauffer P.O.; [34.730° N, 119.033° W]; 5–7 May 1959; P.D. Hurd leg.; ex *Descurainia sophia*; EMEC • 1 ♂; same data as for preceding; 5–7 May 1959; P.D. Hurd leg.; ex *Descurainia sophia*; EMEC • 1 ♂; Ventura Co., Lockwood Creek, near Stauffer P.O.; [34.730° N, 119.033° W]; 5 May 1959; G.I. Stage leg.; ex *Descurainia sophia*; EMEC • 2 ♂♂; same data as for preceding; 7 May 1959; P.D. Hurd leg.; ex *Descurainia sophia*; EMEC • 1 ♂; same data as for preceding; 5 May 1959; G.I. Stage leg.; ex *Descurainia sophia*; EMEC • 1 ♀; Ventura Co., Lockwood

Valley, near Stauffer P.O.; [34.733° N, 119.04° W]; 3 May 1959; J. Powell leg.; ex *Phacelia ciliata*; EMEC • 1 ♀; Yolo Co., Putah Creek Canyon; [38.512° N, 122.048° W]; 19 Apr. 1970; D.P. Levin leg.; EMEC • 1 ♂; Yolo Co., Rumsey; [38.889° N, 122.239° W]; 1 May 1959; Menke and Stange leg.; EMEC. – **Colorado** • 1 ♀; Boulder Co., 2 mi. N of Boulder; [40.044° N, 105.27° W]; elev. 1676 m; 9 May 1980; U.N. Lanham leg.; ex *Physaria belli*; UCMC • 1 ♀; Boulder Co., 3 mi. E of Jamestown; [40.115° N, 105.331° W]; 31 May 1980; K. Neff and U. Lanham leg.; ex *Physaria*; UCMC • 2 ♀♀; Boulder Co., 4 km N of Lyons; 40.24847° N, 105.29742° W; elev. 1705 m; 19 May 2007; C. Sheffield and J. Gibbs leg.; RSKM • 2 ♀♀; Boulder Co., 4 mi. N of Boulder; [40.073° N, 105.271° W]; elev. 1676 m; 21 May 1980; U.N. Lanham and P. Robinson leg.; ex *Physaria belli*; UCMC • 1 ♀; Boulder Co., 5 mi. N of Boulder; [40.089° N, 105.27° W]; 9 May 1939; Rodeck and Lanham leg.; UCMC • 2 ♀♀; Boulder Co., 5 mi. NW of Boulder; [40.066° N, 105.337° W]; 31 May 1963; U.N. Lanham and B. Vogel leg.; ex *Prunus virginiana*; UCMC • 1 ♀; Boulder Co., 6 mi. NW of Boulder; [40.077° N, 105.351° W]; elev. 1829 m; 22 May 1981; U.N. Lanham leg.; ex *Physaria vitulifera*; UCMC • 2 ♀♀; Boulder Co., 9 mi. NW of Longmont Foothills; [40.259° N, 105.222° W]; 22 Jun. 1961; U.N. Lanham leg.; ex *Amorpha fruticosa*; UCMC • 1 ♀; Boulder Co., Boulder; [40.02° N, 105.27° W]; 21 May 1922; E.M. Foster leg.; UCRC • 1 ♀; same data as for preceding; 18 May 1913; M.D. Ellis leg.; UCRC • 1 ♀; same data as for preceding; 23 May 1913; M.D. Ellis leg.; ex *Erysimum capitatum*; UCRC • 1 ♀; same data as for preceding; 22 May 1913; M.M. Ellis leg.; ex *Astragalus agrestis*; UCRC • 1 ♀; same data as for preceding; 22 May 1913; M.M. Ellis leg.; UCRC • 1 ♀; same data as for preceding; 20 May 1922; C. Walton leg.; UCRC • 2 ♀♀; same data as for preceding; 14 May 1939; R. Bauer leg.; UCMC • 1 ♀; same data as for preceding; 14 May 1939; U. Lanham leg.; UCMC • 1 ♀; same data as for preceding; Spring–1931; P. Lundy leg.; UCMC • 2 ♀♀; same data as for preceding; 14 Jul. 1961; Swenson and Lanham leg.; UCMC • 1 ♀; same data as for preceding; 20 Apr. 1965; U. Lanham leg.; ex *Salix*; UCMC • 1 ♀; same data as for preceding; 25 Apr. 1968; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; same data as for preceding; 15 May 1908; S.A. Rohwer leg.; ex *Salix*; MCZ • 1 ♀; same data as for preceding; 21 May; T.D.A. Cockerell leg.; ex *Rubus deliciosus*; MCZ • 1 ♀; same data as for preceding; 17 May 1922; D.W. Macomber leg.; CAS • 1 ♀; same data as for preceding; 29 Apr. 1906; S.A. Rohwer leg.; CAS • 1 ♀; Boulder Co., Boulder Canyon; [40.001° N, 105.386° W]; 22 May 1962; R.W. Thorp leg.; EMEC • 1 ♀; Boulder Co., near Altona; [40.148° N, 105.293° W]; 30 May 1975; U. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Chaffee Co., Poncha Pass; [38.534° N, 106.171° W]; 20 Jun. 1933; C.A. Wagner leg.; CAS • 1 ♀; same data as for preceding; 20 Jun. 1933; W. Steele leg.; CAS • 1 ♀; Costilla Co., San Luis; [37.201° N, 105.424° W]; 26 Apr. 1955; H.G. Rodeck leg.; UCMC • 5 ♀♀; Delta Co., 4 mi. Escalante Canyon; [38.728° N, 108.14° W]; 21 May 1963; C.J. McCoy and B. Vogel leg.; UCMC• 2 ♀♀; Douglas Co., 10 mi. N of Castlerock; [39.517° N, 104.856° W]; 26 Apr. 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 6 ♀♀; Douglas Co., 10 mi. SSE of Franktown; [39.319° N, 104.977° W]; 26 Apr. 1963; U.N. Lanham leg.; ex *Salix*; UCMC (Fig. 46) • 10 ♀♀; Douglas Co., 5 mi. SSW of Franktown; [39.324° N, 104.789° W]; 26 Apr. 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 6 ♀♀; same data as for preceding; 12 Apr. 1963; U.N. Lanham *et al*. leg.; ex *Salix*; UCMC • 1 ♀; Eagle Co., 2 mi. N of Dotsero; [39.673° N, 107.067° W]; 27 Jun. 1963; B. Vogel leg.; ex *Tamarix*; UCMC • 1 ♀; El Paso Co., Solar Trails County Park; [38.7094° N, 104.6617° W]; elev. 1980 m; 26 May 1980; CUIC • 1 ♀; El Paso Co., Foster Ranch; [38.6391° N, 104.5515° W]; elev. 1740 m; 22 May 1977; F.M. Brown leg.; ex *Cardaria*; CUIC • 1 ♀; El Paso Co., Manitou; [38.857° N, 104.917° W]; 20 Jun. 1926; M.C. Van Duzee leg.; CAS • 2 ♀♀; Elbert Co., Elbert; [39.219° N, 104.537° W]; 21 May; W.P. Cockerell leg.; ex *Salix*; UCRC • 1 ♀; Elbert Co., Running Creek Field Station; [39.3319° N, 104.4852° W]; elev. 2120 m; 25 May 1977; Susan Condie leg.; ex *Salix*; CUIC • 1 ♀; Elbert Co., Running Creek Field Station; [39.3306° N, 104.4858° W]; elev. 2120 m; 27 May 1976; F.M. Brown leg.; ex *Prunus*; CUIC• 1 ♀; Garfield Co., 4 mi. N of Rifle; [39.592° N, 107.783° W]; 24 Apr. 1982; P. Robinson leg.; UCMC • 1 ♀; Huerfano Co., 3 mi. W of Walsenburg; [37.618° N, 104.836° W]; 30 Apr. 1981; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Huerfano Co., Walsenburg; [37.622° N, 104.781° W]; 1 May 1981; U.N. Lanham leg.; ex *Cardaria*; UCMC • 1 ♀; Jefferson Co., 1 mi. S of Eldorado Springs; [39.917° N, 105.284° W]; 22 Apr. 1985;

U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; same data as for preceding; 29 Apr. 1965; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Kit Carson Co., 12 mi. N of Burlington; [39.478° N, 102.27° W]; 9 May 1977; U.N. Lanham, P. Byron leg.; ex *Salix*; UCMC • 3 ♀♀; Larimer Co., 10 mi. WSW of Loveland; [40.339° N, 105.249° W]; elev. 1981 m; 15 May 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 10 ♀♀; Larimer Co., 13 mi. WSW of Loveland; [40.321° N, 105.302° W]; elev. 1981 m; 30 Apr. 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 17 ♀♀; Larimer Co., 14 mi. W of Fort Collins; [40.585° N, 105.351° W]; elev. 2012 m; 6 May 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Larimer Co., 16 mi. N of Fort Collins; [40.817° N, 105.084° W]; 10 May 1963; U. Lanham leg.; ex *Salix*; UCMC • 1 ♀; Larimer Co., 16 mi. WNW of Fort Collins; [40.671° N, 105.367° W]; elev. 2134 m; 9 May 1963; U.N. Lanham leg.; UCMC • 1 ♀; Larimer Co., 5 mi. N of Masonville; [40.560° N, 105.211° W]; 10 May 1963; U. Lanham leg.; ex *Prunus virginiana*; UCMC • 1 ♀; same data as for preceding; 10 May 1963; U. Lanham leg.; ex *Rhus trilobata*; UCMC • 6 ♀♀; Larimer Co., 7 mi. W of Berthoud; [40.304° N, 105.214° W]; elev. 1676 m; 15 May 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 1 ♀; same data as for preceding; 15 May 1963; U.N. Lanham leg.; ex *Rhus trilobata*; UCMC • 1 ♀; Larimer Co., 8 mi. WSW of Loveland; [40.352° N, 105.209° W]; elev. 1676 m; 30 Apr. 1963; U.N. Lanham leg.; ex *Prunus*; UCMC • 1 ♂; Mesa Co., 4 mi. W of Mesa; [39.142° N, 108.194° W]; 18 Jun. 1938; R. Bauer leg.; UCMC • 6 ♀♀; Mesa Co., Colorado National Monument; [39.051° N, 108.692° W]; elev. 1753 m; 15 May 1963; C.J. McCoy leg.; ex *Lepidium montanum*; UCMC • 6 ♀♀; same data as for preceding; 8 May 1963; C.J. McCoy leg.; ex *Lepidium montanum*; UCMC • 2 ♀♀; same data as for preceding; 12 May 1963; C.J. McCoy leg.; ex *Lepidium montanum*; UCMC • 2 ♀♀; same data as for preceding; 16 May 1985; U. Lanham and M. Weissmann leg.; ex *Lepidium montanum*; UCMC • 1 ♀; Mesa Co., Gateway; [38.680° N, 108.977° W]; elev. 1676 m; 3 May 1978; U. Lanham leg.; ex *Lepidium montanum*; UCMC • 2 ♀♀; Mesa Co., Whitewater; [38.991° N, 108.453° W]; 18 May 1963; B. Vogel and C.J. McCoy leg.; ex *Astragalus*; UCMC • 1 ♀; Mesa Co.; 39.0295° N, 108.6276° W; 24–25 Aug. 2011; BIML • 1 ♀; Moffat Co., 23 mi. SW of Maybell; [40.285° N, 108.404° W]; elev. 1829 m; 26 May 1974; U.N. Lanham leg.; UCMC • 1 ♂; Montezuma Co., Mesa Verde; [37.183° N, 108.5° W]; 3 Jul. 1907; EMEC • 1 ♀; Montrose Co., 17 mi. SSW of Naturita; [38.101° N, 108.673° W]; elev. 1981 m; 29 May 1977; U. Lanham and P. Byron leg.; ex *Carderia*; UCMC • 1 ♀; Pueblo Co., Colorado City; [37.945° N, 104.836° W]; 2 May 1977; U. Lanham and P. Byron leg.; ex *Prunus*; UCMC • 1 ♀; same data as for preceding; 20 May 1975; U. Lanham leg.; ex *Rhus trilobata*; UCMC • 1 ♀; same data as for preceding; 20 May 1975; U. Lanham leg.; ex *Prunus virginiana* var. *demissa* (verbatim: *Prunus melanocarpus*); UCMC • 1 ♀; same data as for preceding; 20 May 1975; U.N. Lanham leg.; ex *Rhus trilobata*; UCMC • 1 ♀; same data as for preceding; 20 May 1975; U.N. Lanham leg.; ex *Cercocarpus montanus*; UCMC • 1 ♂; Routt Co., 4 mi. E of Steamboat Springs; [40.485° N, 106.75° W]; 28 Aug. 1979; U.N. Lanham leg.; UCMC • 1 ♂; Routt Co., 8 mi. NW of Steamboat Springs; [40.600° N, 106.95° W]; 28 Aug. 1979; U.N. Lanham leg.; ex *Solidago*; UCMC • 1 ♀; Routt Co., SE of Steamboat Springs; [40.485° N, 106.832° W]; 18 Jun. 1978; U. Lanham leg.; ex *Ceanothus*; UCMC • 2 ♂♂; Yuma Co., Beecher Island; [39.870° N, 102.185° W]; 21 Jun. 1979; U.N. Lanham leg.; ex *Melilotus officinalis*; UCMC. – **Idaho** • 1 ♀; Canyon Co., Deer Flat National Wildlife Refuge, DFS; 43.55281° N, 116.64137° W; 4–5 Oct. 2012; Addison Mohler leg.; OSAC • 2 ♀♀; Gooding Co., Hagerman Valley; [42.817° N, 114.898° W]; 16 May 1929; ex *Solidago altissima*; USNM • 1 ♀; Gooding Co., Wood River, 1 mi. NE of Goodling; [42.949° N, 114.698° W]; 6–7 Jul. 1980; M.S. Wasbauer and K.M. Wasbauer leg.; CSCA • 2 ♂♂; same data as for preceding; 6–7 Jul. 1980; M.S. Wasbauer and K.M. Wasbauer leg.; CSCA • 1 ♀; Latah Co., Moscow; [46.732° N, 117.001° W]; 4 Nov. 1966; UCRC • 4 ♂♂; Nez Perce Co., Top of Lewiston Grade; [46.462° N, 117.02° W]; 30 Jun. 1975; J. Powell leg.; EMEC • 1 ♂; Oneida Co., Rock Creek; [42.188° N, 112.655° W]; 21 Jul. 1971; G.F. Knowlton leg.; CUIC • 1 ♂; Oneida Co., Rock Creek; [42.188° N, 112.655° W]; 14 Jul. 1971; G.F.vKnowlton leg.; CUIC • 1 ♀; Oneida Co., 2 mi. N of Stone; [42.064° N, 112.895° W]; 16 May 1969; G.F. Knowlton and G.E. Bohart leg.; CUIC • 1 ♂; Owyhee Co., 6 mi. E of Silver City; [43.016° N, 116.614° W]; 20 Jul. 1965; R.L. Langston leg.; ex *Clarkia pulchella*; EMEC • 1 ♂; Owyhee Co., Jump Creek; [43.479° N, 116.926° W]; 23 Jun. 1958; P.H. Raven leg.; ex *Chylismia*

claviformis subsp. *integrior* (verbatim: *Oenothera claviformis* subsp. *purparescens*); EMEC • 1 ♀; Twin Falls Co., Castleford; [42.521° N, 114.873° W]; 28 Jun. 1928; ex *Solidago altissima*; UCRC. – **Montana** • 2 ♀♀; Big Horn Co., Custer Battlefield; [45.57° N, 107.43° W]; 4 Jun. 1941; G.E. Ferguson leg.; OSAC • 4 ♂♂; Carbon Co., East Rosebud Canyon; [45.484° N, 109.457° W]; elev. 1800 m; 10 Jul. 1963; B. Vogel leg.; UCMC • 1 ♀; Richland Co., Elk Island, 3_Canopy; 47.46127° N, 104.31522° W; 29 Jun.–1 Jul. 2021; A.R. Morphew leg.; WRME • 2 ♀♀; Missoula Co., Florence MPG Ranch; 46.6850° N, 113.9861° W; elev. 1291 m; 4–6 Jun. 2019; M. Seidensticker leg.; CBG • 1 ♀; Missoula Co., Florence MPG Ranch; 46.6888° N, 113.9922° W; elev. 1422 m; 11–13 Jun. 2019; M. Seidensticker leg.; CBG • 1 ♀; Missoula Co., Florence MPG Ranch; 46.6935° N, 114.0086° W; elev. 1198 m; 10–12 Jun. 2019; M. Seidensticker leg.; CBG • 1 ♀; Missoula Co., Florence MPG Ranch; 46.6901° N, 113.9847° W; elev. 1380 m; 4–6 Jun. 2019; M. Seidensticker leg.; CBG • 1 ♀; Missoula Co., Florence MPG Ranch; 46.7144° N, 113.995° W; elev. 1535 m; 20–22 May 2019; M. Seidensticker leg.; CBG • 1 ♀; Missoula Co., Florence MPG Ranch; 46.6901° N, 113.9847° W; elev. 1380 m; 11–18 Jun. 2019; M. Seidensticker leg.; CBG • 1 ♀; Custer Co., Ft. Keogh, RO Restoration Block 8; 46.40592° N, 105.87979° W; 18–20 May 2021; J. Muscha and A. Pearson leg.; WRME • 1 ♀; Richland Co., Seven Sisters, 2_Ground; 47.57646° N, 104.22487° W; 15–17 Jun. 2021; A.R. Morphew leg.; WRME. – **Nevada** • 1 ♀; Churchill Co., 25 mi. SE of Fallon; [39.300° N, 118.62° W]; 25 Apr. 1980; R.W. Rust leg.; ex *Astragalus*; CUIC • 1 ♀; Clark Co., Kyle Canyon, Mt Charleston; [36.2714° N, 115.5781° W]; elev. 1981 m; 3 Jun. 1941; P.H. Timberlake leg.; UCRC • 2 ♂♂; Carson City; [39.16° N, 119.78° W]; Jul.; Baker leg.; UCRC • 1 ♂; same data as for preceding; Jul.; Baker leg.; USNM • 1 ♂; same data as for preceding; 25 Jun. 1929; E.P. Van Duzee leg.; CAS • 1 ♀; Kings Canyon Ranch, Carson City; [39.161° N, 119.799° W]; elev. 1524 m; 23 Jun. 1964; D. Bolinger leg.; OSAC • 1 ♀; Clark Co., Kyle Canyon, Mt Charleston; [36.2725° N, 115.5275° W]; elev. 1707 m; 4 Jun. 1941; P.H. Timberlake leg.; UCRC • 1 ♀; Clark Co., Kyle Canyon, Mt Charleston; [36.2703° N, 115.5519° W]; elev. 1829 m; 5 Jun. 1941; P.H. Timberlake leg.; UCRC • 1 ♂; same data as for preceding; 5 Jun. 1941; P.H. Timberlake leg.; UCRC • 1 ♂; Clark Co., Lee Canyon, Charleston Mts; [36.311° N, 115.671° W]; elev. 1829 m; 3 Jun. 1941; P.H. Timberlake leg.; UCRC • 2 ♂♂; Douglas Co., Topaz Lake; [38.696° N, 119.519° W]; 11 Jul. 1967; W.J. Turner leg.; EMEC • 1 ♀; Elko Co., Elko; [40.832° N, 115.763° W]; 19 May 1926; M.C. Van Duzee leg.; CAS • 4 ♂♂; Lander Co., Kingston Canyon; [39.225° N, 117.139° W]; elev. 2134 m; 22 Jul. 1968; J. Powell leg.; EMEC • 1 ♀; Lincoln Co., 8 mi. E of Panaca; [37.787° N, 114.241° W]; 22 Jun. 1982; W.J. Pulawski leg.; CAS • 1 ♂; Storey Co., Ophir Grade, 2 mi. SW of Virginia City; [39.299° N, 119.66° W]; elev. 1950 m; 20 Jul. 1964; R.L. Langston leg.; EMEC • 3 ♂♂; Storey Co., Virginia City; [39.309° N, 119.65° W]; 5 Jul. 1964; C.N. Slobodchikoff leg.; CAS • 4 ♀♀; Washoe Co., 21 mi. SE of Eagleville, California; [41.093° N, 119.723° W]; 11 Jun. 1970; P.A. Rude leg.; ex *Lepidium appelianum* (verbatim: *Cardaria pubescens*); EMEC • 2 ♂♂; Washoe Co., Patrick; [39.547° N, 119.579° W]; 30 Jun. 1964; M.E. Irwin leg.; UCRC • 1 ♂; Washoe Co., Sparks; [39.535° N, 119.753° W]; 23 Jun. 1927; E.P. Van Duzee leg.; CAS. – **New Mexico** • 1 ♂; Bernalillo Co., 1 mi. W of Chilili; [34.871° N, 106.285° W]; 6 Jul. 1965; R.C. Dickson leg.; UCRC • 1 ♀; Grant Co., Cherry Creek Campground, 14 mi. N of Silver City; [32.914° N, 108.225° W]; elev. 2255 m; 15–16 Aug. 1993; J.E. O'Hara leg.; RSKM • 1 ♂; Grant Co., Cherry Creek Campground, 14 mi. N of Silver City; [32.914° N, 108.225° W]; elev. 2255 m; 15–16 Aug. 1993; J.E. O'Hara leg.; RSKM • 3 ♀♀; Socorro Co., 10 mi. W of Socorro; [34.044° N, 107.068° W]; 28 Mar. 1963; U.N. Lanham leg.; UCMC. – **Oregon** • 1 ♂; Baker Co., 4 mi. NW of Haines; [44.954° N, 117.998° W]; 8 May 1955; W.P. Stephen leg.; OSAC • 1 ♀; Baker Co., Oregon Trail Interpretive Center; 44.8118° N, 117.7265° W; 20 Jun.–5 Jul. 2011; J. Rebholz leg.; OSAC • 1 ♂; Crook Co., 11 mi. SW of Prineville; [44.187° N, 120.99° W]; 16 Jul. 1965; R.L. Langston leg.; EMEC • 2 ♂♂; Crook Co., 25 mi. E of Prineville; [44.300° N, 120.666° W]; elev. 1097 m; 13 Jul. 1936; H.A. Scullen leg.; OSAC • 2 ♀♀; Deschutes Co., Redmond; [44.273° N, 121.174° W]; 11 May 1939; Schuh and Gray leg.; OSAC • 1 ♂; Grant Co., Fall Mountain Lookout Trail; [44.294° N, 119.043° W]; elev. 1585–1829 m; 14 Jul. 1936; H.A. Scullen leg.; OSAC • 1 ♀; Harney Co., 17 mi. N of French–Glen; [43.052° N, 118.918° W]; 19 May 1956; J.D. Lattin leg.; OSAC • 1 ♀; Harney Co., Blitzen Valley; [43.272° N,

118.853° W]; 15 May 1936; S.G. Jewett leg.; OSAC • 1 ♀; Harney Co., Blitzen Valley, Buena Vista Ranch; [43.272° N, 118.853° W]; 19 Apr. 1936; S.G. Jewett leg.; OSAC • 3 ♀♀; Harney Co., Buena Vista Ranch, Blitzen Valley; [43.272° N, 118.853° W]; 19 Apr. 1936; S.G. Jewett leg.; OSAC • 1 ♀; Harney Co., Malheur National Wildlife Refuge, BV; 43.06803° N, 118.8681° W; 18–19 May 2012; Marilyn Kircus leg.; OSAC • 1 ♀; Harney Co., Malheur National Wildlife Refuge, PSD; 42.80817° N, 118.87006° W; 17–18 Jun. 2012; Marilyn Kircus leg.; OSAC • 1 ♀; Harney Co., Malheur National Wildlife Refuge, SBV; 42.8188° N, 118.8688° W; 17 Apr. 2012; J.D. Engler leg.; OSAC • 1 ♀; Hood River Co., Hood River; [45.705° N, 121.522° W]; 8 Jul. 1927; E.C. VanDyke leg.; CAS • 1 ♀; Klamath Co., 10 mi. E of Bly; [42.397° N, 120.847° W]; 12 Jul. 1940; H.A. Scullen leg.; ex Eriogonum; OSAC • 2 ♀♀; Klamath Co., Klamath Falls; [42.225° N, 121.782° W]; 10 May 1924; C.L. Fox leg.; CAS • 1 ♀; same data as for preceding; 8 May 1924; C.L. Fox leg.; CAS • 2 ♀♀; same data as for preceding; 9 May 1924; C.L. Fox leg.; CAS • 1 ♀; Klamath Co., Merrill; [42.026° N, 121.599° W]; 10 May 1924; C.C. Wilson leg.; ex *Mutarda arvensis* (verbatim: *Sinapis arvensis*); UCRC • 1 ♀; Lake Co., Hart Mountain; [42.549° N, 119.642° W]; 17 Jun. 1938; K. Gray and J. Schuh leg.; OSAC • 3 ♀♀; Lake Co., Hart Mountain Antelope Refuge; [42.549° N, 119.642° W]; 24 Apr. 1954; Otto C. Nelson leg.; ex *Ribes*; OSAC • 1 ♀; same data as for preceding; 4 May 1954; Otto C. Nelson leg.; ex *Taraxacum*; OSAC • 1 ♀; Lake Co., Picture Rock Pass; [43.048° N, 120.799° W]; 19 Apr. 1950; Black and Davis leg.; OSAC • 1 ♀; Lake Co., Summer Lake; [42.973° N, 120.778° W]; 16 Jun. 1938; Gray and Schuh leg.; OSAC • 1 ♂; Malheur Co., Nyssa; [43.877° N, 116.995° W]; elev. 665 m; 16 Jun. 1926; R.W. Haegele leg.; UCRC • 1 ♂; Malheur Co., Ranaway Gulch; [42.4083° N, 117.8225° W]; elev. 1430 m; 14 Jul. 1984; William H. Clark and Donald R. Frohlich leg.; CUIC • 1 ♀; Malheur Co., Runaway Gulch; [42.4083° N, 117.8225° W]; elev. 1430 m; 23 Apr. 1983; Cynthia J. Clark, William H. Clark and Donald R. Frohlich leg.; CUIC • 1 ♂; Malheur Co., Sucker Creek Canyon; [42.550° N, 117.3° W]; 15–18 Jun. 1951; Borys Malkin leg.; CAS • 1 ♂; Malheur Co., Vale; [43.982° N, 117.239° W]; 29 Jun. 1902; Wicklund leg.; OSAC • 3 ♀♀; Umatilla Co., Cayuse; [45.676° N, 118.574° W]; 23 Apr. 1939; K. Gray and J. Schuh leg.; OSAC • 17 ♂♂; Umatilla Co., Milton; [45.934° N, 118.391° W]; 22 Jun. 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; same data as for preceding; 22 Jun. 1938; K. Gray leg.; EMEC • 1 ♀; Umatilla Co., Thorn Hollow; [45.689° N, 118.462° W]; 29 Apr. 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♂; Umatilla Co., Ukiah–Dale Forest Wayside, Camas Creek; [45.126° N, 118.971° W]; 24 Jul. 1974; Paul H. Arnaud Jr leg.; CAS • 21 ♀♀; Umatilla Co., Weston; [45.813° N, 118.425° W]; 28 Apr. 1939; K. Gray and J. Schuh leg.; OSAC • 22 ♀♀; same data as for preceding; 29 Apr. 1939; K. Gray leg.; ex *Brassica*; OSAC • 2 ♀♀; Umatilla Co., Wild Horses Mountain, Athena; [45.802° N, 118.481° W]; 14 May 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; Umatilla, Union, Grant, or Baker Co., Blue Mountain; [45.000° N, 118.25° W]; 25 Aug. 1948; J.E. Davis leg.; OSAC • 1 ♂; Union Co., La Grande; [45.323° N, 118.088° W]; 20 Jul. 1929; H.A. Scullen leg.; ex *Convolvulus*; OSAC • 1 ♀; same data as for preceding; 28 May 1943; G.R. Ferguson leg.; OSAC • 1 ♂; Wallowa Co., 5 mi. E of Minam, Wallowa Canyon Fount; [45.571° N, 117.631° W]; elev. 823 m; 21 Jul. 1929; H.A. Scullen leg.; OSAC • 1 ♂; Wallowa Co., Chief Joseph, Mt Joseph; [45.285° N, 117.262° W]; 12 Aug. 1950; G.H. Sperry and J.L. Sperry leg.; UCRC • 1 ♀; Wallowa Co., Joseph; [45.354° N, 117.23° W]; 29 Jul. 1941; R.E. Rieder leg.; ex *Melilotus*; OSAC • 2 ♂♂; Wasco Co., 10 mi. S of The Dalles; [45.459° N, 121.178° W]; 15 Jun. 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; same data as for preceding; 5 May 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; Wasco Co., 12 mi. S of Dufur; [45.316° N, 121.128° W]; 5 May 1938; K. Gray and J. Schuh leg.; OSAC • 3 ♀♀; Wasco Co., 5 mi. S of The Dalles; [45.519° N, 121.178° W]; 5 May 1938; K. Gray and J. Schuh leg.; OSAC • 9 ♀♀; Wasco Co., Mosier; [45.683° N, 121.398° W]; 24 May 1938; K. Gray and J. Schuh leg.; OSAC • 4 ♀♀; Wasco Co., The Dalles; [45.600° N, 121.187° W]; 24 May 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; Wheeler Co., 17 mi. E of Mitchell; [44.564° N, 119.807° W]; 30 Jun. 1967; S. Paul Welles leg.; ex *Clarkia pulchella*; EMEC. – **Utah** • 1 ♀; Box Elder Co., Curlew Junction; [41.987° N, 112.684° W]; 16 May 1969; G.F. Knowlton and G.E. Bohart leg.; CUIC • 1 ♀; Grand Co., 15 mi. NW of Cisco; [39.121° N, 109.529° W]; 22 May 1979; D.B. Wahi leg.; SEMC • 1 ♀; Grand Co., 8 mi. SE of Emery; [38.843° N, 111.142° W]; 22 May 1979; D.B. Wahi

leg.; SEMC • 2 ♀♀; Salt Lake Co., Camp Douglas; [40.765° N, 111.841° W]; CMNH • 1 ♀; Tooele Co., Grantsville; [40.599° N, 112.465° W]; 19 May 1919; G.F. Knowlton leg.; CAS • 1 ♀; San Juan Co., Kigalia Ranger Station, Manti–La Sal National Forest; [37.675° N, 109.826° W]; 5 Jul. 1935; Brues leg.; MCZ • 1 ♀; Cache Co., Logan River; [41.733° N, 111.763° W]; 24 May 1954; G.E. Bohart leg.; ex *Salix*; SEMC • 3 ♀♀; Cache Co., Wellsville; [41.638° N, 111.933° W]; 13 May 1954; G.E. Bohart leg.; ex *Lomatium dissectum*; SEMC. – **Washington** • 1 ♀; Asotin Co., Asotin Creek; [46.332° N, 117.077° W]; 27 Apr. 1924; A.L. Melander leg.; UCRC • 8 ♀♀; Asotin Co., Clarkston; [46.416° N, 117.045° W]; CMNH • 45 ♂♂; Asotin Co., Fields Spring State Park, S of Antone; [46.087° N, 117.172° W]; 28 Jul. 1985; Finnamore and Thormin leg.; PMAE (Figs 41E, 48) • 1 ♂; same data as for preceding; 28 Jul. 1985; Finnamore and Thormin leg.; EMEC • 1 ♀; Chelan Co., N of Dryden; [47.533° N, 120.602° W]; 23 Apr. 1925; A.L. Melander leg.; UCRC • 1 ♀; Douglas Co., Pine Canyon; [47.636° N, 120.166° W]; 2 May 1937; OSAC • 3 ♂♂; Pend Oreille Co., Metaline Falls; [48.851° N, 117.39° W]; 1 Aug. 1923; C.L. Fox leg.; CAS • 1 ♀; Walla Walla Co., Prescott; [46.300° N, 118.315° W]; L.R. Dice leg.; EMEC • 4 ♂♂; Walla Walla Co., Walla Walla; [46.063° N, 118.343° W]; 5–10 Jun. 1936; R.M. and G.E. Bohart leg.; EMEC • 5 ♀♀; same data as for preceding; 29 Mar.–2 Jun. 1937; R.M. and G.E. Bohart leg.; CAS • 1 ♂; same data as for preceding; 5–10 Jun. 1936; R.M. and G.E. Bohart leg.; CAS • 1 ♀; Walla Walla Co., Walla Walla; [46.0625° N, 118.343° W]; 22 Apr. 1925; M.C. Lane leg.; OSAC • 2 ♂♂; Whitman Co., Almota; [46.703° N, 117.469° W]; Melander leg.; UCRC • 3 ♂♂; same data as for preceding; 24 Jun.; Melander leg.; MCZ • 1 ♀; Whitman Co., Colfax; [46.880° N, 117.364° W]; 9 Jul. 1925; C.L. Fox leg.; CAS • 2 ♀♀; same data as for preceding; 8 Jul. 1925; C.L. Fox leg.; CAS • 1 ♂; same data as for preceding; 8 Jul. 1925; C.L. Fox leg.; CAS • 1 ♂; same data as for preceding; 9 Jul. 1925; C.L. Fox leg.; CAS • 1 ♀; Whitman Co., Wawawai; [46.638° N, 117.379° W]; 24 Apr. 1909; W.M. Mann leg.; EMEC • 2 ♀♀; Yakima Co., Satus Creek; [46.084° N, 120.554° W]; 28 Apr. 1938; K. Gray leg.; ex *Purshia tridentata*; OSAC • 2 ♀♀; Yakima Co., Selah; [46.652° N, 120.535° W]; 14 May 1919; OSAC. – **Wyoming** • 1 ♀; Lincoln Co.; 41.8650° N, 110.7653° W; 20–21 Sep. 2011; BIML.

Redescription

Female

Body measurements. Length 6.46 mm (±0.45). Head long 1.67 mm (±0.05 SD). Face length 1.39 mm (±0.05 SD). Head width 1.61 mm (±0.05 SD). Wing length 4.82 mm (±0.19 SD). n = 5.

Coloration. Head and mesosoma black. Clypeus apex black. Labrum black to dark brown. Mandible black to dark brown basally, becoming light brown medially and reddish brown apically. Flagellum dark brown to brown dorsally, yellowish brown ventrally. Pronotal lobe dark brown. Tegula translucent yellowish brown, with brown base. Wing membrane faintly brown, veins light brown. Legs brown. Metasoma black to dark brown with rims of terga and sterna broadly light brown.

Pubescence. Body hair colour off-white. Tomentum dense on pronotal angle, and lobe, space between pronotal lobe and tegula; very sparse or sometimes absent on T2–T3 basolaterally. Mesosoma covered by erect plumose hairs (1–2.5 OD) and sub-appressed simple short hairs (<0.5 OD). Metafemoral scopa with dense plumose hairs. Wing hairs brown, very short and sparse.

Surface sculpturing. Clypeus polished, becoming weakly imbricate in the basal half; punctures irregularly sparse (IS≤2 PD) apically, becoming smaller and denser (IS≤1 PD) basally. Supraclypeal area polished, becoming imbricate posterolaterally; punctures sparse (IS = 1–3 PD) anteromedially, becoming dense (IS≤1 PD) posterolaterally. Frons reticulate-punctate; punctures crowded (IS = 0 PD). Ocellocular area polished; punctures dense (IS<1 PD). Gena polished and weakly lineolate posteriorly; punctures sparse (IS = 1–2 PD), becoming obscure posteriorly. Postgena polished, weakly lineolate adjacent to hypostomal carina and posteriorly. Tegula broadly impunctate, minute punctures present

anteriorly. Mesoscutum imbricate throughout with a subtle weakening submedially; punctures dense throughout (IS < 1 PD), becoming moderately dense submedially (IS = 1–1.5 PD), diversopunctate. Mesoscutellum polished; punctures dense (IS < 1 PD) marginally and on median line, sparse submedially (IS = 1–4 PD). Metanotum rugulose laterally, ruguloso-punctate medially with punctures crowded (IS = 0 PD). Propodeal triangle with rugae moderately strong, reaching half towards posterior margin, anastomosing medially and weakly so laterally, lateral rugae not extending to dorsolateral slope of propodeum lateral face; interspace sculpture imbricate to tessellate. Preepisternum weakly rugulose. Hypoepimeron imbricate to weakly rugulose; impunctate. Mesepisternum finely rugulose, imbricate ventrally; impunctate. Propodeum lateral face strongly imbricate, punctures obscure; posterior face polished to weakly imbricate, with punctures dense anteriorly (IS ≤ PD), becoming irregularly sparser posteriorly (IS < 3 PD). T1 anterior face polished, punctures present laterally, sparse (IS = 1–4 PD);

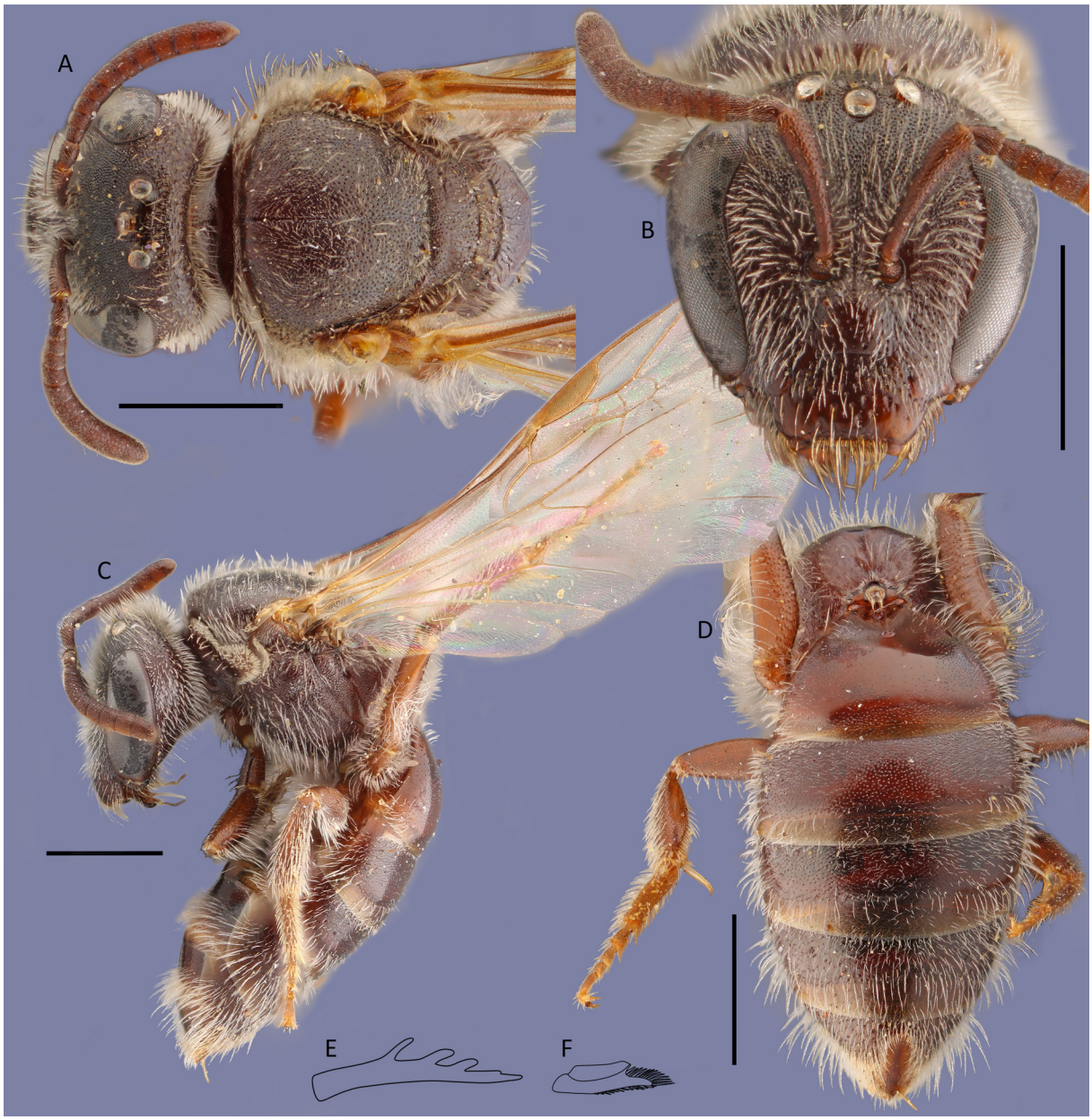


Fig. 46. *Lasioglossum* (*Hemihalictus*) *ruficorne* (Crawford, 1907), ♀ (UCMC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

dorsal surface polished, punctures present laterally, sparse (IS = 1–3 PD), becoming sparser (IS = 1–6 PD) towards premarginal line and nearly impunctate medially; rim coriarious, punctures sparse (IS = 1–3 PD). T2 disc coriarious to polished, base densely punctate (IS ≤ 1 PD), becoming moderately dense to moderately sparse (IS = 1–2 PD) apically; rim coriarious, with minute and sparse punctures (IS = 1–4 PD), becoming impunctate narrowly after laterally premarginal line.

Structure. Head long, length/width ratio 1.04 (±0.01 SD). Face length/width ratio 0.86 (±0.01 SD). Clypeus projecting ~74% below suborbital tangent. Mandible short, reaching opposing clypeal angle. Eyes convergent below, UOD/LOD ratio 1.07 (±0.02 SD). Ocelli normal. Gena/eye width ratio 0.68 (±0.04 SD). Pronotal angle obtuse. Intertegular span 0.89 mm (±0.05 SD). Mesoscutum length/width ratio 0.90 (±0.03 SD); mesoscutum/scutellum length ratio 2.35 (±0.25 SD); scutellum/metanotum length

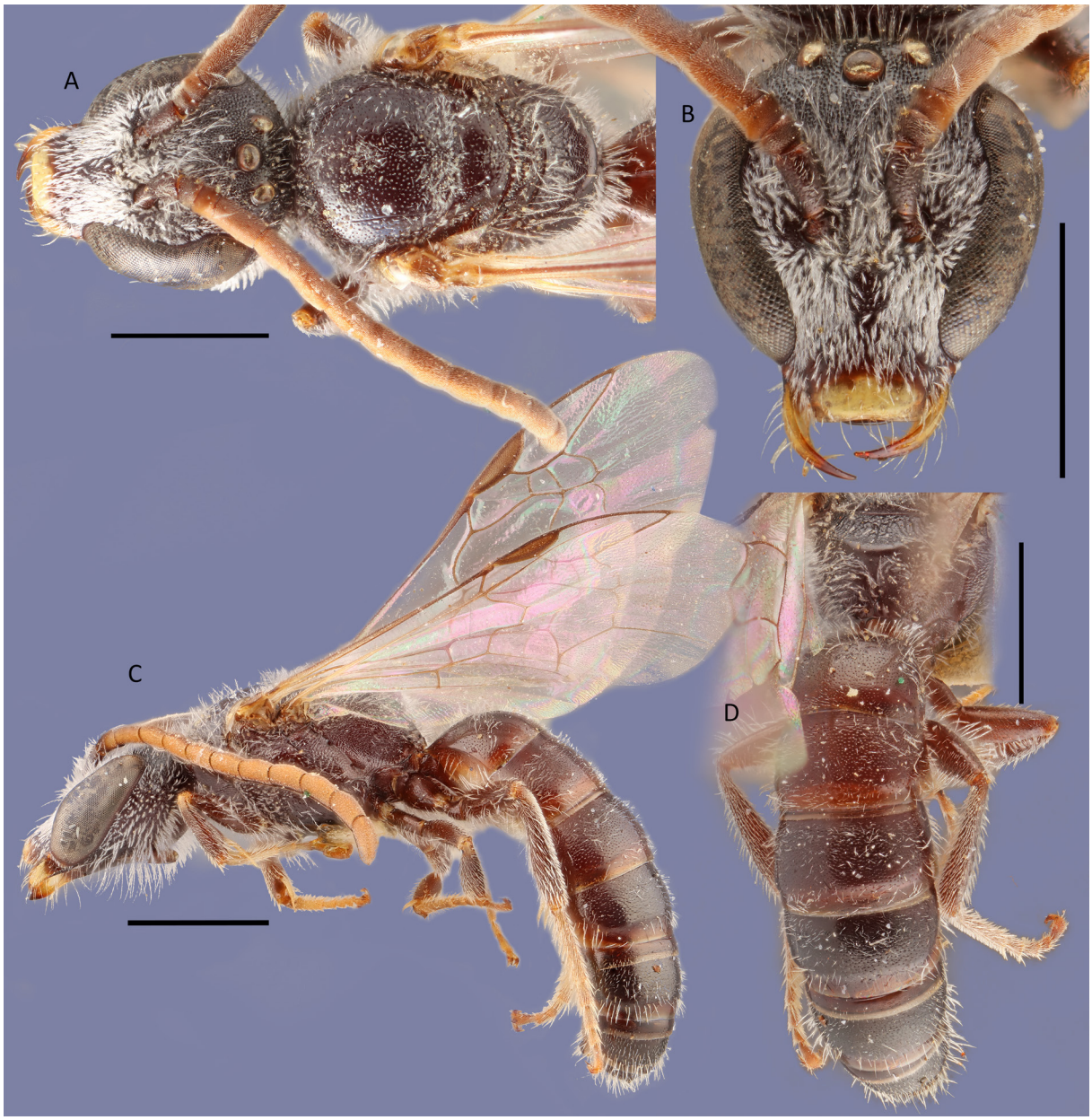


Fig. 47. *Lasioglossum* (*Hemihalictus*) *ruficorne* (Crawford, 1907), ♂ (UCRC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

ratio 1.74 (±0.17 SD); metanotum/propodeal triangle length ratio 0.64 (±0.08 SD). Protibial spur with apical serrations shorter than width of malus; malus extending beyond the velum, nearly ¾ the length of velum. Inner metatibial spur pectinate, teeth 3–5, basal teeth longer than width of rachis. Propodeal triangle posterior margin rounded onto posterior propodeal surface. Propodeal lateral carina not reaching dorsal margin, oblique carina absent.

Variation. Occasionally, the rims of the metasomal terga become conspicuously more yellow. Sometimes, the supraclypeal area is weakly imbricate medially. The ocellocular area is sometimes weakly rugulose, with crowded punctures (IS = 0 PD). The mesoscutum exhibits variation in puncture density and texture. In some individuals, it is more imbricate throughout, with a pronounced microsculpture. Others have a

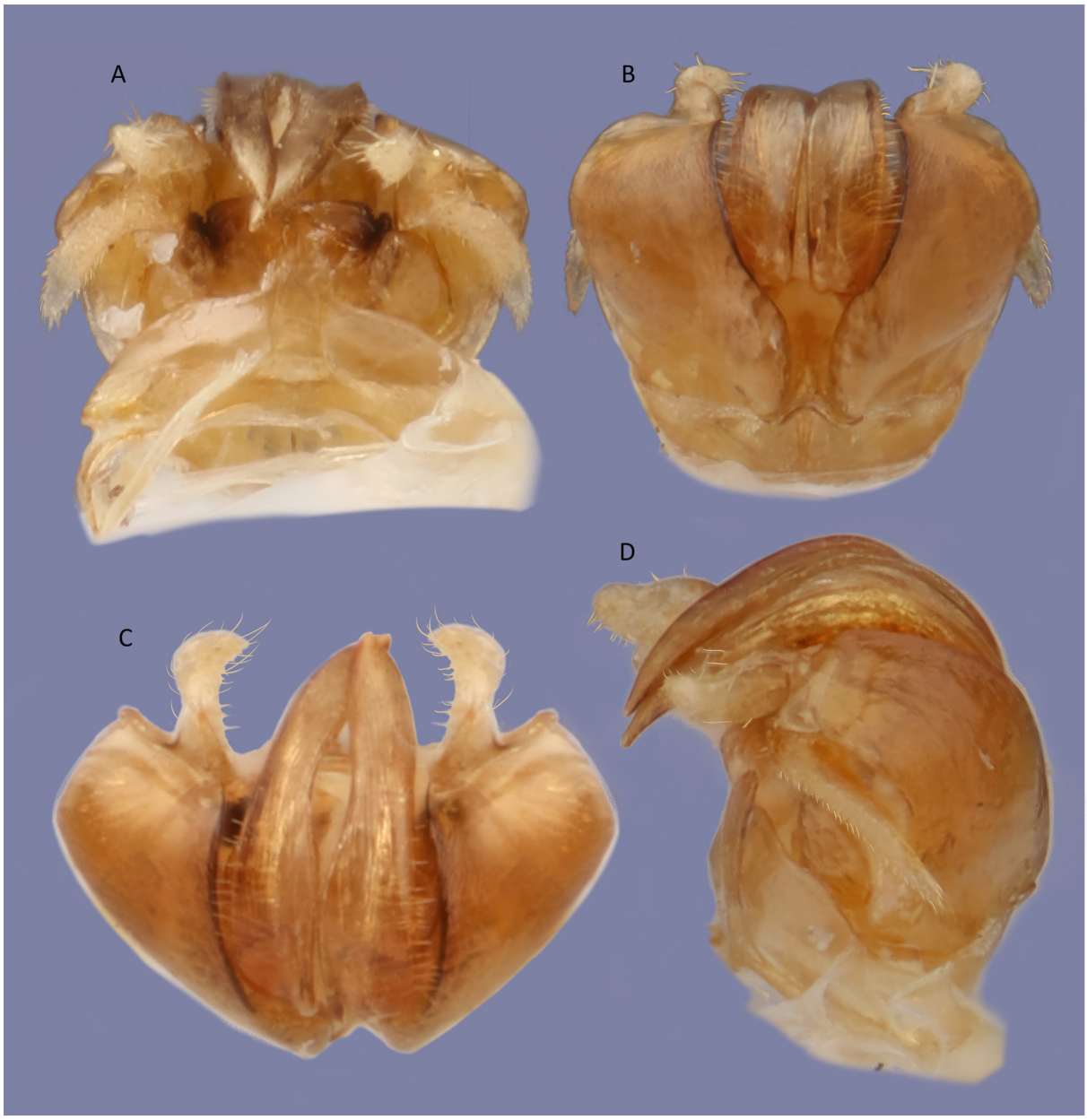


Fig. 48. Genitalia of *Lasioglossum* (*Hemihalictus*) *ruficorne* (Crawford, 1907), ♂ (PMAE). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

mostly imbricate mesoscutum that becomes nearly polished submedially. Occasionally, the punctures are dense throughout (IS < 1 PD), but in some cases, they become sparser submedially (IS = 1–3 PD).

Male

Body measurements. Length 6.65 mm (± 0.34 SD). Head length 1.57 mm (± 0.07 SD). Face length mm 1.36 (± 0.06 SD). Head width 1.45 mm (± 0.07 SD). Wing length 4.36 mm (± 0.10 SD). n = 5.

Colouration. Head and mesosoma black. Clypeus apical half yellow. Labrum brown. Mandible brown basally, becoming yellow medially and reddish brown apically. Flagellum brown dorsally, yellow ventrally. Pronotal lobe brown. Tegula translucent yellowish brown. Wing membrane faintly brown, veins brown. Legs dark brown to brown, except yellow tarsi. Metasoma dark brown with rims of terga and sterna narrowly lighter.

Pubescence. Body hair colour off-white. Tomentum dense on paraocular area, clypeus basally, supraclypeal area laterally, pronotal angle, and lobe, space between pronotal lobe and tegula. Mesosoma covered by erect plumose hairs (1–2 OD) and sub-appressed simple short hairs (< 0.5 OD). Metasomal sterna with dense, erect and sub-appressed, plumose, short (< 1.5 OD) hairs. Wing hairs brown, very short and sparse.

Surface sculpturing. Clypeus polished; punctures irregularly sparse (IS ≤ 2 PD) apically, becoming smaller and denser (IS ≤ 1 PD) basally. Supraclypeal area polished; punctures dense (IS < 1 PD). Frons reticulate-punctate; punctures crowded (IS = 0 PD). Ocellocular area polished, punctures dense (IS ≤ 1 PD). Gena polished and weakly lineolate posteriorly; punctures moderately sparse (IS = 1–2 PD), becoming obscure posteriorly. Postgena polished anteriorly, become lineolate posteriorly. Tegula broadly impunctate. Mesoscutum mostly polished, slightly imbricate anteriorly; punctures dense (IS ≤ 1 PD), becoming sparse (IS = 1–2 PD) mesad of parapsidal line, diversopunctate. Mesoscutellum polished; punctures dense

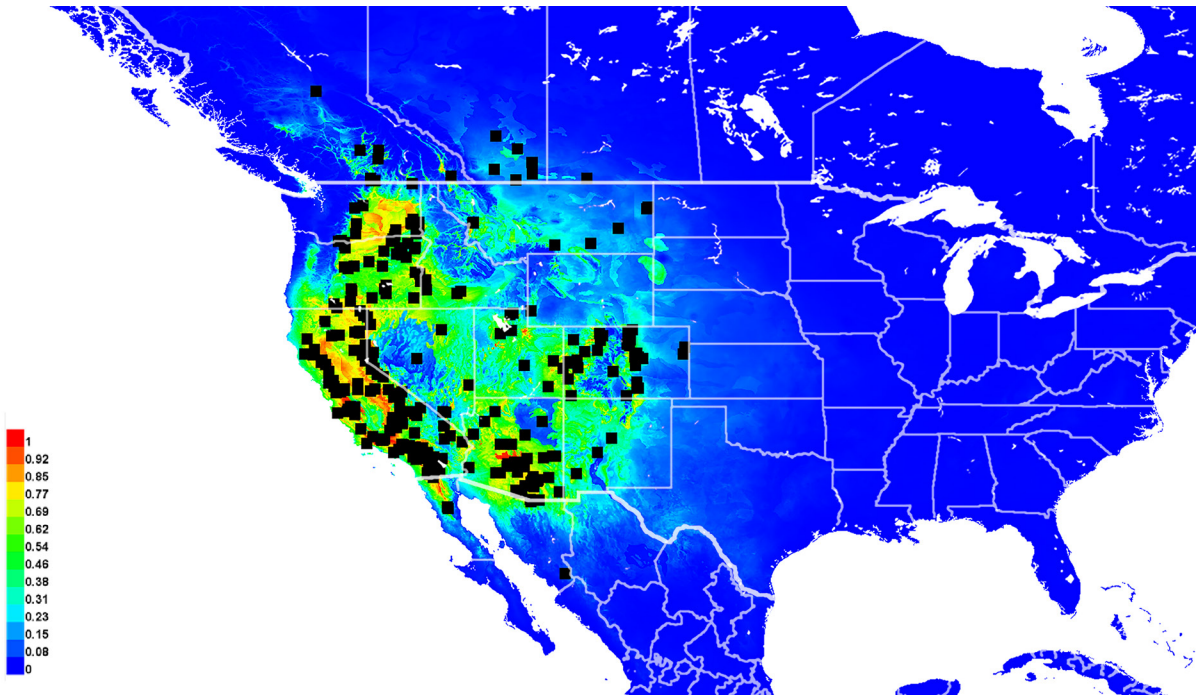


Fig. 49. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *ruficorne* (Crawford, 1907) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

(IS≤1 PD) marginally and on median line, sparse submedially (IS = 1–2 PD). Metanotum rugulose. Propodeal triangle with rugae moderately strong, reaching ¾ towards posterior margin, anastomosing medially and weakly so laterally, lateral rugae not extending to dorsolateral slope of propodeum lateral face; interspace sculpture imbricate to tessellate and becoming polished posteriorly on posterior margin. Preëpisternum weakly rugulose. Hypoepimeron imbricate to weakly rugulose; punctures obscure. Mesepisternum reticulate-punctate with crowded punctures, becoming imbricate ventrally where the punctures become obscure or impunctate. Propodeum lateral face strongly imbricate, and becoming rugulose dorsolateral slope, punctures obscure; posterior face weakly rugulose-imbricate, with dense punctures anteriorly (IS<1 PD). T1 anterior face polished, few scattered punctures present laterally; dorsal



Fig. 50. *Halictus pulveris* Cockerell, 1930, syntype, ♀ (AMNH_IZC 00323614), junior synonym of *Lasioglossum ruficorne* (Crawford, 1907) . **A**. Mesoscutum. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm. (photo credit: C.S. Smith, AMNH).

surface polished, punctures present laterally, moderately sparse (IS = 1–2 PD), becoming sparser (IS = 1–4 PD) on subapicolateral boss; rim polished, punctures moderately sparse (IS = 1–2 PD) and becoming impunctate laterally and apically. T2 disc coriarious basally, becoming polished apically, with dense (IS≤1 PD); rim polished, with minute, sparse punctures (IS = 1–4 PD), becoming impunctate apically.

Structure. Head long, length/width ratio 1.09 (±0.00 SD). Face length/width ratio 0.93 (±0.01 SD). Clypeus projecting ~67% below suborbital tangent. Mandible short, reaching opposing clypeal angle. Flagellomeres long, F1 length/pedicel length ratio 1.10 (±0.11 SD); F2 length/F1 length ratio 2.46 (±0.21 SD); F2 length/F2 width ratio 1.66 (±0.15 SD). Gena/eye width ratio 0.60 (±0.03 SD). Forewing with 3 submarginal cells. Pronotal angle obtuse. Intertegular span 0.73 mm (±0.09 SD). Mesoscutum

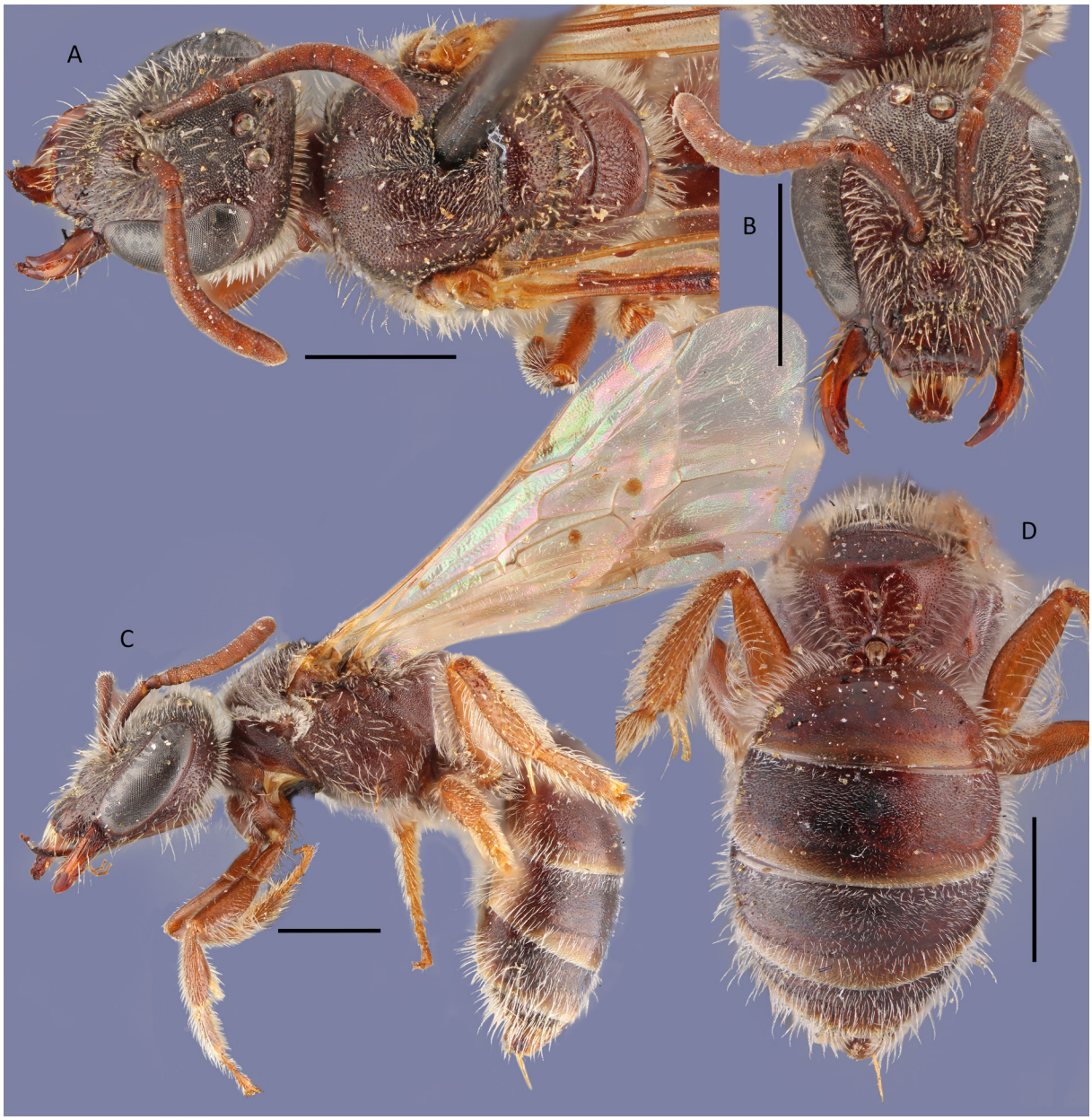


Fig. 51. *Halictus vaporellus* Cockerell, 1910, syntype, ♀ (USNM Type No. 23324), junior synonym of *Lasioglossum ruficorne* (Crawford, 1907) . **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

length/width ratio 0.99 (±0.05 SD). Propodeal lateral carina not reaching dorsal margin, oblique carina absent. n = 5.

Genitalia (Figs 48, 120H). Gonostylus elongate, about 3 times as long as broad, and concave on outer margin, with long setae. Retrorse lobe slender, attenuated apically, about 3 times as long as broad, covered in short setae.

Variation. Sometimes, the tegula becomes more translucent yellow. Occasionally, the tarsi get more yellowish-brown. Typically, there is a strong colour gradient between the tibia and basitarsus. Rarely, some specimens exhibit a subtle colour gradient, similar to that observed in the legs of male *L. ruficorne*. In some instances, the punctures on the supraclypeal area can be nearly crowded in the middle. In some specimens, the mandible slightly extends beyond the opposing clypeal angle.

Range

Canada (Alberta, British Columbia, Saskatchewan), Mexico (Baja California, Sonora), USA (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming) (Fig. 49).

Floral hosts

AGAVACEAE: *Agave utahensis* var. *nevadensis* Engelm. ex Greenm. & Roush, *Yucca* sp. • ANACARDIACEAE: *Rhus trilobata* Nutt. • APIACEAE: *Lomatium dissectum* (Nutt.) Mathias & Constance • ASCLEPIADACEAE: *Asclepias tuberosa* L. • ASTERACEAE: *Baccharis salicifolia* (Ruiz & Pav.) Pers., *Lasthenia* sp., *Baileya multiradiata* Harv. & A.Gray, *Chrysothamnus* sp., *Cirsium cymosum* (Greene) J.T.Howell, *Encelia farinosa* A.Gray ex Torr., *Encelia* sp., *Gutierrezia microcephala* (DC.) A.Gray, *Haplopappus* sp., *Barkleyanthus salicifolius* (Kunth) H. Rob. & Brettell, *Solidago altissima* L., *Solidago* sp., *Taraxacum* sp., *Heliomeris multiflora* Nutt. • BORAGINACEAE: *Cryptantha barbigera* (A.Gray) Greene, *Cryptantha intermedia* (A.Gray) Greene, *Cryptantha utahensis* (A.Gray) Greene, *Eremocarya micrantha* (Torr.) Greene, *Heliotropium* sp., *Plagiobothrys nothofulvus* (A.Gray) A.Gray • BRASSICACEAE: *Brassica* sp., *Cardaria* sp., *Descurainia sophia* (L.) Webb ex Prantl, *Erysimum capitatum* (Douglas ex Hook.) Greene, *Isatis tinctoria* L., *Lepidium appelianum* Al-Shehbaz, *Lepidium fremontii* S.Watson, *Lepidium montanum* Nutt., *Lobularia maritima* (L.) Desv., *Mutarda arvensis* (L.) D.A.German, *Physaria bellii* G.A.Mulligan, *Physaria* sp., *Physaria vitulifera* Rydb., *Sinapis alba* L. or *Brassica oleracea* L., *Sisymbrium* sp., *Stanleya pinnata* (Pursh) Britton • CACTACEAE: *Opuntia* sp. • CAPPARACEAE: *Cleomella arborea* (Nutt.) Roalson & J.C.Hall Greene • CAPRIFOLIACEAE: *Viburnum tinus* L. • CONVOLVULACEAE: *Convolvulus* sp. • ERICACEAE: *Arctostaphylos* sp. • FABACEAE: *Amorpha fruticosa* L., *Astragalus agrestis* Douglas ex G.Don, *Astragalus crotalariae* (Benth.) A.Gray, *Astragalus* sp., *Parkinsonia microphylla* Torr., *Melilotus officinalis* (L.) Lam., *Melilotus* sp. • GROSSULARIACEAE: *Ribes indecorum* Eastw., *Ribes* sp. • HYDRANGEACEAE: *Fendlera* sp. • HYDROPHYLLACEAE: *Ellisia* sp., *Emmenanthe penduliflora* Benth., *Eriodictyon* sp., *Eriodictyon trichocalyx* A.Heller, *Phacelia calthifolia* Brand, *Phacelia ciliata* Benth., *Phacelia distans* Benth., *Phacelia minor* (Harv.) Thell., *Phacelia* sp., *Phacelia tanacetifolia* Benth. • LAMIACEAE: *Condea emoryi* (Torr.) Harley & J.F.B.Pastore, *Hyptis* sp., *Poliomintha incana* (Torr.) A.Gray, *Salvia dorrii* var. *incana* (Benth.) Strachan • LILIACEAE: *Allium siskiyouense* Ownbey ex Traub • LOASACEAE: *Eucnide urens* Parry ex Coville • MALVACEAE: *Sphaeralcea ambigua* A.Gray, *Sphaeralcea* sp. • ONAGRACEAE: *Chylismia claviformis* subsp. *integrior* (P.H. Raven) W.L.Wagner & Hoch, *Clarkia modesta* Jeps., *Clarkia pulchella* Pursh, *Oenothera brevipes* A. Gray, *Oenothera* sp., *Taraxia tanacetifolia* (Torr. & A.Gray) Piper • PAPAVERACEAE: *Papaver* sp. • POLEMONIACEAE: *Gilia* sp. • POLYGONACEAE: *Eriogonum fasciculatum* Benth., *Eriogonum inflatum* Torr. & Frém., *Eriogonum* sp., *Eriogonum umbellatum* Torr., *Eriogonum wrightii* var. *subscaposum* S.Watson • PORTULACACEAE: *Calyptridium umbellatum* (Torr.) Greene • RANUNCULACEAE: *Ranunculus* sp. • RHAMNACEAE: *Ceanothus* sp., *Frangula californica* (Eschsch.) A.Gray, *Rhamnus crocea* Nutt., *Frangula californica* subsp. *tomentella* (Benth.) Kartesz & Gandhi • ROSACEAE: *Cercocarpus montanus* Raf., *Malus* sp., *Prunus andersonii* A.Gray, *Prunus fremontii* S.Watson, *Prunus*

ilicifolia (Nutt. ex Hook. & Arn.) D. Dietr., *Prunus* sp., *Prunus virginiana* var. *demissa* (Nutt.) Torr., *Prunus subcordata* Benth., *Prunus virginiana* L., *Purshia tridentata* (Pursh) DC., *Rubus deliciosus* Torr. • SALICACEAE: *Salix exigua* Nutt., *Salix vestita* Pursh, *Salix* sp. • TAMARICACEAE: *Tamarix gallica* L., *Tamarix* sp. • ZYGOPHYLLACEAE: *Larrea tridentata* (DC.) Coville, *Larrea* sp.

DNA barcodes

DNA barcodes of the *L. ruficorne* form a single cluster with sequences from Alberta, British Columbia, Northwest Territories, Saskatchewan, Colorado, Oregon, Utah, Nevada, and New Mexico.

Lasioglossum synthyridis (Cockerell 1906)
Figs 52–53, 117A, 120I

Halictus (*Evylaeus*) *synthyridis* Cockerell, 1906: 427.
Halictus inconditus Cockerell, 1916: 101. **Syn. nov.**
Halictus tracyi Cockerell, 1936: 161. Synonymy by Gibbs *et al.* 2013.

Lasioglossum (*Evylaeus*) *inconditum* – Michener 1951: 1108 (catalogue).
Lasioglossum (*Evylaeus*) *rufitarse* – Michener 1951: 1110 (catalogue). — Krombein 1967: 461 (catalogue).
Lasioglossum (*Evylaeus*) *synthyridis* – Michener 1951: 1110 (catalogue).
Lasioglossum (*Evylaeus*) *tracyi* – Michener 1951: 1110 (catalogue).
Evylaeus rufitarsis – Mitchell 1960 (redescription, key). — Hurd 1979: 1961 (catalogue). — Moure & Hurd 1987: 82 (catalogue).
Evylaeus inconditus – Hurd 1979: 1960 (catalogue). — Moure & Hurd 1987: 75 (catalogue).
Evylaeus tracyi – Hurd 1979: 1962 (catalogue). — Moure & Hurd 1987: 83 (catalogue).
Evylaeus synthyridis – Hurd 1979: 1962 (catalogue). — Moure & Hurd 1987: 83 (catalogue).
Lasioglossum (*Hemihalictus*) *inconditum* – Gibbs *et al.* 2013 (redescription, key).

Etymology

The specific epithet is a noun in the genitive case, in reference to the host plant of the holotype, *Synthyris plantaginea*.

Diagnosis

Refer to *L. diatretum* diagnosis.

Type material

Holotype of *Halictus* (*Evylaeus*) *synthyridis* (holotype not examined; current location unknown)
UNITED STATES – **Colorado** • ♀; Florissant; 16 Jun. 1906; T.D.A. Cockerell leg.; ex *Synthyris plantaginea*; UCMC.

Paratypes of *Halictus* (*Evylaeus*) *synthyridis* (designated herein; examined)
UNITED STATES – **Colorado** • 1 ♀; Teller Co., Florissant; 9 Jul.; S.R. Rohwer leg.; USNM (Type No. 12048) (Figs 52–53) • 1 ♂; same data as for preceding; 18 Jul.; S.R. Rohwer leg.; *Polemonium*; UCRC.

Specimen labels
"Florissant, / Colo. July9. / S.R. Rohwer // {illegible} // *H. synthyridis* / Ckll Cotype // CoType / No 12048 / U.S.N.M. // PARATYPE" • "Florissant, / Colo. July18. / S.R. Rohwer // *Polemonium* // *H. synthyridis* / Ckll Cotype // UCRC // PARATYPE".

Type notes

The holotype of *L. synthyridis* is cataloged under UCMC, but it was not located within UCMC collections, and its current whereabouts remain unknown. Among the examined material, one female paratype (USNM

12048) and one male paratype (UCRC) correspond to *Lasioglossum inconditum* (Cockerell, 1916). Non-type material identified by T.D.A. Cockerell closely resembles *Lasioglossum diatretum* (Vachal, 1904). Based on the original description, it is likely that additional paratypes of *L. synthyridis* exist, but these have not been located. Given the clear correspondence of its paratypes to *L. inconditum*, we formally synonymize *L. synthyridis* as a senior subjective synonym of *L. inconditum* (Cockerell, 1916).

Description

Genitalia (Figs 53, 120I). Gonostylus elongate, about 4.5 times as long as broad, and with short setae. Retrorse lobe pointed apically, about 4 times as long as broad, covered in short setae.



Fig. 52. *Halictus* (*Evylaeus*) *synthyridis* Cockerell 1906, paratype, ♀ (USNM Type No. 12048). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

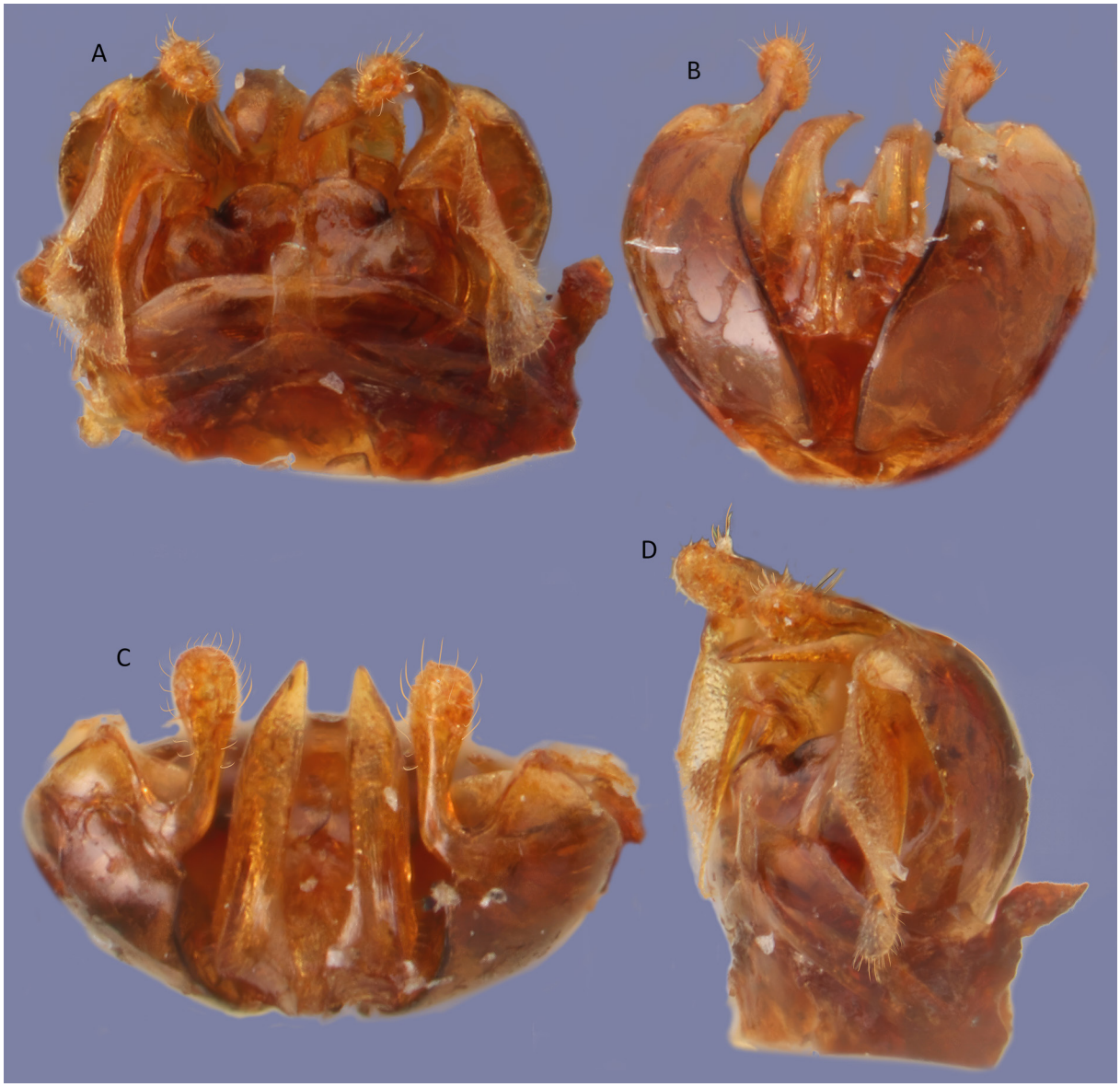


Fig. 53. Genitalia of *Lasioglossum* (*Hemihalictus*) *synthyridis* (Cockerell, 1906), paratype, ♀ (USNM Type No. 12048). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

Remarks

For detailed description and distribution information (as *L. inconditum*), see Gibbs *et al.* (2013).

Lasioglossum* (*Hemihalictus*) *opata sp. nov.
urn:lsid:zoobank.org:act:C03DBFC6-0AD1-49BC-8EF9-FCAAF9502AA9
Figs 54, 55, 93B, 97C, 104H, 106B

Diagnosis

Females of *L. opata* sp. nov. are readily distinguished from other western North American species by their larger body size (length 8.18 mm ±0.54 SD), enlarged tegula, round head (length/width ratio 0.96 ±0.01 SD), the propodeal triangle with weak rugae and faint apical carina, T1 with a fan bearing

a narrow dorsal opening, and distinct mesepisternal sculpture featuring strigate-rugulose patterning anteroventrally. Male is unknown.

Etymology

The specific epithet 'opata' is derived from the name of the Opata tribe, an Indigenous community historically residing in northern Mexico along the border with Arizona. This naming choice serves as a tribute to the Opata nation. It is treated as a noun in apposition.

Type material

Holotype

MEXICO – **Sonora** • ♀; Nogales; [31.308° N, 110.942° W]; 4 Sep. 1962; A.E. Michelbacher leg.; EMEC (Fig. 54).

Specimen labels

"MEX: Son. / Nogales, / IX–4–65 // A.E. Michelbacher Collector // *Lasioglossum* GIBBS-14503 // HOLOTYPE / *Lasioglossum* (*Hemihalictus*) *opata* Hettiarachchi and Gibbs".

Paratypes

MEXICO – **Sonora** • 1 ♀; Álamos; [27.023° N, 108.935° W]; 27 Feb. 1963; P.H. Arnaud Jr leg.; EMEC • 1 ♀; same data as for preceding; 24 Feb. 1963; P.H. Arnaud Jr leg.; EMEC • 24 ♀♀; Navojoa; [27.072° N, 109.444° W]; 19 Aug. 1962; A.E. Michelbacher and M.M. Michelbacher leg.; ex domestic squash; EMEC • 1 ♀; Nogales; [31.308° N, 110.942° W]; 4 Sep. 1962; A.E. Michelbacher leg.; EMEC.

UNITED STATES – **Arizona** • 1 ♀; Santa Cruz Co., Patagonia; [31.54° N, 110.76° W]; 19 Apr. 1956; G.D. Butler leg.; ex alfalfa; ASUHIC.

Description

Female

Body measurements. Length 8.18 mm (±0.54 SD). Head length 1.89 mm (±0.04 SD). Face length 1.59 mm (±0.03 SD). Head width 1.97 mm (±0.05 SD). Wing length 5.60 mm (±0.10 SD). n = 5.

Colouration. Head and mesosoma black. Clypeus apex dark brown. Labrum dark brown. Mandible brown with dark brown base. Flagellum brown dorsally, light brown ventrally. Pronotal lobe brown. Tegula mostly dark brown, light brown medially. Wing membrane faintly brownish, veins with subcosta brown, otherwise light brown. Legs dark brown. Metasoma dark brown to brown with rims of terga, sterna and downcurved lateral areas of terga broadly light brown.

Pubescence. Body hair colour off-white. Tomentum dense on pronotal angle and lobe, space between pronotal lobe and tegula, metanotum, propodeum lateral surface anterodorsally, and T2–T4 basolaterally; moderately dense on gena, anterolateral angle and marginally on mesoscutum; sparse on paraocular area, propodeum posterior surface mostly on dorsally. Mesosoma covered by appressed, simple, very short hairs (<0.25 OD) mixed with sparse, erect, weakly plumose, long hairs (<1 OD) on mesoscutum and erect, plumose, long hairs (<2 OD) on other areas. Metasomal sterna with moderately sparse, erect, weakly plumose, long (<3 OD) hairs. Wing hairs brown, very short and sparse. T1 with a fan, narrow dorsal opening (0.5 OD), composed of overlapping sub-appressed simple hairs (< 2 OD).

Surface sculpturing. Clypeus tessellate, becoming polished apical half; punctures irregularly sparse (IS<4 PD) apically and medially, becoming smaller and denser (IS<1 PD) basolaterally. Supraclypeal area tessellate medially, imbricate posterolaterally; punctures fine, dense (IS≤1 PD). Frons reticulate-punctate punctures crowded (IS = 0 PD). Ocellocular area polished; punctures moderately sparse (IS = 1–2 PD) and distinctly doubly punctate with minute punctures throughout. Gena polished, becoming

lineolate posteriorly; punctures dense (IS ≤ 1PD), becoming obscure posteriorly. Postgena polished, weakly lineolate adjacent to hypostomal carina. Tegula punctures dense (IS ≤ 1PD) in the anterior half and basally, becoming impunctate posteriorly. Mesoscutum tessellate to imbricate throughout; punctures dense (IS ≤ 1 PD), becoming anteromedially moderately sparse (IS = 1–2 PD), doubly punctate. Mesoscutellum polished medially, becoming weakly rugulose to imbricate marginally; punctures dense (IS < 1 PD) marginally and on median line, sparse submedially (IS = 1–3 PD), diversopunctate. Metanotum weakly rugulose, punctures obscure. Propodeal triangle with rugae weak, only visible laterally, weakly anastomosing, extending to dorsolateral slope; interspace sculpture strongly imbricate. Preëpisternum rugulose. Hypoepimeron strongly rugulose; punctures obscure. Mesepisternum rugulose,

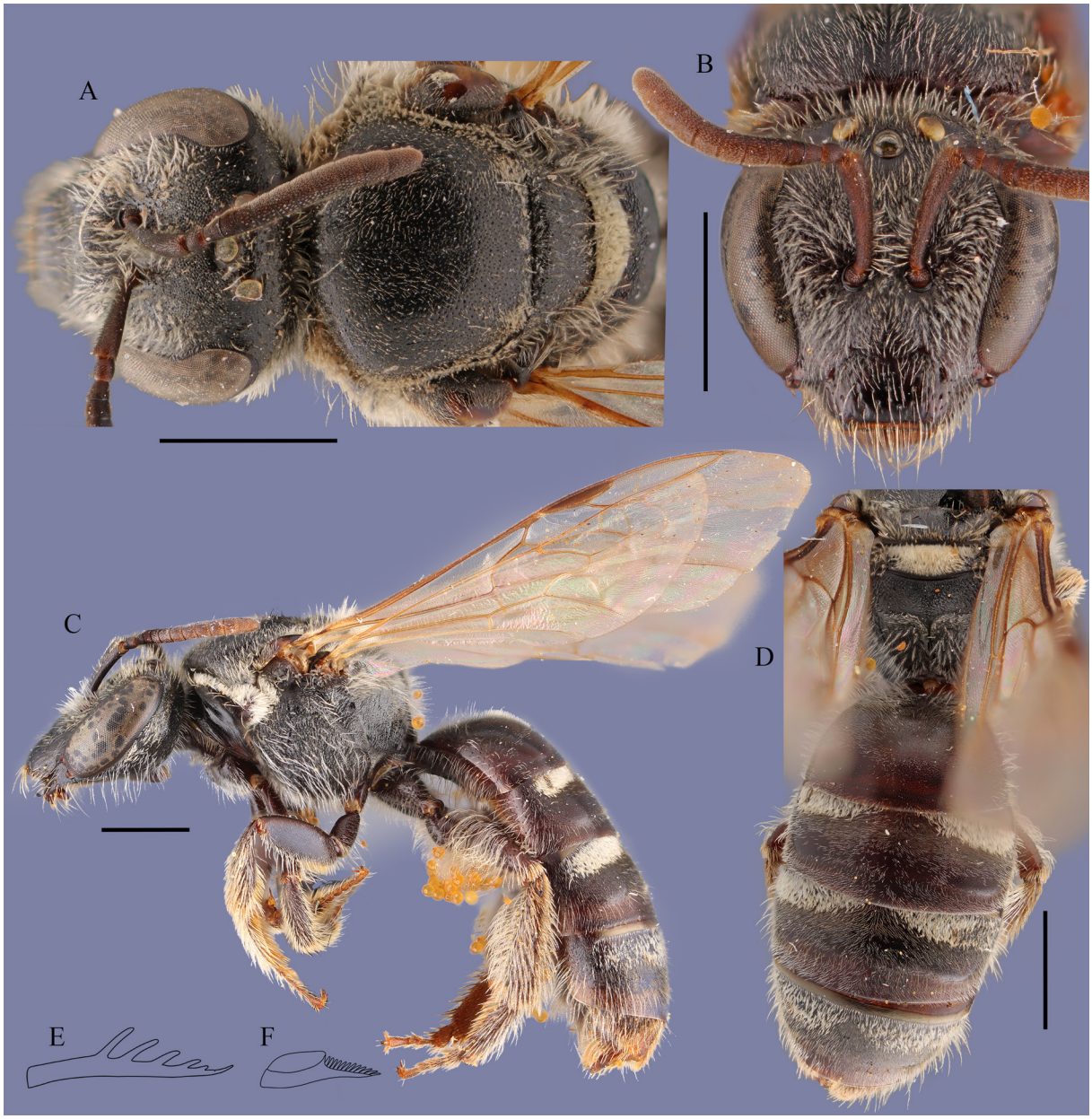


Fig. 54. *Lasioglossum* (*Hemihalictus*) *opata* sp. nov., holotype, ♀ (EMEC). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

becoming strigate-rugulose anteroventrally. Propodeum lateral face imbricate; posterior face rugulose. T1 anterior face dull, strongly coriarious; dorsal surface polished to coriarious, punctures sparse (IS = 1–3 PD), becoming more sparsely punctate (IS = 2–7 PD) in small subapicolateral boss and punctures minute, and sparse (IS = 1–3 PD) on rim, becoming impunctate apical half and medially on rim. T2 disc weakly coriarious to polished, punctures moderately dense (IS =1–2 PD) basally, becoming sparse (IS = 1–4 PD) apically; rim coriarious, punctures minute and sparse (IS = 1–3 PD).

Structure. Head round, length/width ratio 0.96 (±0.01 SD). Face length/width ratio 0.81 (±0.01 SD). Clypeus projecting ~77% below suborbital tangent; clypeus length/width ratio 1.07 (±0.08 SD). Mandible short, just extending beyond opposing clypeal angle. Eyes convergent below, UOD/LOD ratio 1.13 (±0.01 SD). Ocelli normal. Gena/eye width ratio 0.85 (±0.06 SD). Pronotal angle obtuse. Intertegular span 1.47 mm (±0.05 SD). Mesoscutum length/width ratio 0.93 (±0.03 SD); mesoscutum/scutellum length ratio 2.90 (±0.14 SD); scutellum/metanotum length ratio 1.53 (±0.16 SD); metanotum/propodeal triangle length ratio 0.88 (±0.10 SD). Protibial spur with apical serrations subequal in length to width of malus; malus extending beyond the velum, nearly as length as velum. Inner metatibial spur pectinate, teeth 4–5, basal teeth longer than width of rachis. Propodeal triangle posterior margin angled onto posterior propodeal surface, apical carina faint. Propodeal lateral carina reaching dorsolateral slope; oblique carina indistinct. n = 5.

Male

Unknown.

Range

Sonoran Deserts to southern Arizona (Fig. 55).

Floral hosts

CUCURBITACEAE: *Cucurbita* sp. • FABACEAE: *Medicago sativa* L.



Fig. 55. Distribution map of *Lasioglossum* (*Hemihalictus*) *opata* sp. nov. Produced by Simplemappr (Shorthouse 2010).

Lasioglossum* (*Hemihalictus*) *ovaliceps (Cockerell, 1898)
Figs 56–59, 95F, 98C, 104L, 112D, 119A, 120J

Halictus ovaliceps Cockerell, 1898: 45.

Halictus ovaliceps – Crawford 1907a: 184 (key).
Lasioglossum (*Evylaeus*) *ovaliceps* – Michener 1951: 1109 (catalogue).
Evylaeus ovaliceps – Hurd 1979: 1961 (catalogue). — Moure & Hurd 1987: 78 (catalogue).

Etymology

The specific epithet is a reference to the head shape, which Cockerell describes as 'longitudinally oval'.

Diagnosis

Both sexes of *L. ovaliceps* can be recognized by the combination of head long, female and male head length/width ratio 1.10 (±0.02 SD) and 1.22 (±0.02 SD), respectively; propodeal triangle with rugae partially extending to the posterior margin; and metasoma orange. *Lasioglossum aspilurus* also has an orange metasoma, but the later species has a much wider head, female and male head length/width ratio 0.91 (±0.01 SD) and 0.96 (±0.02 SD), respectively, and the rugae of the propodeal triangle almost reaching the posterior margin. There are dark morphs of male *L. ovaliceps* with brown metasoma. In this case, they could be confused with *L. buccale* males, but males of *L. buccale* are comparatively larger (7.5–8.5 mm); clypeus slightly yellow only apically; the rugae of the propodeal triangle reaching posterior margin.

Lasioglossum ovaliceps are superficially similar in colour to *Sphecodes*, but the generic characters for *Lasioglossum* will distinguish them and the long head and yellow maculation of the male is not present in *Sphecodes*.

Members of the *L.* (*Dialictus*) *petrellus* species group typically have long heads and reddish metasoma but have the head and mesosoma dull-metallic (Gibbs 2009).

Type material

Syntype of *Halictus ovaliceps* (designated herewith; examined by photos)
UNITED STATES – **New Mexico** • 1 ♀; Santa Fe Co., Santa Fe; [35.67° N, 105.96° W]; Aug; Boyle leg.; USNM Type No. 5832..

Specimen labels
"Ckll. 4034. / Sta Fe. Aug. / Boyle. // Type / No. 5832 / U.S.N.M. // *H. ovaliceps* / Ckll. TYPE. // USNMENT / 01735680".

Type notes

The species was described as part of a key and no information on the composition of the type series was available in the original description. Following recommendation 73F of the Code, we assume the existence of a syntype series. A specimen at the USNM (above) is labelled as 'type'. The identity of the species is not in dispute, so no lectotype designation is required.

Material examined

CANADA – **Alberta** • 1 ♀; Cypress Co., Cypress Hills PP, Battle Creek Rd, Graburn Overlook; 49.6625° N, 110.042222° W; elev. 1220–1260 m; 6–7 Jun 2025; M. Buck leg.; PMAE • 1 ♀; Onefour; 49.156167° N, 110.273278° W; 29 Jul. 2010; N. de Silva leg.; RSKM • 1 ♀; Waterton ID, Waterton NP, Lower Waterton Lake, E side; 49.088333° N, 113.845833° W; elev. 1280 m; 19 Jul 2023; M. Buck

leg.; PMAE. – **British Columbia** • 1 ♀; Ag. Can. Rea. Stn; [49.57° N, 119.64° W]; 27 Jun. 1990; S.G. Cannings leg.; UBCZ • 1 ♀; Nanaimo, Biological Station; [49.211° N, 123.955° W]; 23 Jun. 1920; E.P. Van Duzee leg.; CAS • 1 ♀; Okanagan-Similkameen Reg. Dist. Osoyoos, Mt Kruger, Strawberry Creek. Road., N-site; 49.0399° N, 119.5084° W; elev. 505 m; 21 Jun. 2008; L.R. Best leg.; WRME • 2 ♀♀; Okanagan-Similkameen Reg. Dist., Mt Oliver, Ripley Lake; 49.2429° N, 119.6326° W; elev. 935 m; 2 May 2009; L.R. Best leg.; PCYU • 1 ♀; Okanagan-Similkameen Reg. Dist., Ripley Lake; 49.243355° N, 119.634954° W; elev. 950 m; 25 Mar. 2009; L.R. Best leg.; PCYU • 1 ♀; Oliver, Burnell Lake; 49.207887° N, 119.612148° W; 27 Jun. 2020; UBCZ • 1 ♀; Penticton, West Bench; [49.495° N, 119.618° W]; 14 Jun. 1987; S.G. Cannings leg.; UBCZ • 1 ♀; same data as for preceding; 24 Jun. 1988; S.G. Cannings leg.; UBCZ • 1 ♀; Squamish, Keyhole Hotsprings; 50.668404° N, 123.460826° W; 16 Jun. 2020; J. Heron leg.; RSKM.

UNITED STATES – **California** • 1 ♀; Alameda Co., Oakland; [37.804° N, 122.271° W]; 21 May 1937; E.S. Ross leg.; CAS • 1 ♀; same data as for preceding; 20 Apr. 1952; R. Schuster leg.; EMEC • 1 ♀; Alameda Co., Tesla; [37.62° N, 121.49° W]; 27 Apr. 1960; W.F. Ehrhardt leg.; EMEC • 1 ♂; Alpine Co., 1 mi. S of Monitor Pass; [38.661° N, 119.621° W]; elev. 2499.4 m; 22–23 Aug. 1979; M. Wasbauer and P. Adams leg.; CSCA • 1 ♀; Alpine Co., Hope Valley; [38.780° N, 119.930° W]; 18 Jul. 1948; EMEC • 1 ♀; Alpine Co., Woodfords; [38.79° N, 119.82° W]; 12 Jun. 1962; EMEC • 1 ♀; Calaveras Co., 1.5 mi. SE of Railroad Flat; [38.327° N, 120.492° W]; 1–2 Jun. 1970; EMEC • 1 ♀; same data as for preceding; 1 Jun. 1970; EMEC • 8 ♀♀; Calaveras Co., 4 mi. S of Railway Flat; [38.285° N, 120.513° W]; elev. 853.4 m; 18 May 1969; ex *Chamaebatia foliolosa*; EMEC (Fig. 56D) • 4 ♀♀; same data as for preceding; 19 May 1969; EMEC • 1 ♀; Calaveras Co., Copperopolis; [37.981° N, 120.642° W]; 15 Apr. 1954; EMEC • 1 ♀; same data as for preceding; 25 Apr. 1954; EMEC • 1 ♀; Calaveras Co., Mokel Hill; [38.301° N, 120.706° W]; Apr; F.E. Blaisdell leg.; CAS • 1 ♀; Contra Costa Co., Mount Diablo; [37.882° N, 121.914° W]; 25 Jun. 1939; E.C. Van Dyke leg.; CAS • 1 ♀; Del Norte Co., Gasquet; [41.845° N, 123.969° W]; 6 Jul. 1960; T.R. Haig leg.; CSCA • 1 ♀; El Dorado Co., 3 mi. S of Camino; [38.694° N, 120.674° W]; 26 Jun. 1948; P.D. Hurd leg.; EMEC • 1 ♀; El Dorado Co., Angora Peak; [38.867° N, 120.073° W]; elev. 2628.9 m; 19 Jul. 1931; E.O. Essig leg.; EMEC • 1 ♀; El Dorado Co., Blodgett Forest, 13 mi. E of Georgetown; [38.892° N, 120.663° W]; 20 Jul. 1967; EMEC • 1 ♀; El Dorado Co., Camino; [38.738° N, 120.675° W]; 19 Jun. 1958; EMEC • 2 ♀♀; El Dorado Co., Echo Lake; [38.834° N, 120.042° W]; elev. 2255.5 m; 30 Jul. 1955; EMEC • 1 ♀; same data as for preceding; 17 Jul. 1961; EMEC • 4 ♀♀; same data as for preceding; 20 Jul. 1960; EMEC • 4 ♀♀; same data as for preceding; 8 Jul. 1961; EMEC • 6 ♀♀; same data as for preceding; 9 Jul. 1961; EMEC • 2 ♀♀; same data as for preceding; 13 Jul. 1956; EMEC • 1 ♀; same data as for preceding; 17 Jun. 1961; EMEC • 1 ♀; same data as for preceding; 1 Jul. 1954; W.W. Middlekauff leg.; EMEC • 1 ♀; same data as for preceding; 29 Jun. 1954; W.W. Middlekauff leg.; EMEC • 1 ♀; same data as for preceding; 17 Jul. 1956; W.W. Middlekauff leg.; EMEC • 1 ♀; same data as for preceding; 2 Jul. 1951; W.W. Middlekauff leg.; EMEC • 1 ♀; same data as for preceding; 6 Jul. 1951; W.W. Middlekauff leg.; EMEC • 1 ♀; same data as for preceding; 9 Jul. 1951; W.W. Middlekauff leg.; EMEC • 1 ♀; same data as for preceding; 21 Jul. 1948; P.D. Hurd leg.; EMEC • 1 ♀; Fresno Co., Sulphur Mdw., Shaver Lake; [37.1042° N, 119.3175° W]; 12–19 Jun. 1968; J.R. Hoy leg.; UCMC • 1 ♀; Humboldt Co., Orleans; [41.301° N, 123.54° W]; 12 Jun. 1961; T.W. Koerber leg.; USNM • 2 ♀♀; Inyo Co., Big Pine Creek Campground; [38.796° N, 116.85° W]; 14 Jul. 1927; P.H. Timberlake leg.; ex *Castilleja applegatei* subsp. *pinetorum* (verbatim: *Castilleja pinetorum*); UCRC • 1 ♂; same data as for preceding; 4 Jul. 1927; P.H. Timberlake leg.; ex *Castilleja applegatei* subsp. *pinetorum* (verbatim: *Castilleja pinetorum*); UCRC • 1 ♂; Inyo Co., Lone Pine; [36.61° N, 118.06° W]; 16 Jun. 1937; E.C. Van Dyke leg.; CAS • 2 ♀♀; Inyo Co., Panamint Mountains; [36.17° N, 117.089° W]; 25 Apr. 1953; P.H. Timberlake leg.; ex Datura inoxia (verbatim: Datura meteloides); UCRC • 1 ♀; Inyo Co., Surprise Canyon; [36.113° N, 117.16° W]; 28 Apr. 1953; C.A. Marsh leg.; ex Eucnide urens; EMEC • 1 ♀; Inyo Co., Surprise Canyon, Panamint Mountains; [36.113° N, 117.160° W]; 24 Apr. 1957; J. Powell leg.; EMEC • 1 ♀; Kern Co., 8 mi. NW of Mojave;

[35.126° N, 118.271° W]; 13 Apr. 1957; EMEC • 1 ♀; Kern Co., Alder Creek Campground; [35.719° N, 118.612° W]; 19 Jul. 1958; EMEC • 1 ♀; Kern Co., Greenhorn MB; [35.729° N, 118.552° W]; 10 Jul. 1955; EMEC • 1 ♀; Kern or Tulare Co., Greenhorn Mountains; [35.85° N, 118.573° W]; 10 Jul. 1955; EMEC • 1 ♀; King Co.; 47.5039° N, 122.2757° W; 19 Apr. 2015; R. Redmond and E.A. Sugden leg.; WRME • 2 ♀♀; Lake Co., 0.1 mi. S of Hobergs; [38.842° N, 122.723° W]; 2 Jun. 1968; ex *Clarkia rhomboidea*; EMEC • 1 ♀; Lake Co., Bartlett Springs Road (8.2 mi. NE) junction Hwy 20; [38.136° N, 122.766° W]; elev. 1097.3 m; 28 Jul. 1980; ex *Keckiella lemmonii*; EMEC • 1 ♀; Lassen Co., Susanville; [40.42° N, 120.65° W]; 15 Jul. 2011; EMEC • 1 ♀; Los Angeles Co., Acton; [34.480° N, 118.190° W]; 14 Mar. 1936; E.G. Linsley leg.; ex *Salix*; EMEC • 1 ♀; same data as for preceding; 19 Mar. 1936; E.G. Linsley leg.; ex *Salix*; EMEC • 1 ♀; Los Angeles Co., Arcadia; [34.133° N, 118.036° W]; MCZ • 2 ♀♀; Los Angeles Co., Bell Canyon, San Dimas Experimental Forest; [34.206° N, 118.690° W]; elev. 218.3 m; 2 May 1965; EMEC • 2 ♀♀; Los Angeles Co., Benedict Canyon; [34.099° N, 118.431° W]; (?) Mar. 1971; EMEC • 1 ♀; Los Angeles Co., Catalina Island; [33.382° N, 118.430° W]; 6 Apr. 1938; W.P. Cockerell leg.; CAS • 1 ♀; Los Angeles Co., Claremont; [34.100° N, 117.720° W]; 15 May 1928; EMEC • 1 ♀; same data as for preceding; 4 May 1915; P.H. Timberlake leg.; ex *Penstemon spectabilis*; UCRC • 1 ♀; same data as for preceding; 27 Apr. 1927; T. Craig leg.; CAS • 1 ♀; same data as for preceding; 8 Mar. 1909; USNM • 7 ♀♀; same data as for preceding; Baker leg.; USNM • 2 ♀♀; Los Angeles Co., Devil's Punchbowl; [34.420° N, 117.852° W]; 1 May 1968; EMEC • 1 ♀; Los Angeles Co., Fish Canon; [34.602° N, 118.665° W]; 25 Apr. 1928; EMEC • 1 ♀; Los Angeles Co., Griffith Park; [34.137° N, 118.294° W]; 5 Apr. 1936; E.G. Linsley leg.; ex *Nemophila*; EMEC • 1 ♀; Los Angeles Co., Los Angeles; [34.050° N, 118.240° W]; 21 Apr. 2017; EMEC • 1 ♀; Los Angeles Co., Monrovia; [34.150° N, 118.000° W]; 15 Aug. 1949; EMEC • 6 ♀♀; Los Angeles Co., Mts near Claremont; [34.161° N, 117.716° W]; Baker leg.; USNM • 1 ♀; same data as for preceding; Baker leg.; ex *Salix*; USNM • 1 ♀; Los Angeles Co., near Solromar; [34.052° N, 118.942° W]; 28 Jun. 1958; P.H. Arnaud leg.; ex *Photinia*; CSCA • 1 ♀; Los Angeles Co., Pasadena; [34.156° N, 118.131° W]; 2 Jun. 1944; MCZ • 1 ♀; Los Angeles Co., Puente Hills; [33.999° N, 117.917° W]; 8 May 1927; P.H. Timberlake leg.; ex *Brassica nigra*; UCRC • 1 ♀; Los Angeles Co., San Gabriel Canyon; [34.249° N, 117.866° W]; 7 Jul. 1946; EMEC • 1 ♀; Los Angeles Co., Tanbark Flat; [34.204° N, 117.760° W]; 10 Jul. 1950; EMEC • 1 ♀; same data as for preceding; 14 Jun. 1950; H.M. Graham leg.; EMEC • 1 ♀; Los Angeles Co., Tapia Park; [34.084° N, 118.707° W]; 9 May 1969; EMEC • 2 ♀♀; Los Angeles Co., Three Points; [34.736° N, 118.598° W]; 2 May 1968; EMEC • 1 ♀; Los Angeles Co., Westwood Hills; [38.302° N, 122.320° W]; 3 Jun. 1937; N.E. Hardman leg.; ex *Brassica*; EMEC • 1 ♀; Los Angeles Co., Whittier; [33.971° N, 118.031° W]; 13 Mar. 1926; P.H. Timberlake leg.; ex *Mirabilis laevis* var. *laevis* (verbatim: *Mirabilis californica*); UCRC • 1 ♀; same data as for preceding; 16 Apr. 1913; P.H. Timberlake leg.; ex *Rubus vitifolius*; USNM • 1 ♀; Los Angeles Co.; [34.33° N, 118.23° W]; 18 Jun. 1915; M.C. Van Duzee leg.; CAS • 1 ♀; same data as for preceding; 6321; EMEC • 2 ♀♀; same data as for preceding; USNM • 1 ♀; Madera Co., San Joaquin Experimental Range; [37.083° N, 119.716° W]; 18 Apr. 1953; P.D. Hurd leg.; ex *Phacelia platyloba*; EMEC • 1 ♀; Marin Co., Blue(?) Valley; 18 May 1919; C.L. Fox leg.; CAS • 1 ♀; Marin Co., Corte Madera C reek; [37.942° N, 122.502° W]; 1–30 Apr. 1915; EMEC • 1 ♀; Marin Co., Inverness; [38.101° N, 122.857° W]; 14 May 1961; C.A. Toschi leg.; EMEC • 1 ♀; Marin Co., Mill Valley; [37.906° N, 122.545° W]; 7 Nov. 1950; H.B. Leech leg.; CAS • 1 ♀; Mariposa Co., 1 mi. W of Mt Bullion; [37.507° N, 120.063° W]; 2 May 1960; ex *Cryptantha*; EMEC • 1 ♀; Mariposa Co., Exchequer Dam; [37.586° N, 120.269° W]; 10 Apr. 1960; ex *Phacelia*; EMEC • 1 ♀; Mendocino Co., UC Hopland Field Station near headquarters; [39.001° N, 123.083° W]; elev. 268.2 m; 2 Jun. 1968; EMEC • 2 ♀♀; Modoc Co., 1 mi. E of Pine Creek; [41.982° N, 120.256° W]; 13 Jun. 1970; EMEC • 4 ♀♀; Modoc Co., 5 mi. N of Davis Creek; [39.372° N, 119.827° W]; 3 Jun. 1971; ex *Lithospermum ruderale*; EMEC • 4 ♀♀; Modoc Co., Buck Creek Ranger Station; [48.269° N, 121.333° W]; elev. 1569.7 m; 5–7 Jun. 1970; EMEC • 4 ♀♀; same data as for preceding; 5 Jun. 1970; EMEC • 1 ♀; Modoc Co., Fandango Pass; [41.802° N, 120.207° W]; elev. 1859.3 m; 7 Jun. 1970; ex *Wyethia*; EMEC • 5 ♀♀; same data as for preceding; 7 Jun. 1970; EMEC • 2 ♀♀; Modoc Co., Rush Creek; 9 mi. NE of Adin; [41.263° N, 120.894° W]; 12 Jun. 1974; EMEC • 2 ♀♀; Mono Co., 7 mi. E of Bodie; [38.212° N,

118.885° W]; 2 Jul. 1964; EMEC • 1 ♀; Mono Co., Blanco's Corral, White Mountains; [37.819° N, 118.476° W]; 25 Jul. 1960; EMEC • 1 ♀; same data as for preceding; 25 Aug. 1960; EMEC • 1 ♂; same data as for preceding; 25 Aug. 1960; P.D. Hurd leg.; EMEC • 1 ♂; same data as for preceding; 25 Aug. 1960; P.D. Hurd leg.; ex *Senecio*; EMEC • 1 ♀; Mono Co., McGee Creek; [37.573° N, 118.791° W]; 28 Jun. 1938; EMEC • 1 ♀; Mono Co., Paradise Camp; [38.288° N, 119.215° W]; 10 Aug. 1961; O.D. MacNeill leg.; CAS • 1 ♀; Mono Co., Silver Lake; [37.778° N, 119.123° W]; 16 Aug. 1948; W.S. Kelson leg.; EMEC • 1 ♂; Mono Co., 1 mi. W of Tom's Place; [37.561° N, 118.700° W]; 13 Aug. 1957; EMEC • 1 ♀; Monterey Co., 4 mi. W of Soledad; [36.424° N, 121.398° W]; 17 Aug. 1964; G.R. Ballmer leg.; UCRC • 1 ♀; Monterey Co., 5 air mi. SW of Greenfield, Arroyo Seco River; [36.268° N, 121.308° W]; elev. 121.9 m; 5 May 1975; EMEC • 1 ♀; Monterey Co., Arroyo Seco River, 5 air mi. SW of Greenfield; [36.269° N, 121.307° W]; elev. 121.9 m; 5 May 1975; EMEC • 1 ♀; Monterey Co., Carmel; [36.555° N, 121.923° W]; 5 May 1930; L.S. Slevin leg.; CAS • 1 ♀; Monterey Co., Carmel Valley; [36.480° N, 121.735° W]; 6 Aug. 1967; T. Plichta and L. LaPre leg.; UCRC • 1 ♀; Monterey Co., Cone Peak, Santa Lucia Mountains; [36.031° N, 121.295° W]; elev. 1219.2 m; 25 Jul. 1980; ex *Keckiella corymbosa*; EMEC • 2 ♀♀; Monterey Co., Indians Rd, 3 air mi. S of Arroyo Seco Guard Station; [36.191° N, 121.493° W]; elev. 823 m; 7 May 1975; EMEC • 1 ♀; Monterey Co., Pebble Beach; [36.566° N, 121.947° W]; 1–30 April 1906; W.P. Cockerell leg.; ex *Scrophularia villosa*; MCZ • 4 ♀♀; Nevada Co., 6 mi. SW of Colfax; [39.039° N, 121.034° W]; 18 Apr. 1968; EMEC • 3 ♂♂; Nevada Co., Grass Valley; [39.219° N, 121.058° W]; elev. 762 m; 23 Jun. 1979; M. Wasbauer and F. Hillermann leg.; CSCA • 2 ♀♀; Nevada Co., Truckee; [39.325° N, 120.184° W]; 15 Jun. 1927; E.P. Van Duzee leg.; CAS • 2 ♀♀; same data as for preceding; 17 Jun. 1927; E.P. Van Duzee leg.; CAS • 1 ♀; same data as for preceding; 21 Jun. 1933; E.P. Van Duzee leg.; CAS • 1 ♀; same data as for preceding; 14 Jun. 1927; E.P. Van Duzee leg.; CAS • 3 ♀♀; Orange Co., Mount Santiago; [33.711° N, 117.534° W]; 19 Sep. 1926; P.H. Timberlake leg.; ex *Ericameria parishii*; UCRC • 1 ♀; same data as for preceding; 19 Sep. 1926; P.H. Timberlake leg.; ex *Solidago velutina* subsp. *californica* (verbatim: *Solidago californica*); UCRC • 1 ♀; Orange Co., Silverado; [33.746° N, 117.636° W]; 3 Nov. 1951; EMEC • 1 ♀; Orange Co., Starr Ranch Audubon Sanctuary, Santa Ana Mountains; [33.632° N, 117.555° W]; elev. 274.3 m; 13 Jul. 1980; ex *Keckiella cordifolia*; EMEC • 1 ♂; Placer Co., Ward Creek, 2 mi. S of Tahoe City; [39.129° N, 120.155° W]; elev. 1844 m; 31 Aug. 1974; EMEC • 1 ♀; Plumas Co., Meadow Valley; [39.937° N, 121.062° W]; 5 Jun. 1924; E.P. Van Duzee leg.; CAS • 2 ♀♀; Plumas Co., Spencer Lakes Road, 7 mi. SW of Johnsville; [39.6763° N, 120.7513° W]; 10 Sep. 1961; J.S. Buckett leg.; UCDC • 1 ♀; Riverside Co., 14 mi. SE of Upper Palm Canyon, Keen Camp Summit; [33.685° N, 116.704° W]; 8 Jul. 1964; E.I. Schlinger leg.; UCRC • 1 ♀; Riverside Co., Corona; [33.87° N, 117.57° W]; 9 Mar. 1972; ex *Paeonia californica*; EMEC • 2 ♀♀; same data as for preceding; 19 Mar. 1972; ex *Paeonia californica*; EMEC • 1 ♀; Riverside Co., Elsinore; [33.681° N, 117.345° W]; Baker leg.; USNM • 2 ♀♀; Riverside Co., Fern Valley; [33.759° N, 116.698° W]; elev. 1981.2 m; 25 Jul. 1965; E.I. Schlinger leg.; UCRC • 1 ♀; Riverside Co., Gavilan Hills; [33.7944° N, 117.3558° W]; elev. 620 m; 27 Apr. 1938; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 6 Apr. 1982; P.H. Timberlake leg.; ex *Scrophularia*; UCRC • 2 ♀♀; same data as for preceding; 7 Apr. 1939; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 6 Apr. 1956; P.H. Timberlake leg.; ex *Salvia mellifera*; UCRC • 1 ♀; same data as for preceding; 4 May 1938; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 2 ♀♀; same data as for preceding; 29 Mar. 1950; P.H. Timberlake leg.; ex *Scrophularia heterophylla* subsp. *laciniata* (verbatim: *Scrophularia laciniata*); UCRC • 1 ♀; Riverside Co., Idyllwild, San Jacinto Mountains; [33.748° N, 116.715° W]; 9 Jun. 1940; C.D. Michener leg.; ex *Penstemon spectabilis*; EMEC • 1 ♀; Riverside Co., Riverside; [33.9556° N, 117.3722° W]; elev. 290 m; 11 Jul. 1942; EMEC • 3 ♀♀; same data as for preceding; 3 Apr. 1928; P.H. Timberlake leg.; ex *Scrophularia californica*; MCZ • 1 ♀; same data as for preceding; 28 Apr. 1925; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 26 Mar. 1928; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 1 ♀; same data as for preceding; 29 Mar. 1928; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 21 Mar. 1926; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data

as for preceding; 4 Mar. 1930; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 20 Mar. 1939; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 2 ♀♀; same data as for preceding; 20 Mar. 1934; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 19 Mar. 1936; C.M. Dammers leg.; UCRC • 1 ♀; same data as for preceding; 27 Mar. 1929; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 22 Mar. 1938; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 30 Mar. 1938; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 2 ♀♀; same data as for preceding; 23 Mar. 1936; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 25 Mar. 1929; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 3 ♀♀; same data as for preceding; 16 Mar. 1928; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 30 Mar. 1926; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 21 Mar. 1926; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 2 ♀♀; same data as for preceding; 24 Mar. 1926; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 16 Mar. 1925; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 22 Mar. 1926; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 18 Mar. 1926; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 2 ♀♀; same data as for preceding; 2 Mar. 1925; P.H. Timberlake leg.; ex *Scrophularia*; UCRC • 1 ♀; same data as for preceding; 19 Mar. 1934; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 2 ♀♀; same data as for preceding; 10 Mar. 1936; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 2 ♀♀; same data as for preceding; 1 Mar. 1926; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 2 Mar. 1926; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 5 Mar. 1940; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 1 ♀; same data as for preceding; 21 Apr. 1926; P.H. Timberlake leg.; ex *Salvia polystachya*; UCRC • 1 ♀; same data as for preceding; 17 Apr. 1939; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 15 Apr. 1939; P.H. Timberlake leg.; ex *Cryptantha intermedia*; UCRC • 1 ♀; same data as for preceding; 29 Apr. 1937; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 3 ♀♀; same data as for preceding; 16 Apr. 1930; P.H. Timberlake leg.; ex *Salvia mellifera*; UCRC • 1 ♀; same data as for preceding; 29 Apr. 1929; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 26 Apr. 1935; P.H. Timberlake leg.; ex *Salvia mellifera*; UCRC • 1 ♀; same data as for preceding; 17 Apr. 1928; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 27 Apr. 1928; P.H. Timberlake leg.; ex *Salvia apiana*; UCRC • 1 ♀; same data as for preceding; 20 Apr. 1927; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 15 Apr. 1930; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 9 Apr. 1954; P.H. Timberlake leg.; ex *Salvia*; UCRC • 1 ♀; same data as for preceding; 10 Apr. 1926; P.H. Timberlake leg.; ex *Salvia*; UCRC • 1 ♀; same data as for preceding; 3 Apr. 1928; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 1 ♀; same data as for preceding; 11 Apr. 1929; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 16 Apr. 1929; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 11 Apr. 1930; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 10 Apr. 1930; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 7 Apr. 1930; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 1 ♀; same data as for preceding; 8 Apr. 1936; P.H. Timberlake leg.; ex *Acmispon glaber* (verbatim: *Lotus scoparius*); UCRC • 1 ♀; same data as for preceding; 12 Apr. 1935; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 10 Apr. 1930; P.H. Timberlake leg.; ex *Salvia columbariae* (verbatim: *Salvia columbarius*); UCRC • 1 ♀; same data as for preceding; 9 Apr. 1934; P.H. Timberlake leg.; ex *Salvia columbariae* (verbatim: *Salvia columbarius*); UCRC • 1 ♀; same data as for preceding; 10 Apr. 1930; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 1 ♀; same data as for preceding; 8 Apr. 1927; P.H. Timberlake leg.; ex *Phacelia minor*; UCRC • 1 ♀; same data as for preceding; 3 Apr. 1930; P.H. Timberlake leg.; ex *Acmispon glaber* (verbatim: *Lotus scoparius*); UCRC • 1 ♀; same data as for preceding; 2 Apr. 1930; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 2 Apr. 1936; P.H. Timberlake leg.;

ex *Acmispon glaber* (verbatim: *Lotus scoparius*); UCRC • 1 ♀; same data as for preceding; 2 Apr. 1930; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 7 Apr. 1925; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 25 May 1929; P.H. Timberlake leg.; ex *Calendula*; UCRC • 1 ♀; same data as for preceding; 9 May 1926; P.H. Timberlake leg.; ex *Melilotus indicus*; UCRC • 1 ♀; same data as for preceding; 15 May 1926; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 15 May 1926; H. Compere leg.; UCRC • 1 ♀; same data as for preceding; 15 May 1928; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 19 May 1928; P.H. Timberlake leg.; ex *Coreopsis*; UCRC • 1 ♀; same data as for preceding; 6 May 1977; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 4 ♀♀; same data as for preceding; 22 Jul. 1927; P.H. Timberlake leg.; ex *Canna*; UCRC • 1 ♀; same data as for preceding; 19 Jun. 1939; P.H. Timberlake leg.; ex *Scrophularia californica*; UCRC • 1 ♀; same data as for preceding; 6 Apr. 1927; P.H. Timberlake leg.; ex *Scrophularia californica*; USNM • 1 ♀; same data as for preceding; 12 May 1934; P.H. Timberlake leg.; ex *Calendula*; EMEC • 1 ♀; same data as for preceding; 6 May 1934; P.H. Timberlake leg.; ex *Scrophularia californica*; EMEC • 1 ♀; Riverside Co., Tin Mine Canyon; [33.836° N, 117.610° W]; elev. 381–533.4 m; 6 Apr. 1968; E.I. Schlinger leg.; ex *Salvia mellifera*; UCRC • 5 ♀♀; Sacramento Co., 10 mi. NE of Folsom; [38.778° N, 121.044° W]; 10 Apr. 1960; M. Wasbauer leg.; ex *Salvia sonomensis*; CSCA • 1 ♀; Sacramento Co., Michigan Bar; [38.499° N, 121.045° W]; 19 Apr. 1961; M.E. Irwin leg.; UCDC • 2 ♀♀; same data as for preceding; 19 Apr. 1961; F.D. Parker leg.; UCDC • 1 ♀; Sacramento Co., Sacramento Valley; [39.000° N, 121.500° W]; 16 Jun. 1928; P.H. Timberlake leg.; ex *Fremontodendron californicum* (verbatim: *Fremontia californica*); UCRC • 1 ♀; San Benito Co., 5 mi. S of Bitterwater; [36.308° N, 121.001° W]; 2 Jul. 1954; C.W. O'Brien leg.; EMEC • 1 ♀; San Benito Co., Deep Creek; [34.271° N, 117.131° W]; 28 Apr. 1936; E.G. Linsley leg.; ex *Lotus*; EMEC • 1 ♀; San Benito Co., Idria (Gem Mine); [36.410° N, 120.670° W]; 29 Jun. 1955; P.D. Hurd leg.; ex *Phacelia*; EMEC • 2 ♀♀; San Benito Co., Lime Kiln Canyon, SW of Paicines; [34.273° N, 118.557° W]; 24 Apr. 1968; EMEC • 4 ♀♀; San Benito Co., Lime Kiln Road, 5 mi. SW of Paicines; [36.689° N, 121.344° W]; 24 Mar. 1966; EMEC • 1 ♀; San Bernardino Co., Camp Baldy; [34.169° N, 117.9261° W]; 12 Jun. 2016; EMEC • 1 ♀; San Bernardino Co., Lake Arrowhead; [34.248° N, 117.189° W]; 26 Jul. 1944; G.P. Mackenzie leg.; UCRC • 2 ♀♀; San Bernardino Co., Lytle Creek; 7 mi. N of Fontana; [34.195° N, 117.441° W]; elev. 1585 m; 17 Apr. 1965; EMEC • 1 ♀; San Bernardino Co., Mill Creek; [40.326° N, 121.523° W]; 16 May 1948; P.H. Timberlake leg.; ex *Arctostaphylos patula*; UCRC • 1 ♀; same data as for preceding; 4 May 1948; P.H. Timberlake leg.; ex *Penstemon grinnellii*; UCRC • 1 ♀; same data as for preceding; 1 Sep. 1947; P.H. Timberlake leg.; ex *Erigeron divergens*; UCRC • 1 ♂; same data as for preceding; 10 Sep. 1945; P.H. Timberlake leg.; ex *Eriogonum*; UCRC (Figs 57–58) • 1 ♀; San Bernardino Co., Redlands; [34.055° N, 117.183° W]; 1913; F.R. Cole leg.; USNM • 1 ♀; San Bernardino Co., San Bernardino Mountains; [34.130° N, 116.880° W]; elev. 1524 m; 19 Aug. 1934; P.H. Timberlake leg.; ex Canna; UCRC • 2 ♀♀; San Bernardino Co., San Bernardino Mountains Little Mojave Valley; [34.289° N, 116.654° W]; 6400; EMEC • 1 ♂; San Bernardino Co., San Bernardino Mountains, Camp O-Ongo near Running Springs; [34.208° N, 117.109° W]; 1 Sep. 1967; EMEC • 1 ♀; San Bernardino Co., Seven Oaks; [34.186° N, 116.910° W]; 28 Jul. 1953; A.L. Melander leg.; USNM • 1 ♀; San Bernardino Co., Victorville; [34.536° N, 117.291° W]; 5 May 1956; W. Wasbauer leg.; EMEC • 2 ♀♀; San Diego Co., Borrego; [33.247° N, 116.372° W]; 31 Mar. 1953; ex *Cryptantha barbigera*; EMEC • 2 ♀♀; San Diego Co., Harbison Canyon; [32.820° N, 116.830° W]; 9 May 1963; EMEC • 1 ♀; San Diego Co., La Mesa; [32.771° N, 117.023° W]; 2 Apr. 1953; F.X. Williams leg.; CAS • 1 ♀; San Diego Co., Ocean Beach; [32.750° N, 117.240° W]; 7 Apr. 2018; J.I. Carlson leg.; CAS • 1 ♂; San Diego Co., Palomar; 33.3333° N, 116.8934° W; 9 Jul. 2014; K.J. Hung leg.; ex *Aquilegia formosa*; SDMC • 1 ♀; San Diego Co., San Diego; [32.720° N, 117.160° W]; 27 Mar. 1933; F.X. Williams leg.; CAS • 1 ♀; San Diego Co., San Ysidro; [32.555° N, 117.044° W]; 29 Apr. 1945; P.G. Teach leg.; ex *Rhus ovata*; UCRC • 1 ♀; San Diego Co., Warner Springs, Agua Caliente Creek; [33.279° N, 116.720° W]; elev. 944.9 m; 23–25 Aug. 1980; M. Wasbauer and P. Adams leg.; CSCA • 1 ♀; same data as for preceding; 26–28 Aug. 1980; M. Wasbauer and P. Adams leg.; CSCA • 1 ♀; San Diego Co., San Felipe Creek; [35.940° N, 121.080° W]; 5 Jun.

1936; P.H. Timberlake leg.; ex *Heliotropium curassavicum*; UCRC • 1 ♀; San Luis Obispo Co., 10 mi. S of Simmler; [35.206° N, 119.986° W]; 3 May 1962; ex *Eschscholtzia californica*; EMEC • 1 ♀; San Luis Obispo Co., 10 mi. W of Simmler; [35.352° N, 120.164° W]; 3 May 1962; ex *Eschscholtzia californica*; EMEC • 1 ♂; San Luis Obispo Co., 5.1 mi. NE of Santa Margarita; [35.442° N, 120.545° W]; 8 Jun. 1962; P.D. Hurd leg.; EMEC • 1 ♀; San Mateo Co., Huddart Park on Kings Mountain Road (5 km W) Woodside; [37.440° N, 122.292° W]; 22 May 1973; P.H. Arnaud Jr leg.; CAS • 1 ♀; San Mateo Co., Jasper Ridge; [37.408° N, 122.227° W]; (?) May 1924; EMEC • 1 ♀; Santa Barbara Co., New Cuyama; [34.948° N, 119.689° W]; 28 Mar. 1957; EMEC • 1 ♀; Santa Barbara Co., Rancho San Marcos HQ, Santa Ynez Mountains; [34.600° N, 119.830° W]; 5 Jul. 1956; E.G. Linsley leg.; ex *Phacelia grandiflora*; EMEC • 1 ♀; Santa Barbara Co., Santa Barbara Botanic Garden; [34.457° N, 119.710° W]; 22 Aug. 1939; P.H. Timberlake leg.; UCRC • 1 ♀; Santa Barbara Co., Santa Cruz Island; [34.004° N, 119.726° W]; 18 May 1919; E.P. Van Duzee leg.; CAS • 2 ♀♀; Santa Clara Co., Alum Rock Park; [37.396° N, 121.802° W]; 16 May 1965; EMEC • 1 ♀; Santa Clara Co., Mountain Home Canyon; [37.121° N, 121.796° W]; 15 Oct. 1956; A.L. Melander leg.; USNM • 1 ♀; Santa Clara Co., Stanford University, W. o Quad; [37.436° N, 122.157° W]; 21 Mar. 1915; H. Morrison leg.; USNM • 2 ♀♀; Santa Clara Co., Del Puerto Canyon, 17.5 mi. W of Patterson; [37.466° N, 121.448° W]; 19 Jun. 1965; EMEC • 2 ♀♀; Santa Clara Co.; [37.29° N, 121.74° W]; EMEC • 1 ♀; Shasta Co., 4 mi. S of Hat Creek; [40.771° N, 121.514° W]; 4 Jun. 1941; EMEC • 1 ♀; Shasta Co., Hat Creek; [40.79° N, 121.474° W]; 5 Jun. 1941; C.D. Michener leg.; EMEC • 1 ♀; same data as for preceding; 4 Jun. 1941; C.D. Michener leg.; EMEC • 1 ♀; Sierra Co., Tamarack Lake; 41.545° N, 121.793° W; 19 Jul. 1931; E.O. Essig leg.; EMEC • 2 ♀♀; Sierra Co., Sierra; [39.573° N, 120.637° W]; 19 Jun. 2013; EMEC • 1 ♀; Siskiyou Co., 14 mi. WSW of Coffee Creek, Josephine Lake; [41.016° N, 122.946° W]; 15 Aug. 1977; S. Kuba leg.; CSCA • 1 ♀; Siskiyou Co., Ash Creek Ranger Station; 9 mi. E of McCloud, sandy area near stream; [41.2532° N, 121.965° W]; elev. 1066.8 m; 7–9 Jun. 1974; EMEC • 1 ♀; Siskiyou Co., Ash Creek Ranger Station; 9 mi. E of McCloud; [41.253° N, 121.965° W]; elev. 1066.8 m; 7 Jun. 1974; EMEC • 4 ♀♀; Siskiyou Co., Jct. Forest Service Roads 42N13 41N06, 14 air mi. NE of McCloud; [41.399° N, 121.947° W]; 10 Jun. 1974; EMEC • 1 ♀; Siskiyou Co., McBride Springs; [41.353° N, 122.282° W]; elev. 1585 m; 10–14 Jun. 1974; EMEC • 1 ♀; same data as for preceding; 10 Jun. 1974; EMEC • 1 ♀; Sonoma Co., Bear Flat; [38.598° N, 122.965° W]; elev. 1524 m; 23 Aug. 1920; P.H. Timberlake leg.; UCRC • 1 ♀; Stanislaus Co., Adobe Creek W; [37.396° N, 121.375° W]; 6 Apr. 1949; W.W. Middlekauff leg.; EMEC • 1 ♀; Stanislaus Co., Del Puerto Canyon; [37.488° N, 121.207° W]; 2 Apr. 1961; ex *Phacelia*; EMEC • 1 ♀; same data as for preceding; 20 Apr. 1949; P.D. Hurd leg.; EMEC • 1 ♀; Stanislaus Co., Knight's Ferry; [37.820° N, 120.664° W]; 30 May 1961; EMEC • 1 ♀; Sutter Co., Wilson; [38.978° N, 121.626° W]; 5 Jun. 1915; H. Morrison leg.; USNM • 4 ♀♀; Tehama Co., Tehama; [40.024° N, 122.124° W]; 4862; EMEC • 1 ♀; Tulare Co., 10 mi. NW of California Hot Springs; [35.982° N, 118.803° W]; 14 May 1963; EMEC • 2 ♀♀; Tulare Co., 2 mi. E of Johnsondale; [35.975° N, 118.504° W]; 27 Apr. 1964; ex *Arctostaphylos*; EMEC • 1 ♀; Tulare Co., 3 mi. W of Three Rivers; [36.437° N, 118.958° W]; 1 Apr. 1939; P.H. Timberlake leg.; ex *Phacelia distans*; UCRC • 2 ♀♀; Tulare Co., 4 mi. N of Kaweah; [36.528° N, 118.918° W]; 13 May 1963; EMEC • 1 ♀; Tulare Co., Hot Springs; [35.880° N, 118.676° W]; 14 May 1963; EMEC • 1 ♀; Tulare Co., Mineral King Road; [36.444° N, 118.717° W]; 16 May 1970; ex *Collinsia heterophylla*; EMEC • 1 ♀; same data as for preceding; 21 May 1970; ex *Collinsia heterophylla*; EMEC • 1 ♀; same data as for preceding; 17 May 1970; EMEC • 1 ♀; same data as for preceding; 15 May 1970; ex *Collinsia heterophylla*; EMEC • 1 ♀; Tulare Co., Potwisha, Sequoia National Park; [36.515° N, 118.801° W]; elev. 609.6–1524 m; 13 Jun. 1929; E.C. Van Dyke leg.; CAS • 1 ♀; Tuolumne Co., 3 mi. NE of Tuolumne City; [37.931° N, 120.202° W]; 23 Mar. 1966; EMEC • 1 ♀; Tuolumne Co., 3 mi. SE of Tuolumne City; [37.931° N, 120.202° W]; 23 Mar. 1966; EMEC • 1 ♀; Tuolumne Co., Pinecrest; [38.189° N, 119.991° W]; 4 Aug. 1948; P.D. Hurd and J.W. MacSwain leg.; EMEC • 1 ♀; Tuolumne Co., Deadman Campground; [38.317° N, 119.750° W]; 6 Jun. 1960; W.A. Steffan leg.; EMEC • 1 ♀; Ventura Co., Calabasas Peak (1 mi. NW) Santa Monica Mountains; 15 Mar. 1971; EMEC • 2 ♀♀; Ventura Co., Hungry Valley; 5 mi. S of Gorman; [34.728° N, 118.866° W]; 6 May 1959; J. Powell leg.; ex *Penstemon centranthifolius*; EMEC • 2 ♀♀; Ventura Co., Hungry Valley;

5 mi. S of Gorman; [34.730° N, 118.866° W]; 6 May 1959; ex *Ericameria cooperi* (verbatim: *Haplopappus cooperi*); EMEC • 1 ♀; same data as for preceding; 4 May 1959; EMEC • 1 ♀; same data as for preceding; 4 May 1959; ex *Ericameria cooperi* (verbatim: *Haplopappus cooperi*); EMEC • 1 ♀; Ventura Co., Quatal Canyon; [34.837° N, 119.360° W]; 9 May 1959; EMEC • 1 ♀; same data as for preceding; 9 May 1959; ex *Penstemon centranthifolius*; EMEC • 1 ♀; Ventura Co., Quatal Canyon, NW corner Ventura; [34.831° N, 119.351° W]; 9 May 1959; ex *Encelia actoni*; EMEC • 1 ♀; same data as for preceding; 9 May 1959; ex *Penstemon centranthifolius*; EMEC • 1 ♀; Ventura Co., Santa Paula; [34.356° N, 119.068° W]; 6 Mar. 1959; W.E. Simonds leg.; CSCA • 2 ♀♀; Ventura Co., Wegis Ranch; 9 May 1963; EMEC • 1 ♀; Lassen National Park; [40.498 ° N, 121.428° W]; 3 Jun. 1941; C.D. Michener leg.; EMEC (Fig. 56A–C) • 1 ♀; Sierra National Forest; [39.573° N, 120.637° W]; elev. 1920.2 m; 28 Jun. 1956; USNM. – **Colorado** • 1 ♀; Boulder Co., 1 mi. W of Gold Hill; [40.063° N, 105.429° W]; 4 Jun. 1963; U.N. Lanham and B. Vogel leg.; ex *Esula*; UCMC • 1 ♂; Boulder Co., Nederland, Ward; [40.070° N, 105.510° W]; 29 Aug. 1959; Ellen Ordway leg.; SEMC • 1 ♀; Jackson Co., Cowdrey; [40.858° N, 106.312° W]; elev. 2529.8 m; 22 Jun. 1961; G.L. Bush leg.; MCZ • 1 ♀; Mineral Co., Creede; [37.849° N, 106.925° W]; elev. 2743.2 m; 1–31 Jul. 1907; F.M. Carpenter leg.; MCZ • 1 ♂; Saguache Co., Valley View Springs, 7 mi. E of Mineral Hot Springs on W foot of Sangre de Cristo range; [38.160° N, 105.795° W]; elev. 2590.8 m; 13 Aug. 1965; H.B. Leech leg.; CAS • 1 ♀; Teller Co., Big Spring Ranch, Florissant; [38.940° N, 105.290° W]; 20 Jun. 1962; EMEC • 1 ♂; same data as for preceding; 30 Jul. 1966; EMEC • 1 ♂; Teller Co., South base Blue Mountain near Florissant; elev. 2568.2 m; 1 Aug. 1966; EMEC. – **Idaho** • 1 ♂; Latah Co., Moscow Mountains; [46.804° N, 116.869° W]; elev. 914.4 m; 27 Jul. 1925; C.L. Fox leg.; CAS • 1 ♀; Lemhi Co., 5 mi. N of Gibbonsville; [45.625° N, 113.927° W]; 21 Jul. 1983; J.D. Pinto and D.R. Pinto leg.; UCRC • 1 ♀; craters of the Moon National Monument and Preserve; [43.172° N, 113.482° W]; 16 Aug. 1964; Blaine, Butte, Lincoln, Minidoka and Power leg.; ex columbine (*Aquilegia*); EMEC. – **Montana** • 1 ♂; Gallatin Co., Madison River, Gallatin National Forest, below Hebgen Dam or reservoir; [45.513° N, 111.592° W]; 28 Aug. 1935; P. Wible leg.; CMNH. – **Nevada** • 2 ♀♀; Elko Co., Spruce Mountain; [40.552° N, 114.821° W]; elev. 2590.8 m; 24 Jun. 1956; EMEC • 2 ♀♀; Eureka Co., 3 mi. W of Eureka; [39.545° N, 116.016° W]; 24 Jun. 1968; EMEC • 1 ♀; Fresno Co., Huntington Lake; [37.236° N, 119.179° W]; elev. 2133.6 m; 7 Jul. 1919; E.P. Van Duzee leg.; CAS • 2 ♀♀; Gooding Co., Wood River, 1 mi. NE of Gooding; [42.948° N, 114.699° W]; 6–7 Jul. 1980; M.S. Wasbauer and K.M. Wasbauer leg.; CSCA • 1 ♀; Harney Co., Alder Springs Campground McKenzie Pass; [44.178° N, 121.911° W]; elev. 1104.9 m; 30 Jun. 1927; H.A. Scullen leg.; OSAC • 1 ♀; Huerfano Co., 12 mi. N of Gardner; [37.906° N, 105.156° W]; elev. 3048 m; 5 Jul. 1975; U.N. Lanham leg.; ex *Castilleja miniata*; UCMC • 1 ♀; Mesa Co., 19 mi. NE of Gateway; [38.862° N, 108.729° W]; 18 May 1963; C.J. McCoy and B. Vogel leg.; UCMC • 1 ♀; Ormsby Co.; [39.16° N, 119.77° W]; 6 Jul.; Baker leg.; USNM • 2 ♀♀; same data as for preceding; Jul.; Baker leg.; USNM • 1 ♂; White Pine Co., 22 mi. W of Ely; [39.251° N, 115.285° W]; 20 Jul. 1958; E.G. Linsley and J.W. MacSwain leg.; EMEC. – **New Mexico** • 2 ♀♀; Catron Co., 8 mi. SE of Lunc; elev. 2286 m; 9–14 Jul. 1979; S. Peck and J. Peck leg.; PMAE • 2 ♀♀; San Miguel Co., Pecos; [35.581° N, 105.678° W]; Jul.07**???**; EMEC • 1 ♀; no place; 23 Jun. 1908; W.T. Cockerell leg.; ex *Castilleja integra*; USNM. – **Oregon** • 1 ♀; Columbia Co., 20 mi. SW of St Helens; [45.650° N, 123.117° W]; 21 May 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; Umatilla Co., Cayuse; [45.676° N, 118.574° W]; 13 May 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; Jackson Co., Chimney Gulch; [44.420° N, 118.993° W]; N. Banks leg.; MCZ • 1 ♀; Klamath Co., Crater Lake; [42.950° N, 122.100° W]; 16 Sep. 1934; A.L. Melander leg.; MCZ • 1 ♀; Klamath Co., Eagle Ridge County Park; [42.405° N, 121.950° W]; 20 May 1924; C.L. Fox leg.; CAS • 1 ♀; same data as for preceding; 24 Jun. 1924; C.L. Fox leg.; CAS • 1 ♀; Clackamas Co., Estacada; [45.290° N, 122.334° W]; 30 Jun. 1930; R.M. Scullen leg.; OSAC • 1 ♀; Wallowa Co., Joseph; [45.353° N, 117.23° W]; 6 Jun. 1970; OSAC • 1 ♀; Jackson Co., Little Squaw Lake (7 mi. E) Copper; [42.037° N, 123.025° W]; elev. 975.4 m; 22 May 1964; E. Copper leg.; OSAC • 1 ♀; Gilliam Co., Mayville; [45.080° N, 120.190° W]; 1–30 Jun. 1918; CAS • 4 ♀♀; Lake Co., Summer Lake; [42.830° N, 120.750° W]; 16 Jun. 1938; K. Gray, J. Schuh leg.; OSAC • 1 ♀; Umatilla Co., Weston; [45.816° N, 118.426° W]; 29 Apr. 1938; K. Gray leg.; ex mustard; OSAC. – **South Dakota** •

1 ♀; Lawrence Co., Spearfish Creek, T3N R1E, S6; [44.41° N, 103.894° W]; 28 Jun. 1965; R.W. Hodges leg.; USNM. – **Utah** • 1 ♀; Beaver Co., Beaver Valley; [38.276° N, 112.639° W]; USNM • 1 ♀; Kane Co., Bryce Canyon; [37.617° N, 112.142° W]; 21 Jun. 1933; O.H. Swezey leg.; CAS • 1 ♀; Garfield Co., Calf Creek; [37.822° N, 111.418° W]; elev. 1645.9–1676.4 m; 28–29 Jul. 1982; A. Menke and K. Menke leg.; USNM • 2 ♀♀; Summit Co., Park City; [40.650° N, 111.501° W]; 8 Jul. 1922; E.P. Van Duzee leg.; CAS. – **Washington** • 1 ♀; Yakima Co., 7 km W of Naches, Hwy 12; 46.7367° N, 120.79103° W; 6 Aug. 2007; J. Gibbs and C. Sheffield leg.; PCYU • 1 ♀; King Co., Seattle; [47.610° N, 122.330° W]; 10420; OSAC • 1 ♀; same data as for preceding; 24 Apr. 1994; UCMC • 1 ♀; same data as for preceding; 5574; UCMC • 1 ♀; same data as for preceding; 20 Apr. 1998; ex *Rubus ursinus*; UCMC • 1 ♀; same data as for preceding; 25 Jun. 1997; UCMC • 1 ♀; same data as for preceding; 4540; UCMC • 1 ♀; same data



Fig. 56. *Lasioglossum* (*Hemihalictus*) *ovaliceps* (Cockerell, 1898), ♀. **A–C**. EMEC. **D**. EMEC. **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

as for preceding; 5254; UCMC • 1 ♀; same data as for preceding; 2733; UCMC • 1 ♀; same data as for preceding; 3765; UCMC • 1 ♀; same data as for preceding; 3775; UCMC • 1 ♀; same data as for preceding; 10 Aug. 1999; ex *Anaphalis*; UCMC • 1 ♀; same data as for preceding; 5956; UCMC • 1 ♀; same data as for preceding; 9 Apr. 1997; UCMC • 1 ♀; same data as for preceding; UCMC • 1 ♀; same data as for preceding; 10416; ex *Crepis capillaris* (verbatim: *Crepis virens*); UCMC • 1 ♀; same data as for preceding; 4898; UCMC • 1 ♀; same data as for preceding; 21 May 1999; ex *Rubus ursinus*; UCMC • 1 ♀; Skamania Co., Hanleys, Mount St Helens; [46.2° N, 122.186° W]; 3 May 1946; T.O. Thatcher leg.; EMEC • 1 ♀; Yakima Co., Yakima; [46.602° N, 120.508° W]; 18 Jun. 1955; H.P. Lanchester leg.; USNM. – **Wyoming** • 1 ♀; Teton Co., Grand Teton National Park Jenny Lake; [43.775° N, 110.72° W]; E.C. Van Dyke leg.; CAS • 2 ♀♀; Teton Co., Teton National Park, String Lake; [43.789° N, 110.732° W];



Fig. 57. *Lasioglossum* (*Hemihalictus*) *ovaliceps* (Cockerell, 1898), ♂ (UCRC). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

18 Jun. 1963; C.A. Toschi leg.; EMEC • 6 ♀♀; Lincoln Co.; 41.865° N, 110.7653° W; 20–21 Sep. 2011; BIML • 1 ♀; Lincoln Co.; 41.8704° N, 110.7772° W; 13 May 2011; BIML • 1 ♂; Lincoln Co.; 41.865° N, 110.7653° W; 20–21 Sep. 2011; BIML.

Description

Genitalia. (Figs 58, 120J). Gonostylus elongate, about 2 times as long as broad, with long setae. Retrorse lobe slender, about 5 times as long as broad. S7 apical lobe broadly rounded.

Range

Canada (Alberta, British Columbia) and USA (California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington) (Fig. 59).

Floral hosts

Cockerell (1903) recorded this species as a habitual visitor of *Castilleja integra* A.Gray (family Scrophulariaceae) in New Mexico.

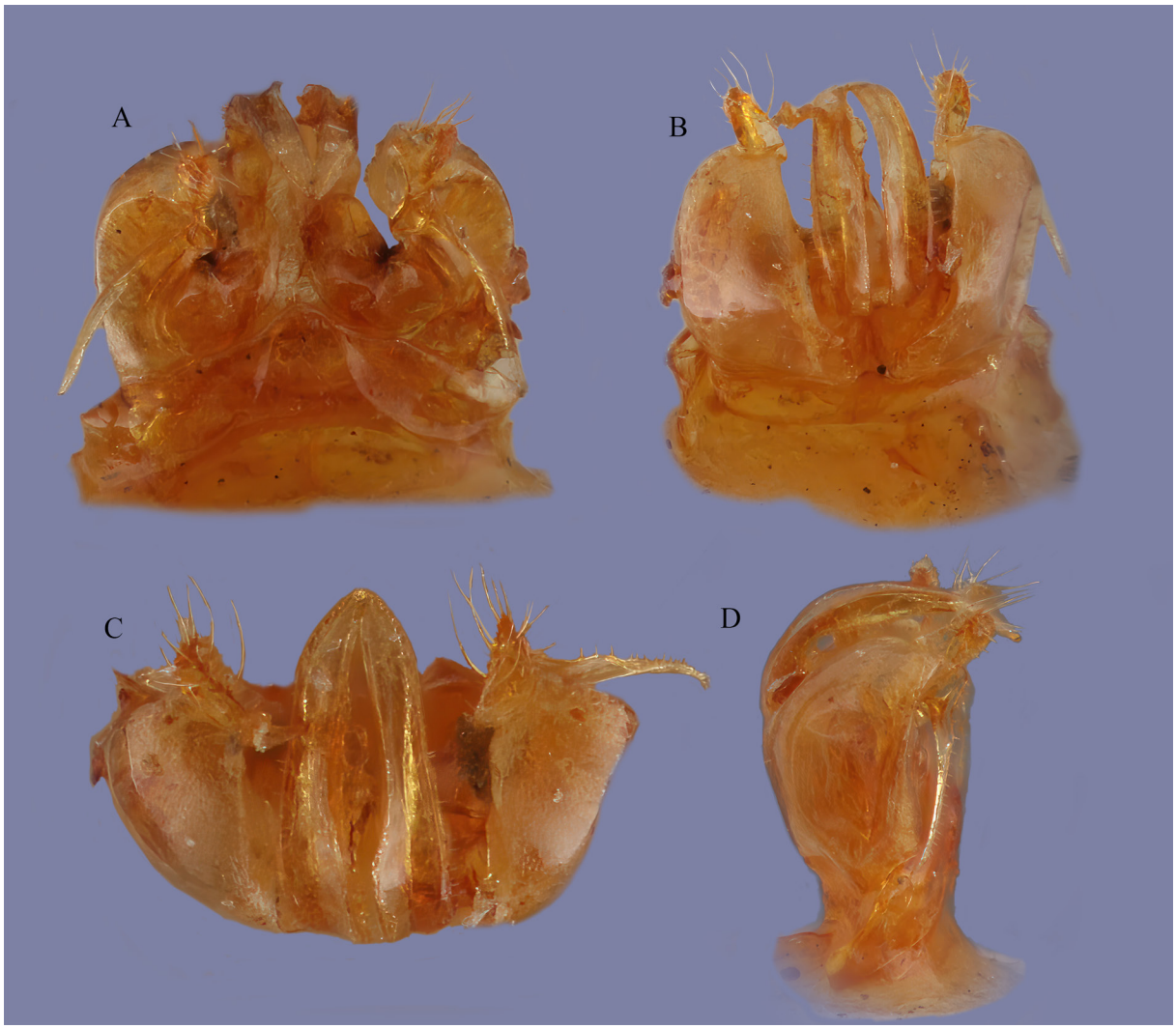


Fig. 58. Genitalia of *Lasioglossum* (*Hemihalictus*) *ovaliceps* (Cockerell, 1898), ♂ (UCRC). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

ANACARDIACEAE: *Rhus ovata* S.Watson • ASTERACEAE: *Anaphalis* sp., *Baccharis* sp. *Calendula* sp., *Coreopsis* sp., *Crepis capillaris* (L.) Wallr., *Encelia actonii* Elmer, *Ericameria cooperi* H.M.Hall, *Ericameria parishii* (Greene) H.M.Hall, *Erigeron divergens* Torr. & A.Gray, *Eriogonum wrightii* var. *subscaposum* S.Watson, *Hazardia squarrosa* (Hook. & Arn.) Greene, *Senecio* sp., *Solidago velutina* subsp. *californica* (Nutt.) Semple, *Wyethia* sp. • BORAGINACEAE: *Cryptantha barbigera* (A.Gray) Greene, *Cryptantha intermedia* (A.Gray) Greene, *Cryptantha* sp., *Heliotropium curassavicum* L., *Lithospermum ruderale* Douglas ex Lehm. • BRASSICACEAE: *Brassica* sp., *Brassica nigra* (L.) W.D.J. Koch • CANNACEAE: *Canna* sp. • ERICACEAE: *Arctostaphylos* sp., *Arctostaphylos patula* Greene • FABACEAE: *Acmispon glaber* (Vogel) Brouillet, *Lotus* sp., *Melilotus indicus* (L.) All. • HYDROPHYLLACEAE: *Nemophila* sp., *Phacelia cicutaria* var. *hispida* (A.Gray) J.T.Howell, *Phacelia distans* Benth., *Phacelia grandiflora* (Benth.) A.Gray, *Phacelia imbricata* Greene, *Phacelia minor* (Harv.) Thell., *Phacelia platyloba* A.Gray, *Phacelia* sp., *Phacelia tanacetifolia* Benth. • LAMIACEAE: *Salvia apiana* Jeps., *Salvia columbariae* Benth., *Salvia mellifera* Greene, *Salvia* sp., *Salvia sonomensis* Greene, *Stachys bullata* Benth. • LOASACEAE: *Eucnide urens* Parry ex Coville • NYCTAGINACEAE: *Mirabilis laevis* var. *laevis* • ONAGRACEAE: *Clarkia rhomboidea* Douglas • PAEONIACEAE: *Paeonia brownii* Douglas ex Hook., *Paeonia californica* Nutt. • PAPAVERACEAE: *Eschscholzia californica* Cham. • POLYGONACEAE: *Eriogonum* sp. • RANUNCULACEAE: *Aquilegia formosa* Fisch. ex DC., *Aquilegia* sp. • ROSACEAE: *Chamaebatia foliolosa* Benth., *Photinia* sp., *Rubus ursinus* Cham. & Schltdl., *Rubus vitifolius* Cham. & Schltdl. • SALICACEAE: *Salix* sp. • SCROPHULARIACEAE: *Castilleja affinis* Hook. & Arn., *Castilleja applegatei* var. *pinetorum* (Fernald) N.H.Holmgren, *Castilleja integra* A.Gray, *Castilleja miniata* Douglas ex Hook., *Collinsia heterophylla* Buist ex Graham, *Cordylanthus pilosus* A.Gray, *Cordylanthus rigidus* subsp. *rigidus*, *Keckiella cordifolia* (Benth.) Straw, *Keckiella corymbosa* (Benth. ex A. DC.) Straw, *Keckiella lemmonii* (A.Gray) Straw, *Keckiella ternata* (Torr. ex A.Gray) Straw, *Penstemon centranthifolius* (Benth.) Benth., *Penstemon grinnellii* Eastw., *Penstemon heterodoxus* A.Gray, *Penstemon spectabilis* Thurb. ex A.Gray, *Scrophularia heterophylla*

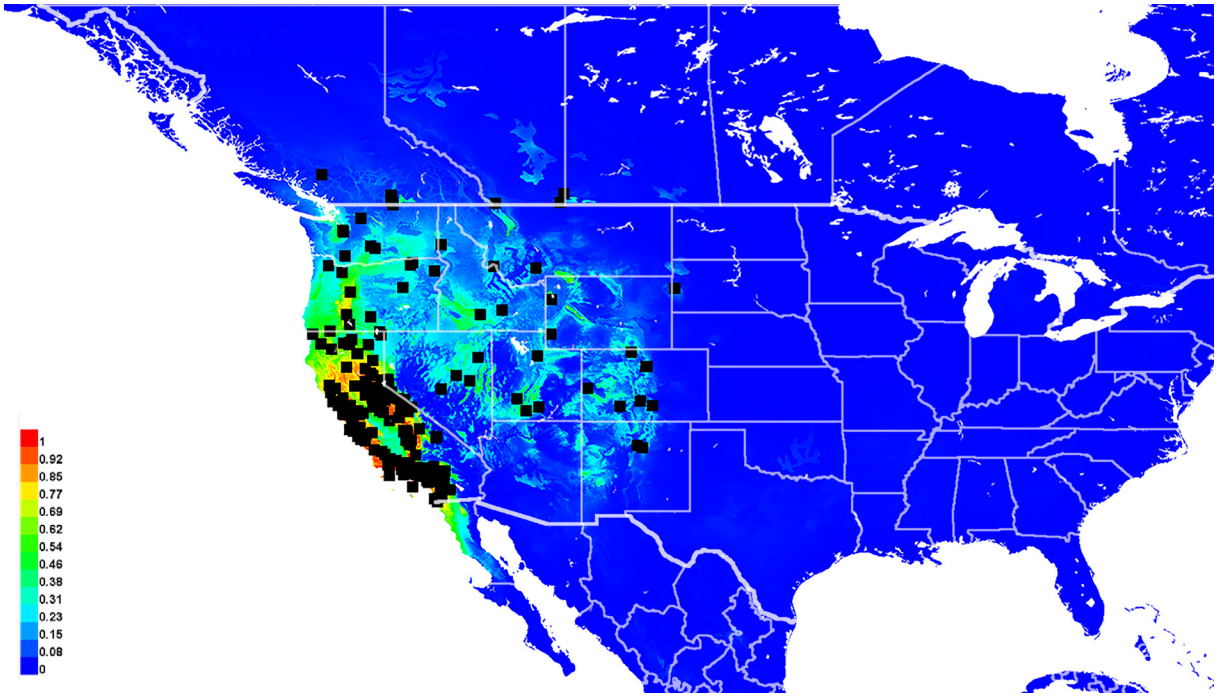


Fig. 59. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *ovaliceps* (Cockerell, 1898) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

subsp. *laciniata* (Waldst. & Kit.) Maire & Petitm., *Scrophularia* sp., *Scrophularia villosa* Pennell, *Triphysaria versicolor* subsp. *faucibarbata* (A.Gray) T.I.Chuang & Heckard • SOLANACEAE: *Datura inoxia* Mill. • STERCULIACEAE: *Fremontodendron californicum* (Torr.) Coville.

Biological notes

Lasioglossum ovaliceps is a ground-nesting species, based on observations of females digging in a clay bank is Pasadena, California in March (Hicks 1936).

DNA barcodes

Ten full DNA barcodes and three partial barcodes were analyzed, from Alberta, British Columbia, Washington, Oregon, Utah, and California. They form a discrete cluster with little intraspecific variation.

Lasioglossum* (*Hemihalictus*) *pectorale species group

Diagnosis

The *L. pectorale* species group can be diagnosed by a combination of characters in both females and males. Females are consistently black bees (no orange metasoma); exhibit a completely rugose or rugulose propodeum, propodeal triangle with strong to moderately strong rugae reaching all the way to the posterior margin; possess an apical carina on the propodeal triangle posterior margin, which forms a sharp edge; and T2–T3 with distinct basolateral tomentum.

Males in this group do not exhibit any clypeal maculations (in contrast to *L. fedorense* species group, *L. pectinatum* species group, *L. subobscurum*, and most of other species in this subgenus); have short, female-like antennae (in contrast to *L. nitidiusculum* species group); usually "normal" (unmodified) heads, meaning that no broad clypeus, no genal tuberculation, and no extremely elongated mandibles, (in contrast to modifications present in males of *L. lustrans*, *L. fedorense* species group, *L. pectinatum* species group, or *L. arizonense* species group).

Comparison with related species and exceptions

Some females of this group show a strongly coriarious anterior face of T1 with a well-developed fan of appressed hairs. But this character is absent in most species in this group, like *L. kincaidii*, *L. nelumbonis*, *L. hewetti*, *L. pectorale*, *L. pectoraloides*, and *L. pseudopectorale.*

Lasioglossum lustrans is included in the *L. pectorale* species group despite lacking an apical carina and a completely rugose propodeum. An exception is *L. lustrans*, in which the male head is modified.

Some species have one or more of the above traits but, except for *L. lustrans*, are not included in the *pectorale* group due to missing other key characters or having conflicting features. Notable comparisons and exceptions include: 1) *L. opata* sp. nov.: females of *L. opata* do exhibit an apical carina (faint), however, in *L. opata* the rugae of the propodeal triangle do not reach the posterior margin, and the propodeum is not completely rugose. 2) *L. swenki*: this species is somewhat problematic to classify. Females of *L. swenki* have an apical carina, and in some specimens the propodeal rugae reach the posterior margin. However, the males of *L. swenki* do not have the normal heads.

Taxonomic remarks

The *pectorale* species group was previously treated in part as the *L. robertsoni* species group by Gibbs *et al.* (2013), but given the rarity and limited representation of *L. robertsoni*, we here propose using *L. pectorale* – a more commonly collected species – as the nominal representative. The *pectorale* species group is proposed as a practical working unit within this revision. Although it may not represent

a strictly monophyletic lineage, the group provides a useful framework for comparing species that share a distinctive suite of morphological traits. Several included and excluded taxa remain taxonomically problematic, and the boundaries of the group are recognized as provisional. Nevertheless, defining this assemblage facilitates clearer discussion and future tracking of related species as additional morphological and molecular data become available.

Included species

Lasioglossum angusticulum sp. nov., *L. angustius* (Cockerell, 1897), *L. kincaidii* (Cockerell, 1898), *L. pathiranae* sp. nov., *L. pectoraloides* (Cockerell, 1895), eastern species *L. pectorale* (Smith, 1853),, *L.. lustrans* (Cockerell 1897) and *L. nelumbonis* (Robertson, 1890), and several Mexican species: *L. cinereum* (Friese, 1917), *L. hewetti* (Cockerell, 1913), *L. pseudopectorale* (Cockerell, 1896), and *L. spinale* (Vachal, 1904).

Lasioglossum* (*Hemihalictus*) *angusticulum sp. nov.
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Figs 60–63, 104E, 105A, 106D, 109D, 113B, 114B, 120K

Diagnosis

Female *L. angusticulum* sp. nov. can be recognised by the combination of head long, length/width ratio 1.06 (±0.03 SD) (remarkably long in *L. pathiranae* sp. nov.); mesoscutum mostly polished (rough in *L. robertsoni*), with distinct double punctation (no double punctation in *L. angustius* and *L. robertsoni*), sparse (IS = 1–3 PD) puncture density submedially (denser in *L. angustius*, *L. pathiranae* and *L. robertsoni*); rugae of the propodeal triangle reaching posterior margin (separating from species in which the rugae do not reach the posterior margin), propodeal triangle posterior margin sharply edged with a less prominent apical carina (this excludes all species with a smoothly rounded posterior margin; apical carina is prominently raised in *L. pathiranae* sp. nov. and *L. robertsoni*); T1 anterior face mostly polished with broad dorsal opening in the fan (T1 anterior face strongly coriarious with a narrower dorsal opening in the fan in *L. robertsoni*, *L. pathiranae*, *L. angustius* and *L. opata* sp. nov.); and T2–T3 with distinct basolateral tomentum (separating it from species lacking basal patches or bands of tomentum on T2–T3, such as *L. nitidiusculum* group).

Males *L. angusticulum* sp. nov. can be recognised by the combination of head long, length/width ratio 1.08 (±0.01 SD) (remarkably long in *L. pathiranae* sp. nov.); mesoscutum mostly polished and distinctly diversopunctate (indistinct in *L. pathiranae*), with moderately sparser (IS = 1–2 PD) interspaces submedially (denser in *L. pathiranae*); rugae of the propodeal triangle reaching posterior margin (separating from species in which the rugae do not reach the posterior margin); mesepisternum reticulate-rugose (finely rugulose in *L. synthyridis*); and propodeal triangle with apical carina indistinct or absent (prominently raised in *L. pathiranae*).

Etymology

The specific epithet *angusticulum* is a diminutive form derived from the Latin '*angustius*' (meaning 'narrow'), referencing *Lasioglossum angustius*, a species with which this new species was previously confused. The name acknowledges the historical taxonomic confusion between the two species.

Material examined

Holotype

UNITED STATES – **Arizona** • ♀; Pima Co., Catalina Mountains; [32.430° N, 110.705° W]; 21 Jul. 1942; E.C. Van Dyke leg.; CAS (Fig. 60).

Specimen labels

"Catalina Mts / Ariz / VII-21-42 // Presented by / EC VanDyk / Collector // *Lasioglossum* / GIBBS-14439 // HOLOTYPE / *Lasioglossum* (*Hemihalictus*) *angusticulum* Hettiarachchi and Gibbs".

Paratypes

UNITED STATES – **Arizona** • 1 ♀; Cochise Co., Chiricahua Mountains, 3.5 mi. SW of Portal; [31.878° N, 109.184° W]; 13 Aug. 1952; H.B. Leech and J.W. Green leg.; CAS • 1 ♀; Coconino Co., 9 mi. N of Jacob Lake; [36.844° N, 112.217° W]; 11 Jun. 1966; J.M. Davidson and M.A. Cazier leg.; ex *Sphaeralcea laxa*; ASUHIC • 3 ♀♀; Coconino Co., Oak Creek Canyon; [34.913° N, 111.727° W]; F.H. Snow leg.; USNM • 1 ♀; Gila Co., Pioneer Pass; [33.270° N, 110.802° W]; 18 Aug. 1958; L.A. Stange leg.; LACM • 1 ♀; Gila Co., Young; [34.101° N, 110.964° W]; 20 Jul. 1996; N.F. Gunz leg.; RSKM • 2 ♀♀; Mojave Co., Hualapai Mountains, S of Kingman; [34.900° N, 113.884° W]; 30 Jul. 1965; M.E. Irwin leg.; UCRC • 1 ♀; same data as for preceding; 30 Jul. 1965; E.I. Schlinger leg.; UCRC • 1 ♀; Navajo Co., 5 mi. S of McNary; [34.000° N, 109.857° W]; 22 Jun. 1957; F.G. Werner and G.D. Butler leg.; ASUHIC • 1 ♀; Navajo Co., Kaventa; [36.722° N, 110.254° W]; 20 Jun. 1933; H.N. Hultgren leg.; CAS • 1 ♂; Navajo Co., 14 mi. S of Show Low; [34.050° N, 110.030° W]; 24 Jun. 1956; G.D. Butler, Gerhardt leg.; ASUHIC (Fig. 61) • 2 ♀♀; Navajo Co., 19 mi. SW of Kayenta; [36.531° N, 110.497° W]; 20 Jun. 1933; H.N. Hultgren leg.; CAS • 1 ♀; Pima Co., Catalina Mountains; [32.430° N, 110.705° W]; 31 May 1954; G.D. Butler leg.; ex *Houstonia wrightii*; ASUHIC • 1 ♂; Pima Co., Santa Catalina Mountains, Summerhaven; [32.445° N, 110.761° W]; 20 Jul. 1942; R.S. Beal leg.; UCRC • 1 ♀; Pima Co., Catalina Mountains; [32.430° N, 110.705° W]; 21 Jul. 1942; E.C. Van Dyke leg.; CAS • 1 ♂; same data as for preceding; CAS (Fig. 62) • 3 ♀♀; same data as for preceding; 20 Jul. 1942; E.C. Van Dyke leg.; CAS • 1 ♀; Pima Co., Catalina Mountains South; [32.375° N, 110.818° W]; 1–31 Jul. 1936; E.S. Ross leg.; CAS • 1 ♀; Pima Co., Bear Wallow, Station Catalina Mountains; [32.424° N, 110.740° W]; 8 Jun. 1961; R.H. Painter and E.M. Painter leg.; ASUHIC • 1 ♀; Pima Co., Catalina Mountains; [32.430° N, 110.705° W]; 30 Apr. 1953; G.D. Butler leg.; ex *Thistle*; ASUHIC • 1 ♀; same data as for preceding; 25 Jul. 1954; G.D. Butler leg.; ASUHIC • 1 ♀; Pima Co., Bear Wallow, Station Catalina Mountains; [32.424° N, 110.740° W]; 5 Jun. 1961; F. Werner leg.; ASUHIC • 1 ♀; Pima Co., Catalina Mountains, Hitchcock Hwy 22 mi; [32.446° N, 110.759° W]; 18 Jul. 1955; F.G. Werner and G.D. Butler leg.; ex yellow composite; ASUHIC • 1 ♀; Pima Co., Catalina Mountains, Hitchcock Hwy 23 mi; [32.444° N, 110.760° W]; 18 Jul. 1955; F.G. Werner and G.D. Butler leg.; ASUHIC • 1 ♂; Pima Co., Bear Wallow, Station Catalina Mountains; [32.424° N, 110.740° W]; 8 Jun. 1961; J.C. Bequaert leg.; ex *Senecio*; ASUHIC • 1 ♂; same data as for preceding; 5 Jun. 1961; F.G. Werner leg.; ex *Senecio*; ASUHIC • 1 ♂; Pima Co., Catalina Mountains; [32.430° N, 110.705° W]; 31 May 1954; G.D. Butler leg.; ASUHIC • 1 ♂; same data as for preceding; 31 May 1954; G.D. Butler leg.; ex *Houstonia wrightii*; ASUHIC • 1 ♂; same data as for preceding; 9 Jun. 1958; ASUHIC • 1 ♀; Pima and Pinal Co., Santa Catalina Mountains; [32.443° N, 110.788° W]; 20 Jul. 1942; H.A. Scullen leg.; SDMC • 3 ♀♀; Yavapai Co., 5.7 mi. S of Prescott; [34.460° N, 112.469° W]; 7 Jun. 1966; J.M. Davidson and M.A. Cazier leg.; ASUHIC. – **Colorado** • 1 ♀; Boulder Co., Boulder; [40.015° N, 105.2705° W]; 14 Aug. 1971; U.N. Lanham leg.; UCMC • 3 ♀♀; Boulder Co., 2 mi. SE of Eldorado Springs; [39.915° N, 105.252° W]; 18 Jun. 1963; B. Vogel and U.N. Lanham leg.; UCMC • 1 ♀; Boulder Co., Boulder; [40.015° N, 105.271° W]; elev. 1828.8 m; 31 May 1961; B.H. Poole leg.; CNC • 1 ♀; same data as for preceding; 16 Jun. 1961; B.H. Poole leg.; CNC • 1 ♀; Boulder Co., 4 mi. NW of Boulder; [40.053° N, 105.324° W]; elev. 2103.1 m; 8 Jun. 1961; B.H. Poole leg.; CNC • 1 ♀; Delta Co., Paonia; [38.868° N, 107.592° W]; 14 Jun. 1926; E.C. Van Dyke leg.; CAS • 1 ♀; Larimer Co.; 40.6833° N, 105.3975° W; 11–12 May 2004; S.W. Droege leg.; PCYU • 1 ♀; Mesa Co.; 39.0295° N, 108.6276° W; C. Stragar leg.; WRME. – **New Mexico** • 1 ♀; Bernalillo Co., Albuquerque; [35.084° N, 106.651° W]; 1 Jul. 1945; W.O. Griesel leg.; LACM. – **Texas** • 1 ♀; Culberson Co., Pine Springs; [31.908° N, 104.826° W]; 26 Apr. 1969; U.N. Lanham leg.; UCMC. – **Utah** • 1 ♀; Washington Co., 3 mi. E of Pine Valley, Juniper Campground; [37.391° N, 113.459° W]; 4 Jun. 1979; R. Hardy leg.; CSCA.

Description

Female

Body measurements. Length 7.79 mm (±0.73 SD). Head length 1.98 mm (±0.08 SD). Face length 1.64 mm (±0.08 SD). Head width 1.86 mm (±0.10 SD). Wing length 5.41 mm (±0.25 SD). n = 6.

Colouration. Head and mesosoma black. Clypeus apex dark brown. Labrum dark brown. Mandible dark brown basally, becoming light brown medially and slightly reddish brown apically. Flagellum brown. Pronotal lobe dark brown. Tegula light brown. Wing membrane hyaline, veins with subcosta brown, otherwise light brown. Legs dark brown to brown. Metasoma dark brown or brown with rims of terga, sterna and downcurved lateral areas of terga narrowly ochreous.



Fig. 60. *Lasioglossum* (*Hemihalictus*) *angusticulum* sp. nov., holotype, ♀ (CAS GIBBS-14439). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

Pubescence. Body hair colour off-white. Tomentum dense on pronotal angle, and lobe, space between pronotal lobe and tegula, metanotum anteromedially, propodeum lateral surface anterodorsally, and T2 basolaterally, and T3 basally; moderately dense on anterolateral angle and marginally of mesoscutum; very sparse on supraclypeal area dorsolaterally, paraocular area, gena near eye margin, propodeum lateral (except anterodorsal area) and posterior surface mostly dorsally. Mesosoma covered by appressed, simple, very short hairs (<0.25 OD) mixed with sparse, erect, weakly plumose, long hairs (<1.5 OD) on mesoscutum and erect, plumose, long hairs (<2 OD) on other areas. Metasomal sterna with moderately sparse, erect, simple to weakly plumose, long (<4 OD) hairs. Metafemoral scopa with dense plumose hairs. Wing hairs brown, very short and sparse. T1 with fan, broad dorsal opening (3–4 OD), composed of overlapping sub-appressed simple hairs (<1.5 OD).



Fig. 61. *Lasioglossum* (*Hemihalictus*) *angusticulum* sp. nov., paratype, ♂ (ASUHIC). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

Surface sculpturing. Clypeus imbricate to tessellate, becoming polished apical half; punctures irregularly sparse (IS < 3 PD) apically and medially, becoming smaller and denser (IS < 1 PD) basolaterally. Supraclypeal area imbricate or tessellate, becoming weakly so or polished medially; punctures dense (IS < 1 PD), becoming moderately dense (IS = 1–2 PD) medially, diversopunctate. Frons reticulate-punctate; punctures crowded (IS = 0 PD). Ocellocular area polished; punctures sparse (IS = 1–3 PD) and diversopunctate posteriorly, becoming dense (IS < 1 PD) anteriorly. Gena polished, becoming lineolate posteriorly; punctures dense (IS < 1 PD), becoming obscure posteriorly. Postgena polished, weakly imbricate adjacent to hypostomal carina. Tegula broadly impunctate, minute punctures present anteriorly and basally, sparse (IS = 1–4 PD). Mesoscutum polished, becoming imbricate anteromedially and on median line; punctures moderately dense (IS = 1–2 PD), becoming sparse (IS = 1–3 PD) mesad of parapsidal line and anteromedially, distinctly doubly punctate. Mesoscutellum polished; punctures dense (IS ≤ 1 PD) marginally and on median line, sparse submedially (IS = 1–5 PD), distinctly diversopunctate. Metanotum rugulose, punctures obscure. Propodeal triangle with rugae strong, reaching posterior margin and even entering to propodeum posterior face, anastomosing medially and weakly so laterally; lateral rugae evidently extending to dorsolateral slope of propodeum lateral face; interspace sculpture shiny to weakly imbricate. Preëpisternum reticulate-rugose. Hypoepimeron rugulose; punctures crowded (IS = 0 PD), indistinct. Mesepisternum reticulate-rugose, becoming rugose ventrally. Propodeum lateral face strongly imbricate, becoming rugulose posteriorly; posterior face rugulose. T1 anterior face mostly polished, but coriarious laterally, punctures present laterally, sparse (IS = 1–4 PD); dorsal surface polished, punctures sparse (IS = 1–3 PD), becoming sparser towards premarginal line and sometime on median line (IS = 1–5 PD) and in small subapicolateral boss (IS = 2–6 PD), diversopunctate, punctures moderately sparse (IS = 1–2 PD) on rim, becoming impunctate apical half and broadly impunctate medially on rim. T2 disc polished, but somewhat weakly coriarious subapicolateral boss apically and on premarginal line, punctures moderately sparse (IS = 1–2 PD) basally and sometime moderately dense (IS = 1–2 PD) basally, becoming sparse (IS = 1–4 PD) apically; rim polished, punctures sparse (IS = 1–3 PD), becoming narrowly impunctate apically and sometimes medially. Punctures on T2 also diversopunctate.

Structure. Head long, length/width ratio 1.06 (± 0.03 SD). Face length/width ratio 0.88 (± 0.25 SD). Clypeus projecting ~ 81% below suborbital tangent; clypeus length/width ratio 1.01 (± 0.08 SD). Mandible length mostly long, extending beyond opposing clypeal angle, and sometimes nearly reaching opposing mandibular base. Eyes convergent below, UOD/LOD ratio 1.20 (± 0.02 SD). Gena/eye width ratio 0.88 (± 0.07 SD). Ocelli normal. Pronotal angle obtuse. Intertegular span 1.44 mm (± 0.12 SD). Mesoscutum length/width ratio 0.91 (± 0.02 SD); mesoscutum/scutellum length ratio 2.87 (± 0.10 SD); scutellum/metanotum length ratio 1.59 (± 0.14 SD); metanotum/propodeal triangle length ratio 0.77 (± 0.11 SD). Protibial spur with apical serrations subequal in length to width of malus; malus extending beyond the velum, nearly ¾ the length of velum. Inner metatibial spur pectinate, teeth 4–5, basal teeth somewhat longer than width of rachis. Propodeal triangle posterior margin angled onto posterior propodeal surface; apical carina present, but a less prominent due to background sculpturing. Propodeal lateral carina reaching dorsolateral slope, oblique carina obscure. n = 6.

Male

Body measurements. Length 6.86 mm (± 0.61 SD). Head length 1.75 mm (± 0.10 SD). Face length 1.44 mm (± 0.07 SD). Head width 1.61 mm (± 0.09 SD). Wing length 4.94 mm (± 0.17 SD). n = 5.

Colouration. Head and mesosoma dark brown to black. Clypeus brown. Labrum dark brown. Mandible dark brown basally, becoming light brown medially and slightly reddish brown apically. Flagellum brown. Pronotal lobe brown. Tegula mostly brown, light brown medially. Wing membrane hyaline, veins with subcosta brown, otherwise light brown. Legs brown. Metasoma dark brown to brown with rims of terga, sterna and downcurved lateral areas of terga narrowly light brown.

Pubescence. Body hair colour off-white. Tomentum dense on pronotal angle, and lobe, space between pronotal lobe and tegula, and metanotum anteromedially; moderately dense on paraocular area, and T2–T4 basolaterally. Mesosoma covered by appressed, simple, very short hairs (< 0.25 OD) mixed with sparse, erect, weakly plumose, long hairs (< 1.5 OD) on mesoscutum and erect, plumose, long hairs (< 2 OD) on other areas. Metasomal sterna with dense, erect and sub-appressed, plumose, short (< 1 OD) hairs. Wing hairs brown, very short and sparse.

Surface sculpture. Clypeus imbricate to tessellate, becoming polished apical ⅔; punctures irregularly sparse (IS < 3 PD) apically and medially, becoming denser (IS < 1 PD) basolaterally. Supraclypeal area imbricate, becoming weakly so or polished medially; punctures dense (IS < 1 PD). Frons reticulate-punctate; punctures crowded (IS = 0 PD). Ocellocular area polished; punctures irregularly sparse (IS < 3 PD), becoming dense (IS < 1 PD) anteriorly. Gena polished, weakly lineolate, becoming lineolate posteriorly; punctures dense (IS < 1 PD), becoming obscure posteriorly. Postgena weakly lineolate. Tegula broadly impunctate, minute punctures present anteriorly and basally, sparse (IS = 1–4 PD). Mesoscutum polished, becoming imbricate anteromedially; punctures dense (IS ≤ 1 PD), becoming moderately sparse (IS = 1–2 PD) mesad of parapsidal line and anteromedially, distinctly doubly

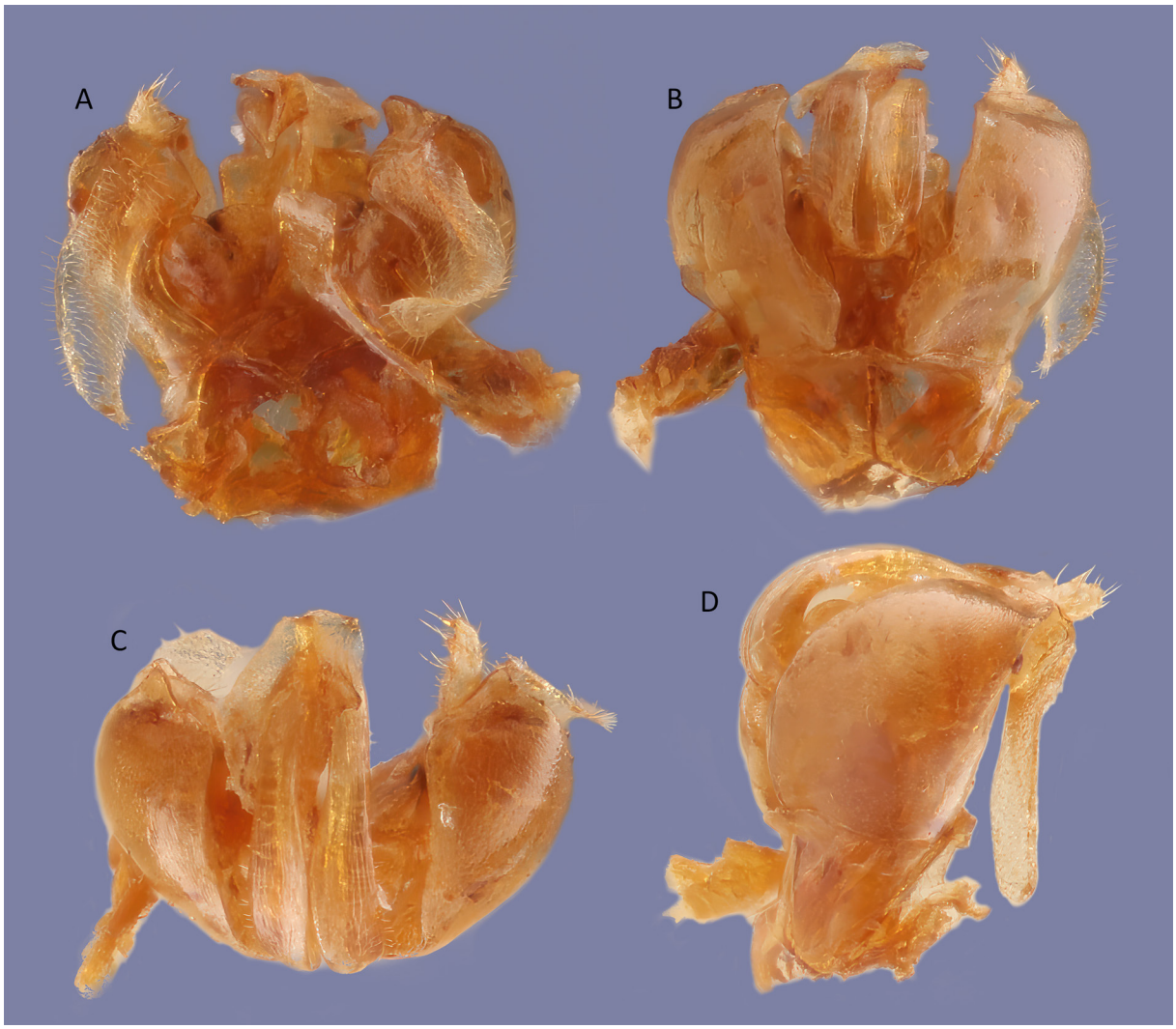


Fig. 62. Genitalia of *Lasioglossum* (*Hemihalictus*) *angusticulum* sp. nov., ♂ (CAS). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

punctate. Mesoscutellum polished; punctures moderately dense (IS = 1–2 PD) marginally and on median line, sparse submedially (IS = 1–5 PD), distinctly diversopunctate. Metanotum rugulose, punctures obscure. Propodeal triangle with rugae moderately strong, reaching posterior margin and even entering to propodeum posterior face, anastomosing medially and weakly so laterally; lateral rugae extending to dorsolateral slope; interspace sculpture shiny to weakly imbricate. Preëpisternum reticulate-rugose. Hypoepimeron rugulose; punctures obscure. Mesepisternum reticulate-rugose. Propodeum lateral face strongly imbricate, becoming rugulose posteriorly; posterior face rugulose to rugose, punctures obscure. T1 anterior face polished, punctures present laterally, sparse (IS = 1–3 PD); dorsal surface polished, punctures moderately sparse (IS = 1–2 PD) or sparse (IS = 1–3 PD), becoming sparser towards premarginal line (IS = 1–4 PD) and in small subapicolateral boss (IS = 2–4 PD), diversopunctate, punctures sparse (IS = 1–3 PD) on rim, becoming impunctate apical half and impunctate medially on rim. T2 disc polished, but somewhat weakly coriarious subapicolateral boss apically, punctures moderately sparse (IS = 1–2 PD) basally, becoming sparse (IS = 1–3 PD) apically; rim polished, punctures sparse (IS = 1–3 PD), becoming narrowly impunctate apically.

Structure. Head long, length/width ratio 1.08 (±0.01 SD). Face length/width ratio 0.90 (±0.02 SD). Clypeus projecting ~68% below suborbital tangent. Mandible long, reaching beyond opposing clypeal angle. Flagellomeres short, F1 length/pedicel length ratio 0.90 (±0.06 SD); F2 length/F1 length ratio 1.20 (±0.08 SD); F2 length/F2 width ratio 0.95 (±0.06 SD). Gena/eye width ratio 0.81 (±0.05 SD). Forewing with 3 submarginal cells. Pronotal angle obtuse. Intertegular span 1.19 mm (±0.12 SD). Mesoscutum length/width ratio 0.94 (±0.05 SD). Propodeal triangle posterior margin angled onto posterior propodeal surface; apical carina present, but indistinct from background sculpturing. Propodeum lateral carinae reaching dorsolateral slope. n = 5.

Genitalia (Figs 62, 120K). Gonostylus elongate, approximately twice as long as broad, and bears short setae. Retrorse lobe broad, about 3 times as long as broad, covered in short sparse setae.

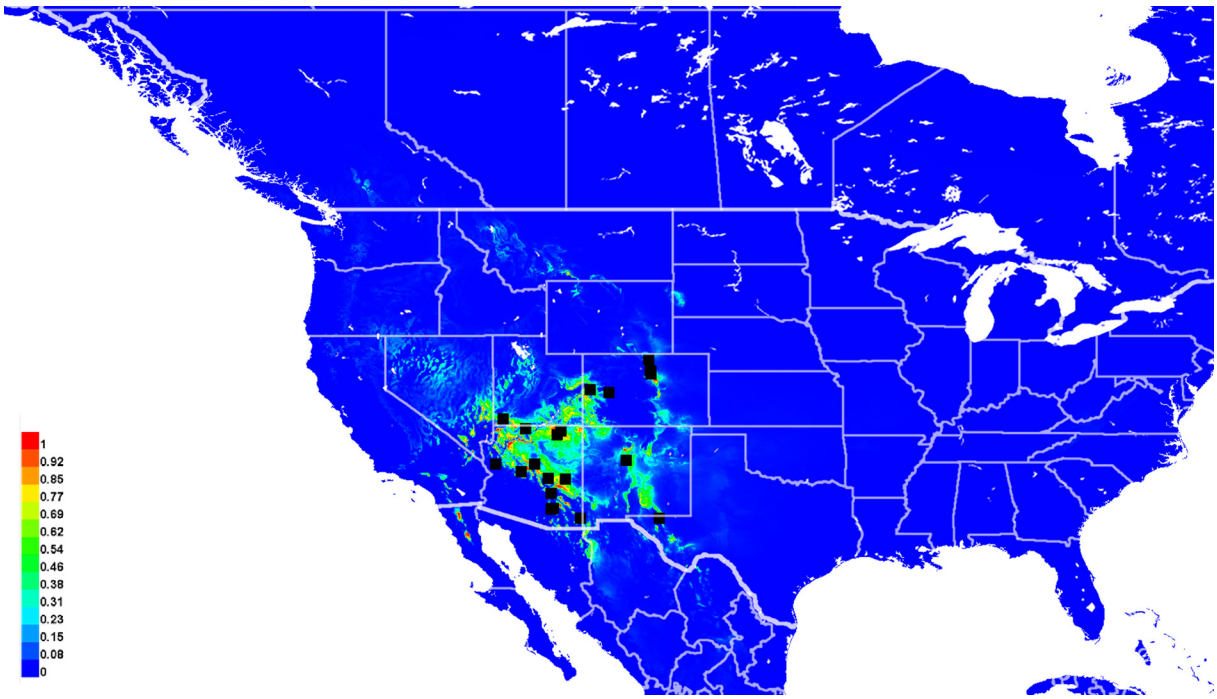


Fig. 63. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *angusticulum* sp. nov. (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

Range

Chihuahuan Desert of Arizona, New Mexico, Arizona, west Texas and to north of Colorado and south of Utah (Fig. 63).

Floral hosts

ASTERACEAE: *Cirsium* sp., *Senecio* sp. • MALVACEAE: *Sphaeralcea laxa* Wooton & Standl. • RUBIACEAE: *Houstonia wrightii* A.Gray

Lasioglossum* (*Hemihalictus*) *angustius (Cockerell, 1897)
Figs 64, 65, 93C, 97D, 104F, 105B, 106C

Halictus angustior Cockerell, 1897c: 165.

Lasioglossum (*Evylaeus*) *angustius* – Michener 1951: 1107 (catalogue).
Halictus angustior – Crawford 1907a: 185 (key).
Evylaeus angustior – Hurd 1979: 1958 (catalogue). — Moure & Hurd 1987: 69 (catalogue).

Etymology

Cockerell (1897c) did not explain the epithet. The specific epithet is a comparative form of the Latin adjective '*angustus*', meaning 'narrow' or 'constricted'; but the author's intent is unknown.

Diagnosis

Female *L. angustius* can be recognised by combination of head long, length/width ratio 1.07 (±0.03 SD) (remarkably long in *L. pathiranae* sp. nov.); mesoscutum imbricate (more polished in *L. angusticulum* sp. nov. and *L. pathiranae*; rough in *L. robertsoni*) with dense (IS≤1 PD) punctures without double punctation (sparser and distinctive double punctation present in *L. angustius* and *L. pathiranae*); hypoepimeron partly polished (rugulose in *L. angusticulum*, *L. pathiranae* and *L. robertsoni*), punctures obscure (distinct in *L. robertsoni* and *L. pathiranae*); propodeal triangle with rugae reaching posterior margin (separating from species in which the rugae do not reach the posterior margin), propodeal triangle posterior margin sharply edged with a less prominent apical carina (this excludes all species with a smoothly rounded posterior margin; apical carina is prominently raised in *L. pathiranae*); T1 strongly coriarious on anterior face with sub-appressed hairs but incomplete fan with narrow dorsal opening (T1 anterior face mostly polished with broad dorsal opening in the fan in *L. angusticulum*); and T2–T3 with distinct basolateral tomentum (removes all species lacking basal patches or bands of tomentum on T2–T3, such as *L. nitidiusculum* group). Males of this species are unknown.

Lasioglossum angustius are most similar to presumably undescribed species from various localities in Mexico, but these species exhibit punctate tegulae, coarser mesepisternum structures, and raised apical carinae.

Type material

Lectotype of *Halictus angustior* (designated herein; examined by photos)
UNITED STATES – **New Mexico** • ♀; Las Cruces; [32.32° N, 106.76° W]; 25 Aug. 1895; Cockerell leg.; ex *Flaveria* (presumably); USNM Type No. 3388.

Specimen labels
"Ckll.4681. / Las Cruces. / on *Flaveria*? // *H. angustior* / TYPE // Type / No.3388 / U.S.N.M.".

Paralectotype of *Halictus angustior* (examined)
UNITED STATES – **New Mexico** • 1 ♀; Las Cruces; [32.32° N, 106.76° W]; 25 Aug. 1895; Cockerell leg.; ex *Flaveria* (presumably); USNM Type No. 3388 (Fig. 64).

Specimen labels

"Ckll.4683. / Las Cruces. / on *Flaveria*? // *Halictus / angustior* / Ckll. // CoType / No.3388 / U.S.N.M.".

Type notes

The original description was based on three females, two collected together in Las Cruces, New Mexico and another from Mesilla, New Mexico. The specimen above is designated as the lectotype to fix the name given the recognition of closely related species in this group (e.g., see below).

Cockerell, 1897c originally described a male specimen, which he tentatively identified as *Lasioglossum angustius*, collected from Ruidoso Creek, New Mexico, at an elevation of 6600 feet, on July 10, on flowers of *Rhus* (E.O. Wooton, no. 172). However, upon re-examination, the specimen was determined to represent a male of *Lasioglossum diatretum*.

Material examined

MEXICO – **Durango** • 1 ♀; Tlahualilo; [26.386° N, 103.618° W]; 3 Sep. 1904; A.W. Morrill leg.; ex *Prunus persica* (L.) Batsch (verbatim: peach blossoms); USNM.

UNITED STATES – **Arizona** • 1 ♀; Cochise Co., Lewis Springs; [31.581° N, 110.143° W]; 18 Jun. 1915; Harold Morrison leg.; USNM. – **New Mexico** • 1 ♀; Doña Ana Co., Mesilla; [32.270° N, 106.801° W]; 13 Jul. 1897; Cockerell leg.; ex *Datura inoxia* (verbatim: *Datura meteloides*); USNM • 1 ♀; same data as for preceding; 1–31 May 1909; Cockerell leg.; ex yellow Composite like *Crepis*; USNM.

Redescription

Female

Body measurements. Length 7.58 mm (±0.21 SD). Head length 1.87 mm (±0.03 SD). Face length 1.50 mm (±0.04 SD). Head width 1.74 mm (±0.05 SD). Wing length 4.99 mm (±0.09 SD). n = 4.

Colouration. Head and mesosoma dark brown. Clypeus apex brown. Labrum brown. Mandible brown basally, slightly reddish brown apically. Flagellum brown dorsally, light brown ventrally. Pronotal lobe brown. Tegula mostly brown, light brown medially. Wing membrane faintly brownish, veins with subcosta brown, otherwise light brown. Legs brown. Metasoma brown with rims of terga, sterna and downcurved lateral areas of terga narrowly light brown.

Pubescence. Body hair colour off-white. Tomentum dense on pronotal angle and lobe, space between pronotal lobe and tegula, metanotum anteromedially, propodeum lateral surface anterodorsally, T2–T3 basolaterally, and T4 basally; moderately dense on anterolateral angle and marginally on mesoscutum; very sparse on supraclypeal area dorsolaterally, paraocular area, gena near eye margin, propodeum lateral (except anterodorsal area) and posterior surface mostly on dorsally. Mesosoma covered by appressed, simple, very short hairs (<0.25 OD) mixed with sparse, erect, weakly plumose, long hairs (<1 OD) on mesoscutum and erect, plumose, long hairs (<2 OD) on other areas. Metasomal sterna with sparse, erect, simple to weakly plumose, long (<3 OD) hairs. Metafemoral scopa with dense plumose hairs. Wing hairs brown, very short and sparse. T1 with a fan, narrow dorsal opening (1.5 OD), composed of overlapping sub-appressed simple hairs (<1.5 OD).

Surface sculpturing. Clypeus tessellate, becoming polished apical ⅓; punctures irregularly sparse (IS<3 PD) apically and medially, becoming slightly smaller and denser (IS<1 PD) on basolaterally. Supraclypeal area tessellate, becoming imbricate ventrally; punctures fine, sparse (IS = 1–3 PD). Frons reticulate-punctate; punctures crowded (IS = 0 PD). Ocellocular area polished; punctures moderately dense (IS = 1–2 PD) and diversopunctate posteriorly and, becoming crowded (IS = 0 PD) anteriorly. Gena rugulose to weakly lineolate, becoming lineolate posteriorly; punctures obscure. Postgena weakly

imbricate to weakly lineolate. Tegula punctures sparse (IS = 1–3 PD) in the anterior half and basally, becoming impunctate posteriorly. Mesoscutum imbricate, but quite weakly so submedially; punctures dense (IS ≤ 1 PD), diversopunctate, but not that conspicuous. Mesoscutellum polished but imbricate marginally; punctures dense (IS ≤ 1 PD) marginally and on median line, sparse submedially (IS = 1–3 PD), diversopunctate. Metanotum rugulose; punctures obscure. Propodeal triangle with rugae moderately strong, reaching posterior margin, strongly anastomosing, lateral rugae extending to dorsolateral slope of propodeum lateral face; interspace sculpture shiny to weakly imbricate. Preëpisternum rugulose. Hypoepimeron polished, becoming finely rugulose dorsally; punctures dense (IS ≤ 1 PD), becoming crowded (IS = 0 PD) and obscure towards dorsally. Mesepisternum reticulate-rugulose, becoming



Fig. 64. *Lasioglossum* (*Hemihalictus*) *angustius* (Cockerell, 1897), paralectotype, ♀ (USNM Type No. 3388). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

rugulose or strongly imbricate posteroventrally; punctures obscure. Propodeum lateral face strongly imbricate; posterior face imbricate-rugulose. T1 anterior face strongly coriarious, punctures present laterally; dorsal surface mostly polished, becoming weakly coriarious on small subapicolateral boss and rim, punctures moderately sparse (IS = 1–2 PD), becoming more sparsely punctate (IS = 2–6 PD) in small subapicolateral boss and punctures fine, minute, and sparse (IS = 1–4 PD) on rim, becoming impunctate apical half and medially on rim. T2 disc polished to coriarious, punctures moderately dense (IS =1–2 PD) basally, becoming sparse (IS = 1–3 PD) apically; rim coriarious, punctures minute and sparse (IS = 1–3 PD), becoming impunctate narrowly after premarginal line.

Structure. Head long, length/width ratio 1.07 (±0.03 SD). Face length/width ratio 0.86 (±0.02 SD). Clypeus projecting ~86% below suborbital tangent; clypeus length/width ratio 0.93 (±0.05 SD). Mandible short, nearly reaching opposing clypeal angle. Eyes convergent below, UOD/LOD ratio 1.15 (±0.01 SD). Ocelli normal. Gena/eye width ratio 0.75 (±0.03 SD). Pronotal angle obtuse. Intertegular span 1.28 mm (±0.04 SD). Mesocutum length/width ratio 0.90 (±0.02 SD); mesoscutum/scutellum length ratio 2.68 (±0.16 SD); scutellum/metanotum length ratio 1.52 (±0.05 SD); metanotum/propodeal triangle length ratio 0.85 (±0.03 SD). Protibial spur with apical serrations subequal in length to width of malus; malus extending beyond the velum, nearly ½ the length of velum. Inner metatibial spur pectinate, teeth 3–4, basal teeth somewhat longer than width of rachis. Propodeal triangle posterior margin angled onto posterior propodeal surface, apical carina indistinct from background sculpturing. Propodeal lateral carina reaching dorsolateral slope, oblique carina obscure. n = 4.

Variation. Specimens from Arizona and Durango have hypoepimeron punctures that are mostly crowded.

Male

Unknown.

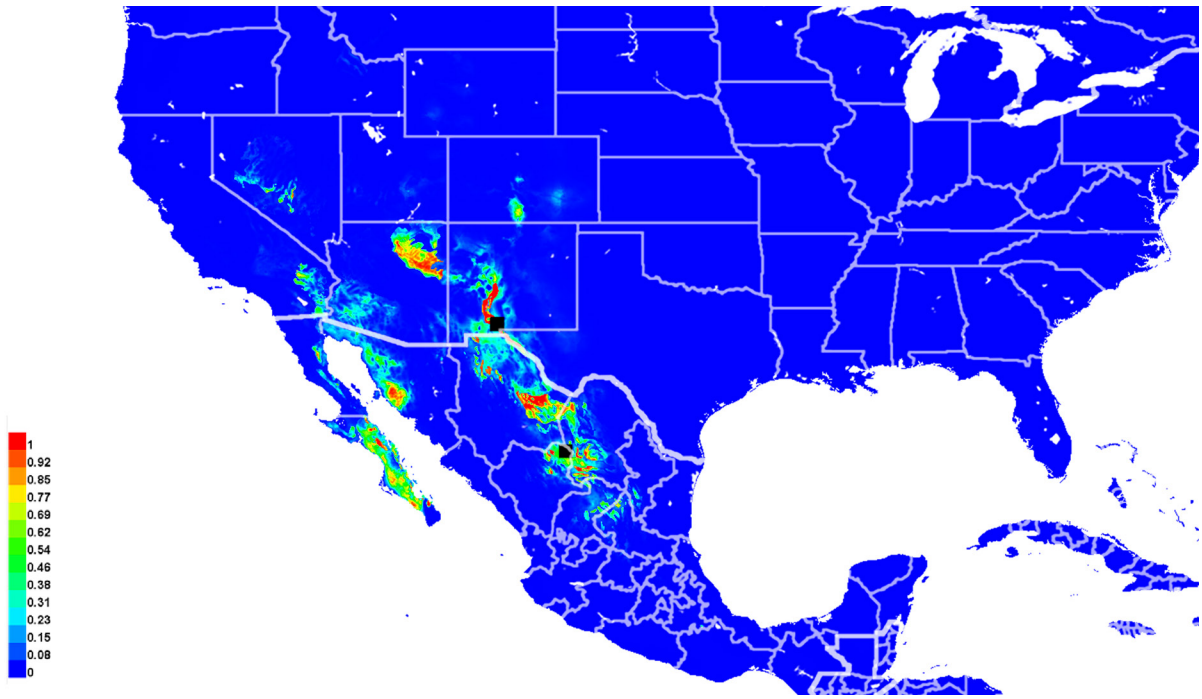


Fig. 65. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *angustius* (Cockerell, 1897) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

Range

Chihuahuan Desert from Mesilla, New Mexico and Tlahualilo, Durango, Mexico (Fig. 65).

Floral hosts

ASTERACEAE: *Flaveria* sp. (presumably, like *Crepis* sp.) • SOLANACEAE: *Datura inoxia* Mill. • ROSACEAE: *Prunus* sp.

Remarks

Rare, with only four known specimens. The most recent record for this species dates to May 1909 in Mesilla, near Las Cruces, the location of the syntypes. Since then, there have been no additional records of this species based on observed materials. Previously, *L. angusticulum* sp. nov. was erroneously identified as *Lasioglossum angustius*. Superficially similar species have been observed in various localities in Mexico, some of which exhibit distinct characteristics such as punctate tegulae, coarser mesepisternum structures, and raised oblique carinae.

Lasioglossum* (*Hemihalictus*) *kincaidii (Cockerell, 1898)
Figs 66–69, 93A, 94A, 105D, 109B, 110A, 120L

Halictus kincaidii Cockerell, 1898: 51.

Halictus kincaidii – Crawford 1906c: 297, 299 (key); 1907a: 184 (key).
Lasioglossum (*Evylaeus*) *kincaidii* – Michener 1951: 1108 (catalogue).
Evylaeus kincaidii – Hurd 1979: 1960 (catalogue). — Moure & Hurd 1987: 75 (catalogue).

Diagnosis

Both sexes of *Lasioglossum kincaidii* can be recognized by the combination of an enlarged, punctate tegula and coarsely rugose mesepisternum. *Lasioglossum kincaidii* is unlikely to be confused with other species, yet it bears a resemblance to *L. pectorale*, particularly in the presence of coarsely rugose mesepisterna. However, distinguishing features include the broadly impunctate tegula and polished mesoscutum in *L. pectorale*, while the mesoscutum of *L. kincaidii* is comparatively duller. *Lasioglossum glabriventre* has an enlarged tegula but the mesepisternum is quite smooth.

Etymology

Presumably named for Mr T. Kincaid, who collected specimens from Olympia, Washington that were subsequently described by Cockerell.

Type material

Syntype of *Halictus kincaidii* (not examined)
UNITED STATES – **Washington** • 1 ♀; Thurston Co., Olympia, [47.038° N, 122.901° W]; 13 Jun. 1895; T. Kincaid leg.; USNM Type No. 29421.

Specimen labels
"Olympia, / Wash. // 6 Ju 95 // Type No. / 29421 / U.S.N.M. // *H. kincaidii*. / n.sp. // USNMENT / 01570341".

Material examined

CANADA – **British Columbia** • 1 ♀; Kelowna, Summerhill Pyramid Winery; 49.80263° N, 119.50596° W; 31 Aug.–14 Sep. 2016; C. Dawson leg.; RSKM • 1 ♀; Okan.–Similk; 49.17693° N, 119.76329° W; 27 Aug.–17 Sep. 2015; C. Dawson leg.; RSKM • 2 ♀♀; Okan.–Similk; 49.187633° N,

119.765° W; 4–15 Sep. 2015; C. Dawson leg.; RSKM • 1 ♀; Okan.–Similk; 49.192341° N, 119.769038° W; 25 Aug.– 11 Sep. 2015; D. Marks leg.; RSKM • 1 ♀; Okan.–Similk; 49.17648° N, 119.76225° W; 25 Aug.–12 Sep. 2015; C. Dawson leg.; RSKM • 1 ♀; Okan.–Similk; 49.188638° N, 119.766776° W; 21 Aug.–15 Sep. 2015; C. Dawson leg.; RSKM • 2 ♀♀; Okanagan Falls, Vaseux Lake Provincial Park; 49.29901° N, 119.53063° W; 16 Aug.–25 Sep. 2021; TM, HS and AB (J. Heron) leg.; RSKM • 2 ♀♀; same data as for preceding; 7 Jul.–16 Aug. 2021; H. Singh and T. McGratton (J.H) leg.; RSKM • 1 ♀; Oliver, Phantom Creek Estates; 49.11641° N, 119.55425° W; 15 Jun. 2017; D. Marks, K. Grant and J. Heron leg.; RSKM • 1 ♀; Oliver, Phantom Creek Estates Winery; 49.1171° N, 119.5582° W; 27 Jul.–18 Aug. 2017; D. Marks, K. Grant and J. Heron leg.; RSKM • 2 ♀♀; Osoyos, West Bench; 49.03687° N, 119.50581° W; 21 Jun.–25 Jul. 2017; D. Marks and K. Grant (J. Heron) leg.; RSKM • 2 ♀♀; Osoyos, West Bench (Crown Land); 49.0304° N, 119.4997° W; elev. 438 m; 14 Jun. 2017; J. Heron, D. Marks and K. Grant leg.; RSKM.

MEXICO – **Baja California** • 1 ♀; Ensenada; [31.858° N, 116.606° W]; 24 Jun. 1950; A.L. Melander leg.; UCRC • 1 ♂; San Vicente; [31.326° N, 116.247° W]; 8 Jul. 1963; J. Powell leg.; EMEC • 1 ♀; Sierra San Pedro Martir, La Encantada; [30.977° N, 115.384° W]; elev. 2133.6 m; 1 Jun. 1958; J. Powell leg.; EMEC • 4 ♀♀; Norte, Rio San Miguel, La Mision; [32.129° N, 116.8154° W]; 22 Aug. 1981; DKF leg.; SDMC.

UNITED STATES – **California** • 2 ♀♀; Alameda Co., Alameda foothills; [37.789° N, 122.225° W]; W.M. Giffard leg.; CAS • 1 ♀; same data as for preceding; 1–31 Aug. 1915; W.M. Giffard leg.; CAS • 1 ♂; same data as for preceding; W.M. Giffard leg.; CAS • 1 ♀; Alameda Co., Altamont; [37.744° N, 121.663° W]; 13 May 1956; W.R. Powell leg.; EMEC • 1 ♀; Alameda Co., Berkeley; [37.872° N, 122.272° W]; 6 May 1952; J.D. Lattin leg.; EMEC • 1 ♂; same data as for preceding; 15 Jul. 1947; P.D. Hurd leg.; EMEC • 1 ♀; same data as for preceding; 24 Apr. 1949; P.D. Hurd leg.; EMEC • 1 ♀; same data as for preceding; 8 Mar. 1946; P.D. Hurd leg.; ex *Narcissus* (verbatim: daffodil); EMEC • 1 ♀; same data as for preceding; 8 Jun. 1948; P.D. Hurd leg.; EMEC • 1 ♀; same data as for preceding; EMEC • 1 ♀; same data as for preceding; 1 May 1949; P.D. Hurd leg.; EMEC • 8 ♂♂; same data as for preceding; 4 Sep. 1959; J. Powell leg.; ex *Baccharis*; EMEC • 1 ♀; same data as for preceding; 4 Sep. 1959; J. Powell leg.; ex *Baccharis*; EMEC • 2 ♂♂; same data as for preceding; 2 Oct. 1960; D.D. Linsdale leg.; EMEC • 17 ♀♀; same data as for preceding; 10 May 1912; J.C. Bridwell leg.; EMEC • 3 ♀♀; same data as for preceding; 27 Mar. 1912; J.C. Bridwell leg.; USNM • 1 ♀; same data as for preceding; 6 May 1912; J.C. Bridwell leg.; USNM • 1 ♀; same data as for preceding; 14 Apr. 1954; H.L. Hansen leg.; EMEC • 3 ♀♀; same data as for preceding; 1 Sep. 1948; EMEC • 1 ♀; same data as for preceding; 14 Mar. 1949; J.W. MacSwain leg.; EMEC • 1 ♀; same data as for preceding; 29 Oct. 1912; EMEC • 1 ♀; Alameda Co., Emeryville; [37.831° N, 122.285° W]; 5 Sep. 1936; G.E. Bohart leg.; CAS • 1 ♀; Alameda Co., Hillsback of Oakland; [37.804° N, 122.271° W]; 2 Aug. 1908; E.C. Van Dyke leg.; CAS • 1 ♀; Alameda Co., Niles; [37.584° N, 121.986° W]; 14 Apr. 1904; E.J. Brausigon leg.; UCRC • 1 ♀; Alameda Co., Oakland; [37.804° N, 122.271° W]; 1–31 Aug. 1936; E.S. Ross leg.; CAS • 1 ♀; same data as for preceding; 10 Apr. 1954; R. Schuster leg.; EMEC • 2 ♀♀; same data as for preceding; 6 Aug. 1920; P.H. Timberlake leg.; ex visiting Compositae; UCRC • 1 ♂; same data as for preceding; 5 Nov. 1955; B.J. Adelson leg.; EMEC • 1 ♀; Alameda Co., San Lorenzo; [37.681° N, 122.124° W]; 4 Sep. 1954; P.D. Hurd leg.; EMEC • 1 ♀; Alameda Co., U.C. Campus; [37.8° N, 122.27° W]; 2 Sep. 1910; J.C. Bridwell leg.; USNM • 1 ♂; Alameda Co., U.C. Campus, Berkeley; [37.873° N, 122.26° W]; 10 Aug. 1910; J.C. Bridwell leg.; USNM • 1 ♀; Alameda Co., University of California Campus, Barkeley; [37.87° N, 122.26° W]; 21 Jun. 1934; H.A. Scullen leg.; OSAC • 1 ♀; Alpine Co., Markleeville; [38.695° N, 119.78° W]; 2 Jul. 1963; R.P. Allen leg.; CSCA • 1 ♂; Butte Co., Chico; [39.740° N, 121.836° W]; 7 Jun. 1954; M. Wasbauer leg.; EMEC • 2 ♀♀; Colusa Co., Sycamore; [39.130° N, 121.940° W]; 15 Jul. 1916; EMEC • 3 ♀♀; Contra Costa Co., Antioch; [38.005° N, 121.806° W]; 8 May 1950; P.D. Hurd leg.; EMEC • 1 ♀; same data as for preceding; 21 May 1949; L.W. Quate leg.; EMEC

• 1 ♀; Contra Costa Co., Danville; [37.820° N, 122° W]; 5 Oct. 1951; F.X. Williams leg.; CAS • 1 ♀; same data as for preceding; 19 Sep. 1951; F.X. Williams leg.; CAS • 1 ♀; same data as for preceding; 20 Jul. 1952; F.X. Williams leg.; CAS • 1 ♀; Contra Costa Co., Hampton Road, P.F. Yorks; [37.984° N, 122.113° W]; 25 Jul. 1975; ex *Photinia arbutifolia* (verbatim: *Heteromeles arbutifolia*); USNM • 1 ♀; Contra Costa Co., Mount Diablo; [37.882° N, 121.914° W]; 10 Jul. 1947; U.N. Lanham leg.; UCMC • 1 ♂; Contra Costa Co., Point Molette, Richmond; [37.948° N, 122.42° W]; 19 Jun. 1964; J.A. Powell leg.; EMEC • 1 ♂; Contra Costa Co., Richmond; [37.936° N, 122.347° W]; 23 Sep. 1950; EMEC • 1 ♂; Del Norte Co., Smith River; [41.94° N, 124.20° W]; 17 Jul. 1930; J.M. Aldrich leg.; EMEC • 1 ♀; Del Notre Co., Klamath; [41.5263° N, 124.0383° W]; 18 Jul. 1934; E.P. Van Duzee leg.; CAS • 1 ♂; El Dorado Co., Fallen Leaf Lake; [38.92° N, 120.06° W]; 24 Aug. 1953; Lattin and Lattin leg.; EMEC • 1 ♂; El Dorado Co., Chile Bar; [38.771° N, 120.813° W]; 5 Jul. 1948; J.W. Adams leg.; EMEC • 1 ♀; El Dorado Co., Fallen Leaf Lake; [38.92° N, 120.06° W]; 24 Jul. 1953; Lattin and Lattin leg.; EMEC • 1 ♀; El Dorado Co., North End Lake Folsom; [38.820° N, 121.092° W]; 23 May 1967; A. Keuter leg.; CAS • 1 ♀; Fresno Co., Laton; [36.433° N, 119.687° W]; 5 Oct. 1959; R.R. Snelling leg.; EMEC • 1 ♂; Fresno Co., Mono Hot Springs; [37.327° N, 119.018° W]; 8 Aug. 1956; R.O. Schuster leg.; EMEC • 1 ♀; Fresno Co., Shaver Lake; [37.089° N, 119.318° W]; 27 Jul. 1968; J.B. Hoy leg.; EMEC • 1 ♀; Glenn Co., Artois; [39.62° N, 122.19° W]; 2 Jun. 1953; J.W. MacSwain leg.; EMEC • 1 ♀; Glenn Co., Phelan Is. REM; 39.6785° N, 121.9639° W; 20 Jun. 2012; N. Williams leg.; WRME • 1 ♀; Humboldt Co., Samoa dunes; [40.763° N, 124.222° W]; 26 Jun. 1969; C. Slobodchikoff leg.; EMEC • 2 ♀♀; Humboldt Co., 1 mi. S of Blue Lake; [40.869° N, 123.984° W]; 12 Jun. 1959; T.R. Haig leg.; CSCA • 1 ♀; Humboldt Co., Arcata; [40.868° N, 124.091° W]; 5 Jun. 1969; R.R. Snelling and R.A. Snelling leg.; EMEC • 1 ♂; same data as for preceding; 4 Jun. 1969; J. Powell leg.; EMEC • 1 ♀; Humboldt Co., Dry Lagoon State Park; [41.225° N, 124.098° W]; 10 Aug. 1953; P.H. Arnaud Jr leg.; CAS • 3 ♀♀; Humboldt Co., Eureka; [40.802° N, 124.164° W]; 6 Jul. 1946; E. Mills leg.; ex on leaves of *Lilium longiflorum*; CSCA • 1 ♀; same data as for preceding; 6 Jul. 1946; E. Mills leg.; ex on leaves of *Lilium longiflorum*; UCRC • 1 ♀; Humboldt Co., Humboldt; [40.8° N, 123.8° W]; 3 Mar. 1911; J.C. Bridwell leg.; USNM • 2 ♀♀; Humboldt Co., Kneeland School; [40.726° N, 123.944° W]; 17 Aug. 1961; T.R. Haig leg.; CSCA • 1 ♂; Humboldt Co., Mad Riv. near Arcata; [40.914° N, 124.101° W]; 1–30 Jun. 1924; J.M. Aldrich leg.; USNM • 1 ♀; Humboldt Co., Maple Creek; [40.762° N, 123.869° W]; 15 Aug. 1968; R.P. Allen leg.; CSCA • 1 ♂; same data as for preceding; 15 Aug. 1968; R.P. Allen leg.; CSCA • 1 ♀; Inyo Co., Lone Pine; [36.61° N, 118.06° W]; 13 May 1969; P. Welles leg.; ex *Salix*; EMEC • 1 ♀; same data as for preceding; 13 May 1969; J.A. Chemsak leg.; EMEC • 1 ♀; Kern Co., 15 mi. E of Bakersfield; [35.368° N, 118.752° W]; 2 May 1953; C.D. MacNeill leg.; CAS • 1 ♀; Kern Co., Kern River Preserve, 1.5 mi. W of Weldon; [35.667° N, 118.317° W]; 31 Mar. 1983; J.D. Pinto and R.K. Velten leg.; UCRC • 1 ♀; Kern Co., Kernville; [35.7331° N, 118.4344° W]; 10 Jul. 1955; J. Powell leg.; EMEC • 1 ♂; Kern Co., Walker Pass; [35.663° N, 118.027° W]; elev. 1597.2 m; 11 Jul. 1964; R.R. Snelling leg.; EMEC • 1 ♀; King Co., 4 mi. NW of Straford; [36.230° N, 119.874° W]; 4 Nov. 1954; R.R. Snelling leg.; ex *Grindelia*; EMEC • 1 ♂; Los Angeles Co., Tanbark Flat; [34.204° N, 117.760° W]; 12 Jul. 1950; W.C. Bentinck leg.; EMEC • 1 ♀; Los Angeles Co., 16 mi. NE of Saugus; [34.570° N, 118.342° W]; 18 Jun. 1962; J.F. Lawrence leg.; EMEC • 1 ♂; Los Angeles Co., Alamitos Bay; [33.750° N, 118.118° W]; 6 May 1939; P.H. Timberlake leg.; ex *Oenothera*; UCRC • 1 ♀; Los Angeles Co., Ballona Wetlands near Playa del Rey; [33.97° N, 118.44° W]; 5 Apr. 1981; C. Nagano leg.; EMEC • 1 ♀; same data as for preceding; 26 Aug. 1981; C. Nagano leg.; EMEC • 3 ♀♀; same data as for preceding; 22 Apr. 1981; C. Nagano leg.; EMEC • 1 ♀; same data as for preceding; 6 Jun. 1981; C. Nagano leg.; EMEC • 2 ♀♀; same data as for preceding; 23 Jul. 1980; C. Nagano, J. Hogue and E. Birdsall leg.; EMEC • 1 ♀; same data as for preceding; 2 Jul. 1980; C. Nagano, J. Hogue and C. Chapelle leg.; EMEC • 1 ♀; same data as for preceding; 9 Jun. 1981; R.R. Snelling leg.; ex *Heliotropium curassavicum*; EMEC • 3 ♀♀; same data as for preceding; 11 Jun. 1981; R.R. Snelling leg.; ex *Carpobrotus*; EMEC • 1 ♀; same data as for preceding; 11 Jun. 1981; R.R. Snelling leg.; ex *Heliotropium curassavicum*; EMEC • 1 ♂; same data as for preceding; 25 Jul. 1981; R.R. Snelling leg.; ex *Foeniculum vulgare*; EMEC • 2 ♂♂; same data as for

preceding; 9 May 1981; C. Nagano leg.; EMEC • 1 ♂; same data as for preceding; 11 Jun. 1981; R.R. Snelling leg.; EMEC • 1 ♂; same data as for preceding; 8 May 1981; R.R. Snelling leg.; EMEC • 1 ♂; same data as for preceding; 11 Jun. 1981; R.R. Snelling leg.; ex *Heliotropium curassavicum*; EMEC • 1 ♂; same data as for preceding; 6 Jun. 1981; C. Nagano leg.; EMEC • 5 ♀♀; Los Angeles Co., Claremont; [34.097° N, 117.719° W]; USNM • 1 ♀; Los Angeles Co., Covina; [34.092° N, 117.879° W]; 15 Apr. 1925; M. Kamal leg.; ex *Brassica*; UCRC • 4 ♀♀; Los Angeles Co., Huntington Park; [33.983° N, 118.217° W]; 28 Jul. 1940; A. Bauman leg.; EMEC • 1 ♀; Los Angeles Co., La Mirada; [33.902° N, 118.01° W]; 4 Apr. 1939; J. Roberds leg.; EMEC • 1 ♀; same data as for preceding; 21 Feb. 1939; J. Roberds leg.; EMEC • 1 ♀; same data as for preceding; 4 Apr. 1939; EMEC • 1 ♀; Los Angeles Co., Los Angeles; [34.053° N, 118.243° W]; 17 Apr. 1935; K. Hollan leg.; EMEC • 1 ♀; same data as for preceding; 31 Jul. 1938; EMEC • 1 ♀; same data as for preceding; 5 May 2017; R. May leg.; EMEC • 1 ♀; same data as for preceding; 10 Apr. 1916; EMEC • 1 ♂; same data as for preceding; 18 Aug. 2017; R. May leg.; EMEC • 1 ♀; same data as for preceding; 6 Apr. 2018; EMEC • 1 ♀; same data as for preceding; 1 Apr. 2016; EMEC • 2 ♀♀; same data as for preceding; 23 Jun. 1917; R. May leg.; EMEC • 1 ♀; same data as for preceding; 20 Apr. 1916; EMEC • 1 ♀; same data as for preceding; 14 Jun. 1947; H. Wilson leg.; EMEC • 1 ♀; Los Angeles Co., Pasadena; [34.148° N, 118.145° W]; 1–31 Aug. 1913; O.B. Hayes leg.; OSAC • 1 ♀; Los Angeles Co., Pomona; [34.061° N, 117.756° W]; 8 Jul. 1931; EMEC • 1 ♀; Los Angeles Co., Redondo; [33.84° N, 118.38° W]; 22 Jun. 1937; J. Roberds leg.; EMEC • 1 ♀; Los Angeles Co., Redondo Beach; [33.858° N, 118.379° W]; 21 Jun. 1937; J. Roberds leg.; EMEC • 1 ♀; Los Angeles Co., Rivera; [33.989° N, 118.089° W]; 7 May 1927; P.H. Timberlake leg.; UCRC • 1 ♀; Los Angeles Co., Santa Monica; [34.022° N, 118.481° W]; 30 Jun. 1935; E.G. Linsley leg.; EMEC • 1 ♀; Los Angeles Co., Valyermo; [34.446° N, 117.852° W]; 13 May 1944; A.L. Melander leg.; UCRC • 1 ♂; Los Angeles Co., West Hollywood Hills; [34.116° N, 118.370° W]; 15 Aug. 1949; R.G. Howell leg.; EMEC • 4 ♂♂; Los Angeles Co., Westwood Hills; [38.302° N, 122.32° W]; 15 Jul. 1930; J. Wilson leg.; EMEC • 1 ♀; same data as for preceding; 29 Feb. 1936; E.G. Linsley leg.; ex *Helianthus*; EMEC • 2 ♀♀; same data as for preceding; 3 Apr. 1937; N.F. Hardman leg.; ex willow; EMEC • 1 ♀; same data as for preceding; 18 Feb. 1935; E.G. Linsley leg.; EMEC • 3 ♀♀; Los Angeles Co., Whittier; [33.972° N, 118.031° W]; L.L. Muchmore leg.; EMEC • 1 ♂; same data as for preceding; L.L. Muchmore leg.; EMEC • 1 ♂; same data as for preceding; 10 Aug. 1920; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 30 Jul. 1926; P.H. Timberlake leg.; ex *Calystegia occidentalis* (verbatim: *Convolvulus occidentalis*); UCRC • 1 ♀; same data as for preceding; 30 Jul. 1934; P.H. Timberlake leg.; ex *Symphyotrichum* (verbatim: Michaelmas daisy); UCRC • 1 ♀; same data as for preceding; 30 Jul. 1926; P.H. Timberlake leg.; ex *Convolvulus*; UCRC • 1 ♂; same data as for preceding; 21 Aug. 1950; H.M. Graham leg.; EMEC • 2 ♀♀; Los Angeles Co.; [34.33° N, 118.23° W]; 16 Apr. 1935; K. Hollan leg.; EMEC • 1 ♀; Madera Co., 8 mi. SE of Madera; [37.042° N, 119.958° W]; 17 Jun. 1957; R.R. Snelling leg.; EMEC • 1 ♀; Madoc Co., Hackamore Reservoir; [41.558° N, 121.14° W]; elev. 1417.3 m; 5 Aug. 1965; T.W. Fisher and R.E. Orth leg.; UCRC • 1 ♂; Marin Co., Stinson Beach; [37.9° N, 122.64° W]; 16 Sep. 1949; CAS • 1 ♀; Mariposa Co., Wawona; [37.537° N, 119.656° W]; 27 Jun. 1948; C.H. Spitzer leg.; EMEC • 1 ♀; Mariposa Co., Yosemite; [37.833° N, 119.500° W]; elev. 1182.6–1219.2 m; 25 Feb. 1938; N.F. Hardman leg.; EMEC • 1 ♀; same data as for preceding; 25 Feb. 1938; E.D. Essig leg.; EMEC • 1 ♀; same data as for preceding; 25 Feb. 1938; K.D. Snyder leg.; EMEC • 4 ♀♀; Mariposa Co., Yosemite National Park, Mirror Lake; [37.748° N, 119.55° W]; 28 Jun. 1947; A.L. Melander leg.; UCRC • 1 ♀; Mariposa Co., Yosemite Valley; [37.7455° N, 119.5937° W]; 27 May 1934; L.S. Slevin leg.; CAS • 1 ♀; same data as for preceding; 24 Jun. 1936; P.H. Timberlake leg.; ex *Helenium bigelovii*; UCRC • 1 ♀; same data as for preceding; 24 Jun. 1936; P.H. Timberlake leg.; ex *Asclepias speciosa*; UCRC • 1 ♀; Mendocino Co., 5.7 mi. S of Leggett; [39.781° N, 123.714° W]; elev. 228.6 m; 4 Jun. 1969; R.R. Snelling and R.A. Snelling leg.; EMEC • 2 ♀♀; Mendocino Co., Caspar; [39.364° N, 123.816° W]; 20 May 1936; I. McCracken leg.; ex *Phacelia californica*; CAS • 3 ♀♀; Mendocino Co., Eel River Ranger Station; [39.8257° N, 123.0836° W]; elev. 457.2 m; 12 Jun. 1972; R. Coville leg.; ex *Convolvulus*; EMEC • 1 ♀; Mendocino Co., McKerricher Beach State Park, 3 mi. N

of Fort Bragg; [39.489° N, 123.797° W]; 7 May 1976; J.A. Powell leg.; EMEC • 1 ♀; Merced Co., 2 mi. SW of Livington; [37.366° N, 120.749° W]; 5 Apr. 1959; G.I. Stage leg.; ex *Camissonia campestris* subsp. *campestris* (verbatim: *Oenothera dentata* var. *campestris*); EMEC • 1 ♀; Merced Co., 2.5 mi. S of Livington; [37.341° N, 120.723° W]; 20 Mar. 1960; R.R. Snelling leg.; ex *Camissonia contorta* (verbatim: *Oenothera contorta*); EMEC • 1 ♀; same data as for preceding; 26 Mar. 1960; R.R. Snelling leg.; ex *Camissonia campestris* subsp. *campestris* (verbatim: *Oenothera dentata* var. *campestris*); EMEC • 1 ♀; same data as for preceding; 26 Mar. 1960; R.R. Snelling leg.; ex *Camissonia contorta* (verbatim: *Oenothera contorta*); EMEC • 1 ♀; same data as for preceding; 2 Apr. 1960; R.R. Snelling leg.; ex *Camissonia campestris* subsp. *campestris* (verbatim: *Oenothera dentata* var. *campestris*); EMEC • 2 ♀♀; Merced Co., Los Banos; [37.059° N, 120.851° W]; 22 May 1918; E.P. Van Duzee leg.; CAS • 6 ♀♀; same data as for preceding; 23 May 1918; E.P. Van Duzee leg.; CAS • 2 ♂♂; same data as for preceding; 22 May 1918; E.P. Van Duzee leg.; CAS • 1 ♀; Modoc Co., Alturas; [41.49° N, 120.54° W]; 9 Jul. 1922; C.L. Fox leg.; CAS • 14 ♀♀; Modoc Co., Lake City; [41.643° N, 120.217° W]; 30 Jul. 1922; C.L. Fox leg.; CAS • 1 ♀; same data as for preceding; 1 Aug. 1922; C.L. Fox leg.; CAS • 1 ♂; same data as for preceding; 30 Jul. 1922; C.L. Fox leg.; CAS • 1 ♀; Mono Co., 3 mi. E of Coleville; [38.564° N, 119.451° W]; 24 Jun. 1962; J. Powell leg.; EMEC • 1 ♀; Mono Co., Benton Station; [37.819° N, 118.476° W]; 20 May 1963; R.P. Allen leg.; CSCA • 2 ♀♀; Monterey Co., Arroyo Seco River, 5 air mi. SW of Greenfield; [36.269° N, 121.307° W]; elev. 121.9 m; 7–8 May 1975; E. Rogers leg.; EMEC • 2 ♀♀; same data as for preceding; 5 May 1975; E. Rogers leg.; EMEC • 2 ♀♀; same data as for preceding; 5 May 1975; J.A. Chemsak leg.; EMEC • 1 ♂; Monterey Co., Asilomar; [36.62° N, 121.94° W]; 26 Sep. 1959; C.W. O'Brien leg.; EMEC • 1 ♂; Monterey Co., Carmel; [36.555° N, 121.923° W]; 19 Jun. 1921; L.S. Slevin leg.; CAS • 1 ♀; same data as for preceding; 29 Jul. 1933; L.S. Slevin leg.; CAS • 1 ♀; same data as for preceding; 20 May 1913; E.C. Van Dyke leg.; CAS • 1 ♀; Monterey Co., Lockwood; [35.94° N, 121.08° W]; 5 May 1959; P.H. Timberlake leg.; UCRC • 3 ♀♀; Monterey Co., Monterey; [36.603° N, 121.893° W]; 25 Sep. 1934; A.L. Melander leg.; MCZ • 3 ♀♀; Nevada Co., 1 mi. S of Hobart Mills; [39.386° N, 120.184° W]; 1 Sep. 1957; J.M. Linsley leg.; ex *Chrysothamnus viscidiflorus* var. *typicus*; EMEC • 1 ♀; Nevada Co., Grass Valley; [39.219° N, 121.058° W]; 5 Apr. 1959; ex *Frangula californica* (verbatim: *Rhamnus californica*); CSCA • 1 ♀; Orange Co., Anaheim; [33.835° N, 117.912° W]; 22 Jul. 1955; C.A. Toschi leg.; EMEC • 1 ♂; Orange Co., Buena Park; [33.856° N, 118.004° W]; 19 May 1944; A.L. Melander leg.; UCRC • 1 ♀; Orange Co., Costa Mesa; [33.665° N, 117.912° W]; 25 Jun. 1939; P.D. Hurd leg.; EMEC • 1 ♀; same data as for preceding; 24 Jun. 1939; P.D. Hurd leg.; EMEC • 1 ♀; same data as for preceding; 4 Jul. 1939; P.D. Hurd leg.; EMEC • 2 ♂♂; Orange Co., Laguna Beach; [33.53° N, 117.77° W]; 7 Aug. 1936; P.H. Timberlake leg.; ex *Heliotropium curassavicum*; UCRC • 1 ♀; same data as for preceding; Baker leg.; USNM • 1 ♂; Orange Co., Laguna Hills; [33.60° N, 117.7° W]; 18 Jul. 1926; P. Small leg.; CAS • 1 ♀; Orange Co., Newport; [33.62° N, 117.89° W]; 15 Jul. 1937; N.F. Hardman leg.; EMEC • 2 ♀♀; Orange Co., Newport (Upper) Bay; [33.65° N, 117.89° W]; 6 Apr. 1964; A.E. Michelbacher leg.; EMEC • 1 ♀; same data as for preceding; 7 Apr. 1964; A.E. Michelbacher leg.; EMEC • 1 ♀; Orange Co., Newport Beach; [33.62° N, 117.89° W]; 19 Aug. 1920; P.H. Timberlake leg.; UCRC • 2 ♀♀; same data as for preceding; 19 May 1964; A.E. Michelbacher leg.; EMEC • 1 ♀; Orange Co., Santa Ana; [33.74° N, 117.88° W]; 30 May 1936; C.E. Norland leg.; EMEC • 1 ♀; same data as for preceding; 12 Jul. 1942; P.D. Hurd leg.; EMEC • 1 ♀; Orange Co., Westminster; [33.751° N, 117.990° W]; 6 May 1939; EMEC • 1 ♀; Pacific Co., Nahcotta; [46.50° N, 124.03° W]; 25 Jul. 1954; OSAC • 2 ♀♀; Placer Co., 4 mi. S of Rocklin; [38.731° N, 121.234° W]; 27 May 1979; Wasbauer, Adams leg.; CSCA • 1 ♀; same data as for preceding; 26 May 1979; Wasbauer, Adams leg.; CSCA • 1 ♀; Placer Co., 5 mi. N of Auburn; [38.960° N, 121.079° W]; 25 Aug. 1948; P.D. Hurd leg.; EMEC • 1 ♀; Placer Co., Forest Hill; [39.02° N, 120.83° W]; 9 Jun. 1931; E.C. Van Dyke leg.; CAS • 1 ♀; Plumas Co., 4 mi. W of Quincy; [39.936° N, 121.022° W]; 20 Jun. 1949; C.I. Smith leg.; EMEC • 2 ♂♂; Plumas Co., 5.5. mi. S of Vinton; [39.722° N, 120.175° W]; 6 Aug. 1963; J.W. MacSwain leg.; ex *Taraxia tanacetifolia* (verbatim: *Oenothera tanacetifolia*); EMEC • 2 ♂♂; same data as for preceding; 6 Aug. 1963; R.W. Thorp leg.; ex *Taraxia tanacetifolia* (verbatim:

Oenothera tanacetifolia); EMEC • 1 ♀; Plumas Co., Lake Almanor; [40.25° N, 121.16° W]; 8 Jul. 1949; P.D. Hurd leg.; EMEC • 1 ♂; Riverside Co., 5 mi. W of Sage; [33.583° N, 117.016° W]; 3 Jul. 1963; P.D. Hurd leg.; EMEC • 1 ♀; Riverside Co., Bautista Canyon; [33.698° N, 116.853° W]; 24 Apr. 1984; F. Corcel leg.; UCRC • 1 ♀; Riverside Co., Hemet; [33.748° N, 116.972° W]; 5–19 Jul. 1950; E.G. Linsley, J.W. MacSwain leg.; EMEC • 1 ♀; same data as for preceding; 26 Aug. 1946; J.W. MacSwain leg.; ex *Tribulus*; EMEC • 1 ♀; same data as for preceding; 24 Jul. 1946; J.W. NacSwain leg.; ex *Helianthus*; EMEC • 1 ♀; Riverside Co., Hurkey Creek, San Jacinto Mountains; [33.714° N, 116.677° W]; 10 Jun. 1950; EMEC • 1 ♀; Riverside Co., Riverside; [33.9556° N, 117.3722° W]; elev. 290 m; 14 Sep. 1939; C.M. Dammers leg.; EMEC • 1 ♀; same data as for preceding; 21 Feb. 1937; EMEC • 4 ♀♀; same data as for preceding; 12 Sep. 1953; P.H. Timberlake leg.; ex *Picris echioides*; EMEC • 1 ♂; same data as for preceding; 1 Jul. 1925; P.H. Timberlake leg.; ex *Leucanthemum* × *superbum* (verbatim: shasta daisy); UCRC • 1 ♂; same data as for preceding; 21 Jul. 1930; P.H. Timberlake leg.; ex *Medicago sativa*; UCRC • 1 ♂; same data as for preceding; 28 Jun. 1940; P.H. Timberlake leg.; ex *Heliotropium curassavicum*; UCRC • 1 ♀; same data as for preceding; 16 Feb. 1925; P.H. Timberlake leg.; ex *Encelia farinosa*; UCRC • 6 ♀♀; same data as for preceding; 24 May 1925; P.H. Timberlake leg.; ex marguerite daisy; UCRC • 1 ♀; same data as for preceding; 15 Jul. 1928; P.H. Timberlake leg.; ex *Mentha spicata*; UCRC • 11 ♀♀; same data as for preceding; 30 May 1925; P.H. Timberlake leg.; ex marguerite daisy; UCRC • 1 ♀; same data as for preceding; 29 Aug. 1926; P.H. Timberlake leg.; ex *Polygonum lapathifolium*; UCRC • 1 ♀; same data as for preceding; 23 Aug. 1925; P.H. Timberlake leg.; ex marguerite daisy; UCRC • 1 ♀; same data as for preceding; 15 Apr. 1928; P.H. Timberlake leg.; ex *Calendula*; UCRC • 1 ♀; same data as for preceding; 1 Jul. 1928; P.H. Timberlake leg.; ex *Leucanthemum* × *superbum* (verbatim: shasta daisy); UCRC • 1 ♀; same data as for preceding; 1 Jul. 1928; P.H. Timberlake leg.; ex marguerite daisy; UCRC • 1 ♀; same data as for preceding; 2 Sep. 1925; P.H. Timberlake leg.; ex *Deinandra*; UCRC • 1 ♀; same data as for preceding; 1 Apr. 1928; P.H. Timberlake leg.; ex *Calendula*; UCRC • 1 ♀; same data as for preceding; 4 Jul. 1936; P.H. Timberlake leg.; ex *Cosmos*; UCRC • 1 ♀; same data as for preceding; 25 Jul. 1926; P.H. Timberlake leg.; ex *Ageratum*; UCRC • 1 ♀; same data as for preceding; 22 Sep. 1934; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 26 Oct. 1939; P.H. Timberlake leg.; ex *Polygonum lapathifolium*; UCRC • 1 ♀; same data as for preceding; 3 Apr. 1932; P.H. Timberlake leg.; ex *Erodium moschatum*; UCRC • 1 ♀; same data as for preceding; 16 Nov. 1935; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 1 Sep. 1935; P.H. Timberlake leg.; ex *Lobularia maritima* (verbatim: *Alyssum maritimum*); UCRC • 1 ♀; same data as for preceding; 6 Oct. 1935; P.H. Timberlake leg.; ex *Polygonum lapathifolium*; UCRC • 2 ♀♀; same data as for preceding; 7 Jun. 1934; P.H. Timberlake leg.; ex *Calendula*; UCRC • 1 ♀; same data as for preceding; 19 Jun. 1932; P.H. Timberlake leg.; ex *Coreopsis tinctoria*; UCRC • 1 ♀; same data as for preceding; 21 Apr. 1924; P.H. Timberlake leg.; ex *Salix nigra*; UCRC • 1 ♀; same data as for preceding; 3 May 1932; P.H. Timberlake leg.; ex *Erodium moschatum*; UCRC • 1 ♀; same data as for preceding; 9 May 1939; P.H. Timberlake leg.; ex *Sonchus oleraceus*; UCRC • 1 ♀; same data as for preceding; 25 May 1940; P.H. Timberlake leg.; ex *Salix gooddingii*; UCRC • 1 ♀; same data as for preceding; 7 Oct. 1937; P.H. Timberlake leg.; ex *Phyla nodiflora* (verbatim: *Lippia filiformis*); UCRC • 1 ♀; same data as for preceding; 23 Sep. 1937; P.H. Timberlake leg.; ex *Stephanomeria exigua*; UCRC • 1 ♀; same data as for preceding; 7 Sep. 1940; P.H. Timberlake leg.; ex michaelmas daisy; UCRC • 1 ♀; same data as for preceding; 21 Jul. 1940; P.H. Timberlake leg.; ex *Coreopsis lanceolata*; UCRC • 1 ♀; same data as for preceding; 16 Aug. 1936; P.H. Timberlake leg.; ex *Mentha spicata*; UCRC • 1 ♀; same data as for preceding; 6 Apr. 1941; P.H. Timberlake leg.; ex *Erodium moschatum*; UCRC • 1 ♀; same data as for preceding; 12 Apr. 1942; P.H. Timberlake leg.; ex *Sonchus oleraceus*; UCRC • 1 ♀; same data as for preceding; 6 Oct. 1941; P.H. Timberlake leg.; ex *Heterotheca grandiflora*; UCRC • 1 ♀; same data as for preceding; 13 Aug. 1947; P.H. Timberlake leg.; ex *Sisyrinchium*; UCRC • 1 ♀; same data as for preceding; 18 May 1947; P.H. Timberlake leg.; ex *Coreopsis lanceolata*; UCRC • 1 ♀; same data as for preceding; 24 Aug. 1953; P.H. Timberlake leg.; ex *Picris echioides*; UCRC • 1 ♀; same data as for preceding; 29 Aug. 1953; P.H. Timberlake leg.; ex *Picris echioides*; UCRC • 1 ♀; same data as for

preceding; 3 Jun. 1934; P.H. Timberlake leg.; ex ??*lanceolata*; UCRC • 1 ♀; same data as for preceding; 15 Apr. 1950; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 14 Sep. 1952; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 29 Aug. 1963; P.H. Timberlake leg.; ex *Picris echioides*; UCRC • 1 ♀; same data as for preceding; 4 May 1929; P.H. Timberlake leg.; ex *Gilia achilleifolia* subsp. *multicaulis* (verbatim: *Gilia multicaulis*); UCRC • 1 ♂; same data as for preceding; 2 Aug. 1925; P.H. Timberlake leg.; ex mint; UCRC (Fig. 68) • 1 ♂; same data as for preceding; 15 Jul. 1925; P.H. Timberlake leg.; ex *Mentha spicata*; UCRC • 1 ♂; same data as for preceding; 7 Sep. 1940; P.H. Timberlake leg.; UCRC (Fig. 67) • 1 ♀; Riverside Co., Temecula; [33.503° N, 117.124° W]; 10 May 1945; A. Melander leg.; UCRC • 1 ♀; Riverside Co., Vail Lake; [33.491° N, 116.974° W]; 26 Aug. 1965; R.E. Orth leg.; UCRC • 1 ♀; Sacramento Co., Carmichael; [38.639° N, 121.321° W]; 23 Aug. 1965; R.F. Wilkey leg.; CSCA • 1 ♀; Sacramento Co., Sacramento; [38.58° N, 121.48° W]; 18 Mar. 1958; W.E. Simonds leg.; CSCA • 1 ♂; same data as for preceding; 2 Aug. 1968; R.A. Belmont leg.; CSCA • 1 ♀; Sacramento Co., Sacramento; [38.58° N, 121.48° W]; 7 Sep. 1959; I. Savage leg.; CSCA • 1 ♀; same data as for preceding; 11 May 1960; M. Washauer leg.; CSCA • 1 ♀; Sacramento Co., Sherman Island; [38.059° N, 121.733° W]; 16 Oct. 1925; E.C. Van Dyke leg.; CSCA • 1 ♀; San Benito Co., 6 mi. SE of Idria; [36.355° N, 120.598° W]; 28 Jun. 1954; J.G. Rozen leg.; ex *Monardella lanceolata*; EMEC • 1 ♀; same data as for preceding; 28 Jun. 1954; J.D. Latin leg.; EMEC • 1 ♀; San Bernardino Co., 2 mi. NE of Highland; [34.138° N, 117.191° W]; 16 Jul. 1957; J.T. Doyen leg.; EMEC • 1 ♂; San Bernardino Co., Mojave River at Apple Valley; [34.511° N, 117.260° W]; 29 Jun. 1940; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 29 Jun. 1940; P.H. Timberlake leg.; ex *Melilotus albus*; UCRC • 1 ♀; San Bernardino Co., Redlands; [34.055° N, 117.182° W]; F.R. Cole leg.; USNM • 1 ♀; San Diego Co., 6 mi. E of Banner; [33.066° N, 116.441° W]; 26 Jun. 1963; C.H. Frady leg.; OSAC • 1 ♂; San Diego Co., Cardiff; [33.021° N, 117.279° W]; 19 Jun. 1940; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 19 Jun. 1940; P.H. Timberlake leg.; UCRC • 1 ♂; same data as for preceding; 19 Jun. 1965; J. Powell leg.; EMEC • 1 ♀; San Diego Co., Cuyamaca Park; [32.928° N, 116.568° W]; 4 May 1943; E.W. Clark leg.; EMEC • 1 ♂; San Diego Co., Del Mar; [32.955° N, 117.263° W]; 6 May 1979; A.S. Menke leg.; USNM • 1 ♀; San Diego Co., Geo. H. Field; SDMC • 1 ♀; San Diego Co., Jacumba; [32.617° N, 116.188° W]; 3 Oct. 1925; C.L. Fox leg.; CAS • 1 ♀; San Diego Co., La Jolla; [32.840° N, 117.277° W]; 4 Jul. 1938; Cockerell leg.; USNM • 1 ♀; San Diego Co., Lake Cuyamaca; [32.987° N, 116.583° W]; 7 May 1945; A.L. Melander leg.; UCRC • 1 ♀; San Diego Co., Mesa Grande; [33.180° N, 116.769° W]; 10 Jul. 1908; F.E. Blaisdell leg.; CAS • 1 ♀; San Diego Co., Pine Valley; [32.822° N, 116.530° W]; 2 Aug. 1926; F.W. Kelsey leg.; SDMC • 1 ♀; San Diego Co., San Diego; [32.72° N, 117.16° W]; 1930; F.W. Kelsey leg.; SDMC • 1 ♂; same data as for preceding; 3 Jul. 1945; EMEC • 1 ♀; San Diego Co., Solana Beach; [32.991° N, 117.269° W]; 19 Jun. 1963; J. Powell leg.; EMEC • 1 ♂; same data as for preceding; 19 Jun. 1963; J. Powell leg.; ex *Heliotropium curassavicum*; EMEC • 2 ♀♀; same data as for preceding; 19 Jun. 1963; J. Powell leg.; ex *Heliotropium curassavicum*; EMEC • 1 ♂; same data as for preceding; 19 Jun. 1963; P.D. Hurd leg.; ex *Heliotropium curassavicum*; EMEC • 16 ♀♀; same data as for preceding; 19 Jun. 1963; P.D. Hurd leg.; ex *Heliotropium curassavicum*; EMEC • 2 ♂♂; same data as for preceding; 19 Jun. 1963; P.D. Hurd leg.; EMEC • 1 ♀; San Diego Co., Sorrente Valley; [32.903° N, 117.185° W]; 1 Sep. 1980; Faulkner leg.; SDMC • 1 ♀; San Diego Co., Torrey Pines; [32.892° N, 117.240° W]; 30 May 1955; W.E. Simonds leg.; CSCA • 2 ♀♀; San Diego Co., Warner Hot Spring; [33.282° N, 116.634° W]; 18 Aug. 1938; C.M. Dammers leg.; UCRC • 1 ♀; San Diego Co., Warner Springs; [33.282° N, 116.634° W]; 27 Jul. 1921; SDMC • 1 ♀; same data as for preceding; 1 Aug. 1921; SDMC • 1 ♀; San Diego Co., Warner Springs, Agua Caliente Creek; [33.279° N, 116.720° W]; 23–25 Aug. 1980; M. Wasbauer, P. Adams leg.; CSCA • 1 ♀; San Diego Co.; [33.03° N, 116.77° W]; 12 Jul. 1929; SDMC • 1 ♀; same data as for preceding; 25 Jun.–14 Jul. 1931; F.W. Kelsey leg.; SDMC • 1 ♀; same data as for preceding; 7 Oct. 1928; SDMC • 1 ♀; San Diego Co., San Felipe Creek; [33.170° N, 115.822° W]; 5 Jun. 1936; P.H. Timberlake leg.; ex *Heliotropium curassavicum*; UCRC • 1 ♀; San Francisco Co., Presidio; [37.789° N, 122.460° W]; 4 May 1927; C.L. Fox leg.; CAS • 1 ♀; San Francisco Co., Sigmund Stern Grove; [37.736° N, 122.479° W]; 17 Aug. 1958; P.H. Arnaud Jr leg.;

ex *Hypochoeris radicata*; CAS • 1 ♀; San Francisco Co., San Francisco; [37.778° N, 122.416° W]; 15 Aug. 1928; C.L. Fox leg.; CAS • 1 ♂; same data as for preceding; 8 Nov. 1925; C.L. Fox leg.; CAS • 1 ♀; San Joaquin Co., 10 mi. S of Stockton; [37.810° N, 121.293° W]; 18 Oct. 1962; A.E. Michelbacher and M.M. Michelbacher leg.; ex banana squash; USNM • 1 ♂; same data as for preceding; 18 Oct. 1962; A.E. Michelbacher and M.M. Michelbacher leg.; ex banana squash; USNM • 1 ♀; San Joaquin Co., 4 mi. N of Tracy; [37.795° N, 121.425° W]; 30 Jul. 1960; W.A. Steffan leg.; EMEC • 1 ♂; San Joaquin Co., Tracy; [37.738° N, 121.434° W]; 21 Jun. 1949; R.F. Smith leg.; ex *Melilotus*; EMEC • 1 ♀; same data as for preceding; 5 May 1949; ex *Brassica*; EMEC • 1 ♀; same data as for preceding; 21 Jun. 1949; R.F. Smith leg.; ex *Melilotus*; EMEC • 1 ♀; same data as for preceding; 13 Jun. 1949; J.W. MacSwain leg.; EMEC • 1 ♀; same data as for preceding; 20 May 1949; R.F. Smith leg.; ex *Brassica*; EMEC • 1 ♂; same data as for preceding; 7 Jun. 1949; J.W. MacSwain leg.; EMEC • 1 ♂; same data as for preceding; 13 Jun. 1949; J.W. MacSwain leg.; ex *Asclepias*; EMEC • 1 ♀; same data as for preceding; 20 May 1949; R.F. Smith leg.; ex *Convolvulus*; EMEC • 1 ♀; San Luis Obispo Co., Oso Flaco Lake; [35.029° N, 120.624° W]; 14 Jul. 1965; J. Powell leg.; EMEC • 1 ♀; San Luis Obispo Co., 10 mi. SE of Creston; [35.416° N, 120.398° W]; 25 Apr. 1968; J. Powell leg.; EMEC • 1 ♀; San Luis Obispo Co., 10 mi. W of Simmler; [35.351° N, 120.163° W]; 5 May 1962; P.D. Hurd leg.; ex *Malacothrix californica*; EMEC • 1 ♀; San Luis Obispo Co., Cayucos Creek; [35.449° N, 120.908° W]; 8 Aug. 1962; J.C. Hall leg.; UCRC • 1 ♀; San Luis Obispo Co., Dune Lakes, 3 mi. S of Oceano; [35.055° N, 120.612° W]; 11 Jul. 1973; R. Coville leg.; EMEC • 1 ♀; San Luis Obispo Co., Grover City; [35.12° N, 120.61° W]; 28 Apr. 1959; J.W. MacSwain leg.; ex *Camissoniopsis cheiranthifolia* (verbatim: *Oenothera cheiranthifolia* var. *cheiranthifolia*); EMEC • 1 ♀; San Luis Obispo Co., Morro Bay; [35.367° N, 120.847° W]; 2 May 1962; C.A. Toschi leg.; EMEC • 2 ♀♀; San Luis Obispo Co., Oso Flaco Lake, 5 mi. S of Oceano; [35.029° N, 120.620° W]; 27 Apr. 1968; J.A. Chemsak leg.; EMEC • 1 ♂; San Luis Obispo Co., Oso Flaco Lake, Costal dunes; [35.029° N, 120.626° W]; 29 Jun. 1967; M.E. Irwin, T. Cronin and S. Larisch leg.; UCRC • 1 ♀; San Luis Obispo Co., Pismo; [35.145° N, 120.639° W]; 8 May 1936; I. McCracken leg.; ex morning glory; CAS • 1 ♀; San Mateo Co., Bean Hollow; [37.23° N, 122.42° W]; 4 Aug. 1960; P.S. Bartholomew leg.; CAS • 1 ♀; San Mateo Co., Menlo Park; [37.453° N, 122.183° W]; 29 Jul. 1937; T.X. Alillium leg.; UCRC • 1 ♀; San Mateo Co., Millbrae; [37.6° N, 122.401° W]; 1 Sep. 1912; E.C. Van Dyke leg.; CAS • 1 ♀; San Mateo Co., Redwood City; [37.483° N, 122.236° W]; 18 Aug. 1956; R.R. Snelling leg.; EMEC • 1 ♂; same data as for preceding; 15 Jun. 1946; P.H. Arnaud leg.; EMEC • 1 ♀; San Mateo Co., Salada Beach; [37.63° N, 122.49° W]; 21 Apr. 1918; E.P. Van Duzee leg.; CAS • 1 ♀; San Mateo Co., San Bruno; [37.625° N, 122.425° W]; 12 Jul. 1965; R.P. Allen leg.; CSCA • 1 ♀; Santa Barbara Co., 3 mi. N of Refugio Beach; [34.504° N, 120.074° W]; 21 Jun. 1965; J. Powell leg.; EMEC • 1 ♂; Santa Barbara Co., 2 mi. E of Solvang; [34.595° N, 120.102° W]; 28 Jun. 1965; R.W. Gear leg.; EMEC • 1 ♀; same data as for preceding; 28 Jun. 1965; J. Powell leg.; EMEC • 1 ♂; Santa Barbara Co., Cañada del Puerto, Santa Cruz Island; [34.019° N, 119.681° W]; 15 Feb. 1964; T. Fisher leg.; UCRC • 1 ♀; Santa Barbara Co., Carpinteria; [34.399° N, 119.519° W]; 14 Aug. 1957; P.D. Hurd leg.; ex Hemizonia; EMEC • 1 ♀; Santa Barbara Co., Coast; [34.423° N, 119.645° W]; W.M. Giffard leg.; CAS • 1 ♀; Santa Barbara Co., Goleta; [34.436° N, 119.828° W]; 23 Jun. 1959; C.A. Campbell leg.; EMEC • 1 ♀; same data as for preceding; 22 Jun. 1959; C.A. Campbell leg.; EMEC • 1 ♂; Santa Barbara Co., Goleta, U.C; [34.434° N, 119.814° W]; 30 Jun. 1965; J. Powell leg.; EMEC • 1 ♀; Santa Barbara Co., Montecito; [34.433° N, 119.633° W]; 3 Jun. 1927; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 3 Jun. 1927; P.H. Timberlake leg.; ex *Eriophyllum confertiflorum*; UCRC • 2 ♀♀; Santa Barbara Co., Potter hotel (near hedge); [34.414° N, 119.692° W]; 3 Jun. 1915; Harold Morrison leg.; USNM • 1 ♀; Santa Barbara Co., Prisoner's Harbor, Santa Cruz Island; [34.019° N, 119.685° W]; 15 Sep. 1964; E.I. Schlinger leg.; UCRC • 1 ♀; Santa Barbara Co., Santa Cruz Island; [34.004° N, 119.726° W]; 17 Aug. 1939; L.M. Martin leg.; EMEC • 1 ♀; same data as for preceding; 14 Aug. 1939; UCRC • 1 ♀; Santa Clara Co., Fleming Avenue; [37.368° N, 121.806° W]; 9 Jul. 1953; O.H. Swezey leg.; OSAC • 1 ♀; Santa Clara Co., Palo Alto; [37.429° N, 122.138° W]; 4 Sep. 1921; E.P. Van Duzee leg.; CAS • 1 ♀; same data as for preceding; 1 Aug. 1891; EMEC • 1 ♂; Santa Clara Co., Salt Marshes, Palo Alto;

[37.461° N, 122.102° W]; 21 Sep. 1913; UCRC • 1 ♀; Santa Clara Co., San Francisquito Creek, Stanford University; [37.439° N, 122.18° W]; 19 Jul. 1910; EMEC • 2 ♀♀; Santa Clara Co., San Jose; [37.336° N, 121.890° W]; USNM • 1 ♀; same data as for preceding; 1910; EMEC • 1 ♀; same data as for preceding; S. Graenicher leg.; MCZ • 1 ♀; Santa Clara Co., Stanford University; [37.43° N, 122.17° W]; 25 Apr. 1961; P.H. Arnaud Jr leg.; CAS • 1 ♀; same data as for preceding; 1–30 May 1930; EMEC • 2 ♀♀; same data as for preceding; 29 Jun. 1910; EMEC • 1 ♀; same data as for preceding; 14 Aug. 1917; ex Centaurea imperialis; EMEC • 1 ♀; same data as for preceding; 24 Jun. 1910; EMEC • 2 ♂♂; Santa Clara Co.; [37.29° N, 121.74° W]; Baker leg.; USNM • 2 ♀♀; same data as for preceding; EMEC • 1 ♂; same data as for preceding; EMEC • 1 ♀; Santa Cruz Co., Mission Springs; [37.066° N, 122.032° W]; 25 Jul. 1956; M.D. Stage leg.; EMEC • 1 ♀; Santa Cruz Co., Watsonville; [36.920° N, 121.764° W]; Aug. 29; J.B.U. Cockwell leg.; ex *Aster*; UCRC • 1 ♀; Shasta Co., 5 mi. E of Burney; [40.8811° N, 121.565° W]; 9 Jun. 1941; C.D. Michener leg.; EMEC • 1 ♀; Shasta Co., Hat Creek; [40.79° N, 121.474° W]; 1 Jun. 1941; C.D. Michener leg.; EMEC • 1 ♀; Shasta Co., Redding; [40.583° N, 122.367° W]; 4 Jul. 1975; CSCA • 1 ♂; Shasta Co., Redding; [40.583° N, 122.367° W]; 1 Jul. 1975; T.R. Haig leg.; CSCA • 1 ♀; Shasta Co., Redding to Igo; [40.54° N, 122.4683° W]; elev. 304.8 m; 23 Jul. 1941; H.A. Scullen leg.; OSAC • 1 ♂; same data as for preceding; 23 Jul. 1941; H.A. Scullen leg.; OSAC • 1 ♀; Shasta Co., Shingletown; [40.496° N, 121.864° W]; 2 Jun. 1941; EMEC • 1 ♀; Shasta Co., Viola; [40.5179° N, 121.678° W]; 27 Jun. 1947; T.F. Leigh leg.; EMEC • 1 ♀; Shasta Co., Whiskeytown; [40.635° N, 122.561° W]; 21 Jun. 1975; T.R. Haig leg.; CSCA • 1 ♀; Siskiyou Co., 1 mi. SE of Bartle; [41.247° N, 121.8076° W]; 8–10 Jun. 1974; R. Coville leg.; EMEC • 1 ♀; same data as for preceding; 8–10 Jun. 1974; J. Chemask leg.; EMEC • 1 ♀; Siskiyou Co., Montague; [41.7283° N, 122.5274° W]; 1 Jun. 1966; R.P. Allen leg.; CSCA • 1 ♀; Solano Co., 4 mi. NE of Benicia; [38.091° N, 122.103° W]; 12 Sep. 1966; J. Powell leg.; EMEC • 1 ♀; Solano Co., Benicia; [38.063° N, 122.156° W]; 14 Aug. 1910; J.C. Bridwell leg.; USNM • 1 ♀; Sonoma Co., 2 mi. N of Two Rock; [38.293° N, 122.794° W]; 28 Apr. 1978; R.W. Thorp leg.; ex *Limnanthes douglasii*; UCDC • 1 ♀; Sonoma Co., Cazadero; [38.533° N, 123.085° W]; 29 Mar. 1935; R.M. Bohart and G.E. Bohart leg.; CAS • 1 ♂; Sonoma Co., Pitkin Ranch, 6 mi. N of Sebastopol; [38.4868° N, 122.824° W]; 25 Jul. 1965; J.W. MacSwain leg.; ex *Clarkia imbricata*; EMEC • 1 ♀; Sonoma Co., Sonoma Coast State Park, Shell Beach; [38.4174° N, 123.1056° W]; 5 May 1962; J. Doyen leg.; EMEC • 1 ♀; Stanislaus Co., 10 mi. SW of Turlock; [37.391° N, 120.975° W]; 12 May 1952; R.R. Snelling leg.; EMEC • 1 ♀; Stanislaus Co., Adobe Creek W; [37.3958° N, 121.3751° W]; 20 Apr. 1945; EMEC • 3 ♀♀; Stanislaus Co., Del Puerto Canyon; [37.488° N, 121.207° W]; 7 May 1970; R.R. Snelling leg.; ex *Centaurea*; EMEC • 1 ♀; Stanislaus Co., La Grange; [37.664° N, 120.464° W]; 30 May 1962; R.P. Allen leg.; EMEC • 1 ♀; Stanislaus Co., San Joaquin River, Newman; [37.342° N, 120.979° W]; 1–30 Jun. 1916; J.M. Aldrich leg.; USNM • 1 ♀; Stanislaus Co., Turlock; [37.495° N, 120.847° W]; 8 Jul. 1956; M.D. Stage leg.; EMEC • 1 ♀; same data as for preceding; 22 Jun. 1952; ex *Heliotropium curassavicum*; EMEC • 1 ♀; same data as for preceding; 15 Apr. 1951; Snelling leg.; EMEC • 1 ♀; same data as for preceding; 31 Jul. 1952; R.R. Snelling leg.; EMEC • 2 ♀♀; same data as for preceding; 3 May 1952; R.R. Snelling leg.; EMEC • 1 ♀; same data as for preceding; 23 Mar. 1953; R.R. Snelling leg.; ex *Eschscholzia californica*; EMEC • 1 ♀; same data as for preceding; 29 Apr. 1953; R.R. Snelling leg.; ex *Rubus*; EMEC • 1 ♀; same data as for preceding; 6 Apr. 1955; R.R. Snelling leg.; ex *Amsinckia*; EMEC • 37 ♀♀; same data as for preceding; 31 Jul. 1952; R.R. Snelling leg.; ex *Centromadia pungens* (verbatim: *Hemizonia pungens*); EMEC • 1 ♀; same data as for preceding; 31 Jul. 1952; J.I. Stage leg.; ex *Centromadia pungens* (verbatim: *Hemizonia pungens*); EMEC • 1 ♀; same data as for preceding; 14 May 1952; R.R. Snelling leg.; ex *Centromadia pungens* (verbatim: *Hemizonia pungens*); EMEC • 1 ♂; same data as for preceding; 5 Jul. 1952; R.R. Snelling leg.; ex *Heliotropium*; EMEC • 1 ♂; same data as for preceding; 3 Jun. 1951; R.R. Snelling leg.; EMEC • 1 ♂; same data as for preceding; 22 Jun. 1952; R.R. Snelling leg.; ex morning glory; EMEC • 1 ♂; same data as for preceding; 19 Jun. 1954; R.R. Snelling leg.; ex *Solidago velutina* subsp. *californica* (verbatim: *Solidago californica*); EMEC • 1 ♂; same data as for preceding; 23 Nov. 1951; R.R. Snelling leg.; EMEC • 2 ♂♂; same data as for preceding; 3 Jun. 1955; P.D. Hurd leg.; EMEC • 1 ♀; Tehama Co., Lassen

National Forest, Lost Creek; [40.56° N, 121.5° W]; elev. 1524 m; 11 Aug. 1966; H.G. Real leg.; CAS • 1 ♂; same data as for preceding; 11 Aug. 1966; H.G. Real leg.; CAS • 1 ♀; Tehama Co., Rio Vsta. REM; 39.878° N, 122.0603° W; 15 May 2012; N. Williams leg.; WRME • 1 ♀; Trinity Co., 7 mi. S of Trinity Center; [40.888° N, 122.7089° W]; 26 Jul. 1954; J. Powell leg.; EMEC • 1 ♀; Trinity Co., 3 mi. E of Burnt Ranch; [40.808° N, 123.417° W]; 11 Jul. 1954; R.O. Schuster leg.; EMEC • 1 ♀; Trinity Co., Carrville; [41.065° N, 122.704° W]; 15 May 1934; E.C. Van Dyke leg.; CAS • 1 ♀; same data as for preceding; 19 Jun. 1951; E.C. Van Dyke leg.; CAS • 1 ♀; same data as for preceding; 8 Jun. 1913; E.C. Van Dyke leg.; CAS • 2 ♀♀; same data as for preceding; 17 Jun. 1913; E.C. Van Dyke leg.; CAS • 1 ♀; Trinity Co., Junction City; [40.74° N, 123.06° W]; 21 Apr. 1977; T.R. Haig leg.; CSCA • 1 ♀; Tulare Co., 3 mi. W of Three Rivers; [36.437° N, 118.958° W]; 1 Apr. 1939; P.H. Timberlake leg.; ex *Anisocoma acaulis*; UCRC • 1 ♀; Tulare Co., Lemon Cove; [36.381° N, 119.026° W]; 29 Mar. 1947; P.D. Hurd leg.; EMEC • 2 ♀♀; Tulare Co., Wood Lake; [36.414° N, 119.099° W]; 10 Jul. 1947; N.W. Frazier leg.; EMEC • 1 ♀; same data as for preceding; 29 May 1947; N.W. Frazier leg.; EMEC • 1 ♂; same data as for preceding; 6 Jun. 1935; A.L. Melander leg.; MCZ • 1 ♀; Ventura Co., Santa Paula; [34.356° N, 119.068° W]; 23 Jul. 1923; D. Burk leg.; EMEC • 1 ♀; Ventura Co., Saticoy; [34.283° N, 119.149° W]; 24 May 1926; EMEC • 1 ♀; same data as for preceding; 19 May 1926; EMEC • 1 ♀; same data as for preceding; 1 Aug. 1924; USNM • 1 ♀; Yolo Co., Davis; [38.554° N, 121.738° W]; 24 Nov. 1935; R.M. Bohart leg.; MCZ • 1 ♀; Yolo Co., Yolo; 38.605833° N, 121.968611° W; 22 Jun. 2011; S. Kaiser leg.; ex *Sonchus oleraceus*; WRME • 1 ♀; Igo to Oak; [39.9° N, 122.1° W]; 23 Jul. 1941; H.A. Scullen leg.; ex *Eryngium articulatum*; OSAC • 1 ♀; R.P. Allen leg.; CSCA. – **Idaho** • 1 ♀; Canyon Co., Deer Flat National Wildlife Refuge, DFO; 43.562° N, 116.66801° W; 12 Apr. 2012; A. Mohler leg.; OSAC • 4 ♀♀; Canyon Co., Deer Flat National Wildlife Refuge, DFS; 43.55281° N, 116.64137° W; 5–6 Jul. 2012; S. Seidel leg.; OSAC (Fig. 66) • 1 ♀; Camas Co., Fairfield; [43.346° N, 114.791° W]; elev. 1543.8 m; 3 Aug. 1928; USNM • 3 ♀♀; Gooding Co., Wood River, 1 mi. NE of Gooding; [42.9483° N, 114.699° W]; 6–7 Jul. 1980; M.S. Wasbauer and K.M. Wasbauer leg.; CSCA. – **Nevada** • 1 ♀; Washoe Co., 1 mi. N of Washoe; [38.32° N, 122.736° W]; 3 Sep. 1964; A.G. Raske leg.; EMEC • 1 ♀; Washoe Co., 10 mi. S of Reno on hyw 395; [39.625° N, 119.913° W]; 19 Jun. 1959; G.I. Stage leg.; ex *Camissonia claviformis* subsp. *cruciformis* (verbatim: *Oenothera clavaeformis* var. *cruciformis*); EMEC • 1 ♀; Washoe Co., Patrick; [39.547° N, 119.578° W]; 16 Jun. 1964; R.E. Scott leg.; UCRC • 1 ♀; Washoe Co., Sparks; [39.554° N, 119.736° W]; 28 Jun. 1927; E.P. Van Duzee leg.; CAS. – **Oregon** • 1 ♀; Baker Co., Haines; [44.912° N, 117.940° W]; 22 May 1935; H.P. Lanohester leg.; EMEC • 2 ♀♀; Benton Co., Corvallis; [44.567° N, 123.283° W]; 11 Jun. 1925; E.P. Van Duzee leg.; CAS • 1 ♀; same data as for preceding; 15 Jun. 1936; G. Ferguson leg.; EMEC • 1 ♀; same data as for preceding; 18 Apr. 1945; OSAC • 1 ♀; same data as for preceding; 14 Apr. 1929; H.A. Scullen leg.; ex *Taraxacum officinale* (verbatim: *Taraxacum* vulgare); OSAC • 1 ♀; same data as for preceding; 9 Aug. 1900; OSAC • 1 ♀; same data as for preceding; 24 May 1935; G. Ferguson leg.; OSAC • 1 ♀; same data as for preceding; 5 Aug. 1935; G. Ferguson leg.; OSAC • 1 ♀; same data as for preceding; 2 Jun. 1935; G. Ferguson leg.; USNM • 1 ♀; same data as for preceding; 10 May 1936; N.P. Larson leg.; USNM • 1 ♀; same data as for preceding; 6 Jun. 1998; USNM • 1 ♀; same data as for preceding; 7 Aug. 1998; USNM • 1 ♀; same data as for preceding; 8 Jun. 1998; USNM • 1 ♀; Benton Co., Corvallis, Ore. Exp. Sta; [44.566° N, 123.277° W]; 25 Apr. 1926; H.A. Scullen leg.; OSAC • 1 ♀; Benton Co., Monroe; [44.315° N, 123.297° W]; 19 Jun. 1930; G. Bennett leg.; OSAC • 2 ♀♀; Columbia Co., Scappoose; [45.754° N, 122.875° W]; 5–6 May 1937; OSAC • 1 ♀; same data as for preceding; 1 Jun. 1937; OSAC • 1 ♀; same data as for preceding; 28 Jun. 1937; R.E. Rieder leg.; OSAC • 2 ♀♀; Curry Co., Brookings; [42.058° N, 124.286° W]; 8 Jul. 1925; H.A. Scullen leg.; OSAC • 1 ♀; Curry Co., Gold Beach; [42.377° N, 124.414° W]; 15 Jul. 1935; OSAC • 1 ♀; Curry Co., Sixes River; [42.85° N, 124.54° W]; 13 Jul. 1925; H.A. Scullen leg.; OSAC • 1 ♀; Deschutes Co., Bend; [44.05° N, 121.3° W]; 25 Jun. 1954; W.P. Stephen leg.; OSAC • 1 ♀; Deschutes Co., Tumalo State Park; [44.129° N, 121.327° W]; 27 Jun. 1961; D.R. Smith leg.; OSAC • 1 ♀; Harney Co., 8 mi. S of Roaring Springs; [42.540° N, 118.986° W]; 21 Jun. 1947; F. Ellertson leg.; OSAC • 2 ♀♀; Harney Co., Blitzen River; [43.29° N, 118.82° W]; 6 Jul. 1906; OSAC

• 2 ♀♀; Harney Co., Malheur National Wildlife Refuge, Tower; 43.2365° N, 118.8421° W; 18–30 Jun. 2011; T. Coe leg.; OSAC • 1 ♀; Harney Co., Steens Mountain; [42.636° N, 118.577° W]; 23 Jun. 1922; E.C. Van Dyke leg.; CAS • 4 ♀♀; Hood River Co., Hood River; [45.709° N, 121.512° W]; 12 Jun. 1920; E.C. Van Dyke leg.; CAS • 1 ♀; Jackson Co., Gold Hill; [42.434° N, 123.054° W]; 13 Jul. 1930; H.A. Scullen leg.; OSAC • 1 ♀; Jackson Co., Madford; [42.332° N, 122.862° W]; 15 Jul. 1930; H.A. Scullen leg.; OSAC • 1 ♂; same data as for preceding; 15 Jul. 1930; H.A. Scullen leg.; OSAC • 4 ♀♀; Josephine Co., Cave Junction; [42.167° N, 123.647° W]; 18 Aug. 1941; P.H. Timberlake leg.; ex *Hypochaeris radicata*; UCRC • 1 ♀; Josephine Co., Lake Selmac; [42.259° N, 123.577° W]; 6 Jul. 1964; P. Rude leg.; EMEC • 2 ♀♀; Klamath Co., Eagle Ridge; [42.418° N, 121.953° W]; 27 May 1924; C.L. Fox leg.; CAS • 1 ♀; Klamath Co., Eagle Ridge Klamath Lake; [42.389° N, 121.975° W]; 27 May



Fig. 66 *Lasioglossum* **(***Hemihalictus***)** *kincaidii* (Cockerell, 1898), ♀ (OSAC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

1924; C.L. Fox leg.; CAS • 1 ♀; Klamath Co., Eagle Ridge, Harrimans Lodge; [42.468° N, 122.1003° W]; C.L. Fox leg.; CAS • 3 ♀♀; same data as for preceding; 6 Aug. 1924; C.L. Fox leg.; CAS • 1 ♀; Klamath Co., Klamath Falls; [42.225° N, 121.782° W]; 1–31 Aug. 1923; EMEC • 1 ♀; Klamath Co., Lamis Mill, Eagle Ridge Klamath Lake; [42.407° N, 121.979° W]; 24 May 1924; C.L. Fox leg.; CAS • 1 ♀; Linn Co., Shedd; [44.462° N, 123.109° W]; 11 Jun. 1929; J.E. Davis leg.; OSAC • 1 ♀; Linn Co., Sodaville; [44.484° N, 122.868° W]; 1903; Herbert leg.; OSAC • 1 ♂; Linn Co.; [44.53° N, 122.57° W]; 17 Aug. 1929; J.E. Davis leg.; OSAC • 1 ♀; Marion Co., Salem; [44.939° N, 123.033° W]; 16 Aug. 1919; EMEC • 1 ♀; Multnomah Co., Portland; [45.49° N, 122.61° W]; 1–30 Jun. 1925; H.A. Scullen leg.; OSAC • 1 ♀; Multnomah County Co., Oxbow Meadow; 45.485° N, 122.302° W; 15 Jun. 2021; J.D. Engler leg.; ex *Leucanthemum*; OSAC • 1 ♀; Multnomah County Co., Oxbow Meadow; 45.4844° N, 122.3015° W;



Fig. 67. *Lasioglossum* (*Hemihalictus*) *kincaidii* (Cockerell, 1898), ♂ (UCRC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

7 Aug. 2020; J.D. Engler leg.; OSAC • 1 ♀; Polk Co., Independence; [44.853° N, 123.191° W]; 16 Jul. 1934; N.P. Larson leg.; OSAC • 2 ♀♀; Sherman Co., Maryhill Ferry, 3 mi. E of Briggs; [45.693° N, 120.806° W]; 3 Jun. 1963; P.H. Raven leg.; ex *Oenothera pallida*; EMEC • 19 ♀♀; same data as for preceding; 19 May 1963; P.H. Raven leg.; ex *Oenothera pallida*; EMEC • 2 ♀♀; Umatilla Co., Milton; [45.936° N, 118.391° W]; 22 Jun. 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♀; Wasco Co., 5 mi. S of The Dalles; [45.528° N, 121.185° W]; 5 May 1938; K. Gray and J. Schuh leg.; OSAC • 1 ♂; Wasco Co., Tygh Valley; [45.25° N, 121.17° W]; 2 Jul. 1941; R.E. Rieder leg.; ex sweet clover; OSAC. – **Utah** • 1 ♀; Box Elder Co., Mouth Bear River; [41.472° N, 112.294° W]; 24 Jul. 1915; A. Wetmore leg.; USNM • 1 ♀; Utah Co., Provo; [40.244° N, 111.66° W]; 1–31 May 1937; H. Chandler leg.; CAS • 1 ♀; Salt Lake Co., Salt Lake City; [40.76° N, 111.89° W]; S.Garman leg.; MCZ. – **Washington** • 1 ♀; Adams Co., Ritzville; [47.126° N, 118.377° W]; 28 Aug. 1923; M.C. Lane leg.; USNM • 1 ♂; Asotin Co., Asotin; [46.339° N, 117.046° W]; 21 Jun. 1932; J.M. Aldrich leg.; ex wild parsnip; USNM • 1 ♀; Clark Co., Ridgefield National Wildlife Refuge, Wig Lk; 45.817° N, 122.773° W; 24 May 2011; A. Chmielewski leg.; OSAC • 1 ♀; Grant Co., Grand Coulee, Osborn's Ranch; [47.904° N, 119.064° W]; 8 Jul. 1902; USNM • 1 ♀; Island Co., Saratoga Beach; [48.087° N, 122.517° W]; 10 Jul. 1938; E. Dalley leg.; OSAC • 1 ♀; King Co., Seattle; [47.61° N, 122.33° W]; 19 Jun. 1920; E.P. Van Duzee leg.; CAS • 1 ♀; same

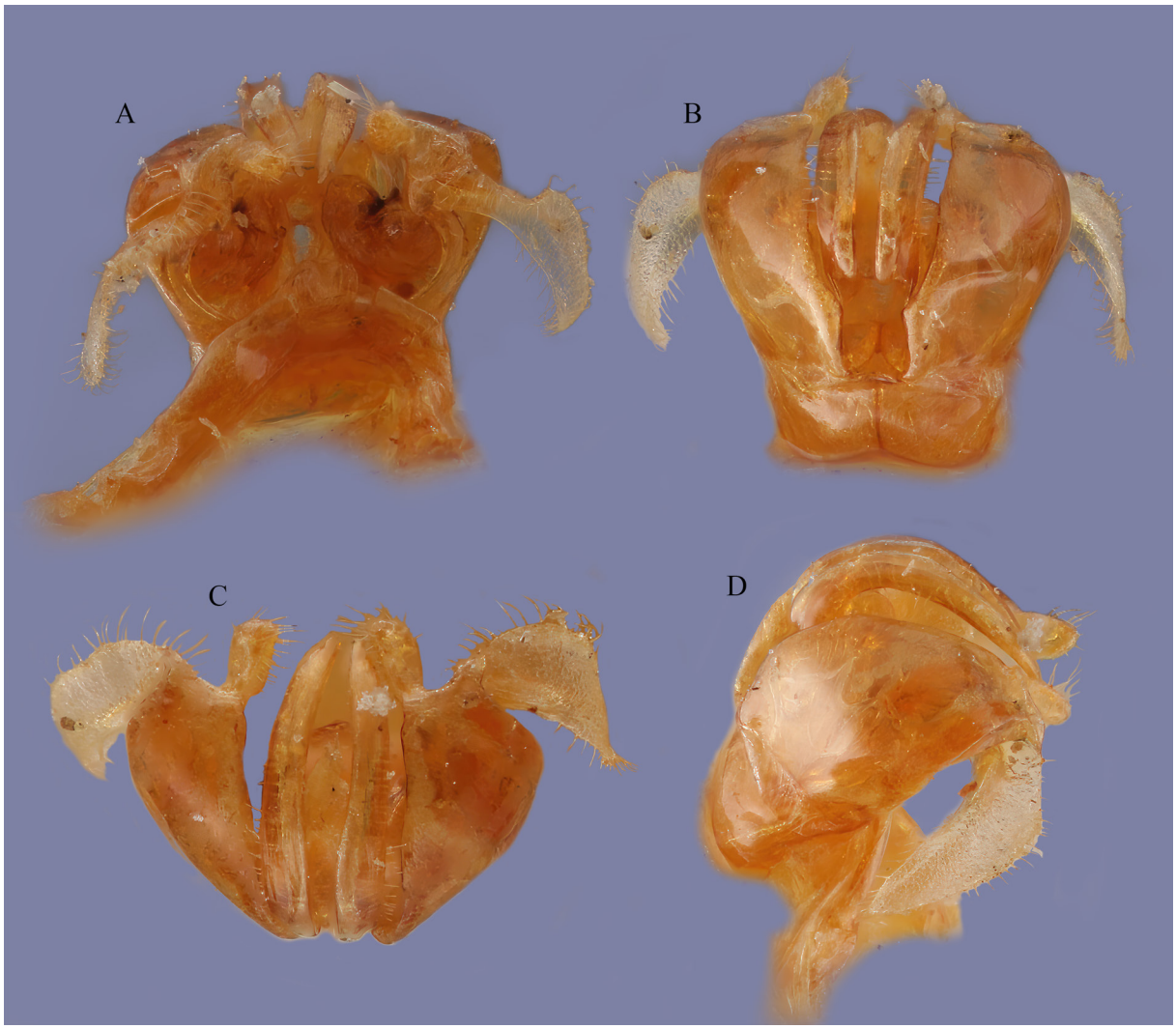


Fig. 68. Genitalia of *Lasioglossum* (*Hemihalictus*) *kincaidii* (Cockerell, 1898), ♂ (UCRC). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

data as for preceding; 18 May 1941; Lewis leg.; OSAC • 1 ♀; same data as for preceding; 25 Jul. 1928; ex *Grindelia* tarweed; OSAC • 3 ♀♀; same data as for preceding; 18 Aug. 1927; ex tarweed *Grindelia*; OSAC • 1 ♀; same data as for preceding; 17 May 1912; OSAC • 1 ♀; same data as for preceding; 1–31 May 1925; OSAC • 1 ♀; same data as for preceding; 29 Jul. 1928; ex *Grindelia* tarweed; OSAC • 1 ♂; same data as for preceding; 7 Aug. 1927; ex *Grindelia* tarweed; OSAC • 1 ♂; same data as for preceding; 18 Aug. 1927; ex *Grindelia* tarweed; OSAC • 1 ♂; same data as for preceding; 4 Aug. 1927; ex *Chamerion angustifolium* subsp. *angustifolium* (verbatim: fireweed, *Epilobium spicatum*); OSAC • 1 ♀; King Co., Seattle; 47.5131° N, 122.3065° W; 14 Jul. 2014; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; King Co., Seattle; 47.4301° N, 122.3051° W; 8 Aug. 2015; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; same data as for preceding; 17 Apr. 2016; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; same data as for preceding; 7 Aug. 2016; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; King Co., Seattle; 47.4295° N, 122.3048° W; 10 May 2017; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; Lincoln Co., Siso-pollinator baseline monitoring, Sage, Downs Rd near Tan Rd E of Lamona; 47.376919° N, 118.389973° W; elev. 547.88 m; 42571; T.D. Hatten leg.; WRME • 1 ♀; Lincoln Co., Siso-pollinator baseline monitoring, Sage, Downs Rd N., S of Coal Coule Lamona; 47.377576° N, 118.391616° W; elev. 547.88 m; 42508; T.D. Hatten leg.; WRME • 1 ♀; Pacific Co., Nahcotta; [46.50° N, 124.03° W]; 1 Aug. 1952; EMEC • 2 ♀♀; same data as for preceding; 25 Jun. 1952; EMEC • 1 ♀; same data as for preceding; 20 Jul. 1951; EMEC • 1 ♀; same data as for preceding; 15 Jun. 1952; EMEC • 1 ♀; same data as for preceding; 10 Aug. 1951; EMEC • 1 ♀; same data as for preceding; 11 Jul. 1951; EMEC • 1 ♀; same data as for preceding; 16 Jul. 1951; EMEC • 1 ♀; same data as for preceding; 30 Jul. 1951; EMEC • 1 ♀; same data as for preceding; 14 Aug. 1951; EMEC • 1 ♂; same data as for preceding; 25 Jul. 1952; EMEC • 2 ♂♂; same data as for preceding; 26 Aug. 1952; EMEC • 1 ♂; same data as for preceding; 23 Aug. 1952; EMEC • 3 ♀♀; same data as for preceding; 30 May 1953; OSAC • 8 ♀♀; same data as for preceding; 9 Jun. 1953; ex *Hypochaeris radicata*; OSAC • 2 ♀♀; same data as for preceding; 15 May 1954; OSAC • 1 ♀; same data as for preceding; 21 Jun. 1953; OSAC • 5 ♀♀; same data as for

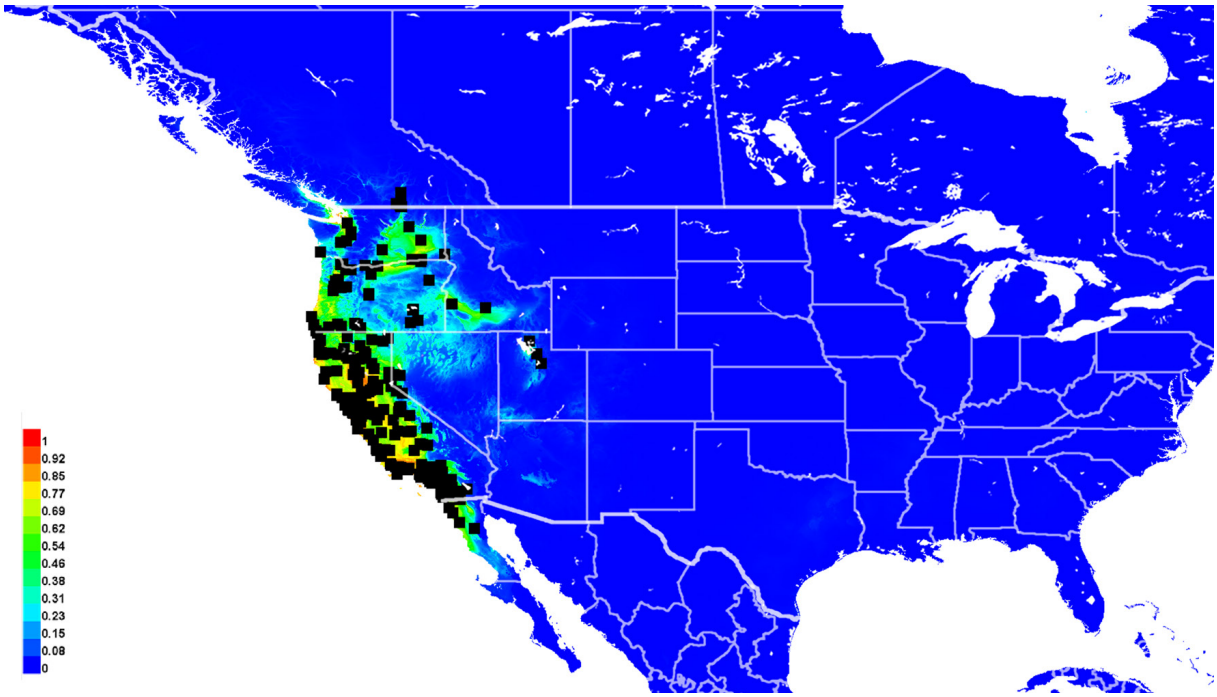


Fig. 69. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *kincaidii* (Cockerell, 1898) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

preceding; 16 Jun. 1953; ex *Symphyotrichum subspicatum* (verbatim: *Aster douglassi*); OSAC • 1 ♀; same data as for preceding; 14 Jun. 1953; OSAC • 2 ♀♀; same data as for preceding; 15 Jun. 1953; OSAC • 1 ♀; same data as for preceding; 5 Aug. 1954; OSAC • 1 ♀; same data as for preceding; 30 Jun. 1954; OSAC • 1 ♀; same data as for preceding; 2 Jul. 1954; ex *Hypochaeris radicata*; OSAC • 1 ♀; same data as for preceding; 16 Jun. 1954; OSAC • 1 ♀; same data as for preceding; 12 May 1954; OSAC • 1 ♀; same data as for preceding; 22 Jul. 1954; OSAC • 3 ♀♀; same data as for preceding; 1 Jun. 1954; ex *Hypochaeris radicata*; OSAC • 1 ♀; same data as for preceding; 22 Jun. 1954; OSAC • 1 ♀; same data as for preceding; 10 May 1954; OSAC • 2 ♀♀; same data as for preceding; 2 Jun. 1954; ex *Hypochaeris radicata*; OSAC • 1 ♀; same data as for preceding; 21 Jun. 1954; OSAC • 1 ♀; same data as for preceding; 25 Jun. 1955; OSAC • 1 ♀; same data as for preceding; 10 May 1953; OSAC • 1 ♀; same data as for preceding; 12 May 1954; SDMC • 1 ♀; same data as for preceding; 8 Aug. 1954; RBCM • 1 ♀; same data as for preceding; 11 Jul. 1954; RBCM • 1 ♀; same data as for preceding; 4 May 1953; RBCM • 1 ♀; same data as for preceding; 1 Jun. 1954; ex *Hypochaeris radicata*; RBCM • 1 ♀; same data as for preceding; Jul. 15; RBCM • 1 ♀; same data as for preceding; 25 Jul. 1954; RBCM • 1 ♀; same data as for preceding; 16 Jun. 1953; ex *Symphyotrichum subspicatum* (verbatim: *Aster douglassi*); RBCM • 1 ♀; same data as for preceding; 21 Jun. 1953; RBCM • 1 ♀; same data as for preceding; 13 Jul. 1953; RBCM • 1 ♀; same data as for preceding; 18 May 1954; OSAC • 1 ♂; same data as for preceding; 10 Aug. 1953; OSAC • 1 ♀; Pacific Co., Willapa National Wildlife Refuge, OSB3; 46.3689° N, 124.0273° W; 22 Aug. 2017; W. Ritchie leg.; OSAC • 1 ♀; Pacific Co., Willapa National Wildlife Refuge, TRL; 46.36886° N, 124.02731° W; 27 Apr. 2015; W. Ritchie leg.; OSAC • 1 ♀; same data as for preceding; 16 May 2016; W. Ritchie leg.; OSAC • 1 ♀; Pierce Co., Fort Lewis; [47.109° N, 122.555° W]; 2 Aug. 1957; R.R. Snelling leg.; EMEC • 1 ♀; Spokane Co., Turnbull National Wildlife Refuge, SSA; 47.4208° N, 117.6203° W; 22–23 Jun. 2016; D. Cousins leg.; OSAC • 1 ♀; same data as for preceding; 27–28 Apr. 2016; D. Cousins leg.; OSAC • 1 ♀; Thurston Co., Olympia; [47.038° N, 122.901° W]; 10 Jun. 1895; USNM • 1 ♀; Walla Walla Co., McNary National Wildlife Refuge, WAL; 46.069° N, 118.8985° W; 1 Jul. 2011; M. Gregg leg.; OSAC • 2 ♀♀; Walla Walla Co., Walla Walla; [46.067° N, 118.339° W]; 29 May 1937; R.M. Bohart and G.E. Bohart leg.; CAS • 1 ♀; Yakima Co., N. Yakima; [46.620° N, 120.544° W]; 24 May 1903; Eldred Jenne leg.; USNM.

Description

Genitalia (Figs 68, 120L). Gonostylus elongate, length approximately twice breadth, with setae short. Retrorse lobe broad, and curved, about 3.5 times as long as broad, pointed at apex, covered in fine, sparse setae.

Range

Canada (British Columbia), Mexico (Baja California), USA (California, Idaho, Nevada, Oregon, Utah, Washington) (Fig. 69).

Biological notes

The robber fly *Megaphorus guildianus* (Williston, 1885) (Asilidae) was recorded as a predator of *L. kincaidii* (Moure & Hurd 1987).

Floral hosts

AIZOACEAE: *Carpobrotus* sp. • APIACEAE: *Eryngium articulatum* Hook., *Foeniculum vulgare* Mill., *Pastinaca sativa* L. • APOCYNACEAE: *Asclepias* sp., *Asclepias* speciosa Torr. • ASTERACEAE: *Ageratum* sp., *Anisocoma acaulis* Torr. & A.Gray, *Argyranthemum frutescens* (L.) Sch.Bip., *Aster* sp., *Baccharis* sp., *Calendula* sp., *Centaurea* sp., *Centromadia pungens* Greene, *Chrysothamnus* sp., *Chrysothamnus viscidiflorus* subsp. *typicus* H.M.Hall & Clem., *Coreopsis lanceolata* L., *Coreopsis tinctoria* Nutt., *Cosmos* sp., *Deinandra* sp., *Encelia farinosa* A.Gray ex Torr., *Eriophyllum*

confertiflorum (DC.) A.Gray, *Grindelia* sp., *Helenium bigelovii* A.Gray, *Helianthus* sp., *Hemizonia* sp., *Heterotheca grandiflora* Nutt., *Hypochaeris radicata* L., *Jensia yosemitana* (Parry ex A.Gray) B.G.Baldwin, *Leucanthemum* × *superbum* (Bergmans ex J.W.Ingram) D.H.Kent, *Leucanthemum* sp., *Malacothrix californica* DC., *Picris echioides* L., *Solidago velutina* subsp. *californica* (Nutt.) Semple, *Sonchus oleraceus* L., *Stephanomeria exigua* Nutt., *Symphyotrichum subspicatum* (Nees) G.L.Nesom, *Taraxacum officinale* F.H.Wigg. • BORAGINACEAE: *Amsinckia* sp., *Heliotropium* sp., *Heliotropium curassavicum* L. • BRASSICACEAE: *Brassica* sp., *Lobularia maritima* (L.) Desv., *Nasturtium officinale* W.T.Aiton, *Sisymbrium irio* • CONVOLVULACEAE: *Calystegia occidentalis* (A.Gray) Brummitt, *Convolvulus* sp., *Ipomoea purpurea* (L.) Roth • CUCURBITACEAE: *Cucurbita maxima* Duchesne • FABACEAE: *Acmispon glaber* (Vogel) Brouillet, *Medicago sativa* L., *Melilotus* sp., *Melilotus albus* Medik. • FRANKENIACEAE: *Frankenia salina* (Molina) I.M.Johnst. • GERANIACEAE: *Erodium moschatum* (L.) L'Hér. • HYDROPHYLLACEAE: *Phacelia californica* Cham. • IRIDACEAE: *Sisyrinchium* sp. • LAMIACEAE: *Mentha spicata* L., *Mentha* sp., *Monardella lanceolata* A.Gray • LILIACEAE: *Narcissus* sp. • LIMNANTHACEAE: *Limnanthes douglasii* R.Br. • ONAGRACEAE: *Camissonia campestris* (Greene) P.H. Raven subsp. *campestris*, *Camissoniopsis cheiranthifolia* (Hornem. ex Spreng.) W.L.Wagner & Hoch, *Camissonia claviformis* (Torr. & Frém.) P.H. Raven subsp. *cruciformis* (Kellogg) P.H. Raven, *Camissonia contorta* (Douglas ex Lehm.) Kearney, *Taraxia tanacetifolia* (Torr. & A.Gray) Piper, *Chamerion angustifolium* (L.) Holub subsp. *angustifolium*, *Oenothera pallida* Lindl., *Oenothera* sp. • PAPAVERACEAE: *Eschscholzia californica* Cham. • POLEMONIACEAE: *Gilia achilleifolia* subsp. *multicaulis* (Benth.) A.D.Grant & V.E.Grant • POLYGONACEAE: *Polygonum lapathifolium* L. • RHAMNACEAE: *Frangula californica* (Eschsch.) A.Gray subsp. *californica* • ROSACEAE: *Photinia arbutifolia* Lindl., *Rubus* sp. • RUBIACEAE: *Kelloggia galioides* Torr. • SALICACEAE: *Salix gooddingii* C.R.Ball, *Salix nigra* Marshall, *Salix* sp. • SOLANACEAE: *Datura inoxia* Mill. • VERBENACEAE: *Phyla lanceolata* (Michx.) Greene, *Phyla nodiflora* (L.) Greene • ZYGOPHYLLACEAE R. Br.: *Tribulus* sp., *Tribulus terrestris* L.

DNA barcodes

Three full DNA barcodes are available, all from British Columbia, Washington, and Oregon. They form a discrete cluster with little intraspecific variation. Sequences show similarity to the other members of the *pectorale* species group and are most similar to other members of the *Lasioglossum pectorale* species group, including *L. nelumbonis* and several Neotropical species.

Lasioglossum* (*Hemihalictus*) *pathiranae sp. nov.
urn:lsid:zoobank.org:act:EE37F974-CA4D-4D5C-A5AD-1ED4E3CB0729
Figs 70–73, 95G, 103A, 104A, 111B, 112A, 120M

Diagnosis

Female *L. pathiranae* sp. nov. can be recognised by the combination of head long, length/width ratio 1.18 ± 0.01 SD (shorter in all the other similar species); mesoscutum polished (rougher in *L. robertsoni*), moderately dense (IS = 1–2 PD) puncture density submedially (sparser in *L. angustius*; denser in *L. angustius* and *L. robertsoni*), double punctate distinctive on anteromedially (no double punctation in *L. angustius* and *L. robertsoni*); propodeal triangle with rugae reaching posterior margin (separating from species in which the rugae do not reach the posterior margin), propodeal triangle posterior margin sharply edged with a distinct raised apical carina (this excludes all species with a smoothly rounded posterior margin); T1 strongly coriarious on anterior face with a fan bearing a narrow dorsal opening (T1 anterior face mostly polished with broad dorsal opening in the fan in *L. angusticulum* sp. nov.); and T2–T3 with distinct basolateral tomentum (removes all species lacking basal patches or bands of tomentum on T2–T3, such as *L. nitidiusculum* group).

Males *L. pathiranae* sp. nov. can be recognised by the combination of head long, length/width ratio 1.12 (±0.05 SD) (shorter in all the other similar species); female-like antennae mesoscutum mostly polished with dense (IS≤1 PD) punctures (moderately sparser (IS = 1–2 PD) in *L. angusticulum* sp. nov.); metapostnotal rugae reaching posterior margin (separating from species in which the rugae do not reach the posterior margin); and propodeal triangle with prominently raised apical carina (indistinct in *L. angusticulum*).

Etymology

The species epithet *pathiranae* is a heartfelt tribute to TH's loving mother, Padmini Pathirana. This new bee species is named in her honour, a meaningful gesture to express TH's deep appreciation and love.

Material examined

Holotype

UNITED STATES – **California** • ♀; Riverside Co., Tabquitz Canyon; [33.501° N, 116.308° W]; 8 Jun. 1957; Menke, Stange and Bromley leg.; LACM (Fig. 70).

Specimen labels

"June 8, 1957 / Tabquitz Canyon / Riverside Co., Cal. / Menke & Stange & Bromley // *Lasioglossum* GIBBS–14412 // HOLOTYPE / *Lasioglossum* (*Hemihalictus*) *pathiranae* Hettiarachchi and Gibbs".

Paratypes

MEXICO – **Baja California Sur** • 2 ♂♂; Sierra Laguna, Big Canyon; [23.567° N, 110.000° W]; 13 Oct. 1941; E. Ross and G. Bohart leg.; CAS (Fig. 72).

UNITED STATES – **Arizona** • 1 ♂; Graham Co., Thatcher; [32.833° N, 109.763° W]; 11 Aug. 1958; Jon McBride leg.; ASUHIC (Fig. 71) • 1 ♀; same data as for preceding; 11 Aug. 1958; Jon McBride leg.; ASUHIC • 1 ♂; Pima and Santa Cruz Co., Santa Rita Mountains; [31.826° N, 110.775° W]; elev. 1219.2 m; 1–31 Oct. 1927; C.T. Vorhies leg.; ASUHIC • 1 ♀; same data as for preceding; 14 Jun. 1942; elev. over 1524 m; H.A. Scullen leg.; OSAC • 2 ♀♀; Pima Co., Tucson; [32.222° N, 110.926° W]; 13 Mar. 1955; F. Werner leg.; ASUHIC • 1 ♀; same data as for preceding; 15–18 Jun. 1962; G.D. Butler leg.; ASUHIC • 1 ♀; same data as for preceding; 19–26 Aug. 1962; G.D. Butler leg.; ASUHIC • 1 ♀; same data as for preceding; 19 May 1955; G.D. Butler leg.; ex *Physaria gordonii* (verbatim: *Lesquerella gordonii*); ASUHIC • 1 ♀; same data as for preceding; 30 May 1954; G.D. Butler leg.; ASUHIC • 1 ♀; same data as for preceding; 25 Sep. 1923; ASUHIC • 1 ♀; Pima Co., Tucson, 1207 E Speedway; [32.236° N, 110.953° W]; 11 Feb. 1962; J.C. Bequaert leg.; ex *Taraxacum officinale*; ASUHIC • 1 ♀; Pima Co., Tucson; [32.222° N, 110.926° W]; 3 Oct. 1923; ASUHIC • 1 ♀; Pima Co., Sabino Canyon; [32.322° N, 110.810° W]; 30 May 1953; G.D. Butler leg.; ASUHIC • 1 ♀; Yavapai Co., Atascosa Mountains, Sycamore Canyon; [31.432° N, 111.188° W]; 14 Jun. 1968; Flint and Menke leg.; ASUHIC. – **California** • 1 ♀; Riverside Co., Whitewater Canyon; [33.968° N, 116.652° W]; 26 Jul. 1963; E.I. Schlinger leg.; LACM • 1 ♀; Riverside Co., Palm Springs; [33.8246° N, 116.5403° W]; 3 Apr. 1925; E.C. Van Dyke leg.; CAS • 1 ♀; Riverside Co., Bautista Canyon near Hemet; [33.698° N, 116.853° W]; 24 Apr. 1972; Ali Tabet leg.; UCRC. – **Texas** • ♀; El Paso Co., Santa Fe Bridge; [31.748° N, 106.487° W]; 19 Feb. 1945; ex strawberry; USNM.

Other material excluded from paratypes

UNITED STATES – **California** • 1 ♀; Orange Co., Starr Ranch Audubon Sanctuary, Santa Ana Mountains; [33.632° N, 117.555° W]; elev. 274.3 m; 17–20 Jun. 1980; D.C. Michener leg.; ex *Keckiella cordifolia*; LACM.

Description

Female

Body measurements. Length 7.92 mm (±0.65 SD). Head length 2.01 mm (±0.05 SD). Face length 1.65 mm (±0.03 SD). Head width 1.69 mm (±0.04 SD). Wing length 5.04 mm (±0.14 SD). n = 5.

Colouration. Head and mesosoma dark brown. Clypeus apex dark brown to brown. Labrum brown. Mandible brown basally, becoming light brown medially and reddish-brown apically. Flagellum brown dorsally, light brown ventrally. Pronotal lobe brown. Tegula light brown, sometime with brown base. Wing membrane faintly brownish, veins with subcosta brown, otherwise light brown. Legs brown. Metasoma dark brown or brown with rims of terga, sterna and downcurved lateral areas of terga broadly light brown.

Pubescence. Body hair colour off-white. Tomentum dense on pronotal angle and lobe, space between pronotal lobe and tegula, metanotum anteromedially, propodeum lateral surface anterodorsally, and T2–T4 basolaterally; moderately dense on anterolateral angle and marginally on mesoscutum; very sparse on supraclypeal area dorsolaterally, paraocular area, gena near eye margin, propodeum lateral (except anterodorsal area) and posterior surface mostly on dorsally. Mesosoma covered by appressed, simple, very short hairs (<0.25 OD) mixed with sparse, erect, weakly plumose, long hairs (<3 OD) on mesoscutum and erect, plumose, long hairs (<2.5 OD) on other areas. Metasomal sterna with moderately sparse, erect, weakly plumose, long (<3 OD) hairs. Metafemoral scopa with dense plumose hairs. Wing hairs brown, very short and sparse. T1 with a fan, narrow dorsal opening (1 OD), composed of overlapping sub-appressed simple hairs (<1.5 OD).

Surface sculpturing. Clypeus imbricate to tessellate, becoming weakly imbricate apical ⅓; punctures irregularly sparse (IS<4 PD) apically and medially, becoming smaller and denser (IS<1 PD) basolaterally. Supraclypeal area tessellate; punctures fine, dense (IS<1 PD). Frons reticulate-punctate with an imbricate microsculpture present throughout the surface; punctures crowded (IS = 0 PD). Ocellocular area polished; punctures dense (IS≤1 PD) and diversopunctate posteriorly, becoming crowded (IS = 0 PD) anteriorly. Gena rugulose to weakly lineolate, becoming lineolate posteriorly; punctures dense (IS<1 PD) or obscure in some angles. Postgena weakly imbricate to weakly lineolate. Tegula punctures sparse (IS = 1–3 PD) in the anterior half and basally, becoming impunctate posteriorly. Mesoscutum polished, becoming imbricate anteromedially and on median line; punctures dense (IS<1 PD), becoming moderately dense (IS = 1–2 PD) submedially, doubly punctate, but only conspicuous on anteromedially. Mesoscutellum polished, becoming rugulose posteriorly and laterally; punctures dense (IS≤1 PD) marginally and on median line, sparse submedially (IS = 1–4 PD), diversopunctate. Metanotum rugulose, punctures obscure. Propodeal triangle with rugae strong, reaching posterior margin, strongly anastomosing; interspace sculpture shiny to weakly imbricate. Preëpisternum reticulate-rugose. Hypoepimeron weakly imbricate, but somewhat polished ventrally, becoming rugulose dorsally; punctures dense (IS<1 PD). Mesepisternum reticulate-rugose, becoming rugose ventrally; impunctate. Propodeum lateral face strongly imbricate, becoming rugulose posteriorly; posterior face rugose, punctures obscure. T1 anterior face dull, strongly coriarious, punctures present laterally; dorsal surface mostly weakly coriarious to coriarious, punctures sparse (IS = 1–3 PD), becoming more sparsely punctate (IS =2–6 PD) in small subapicolateral boss and punctures fine, minute, and sparse (IS = 1–4 PD) on rim, becoming impunctate apical third and medially on rim. T2 disc coriarious to polished, punctures moderately dense (IS =1–2 PD) basally, becoming sparse (IS = 1–3 PD) apically; rim coriarious, punctures minute and sparse (IS = 1–3 PD), becoming impunctate narrowly after premarginal line.

Structure. Head long, length/width ratio 1.18 (±0.01 SD). Face length/head width ratio 0.97 (±0.02 SD). Clypeus projecting ~89% below suborbital tangent; clypeus length/width ratio 1.10 (±0.08 SD). Mandible long, nearly reaching opposing mandibular base. Eyes convergent below [UOD/LOD ratio 1.16 (±0.04 SD)]. Ocelli normal. Gena/eye width ratio 0.83 (±0.34 SD). Pronotal angle obtuse. Intertegular

span 1.40 mm (±0.11 SD). Mesoscutum length/width ratio 0.90 (±0.06 SD); mesoscutum/scutellum length ratio 2.98 (±0.13 SD); scutellum/metanotum length ratio 1.55 (±0.14 SD); metanotum/propodeal triangle length ratio 0.88 (±0.16 SD). Protibial spur with apical serrations longer or subequal in length to width of malus; malus not reaching much beyond velum. Inner metatibial spur pectinate, teeth 3–4, basal teeth longer than width of rachis. Propodeal triangle posterior margin angled onto posterior propodeal surface; apical carina well distinct and high. Propodeal lateral carina reaching dorsolateral slope; oblique carina obscure from background sculpturing. n = 6.

Variation. One female we observed from Orange County has an exceptionally shiny mesoscutum.



Fig. 70. *Lasioglossum* (*Hemihalictus*) *pathiranae* sp. nov., holotype, ♀ (LACM). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

Male

Body measurements. Length 5.55 mm (±0.56 SD). Head length 1.65 mm (±0.05 SD). Face length 1.42 mm (±0.08 SD). Head width 1.48 mm (±0.09 SD). Wing length 4.33 mm (±0.23 SD). n = 3.

Colouration. Head and mesosoma dark brown to black. Clypeus brown. Labrum dark brown. Mandible dark brown basally, becoming light brown medially and slightly reddish brown apically. Flagellum dark brown dorsally, brown ventrally. Pronotal lobe brown. Tegula mostly dark brown, light brown medially. Wing membrane faintly brownish, veins mostly brownish. Legs brown. Metasoma dark brown to brown with rims of terga, sterna and downcurved lateral areas of terga narrowly light brown.



Fig. 71. *Lasioglossum* (*Hemihalictus*) *pathiranae* sp. nov., paratype, ♂ (ASUHIC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

Pubescence. Body hair colour off-white. Tomentum dense on pronotal angle, and lobe, space between pronotal lobe and tegula, metanotum anteromedially, and T2–T3 basolaterally; sparse on paraocular area and propodeum posterior face. Mesosoma covered by appressed to erect, simple, very short hairs (<0.25 OD) mixed with very sparse, erect, weakly plumose, long hairs (<1 OD) on mesoscutum and erect, plumose, long hairs (<2.5 OD) on other areas. Metasomal sterna with dense, erect and sub-appressed, plumose, long (<2 OD) hairs. Wing hairs brown, very short and sparse.

Surface sculpture. Clypeus polished, becoming imbricate basally and sometime polished throughout; punctures irregularly sparse (IS<5 PD) apically and medially, becoming denser (IS<2 PD) basolaterally. Supraclypeal area imbricate, becoming weakly so medially; punctures dense (IS<1 PD), becoming little bit sparser anteromedially (IS ≤1 PD). Frons reticulate-punctate; punctures crowded (IS = 0 PD). Ocellocular area polished; punctures moderately dense (IS = 1–2 PD) and diversopunctate posteriorly, becoming crowded (IS = 0 PD) anteriorly. Gena weakly lineolate, becoming lineolate posteriorly; punctures dense (IS<1 PD), becoming obscure posteriorly. Postgena weakly lineolate. Tegula broadly impunctate, minute punctures present anteriorly and basally, sparse (IS = 1–3 PD). Mesoscutum polished, becoming imbricate anteromedially and halfway on median line; punctures dense (IS≤1 PD), doubly

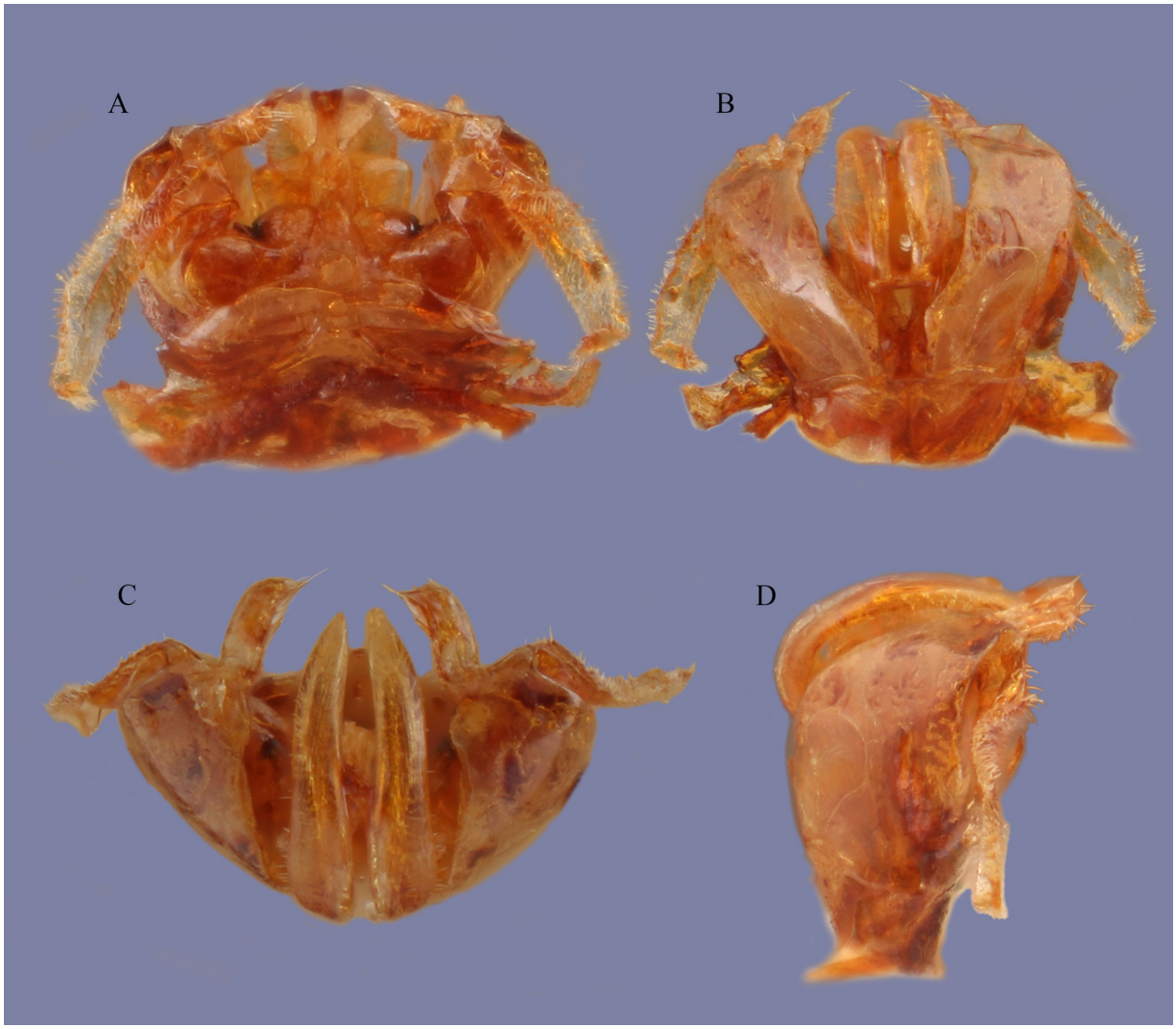


Fig. 72. Genitalia of *Lasioglossum* (*Hemihalictus*) *pathiranae* sp. nov., ♂ (CAS). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

punctate (or diversopunctate). Mesoscutellum polished, becoming rugulose posteriorly; punctures dense (IS ≤ 1 PD) marginally and on median line, sparse submedially (IS = 1–3 PD), diversopunctate. Metanotum rugulose, punctures obscure. Propodeal triangle with rugae strong, reaching posterior margin and join with sharply carinate posterior border, moderately anastomosing medially and weakly so laterally; interspace sculpture shiny. Preëpisternum reticulate-rugose. Hypoepimeron rugulose dorsally, becoming weakly so ventrally; punctures crowded (IS = 0 PD). Mesepisternum reticulate-rugose, becoming rugose ventrally. Propodeum lateral face rugulose, becoming rugose posteriorly; posterior face strongly rugose. T1 anterior face polished, punctures present laterally; dorsal surface polished, punctures sparse (IS = 1–3 PD), becoming sparser towards premarginal line (IS = 1–4 PD) and becoming nearly impunctate in large subapicolateral boss; punctures minute, and sparse (IS = 1–4 PD) on rim, becoming impunctate apical half and impunctate medially on rim. T2 disc polished, punctures sparse (IS =1–3 PD) basally, becoming sparse (IS = 1–4 PD) apically and nearly impunctate or very sparse on subapicolateral boss (IS = 2–6 PD); rim polished, punctures minute and sparse (IS = 1–3 PD), becoming narrowly impunctate apically.

Structure. Head long, length/width ratio 1.12 (±0.05 SD). Face length/width ratio 0.96 (±0.02 SD). Clypeus projecting ~74% below suborbital tangent. Mandible long, just reaching opposing mandibular base. Flagellomeres short, F1 length/pedicel length ratio 1.05 (±0.10 SD); F2 length/F1 length ratio 1.18 (±0.16 SD); F2 length/F2 width ratio 1.02 (±0.08 SD). Gena/eye width ratio 0.87 (±0.04 SD). Forewing with 3 submarginal cells. Pronotal angle obtuse, quite sharp angle. Intertegular span 0.99 mm (±0.15 SD). Mesoscutum length/width ratio 0.95 (±0.01 SD). Propodeal triangle posterior border sharply carinate, well distinct and high. Propodeum lateral carinae reaching dorsolateral slope; oblique carina obscure from background sculpturing. n = 3.

Genitalia (Figs 72, 120M). Gonostylus elongate, approximately 3 times as long as broad, bearing short setae. Retrorse lobe broad, about 5 times as long as broad, covered in short sparse setae.

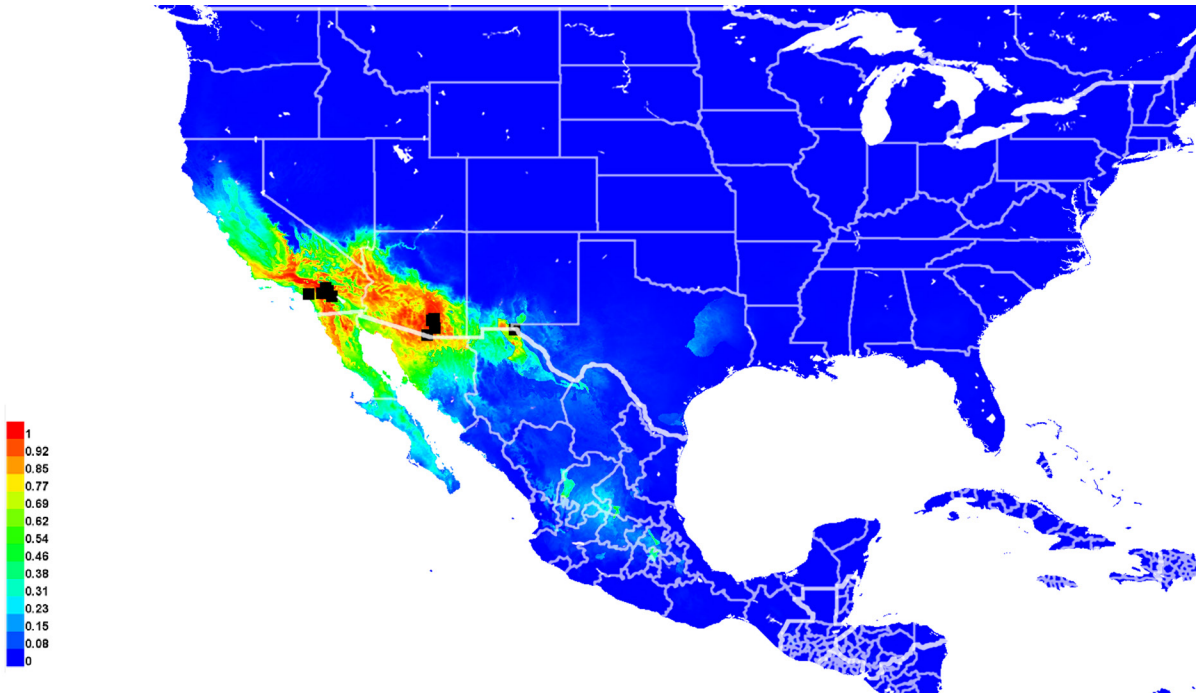


Fig. 73. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *pathiranae* sp. nov. (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

Range

Southern California through to southern Arizona, west of Texas (Fig. 73).

Floral hosts

ASTERACEAE: *Taraxacum officinale* F.H.Wigg • BRASSICACEAE: *Physaria gordonii* (A.Gray) O'Kane & Al-Shehbaz • ROSACEAE: *Fragaria* sp. • SCROPHULARIACEAE: *Keckiella cordifolia* (Benth.) Straw.

Lasioglossum* (*Hemihalictus*) *pectoraloides (Cockerell, 1895)
Figs 74–77, 93D, 101D, 104G, 109C, 111C, 120N

Halictus pectoraloides Cockerell, 1895: 64.
Halictus pectoraloides var. *beatulus* Cockerell, 1918: 262.
Halictus (*Evylaeus*) *grindeliae* Cockerell, 1934: 29 (synonymy by Timberlake in Michener 1951: 1109).

Halictus pectoraloides – Cockerell 1898: 46 (key). — Crawford 1907a: 185 (key).
Lasioglossum (*Evylaeus*) *pectoraloides* – Michener 1951: 1109 (catalogue).
Evylaeus pectoraloides – Hurd 1979: 1961 (catalogue). — Moure & Hurd 1987: 80 (catalogue).

Etymology

Cockerell (1895) states that this species has been "confounded with *H. pectoralis*, which it much resembles". He contrasts the two directly in his description. The suffix '*-oides*', means 'resembling'.

Diagnosis

Both sexes of *L. pectoraloides* can be easily recognised by the combination of mesepisternum shiny with a combination of rugulose and distinct punctation (rugose in *L. pectorale* and *L. kincaidii*); tegula ovoid (enlarged in *L. kincaidii*); metasoma with basolateral tomentum (absent in *L. sequoia*e and *L. villosulum*); propodeal triangle with rugae reaching posterior margin, this margin with a distinct apical carina forming a sharp edge; and apical impressed areas polished and almost impunctate (in contrast to *L. pectorale*).

Type material

Syntype of *Halictus pectoraloides*
♀, not examined; current location unknown.

Holotype of *Halictus pectoraloides* var. *beatulus* (by original designation; examined by photos)
UNITED STATES – **New Mexico** • ♀; Doña Ana Co., Mesilla; [32.27° N, 106.80° W]; 25 Jun.; T.D. Cockerell leg.; ex *Chloracantha spinosa* (verbatim: *Aster spinosus*); USNM Type No. 22953.

Specimen labels
"Mesilla / June 25. / (Ckll) // on *Aster spinosus* // Type No. / 22953 / U.S.N.M. // *Halictus* / *pectoraloides* / v. *beatulus* / Ckll. TYPE // USNMENT / 01735665".

Holotype of *Halictus* (*Evylaeus*) *grindeliae* (by original designation; not examined)
UNITED STATES – **Colorado** • 1 ♀; Hudson; 1 Oct. 1933; UCMC.

Type notes

Cockerell (1895) stated that *L. pectoraloides* was very abundant and recorded it from Mesilla Valley and Las Cruces, New Mexico, but did not explicitly designate a holotype. The location of the type series is unknown. Cockerell (1918) later documented the variety *beatulus* from Mesilla and Las Cruces, New

Mexico, and referred specifically to a single type specimen. Subsequently, Cockerell (1934) reported the location of a type specimen of *Halictus grindeliae* and gave no indication that additional type specimens existed. On this basis, we interpret the name as having been established from a single specimen and therefore treat it as based on a holotype by monotypy.

Material examined

MEXICO – **Chihuahua** • 1 ♀; Villa Ahumada, 3 mi. S of Chihuahua; [30.5645° N, 106.5058° W]; 10 Jul. 1964; J. Powell leg.; EMEC. – **Sonora** • 1 ♀; 10 mi. S of Caborca; [30.5687° N, 112.1619° W]; 11 Jun. 1962; D.H. Janzen leg.; EMEC • 2 ♀♀; 30 km E of Agua Prieta; 31.3258° N, 109.2881° W; 6 Apr. 2006; L. Julier leg.; ex *Physaria gordonii* (verbatim: *Lesquerella gordonii*); PCYU • 1 ♀; 30 km E of Agua Prieta; 31.333333° N, 109.259722° W; 20 Aug. 2003; R.L. Minckley leg.; ex *Baccharis*; ASUHIC • 1 ♀; Nogales; [31.3402° N, 110.9361° W]; 4 Sep. 1965; A.E. Michelbacher leg.; EMEC • 2 ♀♀; Valley of Mexico; [19.67° N, 98.87° W]; 1–31 Aug. 1929; Y. Mexia leg.; CAS.

UNITED STATES – **Arizona** • 2 ♀♀; Cochise Co., 1 mi. NNW of Jct. State Line Rd and Hwy 80, along irrigation ditch; [31.44° N, 109.83° W]; 9 Aug. 1973; S.I. Frommer and S.L. Frommer leg.; UCRC • 1 ♀; Cochise Co., 1.7 mi. NW of Portal, San Simon Road; [31.9307° N, 109.1619° W]; 26 Jul. 1973; S.I. Frommer and S.L. Frommer leg.; UCRC • 1 ♀; Cochise Co., 17 mi. E of Douglas; [31.3418° N, 109.2575° W]; 8 Aug. 1958; P.D. Hurd leg.; ex *Lepidium thurberi*; EMEC • 1 ♀; Cochise Co., 2 mi. NE of Portal; [31.9308° N, 109.1163° W]; 14 Jul. 1964; J.H. Puckle, M.A. Mortenson and M.A. Cazier leg.; ex *Baccharis salicifolia* (verbatim: *Baccharis glutinosa*); ASUHIC • 1 ♀; Cochise Co., 27 mi. SE of Willcox; [31.9598° N, 109.5075° W]; 31 Aug. 1980; McGinley and Woodley leg.; ex *Gaillardia*; MCZ • 3 ♀♀; Cochise Co., 4 mi. N of Elfrida; [31.743° N, 109.688° W]; 20 May 1961; R.H. Painter and E.M. Painter leg.; ASUHIC • 1 ♀; Cochise Co., 5 mi. SE of Apache; [31.638° N, 109.072° W]; 11 Aug. 1958; P.D. Hurd leg.; ex *Eriogonum*; EMEC • 1 ♀; Cochise Co., 5 mi. SE of San Simon; [32.215° N, 109.167° W]; 22 Aug. 1967; E. Schlinger leg.; UCRC • 1 ♀; Cochise Co., Benson; [31.956° N, 110.307° W]; 14–15 Sep. 1974; E.G. Linsley and J.M. Linsley leg.; ex *Helianthus annuus*; EMEC • 1 ♀; same data as for preceding; 7 Aug. 1961; P.H. Johnson leg.; ASUHIC • 1 ♀; Cochise Co., Cochise; [32.114° N, 109.922° W]; elev. 1280.2 m; 26 May 1961; H.A. Scullen leg.; EMEC • 1 ♀; Cochise Co., Douglas; [31.34° N, 109.55° W]; 9 Aug. 1944; W.W. Jones leg.; EMEC • 7 ♀♀; same data as for preceding; 16 Jun. 1942; H.A. Scullen leg.; EMEC • 1 ♀; Cochise Co., Douglas, Huachucha Mountains; [31.4° N, 110.3° W]; 8 Jun. 1933; W.W. Jones leg.; EMEC • 1 ♀; Cochise Co., Portal; [31.914° N, 109.141° W]; 18 Jul. 1963; A. Raske leg.; ex *Datura metaloides*; EMEC • 1 ♀; Cochise Co., Portal, Chiricahua Mountains; [31.929° N, 109.378° W]; elev. 1432.6 m; 14 Aug. 1965; G.R. Ballmer leg.; UCRC • 1 ♀; Cochise Co., Rucker Canyon, Chiricahua Mountains; [31.753° N, 109.43° W]; 25 Aug. 1970; EMEC • 1 ♀; Cochise Co.; [31.88° N, 109.75° W]; 23 Jun. 1916; V.W. Owen leg.; CAS • 3 ♀♀; Cochise Co., St David; [31.8936° N, 110.2284° W]; 27 Jul. 1955; G. Butler and F. Werner leg.; ex *Lepidium virginicum* subsp. *menziesii* (verbatim: *Lepidium medium*); ASUHIC • 1 ♀; same data as for preceding; 27 Jul. 1955; G. Butler and F. Werner leg.; ASUHIC • 1 ♀; same data as for preceding; 27 Jul. 1955; G. Buttler, F. Werner leg.; ex *Lepidium*; ASUHIC • 1 ♀; same data as for preceding; 2 May 1956; G. Butler and F. Werner leg.; ASUHIC • 1 ♀; same data as for preceding; 2 May 1956; F. Werner and G. Buttler leg.; ASUHIC • 3 ♀♀; same data as for preceding; 2 May 1956; F. Werner and G. Buttler leg.; ex alfalfa; ASUHIC • 1 ♀; Coconino Co., 10 mi. N of Sedona; [35.0115° N, 111.7598° W]; 27 Jul. 1956; G.D. Butler and Gerhardt leg.; ex *Melilotus alba*; ASUHIC • 1 ♀; same data as for preceding; 27 Jul. 1956; G.D. Butler and Gerhardt leg.; ASUHIC • 2 ♀♀; Coconino Co., 24 mi. N of Cameron; [36.22° N, 111.411° W]; 28 May 1954; F. Werner leg.; ASUHIC • 1 ♀; Coconino Co., 26 mi. N of Cameron; [36.246° N, 111.412° W]; 28 May 1954; F. Werner leg.; ASUHIC • 3 ♀♀; Coconino Co., Oak Creek Canon; [34.91° N, 111.73° W]; elev. 1828.8 m; F.H. Snow leg.; SEMC • 1 ♂; same data as for preceding; Aug; F.H. Snow leg.; USNM • 2 ♀♀; same data as for preceding; Jul.; F.H. Snow leg.; USNM • 1 ♀; Doña Ana Co., Las Cruces; [32.3199° N, 106.7637° W]; 10 May; Townsend leg.;

ex *Dimorphocarpa wislizeni*; CMNH • 7 ♀♀; Gila Co., Gila River, 2 mi. SW of Christmas; [33.027° N, 110.738° W]; 5 Jun. 1962; J.C. Bequaert leg.; ASUHIC (Fig. 74A–B) • 1 ♂; same data as for preceding; 5 Jun. 1962; Bequaert and Werner leg.; ASUHIC • 1 ♀; Gila Co., San Carlos; [33.351° N, 110.452° W]; 15 Jul. 1955; N.J. Nerney leg.; ex alfalfa; ASUHIC • 2 ♀♀; Graham Co., Central; [32.868° N, 109.793° W]; 24 Jun. 1954; G.D. Butler leg.; ASUHIC • 2 ♀♀; Graham Co., Geronimo; [33.077° N, 110.035° W]; 15 Sep. 1957; P.H. Timberlake leg.; ex *Conyza canadensis* var. *canadensis* (verbatim: *Erigeron canadensis*); UCRC • 3 ♀♀; same data as for preceding; 15 Sep. 1957; P.H. Timberlake leg.; UCRC • 1 ♀; Graham Co., Gila Valley; [33.183° N, 110.217° W]; 29 Jul. 1933; CAS • 1 ♀; Graham Co., Safford; [32.833° N, 109.715° W]; 19 Jul. 1956; C. Williams leg.; ex cotton (*Gossypium*); ASUHIC • 1 ♀; same data as for preceding; 3 May 1956; F. Werner, G. Buttler leg.; ex alfalfa; ASUHIC • 1 ♀; Maricopa Co., 3 mi. W of Palo Verde; [33.348° N, 112.73° W]; 21 Feb. 1961; J.C. Bequaert leg.; ex *Dimorphocarpa wislizeni* (verbatim: *Dithyrea wislizeni*); ASUHIC • 2 ♀♀; Maricopa Co., Tempe; [33.4128° N, 111.9431° W]; 31 Jul. 2017; Wheeler leg.; MCZ • 1 ♀; same data as for preceding; 1 Jul.; J. Bequaert leg.; MCZ • 1 ♀; Maricopa Co., Buckeye; [33.37° N, 112.59° W]; 28 May 1933; P.H. Timberlake leg.; ex *Salix nigra*; UCRC • 1 ♀; Maricopa Co., Granite Reef Dam; [33.516° N, 111.691° W]; 6 Apr. 1961; C.R. Brehmer leg.; ASUHIC • 1 ♀; Maricopa Co., Laveen; [33.378° N, 112.168° W]; 31 May 1955; O.L. Barnes leg.; ex alfalfa; v • 1 ♀; Maricopa Co., Mesa; [33.422° N, 111.823° W]; elev. 365.8 m; 21 Mar. 1926; A.A. Nichol leg.; ASUHIC • 1 ♀; Maricopa Co., Palo Verde; [33.348° N, 112.678° W]; 11 Jun. 1919; A. Wetmore leg.; USNM • 1 ♀; Maricopa Co., St Johns; [34.502° N, 109.372° W]; 26 Jul. 1956; G.D. Butler and Gerhardt leg.; ASUHIC • 1 ♀; Maricopa Co., Tempe; [33.4128° N, 111.9431° W]; 1–31 Jul. 1931; J. Bequaert leg.; MCZ • 1 ♀; same data as for preceding; 20 Nov. 1958; J. McBride leg.; ASUHIC • 5 ♀♀; Maricopa Co., Tolleson; [33.45° N, 112.259° W]; 29 May 1933; P.H. Timberlake leg.; ex *Sphaeralcea*; UCRC • 2 ♀♀; same data as for preceding; 28 May 1933; P.H. Timberlake leg.; ex *Sphaeralcea*; UCRC • 10 ♀♀; Navajo Co., Snowflake; [34.51° N, 110.08° W]; 25 Jul. 1956; G.D. Butler and Gerhardt leg.; ASUHIC • 3 ♀♀; same data as for preceding; 25 Jul. 1956; Gerhardt and Butler leg.; ASUHIC • 1 ♀; Navajo Co., Taylor; [34.47° N, 110.1° W]; 25 Jul. 1956; G.D. Butler and Gerhardt leg.; ex alfalfa; ASUHIC • 1 ♂; same data as for preceding; 25 Jun. 1956; G.D. Butler and Gerhardt leg.; ASUHIC (Fig. 75) • 1 ♀; Navajo Co., Laguna Creek Kayenta; [36.86° N, 109.82° W]; 13 Jul. 1967; J.H. Davidson, J.M. Davidson and M.A. Cazier leg.; ASUHIC • 2 ♀♀; Pima Co., 10 mi. E of Tucson; [32.2498° N, 110.8037° W]; 30 Jul. 1955; G.D. Butler leg.; ex *Lepidium*; ASUHIC • 1 ♂; Pima Co., Continental; [31.85° N, 110.97° W]; 14 Jun. 1955; G.D. Butler leg.; ASUHIC • 1 ♀; Pima Co., Continental; [31.851° N, 110.975° W]; 14 Jun. 1955; G.D. Butler leg.; ex *Verbesina encelioides*; ASUHIC • 1 ♀; Pima Co., 7.5 mi. W of Arivaca; [31.576° N, 111.459° W]; 31 Jul. 1952; H.B. Leech and J.W. Green leg.; ex *Verbesina encelioides*; CAS • 2 ♀♀; Pima Co., Aguirre Lake; [31.589° N, 111.508° W]; 5 May 1963; M.L. Noller leg.; ex *Neltuma juliflora* (verbatim: *Prosopis juliflora*); ASUHIC • 1 ♀; Pima Co., Sahuarita; [31.9291° N, 110.9822° W]; 17 Apr. 1956; G.D. Butler leg.; ex alfalfa; ASUHIC (Fig. 74D) • 1 ♀; Pima Co., Tucson; [32.222° N, 110.926° W]; 2–7 Jun. 1962; G.D. Butler leg.; ASUHIC • 1 ♀; same data as for preceding; 2 Jun. 1962; G.D. Butler leg.; ex *Calendula*; ASUHIC • 2 ♀♀; same data as for preceding; 30 May 1953; G.D. Butler leg.; ex crownbeard (*Verbesina*); ASUHIC • 1 ♂; same data as for preceding; 6 Jul. 1962; G.D. Butler leg.; ASUHIC • 2 ♀♀; same data as for preceding; 11 Jun. 1964; G.D. Butler leg.; ASUHIC • 1 ♂; same data as for preceding; 6 Jul. 1962; G.D. Butler leg.; ex suck/cotton; ASUHIC • 1 ♀; same data as for preceding; 11 May 1953; G.D. Butler leg.; ex desert marigold; ASUHIC • 1 ♀; same data as for preceding; 30 May 1953; G.D. Butler leg.; ex bachelor's button; ASUHIC • 4 ♀♀; same data as for preceding; 30 May 1953; G.D. Butler leg.; ex sun flower; ASUHIC • 1 ♀; same data as for preceding; 21 May 1962; G.D. Butler leg.; ex safflower; ASUHIC • 1 ♀; same data as for preceding; 24 May 1953; G.D. Butler leg.; ex *Calendula*; ASUHIC • 1 ♀; same data as for preceding; 30 May 1954; G.D. Butler leg.; ex *Haplopappus*; ASUHIC • 1 ♀; same data as for preceding; 29 May 1953; G.D. Butler leg.; ex *Calendula*; ASUHIC • 1 ♀; same data as for preceding; 30 May 1964; G.D. Butler leg.; ex safflower; ASUHIC • 1 ♀; same data as for preceding; 31 May 1962; G.D. Butler leg.; ex safflower; ASUHIC •

1 ♀; same data as for preceding; 20 Jun. 1964; G.D. Butler leg.; ex safflower; ASUHIC • 3 ♀♀; same data as for preceding; 1–30 Jun. 1965; G.D. Butler leg.; ex safflower; ASUHIC • 1 ♀; same data as for preceding; 23 May 1962; G.D. Butler leg.; ex safflower; ASUHIC • 1 ♀; same data as for preceding; 8 Apr. 1955; G.D. Butler leg.; ex *Baileya multiradiata*; ASUHIC • 1 ♀; same data as for preceding; 23 Aug. 1955; G.D. Butler leg.; ASUHIC • 1 ♀; same data as for preceding; 8 Jun. 1962; G.D. Butler leg.; ex safflower; ASUHIC • 1 ♀; same data as for preceding; 17 Jul. 1955; G.D. Butler leg.; ex *Wislizenia*; ASUHIC • 2 ♀♀; same data as for preceding; 1 Aug. 1975; E.G. Linsley and J.M. Linsley leg.; ex *Tamarix chinensis*; EMEC • 1 ♀; same data as for preceding; 10 Apr. 1955; T. Adams leg.; ASUHIC • 8 ♀♀; same data as for preceding; 12 Oct. 1963; ASUHIC • 1 ♀; Pima Co., San Xavier Mission; [32.107° N, 111.008° W]; 15 Oct. 1936; E.P. Van Duzee leg.; EMEC • 3 ♀♀; Santa Cruz Co., 19 mi. NW of Nogales; [31.5334° N, 111.1622° W]; 27 May 1961; R.H. Painter and E.M. Painter leg.; ASUHIC • 3 ♀♀; Santa Cruz Co., 3 mi. S of Patagonia; [31.4977° N, 110.7552° W]; 29 Jul. 1962; M. Noller leg.; ex *Baccharis salicifolia* (verbatim: *Baccharis glutinosa*); ASUHIC • 1 ♀; Santa Cruz Co., 5 mi. N of Patagonia; [31.6126° N, 110.76° W]; 5 May 1961; R.H. Painter and E.M. Painter leg.; ASUHIC • 5 ♀♀; Santa Cruz Co., Amado; [31.705° N, 111.066° W]; elev. 914.4 m; 14 Jun. 1963; Scullen and Bolinger leg.; EMEC • 1 ♀; Santa Cruz Co., Patagonia; [31.54° N, 110.76° W]; 28 May 1995; B. Brown and E. Wilk leg.; PMAE • 5 ♀♀; same data as for preceding; 26 Jul. 1962; Werner, Bequaert and Noller leg.; ASUHIC • 8 ♀♀; same data as for preceding; 29 Jul. 1962; Noller, Bequaert, Johnson leg.; ex *Lepidium thurberi*; ASUHIC • 1 ♀; same data as for preceding; 26 Mar. 1955; G. Butler and F. Werner leg.; ex *Barkleyanthus salicifolius* (verbatim: *Senecio salignus*); ASUHIC • 1 ♂; same data as for preceding; 26 Jul. 1962; Werner, Bequaert and Noller leg.; ex suck/cotton; ASUHIC • 1 ♂; same data as for preceding; 3 Aug. 1958; M. Adachi leg.; ASUHIC • 3 ♀♀; same data as for preceding; 25 Aug. 1955; F.G. Werner and G.D. Butler leg.; ex *Cleomella jonesii* (verbatim: *Cleome jonesii*); ASUHIC • 1 ♀; same data as for preceding; 10 Aug. 1958; F.G. Werner and G.D. Butler leg.; ASUHIC • 1 ♀; same data as for preceding; 3 Aug. 1958; M. Adachi leg.; ASUHIC • 1 ♀; same data as for preceding; 21 May 1955; G.D. Butler leg.; ex alfalfa; ASUHIC • 1 ♀; same data as for preceding; 21 May 1955; G.D. Butler leg.; ex mustard; ASUHIC • 1 ♀; same data as for preceding; 21 May 1955; G.D. Butler leg.; ex *Sphaeralcea*; ASUHIC • 1 ♀; same data as for preceding; 8 Aug. 1940; P.H. Timberlake leg.; ex *Cleome lutea*; UCRC • 1 ♀; same data as for preceding; 9 Aug. 1940; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 15 Aug. 1953; P.H. Timberlake leg.; UCRC • 2 ♂♂; Santa Cruz Co., Patagonia Sta; [31.49° N, 110.85° W]; 25 Jul. 1975; E.G. Linsley and J.M. Linsley leg.; ex *Sapindus saponaria*; EMEC (Fig. 76) • 1 ♀; Santa Cruz Co., Patagonia, Sonoita Creek Reserve; [31.52° N, 110.77° W]; 15 Jul. 1995; B. Brown and E. Wilk leg.; PMAE • 1 ♂; Santa Cruz Co., Tubac; [31.626° N, 111.052° W]; 21 Aug. 1935; R.H. Beamer leg.; SEMC • 1 ♀; Yuma Co., Roll; [32.75° N, 113.99° W]; 2 Jun. 1955; G.D. Butler leg.; ASUHIC • 1 ♀; same data as for preceding; 14 Apr. 1955; G.D. Butler and Gerhardt leg.; ex *Heliotropium*; ASUHIC • 1 ♀; Bill Williams Fork; [34.272° N, 114.046° W]; F.H. Snow leg.; SEMC • 2 ♀♀; S. Arizona; [33.4° N, 112.51° W]; 1–31 Aug. 1902; Carl F. Baker leg.; ex *Sisymbrium*; USNM. – **California** • 1 ♀; San Bernardino Co., Needles; [34.85° N, 114.61° W]; 3 Apr. 1951; EMEC. – **Colorado** • 2 ♀♀; Bent Co., John Martin Reservoir; [38.073° N, 103.028° W]; 6 Jul. 1978; G.E. Bohart leg.; ex *Melilotus*; UCMC • 1 ♀; Boulder Co., Boulder; [40.015° N, 105.271° W]; 1–30 Jun. 1920; H. Andrews leg.; UCMC • 2 ♀♀; Boulder Co.; [40.14° N, 105.47° W]; 18 Jun. 1925; C.H. Hicks leg.; UCMC • 1 ♀; Clear Creek Co., Bear Creek; [33.4° N, 112.51° W]; 20 Jul.; E.J. Oslar leg.; USNM • 2 ♀♀; same data as for preceding; 15 Jul.; E.J. Oslar leg.; USNM • 1 ♀; same data as for preceding; 13 May; E.J. Oslar leg.; USNM • 11 ♀♀; same data as for preceding; USNM • 1 ♀; Clear Creek Co., Clear Creek; [39.83° N, 104.95° W]; Oslar leg.; MCZ • 2 ♀♀; same data as for preceding; N. Banks leg.; MCZ • 23 ♀♀; Clear Creek Co., Clear Creek; [39.828° N, 104.949° W]; USNM • 1 ♀; Conejos Co., Los Pinos; [37.09° N, 106.49° W]; 31 May 1999; Carl F. Baker leg.; ex *Prunus*; USNM • 1 ♀; same data as for preceding; 31 May 1999; Carl F. Baker leg.; USNM • 3 ♀♀; Denver Co., Denver; [39.739° N, 104.985° W]; 28 May 1998; E.J. Oslar leg.; USNM • 4 ♀♀; same data as for preceding; USNM • 1 ♀; same data as for preceding; 3 Aug; E.J. Oslar

leg.; USNM • 47 ♀♀; Douglas Co., Platte Canyon; [39.485° N, 105.106° W]; USNM • 1 ♂; Elbert Co., Box Elder Creek E of Aurora; [40.332° N, 104.511° W]; 14 Aug. 1947; H.G. Rodeck leg.; UCMC • 5 ♀♀; Logan Co., Sterling; [40.626° N, 103.211° W]; 21 Jul. 1923; G. Sandhouse leg.; USNM • 2 ♀♀; same data as for preceding; 3 Jul. 1923; G. Sandhouse leg.; ex marigold; USNM • 6 ♀♀; same data as for preceding; 28 Jun. 1923; G. Sandhouse leg.; USNM • 1 ♀; same data as for preceding; 20 Jul. 1923; G. Sandhouse leg.; USNM • 1 ♂; same data as for preceding; 20 Jul. 1923; G. Sandhouse leg.; USNM • 1 ♀; same data as for preceding; 17 Jun. 1923; G. Sandhouse leg.; USNM • 3 ♀♀; same data as for preceding; 13 Jun. 1923; G. Sandhouse leg.; USNM • 1 ♀; same data as for preceding; 6 Jul. 1923; G. Sandhouse leg.; USNM • 1 ♀; same data as for preceding; 18 Jun. 1923; G. Sandhouse leg.; USNM

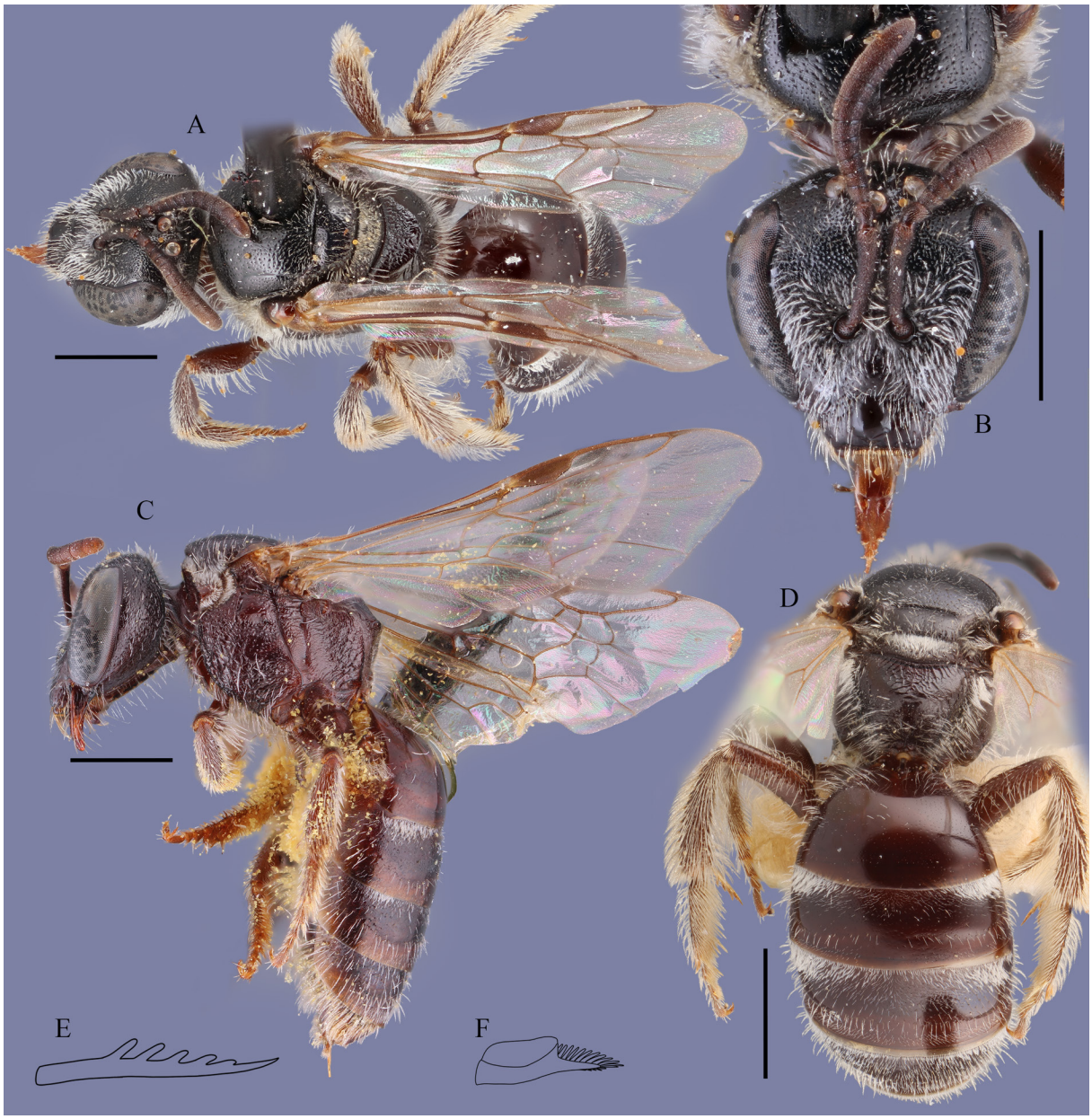


Fig. 74. *Lasioglossum* (*Hemihalictus*) *pectoraloides* (Cockerell, 1895), ♀. **A–B, D**. ASUHIC. **C**. UCMC. **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

• 1 ♀; same data as for preceding; 23 Jun. 1923; G. Sandhouse leg.; USNM • 1 ♀; same data as for preceding; 11 Jul. 1921; G. Sandhouse leg.; USNM • 2 ♀♀; Mesa Co., Colorado National Monument; [39.0425° N, 108.6861° W]; elev. 1371.6 m; 16 May 1963; C.J. McCoy leg.; ex *Sphaeralcea parvifolia*; UCMC • 1 ♀; same data as for preceding; 24 May 1963; C.J. McCoy leg.; ex *Sphaeralcea*; UCMC (Fig. 74C) • 1 ♀; same data as for preceding; 28 May 1963; C.J. McCoy leg.; UCMC • 1 ♀; Moffat Co., Castle Park, Dinosaur National Monument; [40.533° N, 108.983° W]; elev. 1569.7 m; 8 Jul. 1949; H.G. Rodeck leg.; ex *Solidago*; UCMC • 2 ♀♀; Morgan Co., 2 mi. E of Roggen; [40.1685° N, 104.3339° W]; 26 May 1963; U.N. Lanham *et al*. leg.; UCMC • 3 ♀♀; Morgan Co., 3 mi. N of Orchard; [40.3734° N, 104.118° W]; 10 May 1963; B. Vogel leg.; UCMC • 1 ♀; Pueblo Co., Pueblo; [38.27° N, 104.62° W]; 21 May 1918; A. Wetmore leg.; USNM • 1 ♀; Weld Co., 10 mi. NE of Roggen; [40.2708° N,

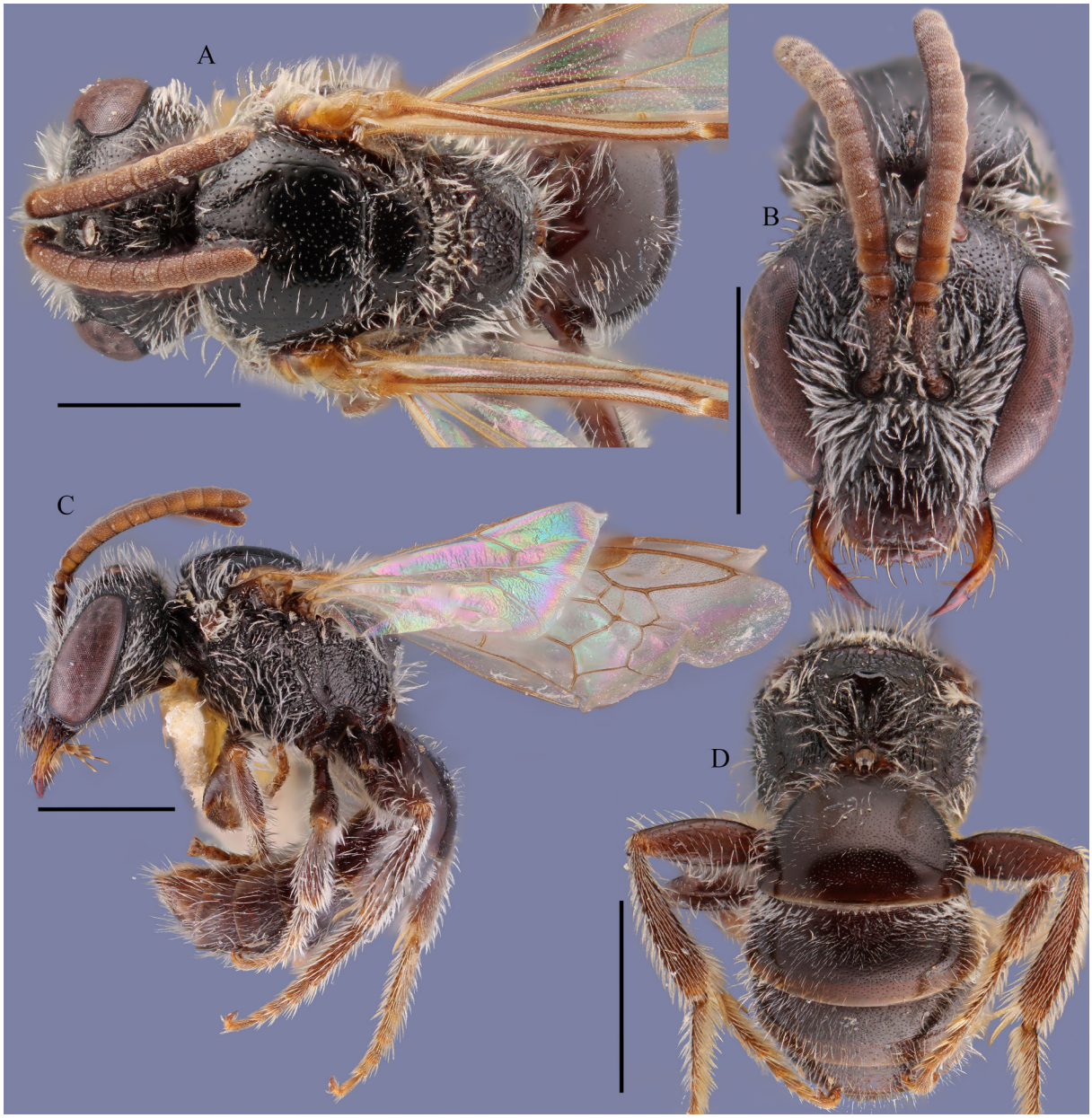


Fig. 75. *Lasioglossum* (*Hemihalictus*) *pectoraloides* (Cockerell, 1895), ♂ (ASUHIC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

104.2377° W]; 25 May 1963; U.N. Lanham leg.; ex *Salix*; UCMC • 3 ♂♂; Weld Co., Owl Creek, 12 mi. NE of Nunn; [40.576° N, 104.636° W]; 4 Aug. 1983; H.E. Evans leg.; UCMC • 1 ♀; Weld Co., Roggen; [40.1683° N, 104.3717° W]; 19 May 1930; W.P. Cockerell leg.; UCRC • 1 ♂; same data as for preceding; 8 Jul. 1984; H.E. Evans leg.; UCMC • 1 ♀; Weld Co., Pawnee National Grassland, Cow Valley Rec. Area; 40.645° N, 104.343° W; elev. 1480 m; 39977; K. Perez, S. McCubbin, J. Cossey and A. Borisenko leg.; CBG • 1 ♀; Yamu Co., Beecher Island; [39.87° N, 102.187° W]; 21 Jun. 1979; U.N. Lanham leg.; ex *Melilotus*; UCMC • 4 ♀♀; White Rocks (?); 29 Jun. 1939; P.H. Timberlake leg.; ex *Monarda pectinata*; UCRC • 1 ♀; same data as for preceding; 28 Jun. 1939; P.H. Timberlake leg.; UCRC • 1 ♂; Carl F. Baker leg.; USNM • 94 ♀♀; same data as for preceding; Carl F. Baker leg.; USNM. – **Nevada** • 2 ♀♀; Clark Co., Las Vegas; [36.175° N, 115.136° W]; 20 Jun. 1939; P.H. Timberlake leg.; ex *Cirsium*; UCRC • 6 ♀♀; Lincoln Co., 3 mi. NW of Caliente; [37.6448° N, 114.5504° W]; 22 Jun. 1982; W.J. Pulawski leg.; CAS. – **New Mexico** • 1 ♀; Bernalillo Co., Oslar, Albuquerque; [35.111° N, 106.593° W]; 17 Jul. 1902; USNM • 3 ♀♀; Chaves Co., 5 mi. E of Roswell; [33.3917° N, 104.4367° W]; 11 Sep. 1961; P.D. Hurd leg.; ex *Lepidium integrifolium* (verbatim: *Lepidium montanum* var. *integrifolium*); EMEC • 3 ♀♀; same data as for preceding; 11 Sep. 1961; P.D. Hurd leg.; ex *Isocoma pluriflora* (verbatim: *Haplopappus pluriflorus*); EMEC • 2 ♂♂; same data as for preceding; 11 Sep. 1961;

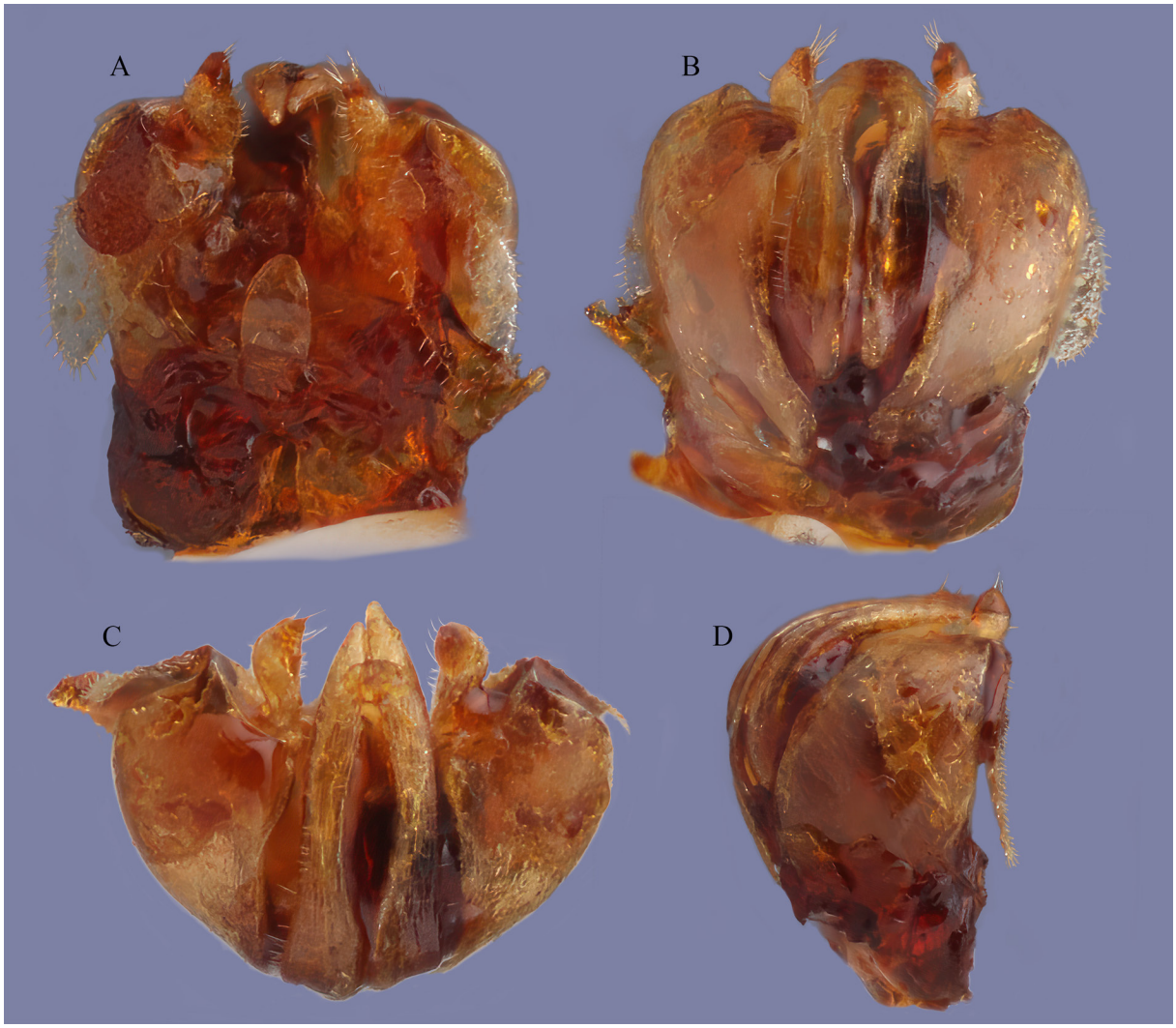


Fig. 76. Genitalia of *Lasioglossum* (*Hemihalictus*) *pectoraloides* (Cockerell, 1895), ♂ (EMEC). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

P.D. Hurd leg.; ex *Lepidium integrifolium* (verbatim: *Lepidium montanum* var. *integrifolium*); EMEC • 2 ♀♀; Chaves Co., 5 mi. W of Roswell; [33.3965° N, 104.608° W]; 11 Sep. 1961; P.H. Timberlake leg.; UCRC • 1 ♀; same data as for preceding; 11 Sep. 1961; P.H. Timberlake leg.; ex *Lepidium montanum*; UCRC • 1 ♀; Cochise Co., Southwest Research Station; 31.8840° N, 109.2070° W]; 19 Aug. 2024; J. Gibbs leg.; WRME • 1 ♀; same data as for preceding; 15 Aug. 2024; J. Gibbs leg.; WRME • 1 ♀; Doña Ana Co., Las Cruces; [32.3199° N, 106.7637° W]; Townsend leg.; MCZ • 1 ♀; same data as for preceding; 4872; Cockerell leg.; ex *Salix*; MCZ • 1 ♀; same data as for preceding; Cockerell leg.; ex *Melilotus*; MCZ • 1 ♀; same data as for preceding; Cockerell leg.; ex *Salix*; MCZ • 1 ♀; same data as for preceding; Townsend leg.; EMEC • 1 ♀; same data as for preceding; 3 May; T.D.A. Cockerell leg.; ex *Salix*; EMEC • 2 ♀♀; same data as for preceding; 18 Jun. 1942; E.C. Van Dyke leg.; CAS • 1 ♀; same data as for preceding; 5 Oct. 1995; Cockerell leg.; USNM • 1 ♀; same data as for preceding; 29 Sep. 1995; Cockerell leg.; USNM • 1 ♀; same data as for preceding; May 11; Townsend leg.; USNM • 1 ♀; same data as for preceding; USNM • 1 ♀; same data as for preceding; 10 May; Townsend leg.; USNM • 3 ♀♀; Doña Ana Co., Las Cruces; [32.3199° N, 106.7637° W]; elev. 1182.6 m; 18 Jun. 1942; H.A. Scullen leg.; EMEC • 1 ♀; Doña Ana Co., Mesilla; [32.27° N, 106.80° W]; 1–30 Apr. 1917; ex plum; USNM • 27 ♀♀; same data as for preceding; 1–30 Apr. 1909; C.N. Ainslie leg.; USNM • 10 ♀♀; same data as for preceding; 4 May 1909; C.N. Ainslie leg.; USNM • 6 ♀♀; same data as for preceding; C.N. Ainslie leg.; USNM • 1 ♂; Doña Ana Co., Mesilla Park; [32.252° N, 106.748° W]; 8 Jul. 1898; W.P. Cockerell leg.; UCRC • 1 ♀; same data as for preceding; 18 May 1900; Cockerell leg.; USNM • 1 ♀; Doña Ana Co., Mesilla; [32.27° N, 106.80° W]; 1–31 May 1910; ex *Hymenoxys*; UCRC • 1 ♀; Eddy Co., 5 mi. N of Carlsbad; [32.49° N, 104.229° W]; 21 Sep. 1956; J.W. MacSwain leg.; ex *Chrysothamnus*; EMEC • 1 ♂; Grant Co., 16 mi. NW of Silver City; [32.9324° N, 108.4755° W]; 13 Jun. 1961; H.A. Scullen leg.; ex *Asclepias*; OSAC • 1 ♀; Guadalupe Co., 2 mi. W of Santa Ross; [34.9368° N, 104.7172° W]; 10 Jul. 1929; V.E. Romney leg.; ex *Croton texensis*; USNM • 1 ♀; Hidalgo Co., 15 mi. S of Animas; [31.729° N, 108.8066° W]; 18 Aug. 1980; McGinley and Woodley leg.; ex *Cleome*; MCZ • 2 ♀♀; Hidalgo Co., 16 mi. S of Animas; 31.7200° N, 108.822° W; 16 Aug. 2024; J. Gibbs leg.; WRME • 1 ♂; same data as for preceding; 16 Aug. 2024; J. Gibbs leg.; WRME • 1 ♀; Hidalgo Co., 29 mi. S of Animas; [31.5275° N, 108.8114° W]; 27 Aug. 1980; McGinley and Woodley leg.; ex *Sphaeralcea*; MCZ • 1 ♀; same data as for preceding; 27 Aug. 1980; McGinley and Woodley leg.; ex *Sphaeralcea*; MCZ • 28 ♀♀; Hidalgo Co., 15 mi. S of Animas; [31.729° N, 108.8066° W]; 15 Aug. 1978; N.S. Wasbauer leg.; ex *Baccharis salicifolia* (verbatim: *Baccharis glutinosa*); CSCA• 1 ♀; Los Alamos Co., Frijoles Canyon; Bandelier National Monument; [36.44° N, 105.503° W]; 14 Jun. 1960; Burks, Kinzer leg.; USNM • 1 ♀; Maricopa Co., 5 mi. SW of Avondale; [33.4303° N, 112.4365° W]; 1 Apr. 1967; G.I. Stage leg.; USNM • 1 ♀; San Miguel Co., Apache Springs; [35.372° N, 105.193° W]; 13 Jul. 1959; E.G. Linsley leg.; EMEC • 1 ♀; Sandoval Co., Peña Blanca; [35.573° N, 106.337° W]; 7 Jun. 1965; U.N. Lanham leg.; UCMC • 2 ♀♀; Santa Fe Co., 10 km S of La Cienega, Hyw 85; 35.5122° N, 106.22415° W; 17 Aug. 2007; C. Sheffield and J. Gibbs leg.; PMAE • 6 ♀♀; Socorro Co., 38 mi. W of Magdalena; [34.0923° N, 107.904° W]; elev. 2164.1 m; 5 Aug. 1946; H.A. Scullen leg.; EMEC • 2 ♀♀; Valencia Co., Los Lunas, 20 mi. W of Carrizo Arroyo; [34.809° N, 106.735° W]; 1–23 Aug. 1977; S. and J. Peck leg.; PMAE • 2 ♀♀; 2.2 mi. E of (?); 16 Sep. 1965; P.H. Timberlake leg.; UCRC. – **Oklahoma** • 1 ♀; Cimarron Co., Lake Carl Etling, Black Mesa State Park, 25 mi. by road NW. of Boise City; [36.84° N, 102.882° W]; 14 Aug. 1967; H.B. Leech leg.; CAS. – **Texas** • 1 ♀; Brewster Co., 1 mi. W of Lajitas; [29.2613° N, 103.7931° W]; 23–30 Apr. 1963; H.E. Evans leg.; MCZ • 1 ♂; Brewster Co., Rio Grande; [26.381° N, 98.818° W]; 13–17 Jun. 1908; Mitchell and Cushman leg.; ex *Neltuma glandulos*a (verbatim: *Prosopis glandulosa*); USNM • 2 ♀♀; Brewster Co., Santa Elena Canyon, Big Bend National Park; [29.165° N, 103.612° W]; 24 Apr. 1953; B.J. Adelson leg.; EMEC • 1 ♀; same data as for preceding; 21 Apr. 1953; M. Wasbauer leg.; EMEC • 1 ♀; Brewster Co., Santa Elena Canyon, Big Bend National Park; [29.165° N, 103.614° W]; 24 Apr. 1953; M. Wasbauer leg.; EMEC • 2 ♀♀; same data as for preceding; 22 Apr. 1953; B.J. Adelson leg.; EMEC • 2 ♀♀; El Paso Co., El Paso; [31.759° N, 106.489° W]; 26 Apr. 1927; J.O. Martin leg.; CAS • 1 ♀; same data as for preceding;

25 Apr. 1927; J.O. Martin leg.; CAS • 1 ♂; Starr Co., Santa Elena; [26.7601° N, 98.4864° W]; 22 Apr. 1953; M. Wasbauer leg.; EMEC • 2 ♀♀; Val Verde Co., Langtry; [29.809° N, 101.559° W]; 14 Jun. 1980; J.L. Neff leg.; ASUHIC. – **Utah** • 1 ♀; Salt Lake Co., Salt Lake; [40.761° N, 111.891° W]; 21 Aug. 1913; P.H. Timberlake leg.; UCRC • 2 ♀♀; Salt Lake Co., Salt Lake City; [40.76° N, 111.89° W]; 9 Jun. 1926; E.C. VanDyke leg.; CAS • 1 ♀; San Juan Co., 4 mi. S of Blanding; [37.565° N, 109.475° W]; 24 Aug. 1967; J.C. Hall leg.; ex *Grindelia*; UCRC • 1 ♀; Sevier Co., Elsinore; [38.684° N, 112.148° W]; 18 Jun. 1933; J.T. Howell leg.; CAS • 1 ♀; Uintah Co., Watson; [39.8802° N, 109.1574° W]; elev. 1615.4 m; 1–31 Aug. 1910; F.M. Carpenter leg.; MCZ • 1 ♂; same data as for preceding; 1–31 Jul. 1922; F.M. Carpenter leg.; MCZ. – **Wyoming** • 2 ♀♀; Natrona Co., South Fork Powder River at Hwy 20, 1.8 mi. W of Town of Powder River; [43.0316° N, 107.0227° W]; 21 Aug. 1965; H.B. Leech leg.; CAS.

Description

Genitalia (Figs 76, 120N). Gonostylus elongate, approximately 2.5 times as long as broad, and bears short setae. Retrorse lobe broad, about 2 times as long as broad, covered in fine setae.

Range

Southwestern US and northern Mexico. Mexico (Chihuahua, Sonora), USA (Arizona, California, Colorado, Nevada, New Mexico, Oklahoma, Texas, Utah, Wyoming) (Fig. 77).

Floral hosts

APOCYNACEAE: *Asclepias* sp. • ASTERACEAE: *Aphanostephus ramosissimus* DC., *Aster* sp., *Baccharis salicifolia* (Ruiz & Pav.) Pers., *Baccharis* sp., *Baileya multiradiata* Harv. & A.Gray, *Barkleyanthus salicifolius* (Kunth) H.Rob. & Brettell, *Calendula* sp., *Carthamus tinctorius* L., *Centaurea cyanus* L., *Chloracantha spinosa* (Benth.) G.L.Nesom, *Chrysothamnus* sp., *Cirsium*

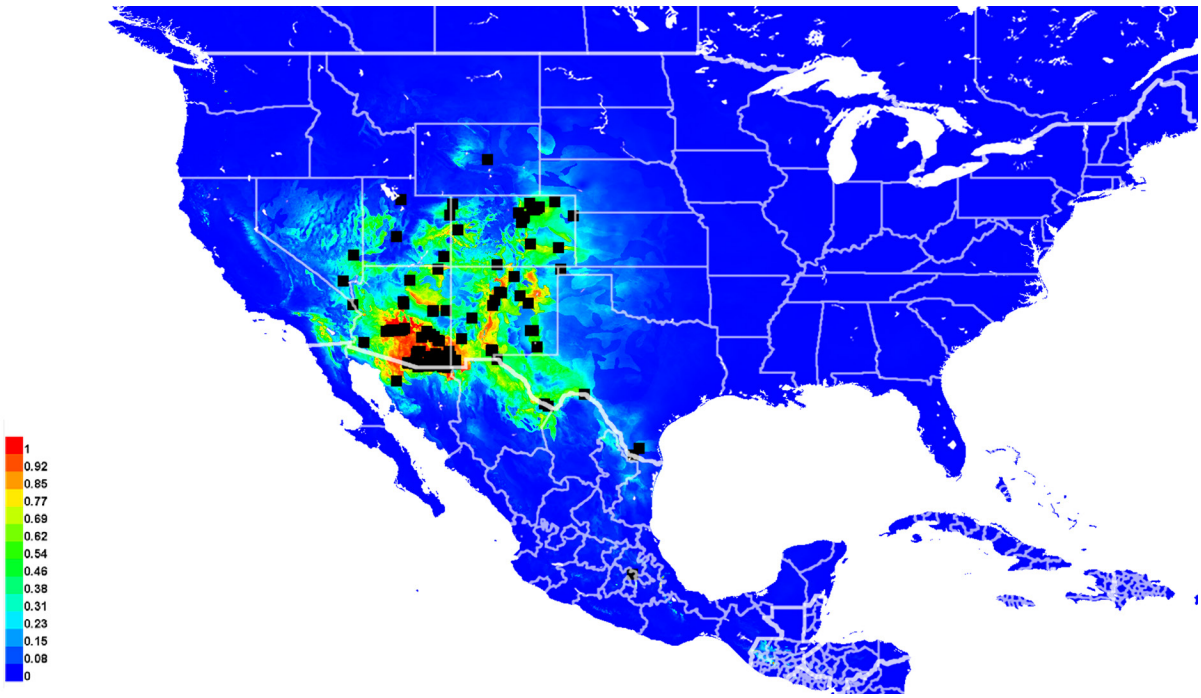


Fig. 77. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *pectoraloides* (Cockerell, 1895) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

sp., *Conyza canadensis* var. *canadensis* Cronquist, *Encelia* sp., *Flaveria* sp., *Grindelia decumbens* Greene, *Grindelia* sp., *Haplopappus* sp., *Helianthus annuus* L., *Helianthus* sp., *Hymenoxys richardsonii* (Hook.) Cockerell, *Hymenoxys* sp., *Isocoma pluriflora* Greene, *Solidago canadensis* L., *Solidago* sp., *Tagetes* sp., *Verbesina encelioides* (Cav.) Benth. & Hook.f. ex A.Gray, *Verbesina* sp. • BORAGINACEAE: *Heliotropium* sp. • BRASSICACEAE: *Descurainia pinnata* (Walter) Britton, *Descurainia* sp., *Dimorphocarpa wislizeni* (Engelm.) Rollins, *Lepidium integrifolium* Nutt., *Lepidium montanum* Nutt., *Lepidium thurberi* Wooton, *Lepidium* sp., *Lepidium virginicum* subsp. *menziesii* (DC.) Thell., *Physaria gordonii* (A.Gray) O'Kane & Al-Shehbaz, *Brassica nigra* (L.) W.D.J. Koch, *Sisymbrium* sp. • CAPPARACEAE: *Cleome lutea* Hook., *Cleome* sp., *Cleomella jonesii* (J.F.Macbr.) J.C.Hall & Roalson, *Wislizenia* sp. • EUPHORBIACEAE: *Croton texensis* (Klotzsch) Müll.Arg. • FABACEAE: *Medicago sativa* L., *Melilotus albus* Medik., *Melilotus indicus* (L.) All., *Melilotus* sp., *Neltuma glandulos*a (Torr.) Britton & Rose, *Neltuma juliflora* (Sw.) Raf. • LAMIACEAE: *Monarda pectinata* Nutt. • MALVACEAE: *Gossypium* sp., *Sphaeralcea* sp., *Sphaeralcea parvifolia* A.Nelson • POLYGONACEAE: *Eriogonum* sp. • ROSACEAE: *Prunus domestica* L., *Prunus* sp. • SALICACEAE: *Salix nigra* Marshall, *Salix* sp. • SAPINDACEAE: *Sapindus saponaria* L. • SOLANACEAE: *Datura inoxia* Mill., *Solanum elaeagnifolium* Cav. • TAMARICACEAE: *Tamarix chinensis* Lour.

DNA barcodes

Two full DNA barcodes and one partial barcode were analyzed all from Sonora. They are indistinguishable from *L. pectorale* (Smith, 1853) (Gibbs *et al.* 2013). The two species can be unambiguously separated using morphology and have distinct distributions.

Lasioglossum* (*Hemihalictus*) *robertsoni (Crawford, 1906)
Figs 78, 79, 104B, 106A

Halictus Robertsoni Crawford, 1906a: 4.

Halictus robertsoni – Crawford 1907a: 185 (key).
Lasioglossum (*Evylaeus*) *robertsoni* – Michener 1951: 1110 (catalogue).
Evylaeus robertsoni – Hurd 1979: 1961 (catalogue). — Moure & Hurd 1987: 81 (catalogue).

Diagnosis

Female *L. robertsoni* can be recognised by the combination of head long, length/width ratio 1.07 (±0.06 SD) (remarkably long in *L. pathiranae* sp. nov.); mesoscutum well imbricate and dull (shinier in all the other similar species), with contiguous (IS < 1 PD) punctures (not contiguous in *L. angustius*); hypoepimeron rugulose (partly polished in *L. angustius*), punctures obscure (distinct in *L. angustius* and *L. pathiranae*); propodeal triangle with rugae reaching posterior margin (separating from species in which the rugae do not reach posterior margin), propodeal triangle posterior margin sharply edged with a distinct apical carina (this excludes all species with a smoothly rounded posterior margin); T1 strongly coriarious on anterior face with a fan bearing a narrow dorsal opening (T1 anterior face mostly polished with broad dorsal opening in the fan in *L. angusticulum* sp. nov.); and T2–T3 with distinct basolateral tomentum (removes all species lacking basal patches or bands of tomentum on T2–T3, such as *L. nitidiusculum* group). Males are unknown.

Etymology

The species was named for Charles Robertson (Carlinville, Illinois) for his "excellent descriptions and notes on Illinois bees".

Type material

Syntypes of *Halictus Robertsoni* ("type" and paratype" status not compliant with ICZN; examined) UNITED STATES – **Texas** • 7 ♀♀. United States, Texas, Victoria Co., Victoria; [28.80° N, 97.01° W]; 24 Feb. 1904; J.C. Crawford leg.; USNM Type No. 12039 (Fig. 78).

Specimen labels

"Victoria / Tex // Feb. 24. 4 // J.C. Crawford collector // Type No. 12039 U.S.N.M. // *Halictus Robertsoni* Cwfd. ♀ Type // USNMENT 01735668" on one female; "Victoria / Tex 4. 04 // J.C. Crawford collector

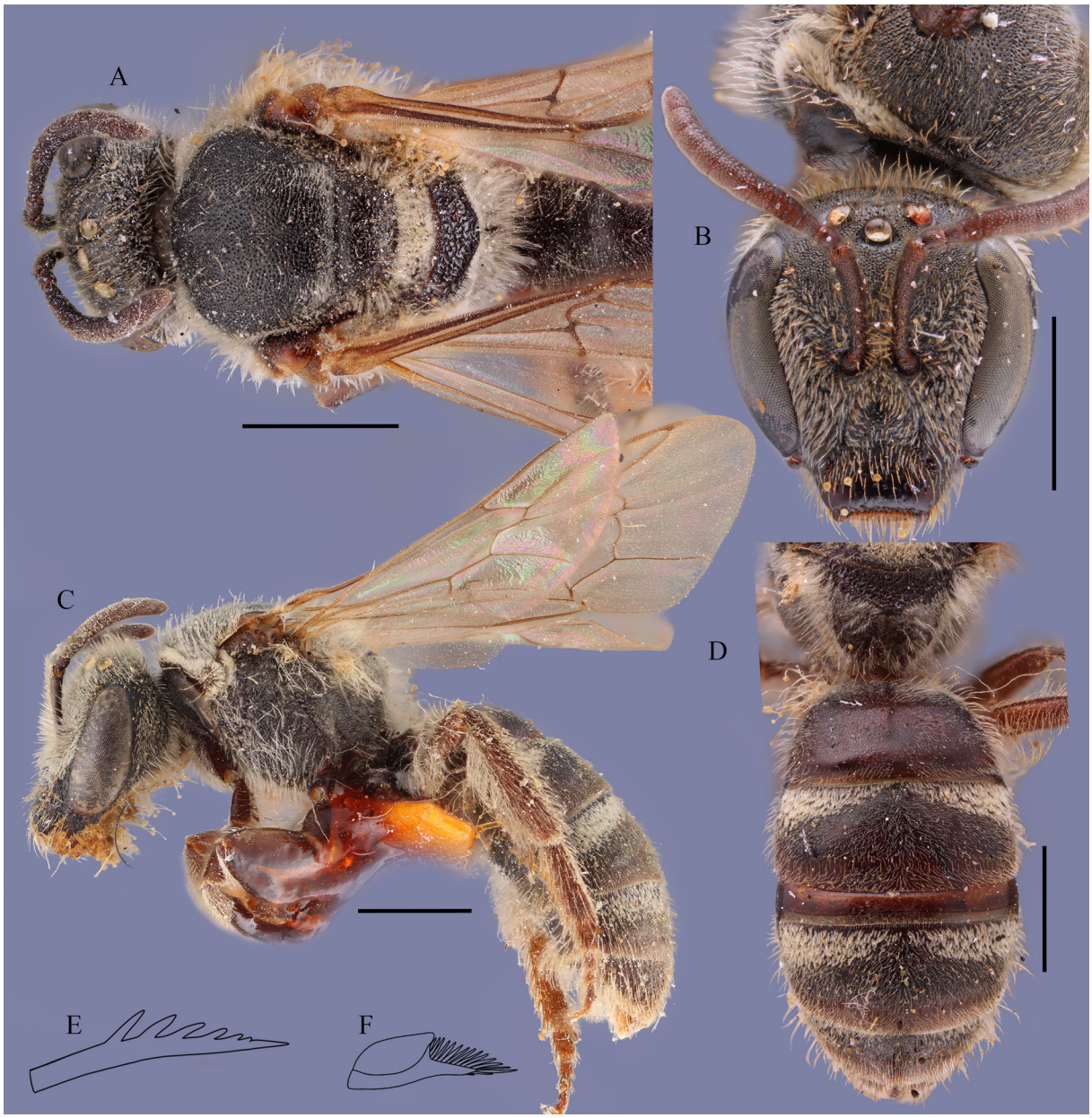


Fig. 78. *Lasioglossum* (*Hemihalictus*) *robertsoni* (Crawford, 1906), syntype, ♀ (USNM Type No. 12039). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

// Type No. 12039 U.S.N.M. // Paratype No. 12039 U.S.N.M. // *Halictus Robertsoni* Cwfd. ♀ Paratype" on remaining females.

Type notes

The original type series was a syntype series. Crawford wrote "Type, Victoria, Texas, Febr. 24, 1904. Crawford collector". There is no reference to additional material; however, someone labeled additional specimens in the USNM, with the same collection data, as paratypes. It is not possible to be certain that it was Crawford who did so, and eve n if so, it cannot be determined whether this occurred before or after the species description was published, and regardless, there was no designation of a particular individual specimen in print at any point, as required by the Code. This does not comply with either Articles 74.5 or 74.6 of the Code, so even though one specimen is labeled as 'type', it is not a validly-designated lectotype under the Code, and the entire set of 7 females is all still syntypes.

Material examined

UNITED STATES – **Texas** • 1 ♀; Bexar Co., San Antonio; [29.425° N, 98.495° W]; 11 Apr. 2006; F.C. Pratt leg.; ex *Pyrrhopappus grandiflorus* [verbatim: *Sitilias grandiflora*]; USNM • 1 ♀; same data as for preceding; 14 May 2006; USNM • 1 ♀; same data as for preceding; ex *Sonchus*; USNM • 1 ♀; Texas Hill Co., New Braunfels; [29.70° N, 98.13° W]; 7 Jun. 1942; E.S. Ross leg.; CAS.

Redescription

Female

Body measurements. Length 7.98 mm (±0.30 SD). Head length 2.00 mm (±0.04 SD). Face length 1.61 mm (±0.06 SD). Head width 1.85 mm (±0.09 SD). Wing length 5.23 mm (±0.30 SD). n = 6.

Colouration. Head and mesosoma dark brown. Clypeus apex dark brown. Labrum brown. Mandible dark brown basally, becoming light brown medially and reddish brown apically. Flagellum brown dorsally, light brown ventrally. Pronotal lobe brown. Tegula brown. Wing membrane faintly brownish, veins with subcosta brown, otherwise light brown. Legs brown. Metasoma dark brown with rims of terga, sterna and downcurved lateral areas of terga broadly light brown.

Pubescence. Body hair colour off-white. Tomentum dense on pronotal angle and lobe, space between pronotal lobe and tegula, pronotal collar, metanotum anteromedially, propodeum lateral surface anterodorsally, T2–T3 basolaterally, and T4 basally; moderately dense on supraclypeal area dorsolaterally, paraocular area, gena near eye margin, anterolateral angle and marginally of mesoscutum, and propodeum posterior surface dorsally; sparse on propodeum lateral (except anterodorsal area). Mesosoma covered by appressed, simple, very short hairs (<0.25 OD) mixed with sparse, erect, weakly plumose, long hairs (<1 OD) on mesoscutum and erect, plumose, long hairs (<2 OD) on other areas. Metasomal sterna with moderately sparse, erect, weakly plumose, long (<2.5 OD) hairs. Metafemoral scopa with dense plumose hairs. Wing hairs brown, very short and sparse. T1 with a fan, narrow dorsal opening (0.5 OD), composed of overlapping sub-appressed simple hairs (<1.5 OD).

Surface sculpturing. Clypeus imbricate to tessellate, becoming polished apical ⅓; punctures irregularly sparse (IS<3 PD) apically and medially, becoming smaller and denser (IS<1 PD) basolaterally. Supraclypeal area tessellate medially, imbricate posterolaterally; punctures fine, irregularly sparse (IS<2 PD) medially, becoming denser (IS<1 PD) posterolaterally. Frons reticulate-punctate punctures crowded (IS = 0 PD). Ocellocular area weakly rugulose; punctures dense (IS<1 PD). Gena polished, becoming lineolate posteriorly; punctures moderately sparse (IS = 1–2 PD) or obscure from some angles, becoming obscure posteriorly. Postgena lineolate. Tegula punctures sparse (IS = 1–3 PD) in the anterior half and basally, becoming impunctate posteriorly. Mesoscutum dull, well imbricate throughout, sometime becoming weakly so laterally; punctures dense (IS<1 PD). Mesoscutellum

polished submedially, becoming weakly rugulose to imbricate marginally; punctures dense (IS < 1 PD) marginally and on median line, sparse submedially (IS = 1–4 PD), diversopunctate. Metanotum rugulose, punctures obscure. Propodeal triangle with moderately strong rugae moderately strong, reaching posterior margin and join with the oblique carina, anastomosing, lateral rugae extending to dorsolateral slope of propodeum lateral face; interspace sculpture shiny to weakly imbricate. Preëpisternum rugose. Hypoepimeron rugulose; punctures obscure. Mesepisternum rugose dorsally, becoming rugulose ventrally. Propodeum lateral face strongly imbricate, becoming rugulose posteriorly; posterior face imbricate-rugulose. T1 anterior face dull, strongly coriarious; dorsal surface weakly polished, becoming weakly coriarious on small subapicolateral boss and coriarious on rim, punctures sparse (IS = 1–3 PD), becoming more sparsely punctate (IS = 2–6 PD) in small subapicolateral boss and punctures fine, minute, and sparse (IS = 1–4 PD) on rim, becoming impunctate apical half and medially on rim. T2 disc coriarious to polished, punctures moderately dense (IS =1–2 PD) basally, becoming sparse (IS = 1–3 PD) apically; rim coriarious, punctures minute and sparse (IS = 3–6 PD) or nearly impunctate after premarginal line, becoming closer (IS = 1–3 PD) apically.

Structure. Head long, length/width ratio 1.07 (±0.06 SD). Face length/width ratio 0.87 (±0.02 SD). Clypeus projecting ~85% below suborbital tangent; clypeus length/width ratio 1.01 (±0.05 SD). Mandible short, not extending much beyond opposing clypeal angle. Eyes convergent below, UOD/LOD ratio 1.15 (±0.03 SD). Ocelli normal. Gena/eye width ratio 0.82 (±0.04 SD). Pronotal angle obtuse. Intertegular span 1.40 mm (±0.11 SD). Mesocutum length/width ratio 0.92 (±0.05 SD); mesoscutum/scutellum length ratio 2.70 (±0.25 SD); scutellum/metanotum length ratio 1.50 (±0.08 SD); metanotum/

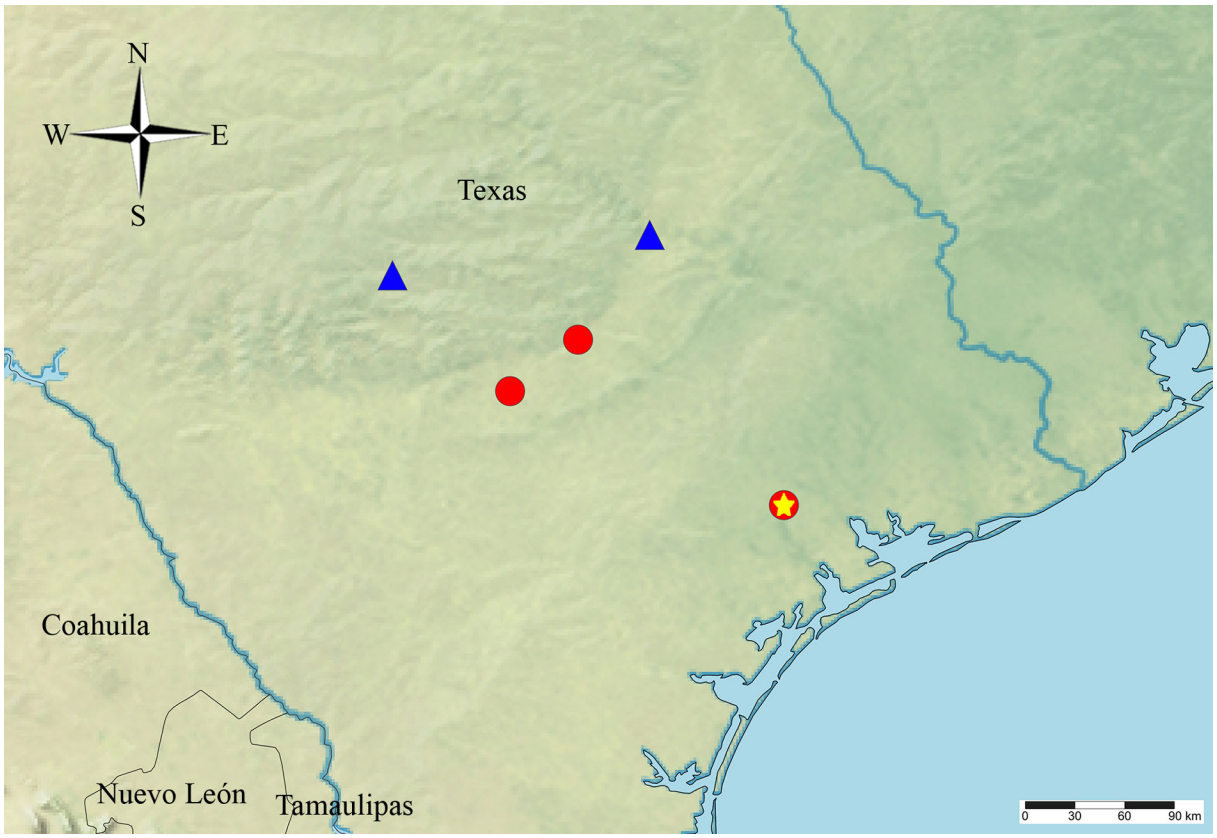


Fig. 79. Distribution map of *Lasioglossum* (*Hemihalictus*) *robertsoni* (Crawford, 1906) (red dots) and potential new species closely related to *L. robertsoni* (blue triangles). Note: Holotype location is marked with stars inside dots. Produced by Simplemappr (Shorthouse 2010).

propodeal triangle length ratio 0.96 (±0.03 SD). Protibial spur with apical serrations shorter or subequal in length to width of malus; malus extending beyond the velum, nearly ½ the length of velum. Inner metatibial spur pectinate, teeth 3–5, basal teeth length mostly subequal or longer than width of rachis and sometime shorter than width of rachis. Propodeal triangle posterior margin carinate, apical carina distinct from background sculpturing. Propodeal lateral carina reaching dorsolateral slope. n = 6.

Male

Unknown

Range

Rare. Texas, including Victoria County, Bexar County, and Texas Hill County, especially both coastal and central regions of Texas (Fig. 79).

Floral host

ASTERACEAE: *Pyrrhopappus grandiflorus* (Nutt.) Nutt., *Sonchus* sp.

Remarks

Rare. *Lasioglossum robertsoni* may include cryptic species, but the limited number of specimens makes it difficult to conclusively separate them with confidence. These specimens are not included in the *L. robertsoni* observed material section but are listed separately below. A conspicuous characteristic distinguishing them from *L. robertsoni* is the presence of abruptly depressed rims on the terga, along with dense (IS < 1 PD) larger punctures on the discs. When run through the key, these potential new species might also be identified as *L. robertsoni*, as they share the same additional characters outlined in the key.

UNITED STATES—**Texas** • 1 ♀; Travis Co., Austin; [30.27° N, 97.74° W]; 8 Jun. 1979; J.L. Neff leg.; ex *Cirsium texanum*; SEMC • 2 ♀♀; Kerr Co.; Kerrville; [30.05° N, 99.14° W]; 13 Aug. 1963; N.L.H. Krauss leg.; USNM (Fig. 79)

Lasioglossum* (*Hemihalictus*) *sequoiae (Michener, 1936)
Figs 80–83, 100B, 106F, 117B, 120O

Halictus (*Evylaeus*) *sequoiae* Michener, 1936: 165.

Lasioglossum (*Evylaeus*) *sequoiae* – Michener 1951: 1110 (catalogue).
Evylaeus sequoiae – Moure & Hurd 1987: 82 (catalogue).

Diagnosis

Female *L. sequoiae* can be recognized by the combination of head round, length/width ratio 0.96 (±0.02 SD); inner metatibial spur denticulate-serrate, teeth shorter than width of rachis; supraclypeal area with dense (IS < 1 PD) punctures throughout; and propodeal triangle with rugae reaching posterior margin. Male *L. sequoiae* can be recognized by the combination of head long, length/width ratio 1.03 (±0.04 SD); clypeus yellow in apical half; supraclypeal area with dense (IS < 1 PD) punctures throughout; mesoscutum polished and with dense (IS < 1 PD) punctures; and propodeal triangle with rugae reaching posterior margin. Both sexes of *L. sequoiae* cannot be easily mixed with other species in western North America.

Etymology

Michener (1936) did not state the derivation of the epithet. The name sequoiae is interpreted here as a possible reference to Sequoia (e.g., the coast redwood, *Sequoia sempervirens* Endl.), given that the type series originates from northern California localities within the broader redwood region.

Type material

Holotype of *Halictus* (*Evylaeus*) *sequoiae* (by original designation; examined by JG ca 2013 and re-examined from photographs)

UNITED STATES – **California** • 1 ♀; Marin Co., Ross; [37.96° N, 122.56° W]; 28 Apr. 1918; E.P. Van Duzee leg.; CAS Type No. 4199.

Specimen labels

"Ross Cal / Marin Co. / Apr. 28' 18 // EPVan Duzee / Collector // *Halictus* / *sequoiae* / Mich. Type // California Academy / of Sciences / Type No. 4199".

Paratypes of *Halictus* (*Evylaeus*) *sequoiae* (by original designation; examined)

UNITED STATES – **California** • 2 ♀♀; Sonoma Co., Mark West Springs; [37.339° N, 121.442° W]; 23 Apr. 1935; E.P. Van Duzee leg.; ex *Nemophila*; CAS • 1 ♀; Marin Co., Fairfax; [37.339° N, 121.442° W]; 12 Apr. 1925; C.L. Fox leg.; CAS • 1 ♀; Marin Co., Ross; [37.339° N, 121.442° W]; 18 Apr. 1928; E.P. Van Duzee leg.; CAS • 1 ♀; Mendocino Co., Yorkville; [37.339° N, 121.442° W]; 8 May 1935; E.P. Van Duzee leg.; ex *Gilia*; CAS.

Specimen labels

"Mark West / Spgs Cal. / IV-23-35 // EPVanDuzee / Collector // *Nemophila tricolor* // *Halictus* / *sequoiae* / Paratype Mich // *Lasioglossum* / GIBBS-12853 and 12854".

"Fairfax, / IV-12-25 / MarinCo. Cal. // C.L. Fox // C.L. Fox Collection // *Halictus* / *sequoiae* / Paratype Mich // *Lasioglossum* / GIBBS-12855".

"Ross Cal / Marin Co. / Apr. 28' 18 // EPVanDuzee / Collector // *Halictus* / *sequoiae* / Paratype Mich // *Lasioglossum* / GIBBS-12932".

"Yorkville Cal / Mndcno. Co. / V-8-35 // EPVanDuzee / Collector // White / Gilia // *Halictus* / *sequoiae* / Paratype Mich // *Lasioglossum* / GIBBS-12856".

Material examined

UNITED STATES – **California** • 1 ♀; Alameda Co., Leona Heights; [37.789° N, 122.178° W]; 6 Apr. 1913; J.C. Bridwell leg.; EMEC • 1 ♀; Calaveras Co., Mokelumne Hill; [37.339° N, 121.442° W]; F.E. Blaisdell leg.; CAS • 1 ♀; same data as for preceding; Apr; F.E. Balaisdell leg.; CAS • 1 ♀; Clara Co., Santa Cruz Mountains; [37.117° N, 121.850° W]; 25 Apr. 1913; J.C. Bridwell leg.; EMEC • 1 ♀; Contra Costa Co., Russelman Park; [37.912° N, 121.906° W]; 22 Jun. 1954; P.D. Hurd leg.; EMEC • 1 ♀; El Dorado Co., 2 mi. SE of Latrobe; [38.538° N, 120.958° W]; 18 Apr. 1976; S.C. Kuba leg.; CSCA • 2 ♀♀; El Dorado Co., Blodgett Forest, 13 mi. E of Georgetown; [38.892° N, 120.663° W]; 10 Jul. 1967; W.J. Turner leg.; EMEC • 2 ♀♀; El Dorado Co., Cool; [38.887° N, 121.015° W]; 4 Apr. 1964; R.W. Thorp leg.; ex *Lasthenia* (verbatim: *Baeria*); EMEC • 4 ♀♀; same data as for preceding; 29 Mar. 1964; J. Powell leg.; EMEC • 1 ♀; Humboldt Co., 4 mi. N of Garberville; [40.158° N, 123.795° W]; 3 Jun. 1963; L.D. Thurman leg.; ex Oenothera; EMEC • 1 ♀; Lake Co., Elk Hill; [37.339° N, 121.442° W]; 1–31 May 1938; CAS • 1 ♀; Lake Co., Lakeport; [37.339° N, 121.442° W]; 1–30 Jun. 1917; J. Bentley leg.; EMEC • 1 ♀; Lake Co., Whispering Pines; [38.814° N, 122.713° W]; 14 Apr. 1964; C.N. Slobodchikoff leg.; EMEC • 9 ♀♀; Los Angeles Co., Claremont; [34.097° N, 117.719° W]; Baker leg.; EMEC • 2 ♀♀; Los Angeles Co., Mts near Claremont; [34.161° N, 117.716° W]; Baker leg.; EMEC • 1 ♀; Madera Co., Oakhurst; [37.328° N, 119.649° W]; 1 Jun. 1942; EMEC • 1 ♀; same data as for preceding; 19 May 1942; C. Kennett leg.; ex *Ranunculus*; EMEC • 1 ♀; Madera Co., San Joaquin Experimental Range; [37.083° N, 119.716° W]; 18 Apr. 1953; H.E. Childs leg.; EMEC • 1 ♀; Madera Co., 2 mi. NE Bass Lake; [37.355° N, 119.558° W]; 14 Jun. 1976; W.W. Middlekauff leg.; EMEC • 1 ♀; Madera Co., Coarsegold; [37.262° N, 119.701° W]; 12 May 1942; A.J. Walz leg.; UCRC • 1 ♀; Marin

Co., Alpine Lake; [37.339° N, 121.442° W]; 26 May 1955; R.O. Schuster leg.; EMEC • 1 ♀; Marin Co., Mount Tamalpias; [37.929° N, 122.578° W]; 25 May 1952; LACM • 1 ♀; Marin Co., San Anselmo; [37.975° N, 122.562° W]; 7 Apr. 1939; EMEC • 2 ♀♀; Marin Co., San Geronimo; [38.013° N, 122.664° W]; 23 Apr. 1913; J.C. Bridwell leg.; EMEC • 1 ♀; Mendocino Co., 3 air mi. NW of Beaver Glade Station. Maple Creek; [39.962° N, 123.034° W]; elev. 975.4 m; 16 Jun. 1972; J. Powell leg.; ex *Triteleia hyacinthina* (verbatim: *Brodiaea hyacinthina*); EMEC • 1 ♀; Mendocino Co., 3 mi. N of Branscob; [39.695° N, 123.626° W]; 25 May 1976; S. Szerlip leg.; ex *Ranunculus*; EMEC • 1 ♀; Mendocino Co., 8 mi. N of Ukiah; [37.339° N, 121.442° W]; 21 Apr. 1935; E.P. Van Duzee leg.; CAS • 1 ♀; Mendocino Co., Hopland Field Station; [39.001° N, 123.080° W]; 1 May 1958; W.W. Middlekauff leg.; EMEC • 1 ♀; Mendocino Co., Ryan Creek; [39.476° N, 123.381° W]; 13 Apr. 1941; N.F. Hardman leg.; EMEC • 1 ♂; same data as for preceding; 19 Jun. 1949; EMEC • 1 ♀; Monterey Co., 5 mi. NE of



Fig. 80. *Lasioglossum* (*Hemihalictus*) *sequoiae* (Michener, 1936), ♀ (UCRC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

Arroyo Seco Guard Station; [36.293° N, 121.435° W]; elev. 243.8 m; 4 May 1975; J. Powell leg.; ex *Cryptantha*; EMEC • 1 ♀; Monterey Co., 8 mi. W of Jolon; [35.970° N, 121.341° W]; 2 Apr. 1959; C.W. O'Brien leg.; EMEC • 1 ♀; Monterey Co., Arroyo Seco, 14 mi. SW of Greenfield; [36.184° N, 121.408° W]; elev. 396.2 m; 12 Jun. 1963; M.L. Noller leg.; ex *Eriophyllum confertiflorum*; ASUHIC • 1 ♀; Monterey Co., Bradley; [37.339° N, 121.442° W]; 23 Apr. 1917; E.P. Van Duzee leg.; CAS • 1 ♀; Monterey Co., Hastings Reservation, near Jamesburg; [36.372° N, 121.586° W]; 3 May 1958; D.D. Linsdale leg.; EMEC (Fig. 81) • 1 ♂; same data as for preceding; 8 Jul. 1958; D.D. Linsdale leg.; EMEC • 1 ♀; Monterey Co., Horse Bridge, 1.5 air mi. SW of Arroyo Seco Guard Station; [36.222° N, 121.495° W]; 6 May 1975; R. Wharton leg.; EMEC • 1 ♀; same data as for preceding; 6 May 1975; J. Powell leg.; EMEC • 1 ♀; Monterey Co., Indians Guard Staion, 17 air mi. NW of Jolon; [36.144° N, 121.392° W]; elev. 640.1 m; 9 May 1975; R. Wharton leg.; EMEC • 1 ♀; Monterey Co., Jamesburg;



Fig. 81. *Lasioglossum* (*Hemihalictus*) *sequoiae* (Michener, 1936), ♂ (EMEC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

[36.370° N, 121.590° W]; 22 Mar. 1940; E.G. Linsley leg.; EMEC • 1 ♀; Monterey Co., Paloma Creek, 3 air mi. NE Arroyo Seco Guard Station; [36.273° N, 121.4499° W]; elev. 274.3 m; 5 May 1975; J. Powell leg.; EMEC • 3 ♀♀; Monterey Co., Robinson Canyon Road, Carmel Valley; [37.339° N, 121.442° W]; 27 Apr. 1955; J. Powell leg.; EMEC • 1 ♀; Monterey Co., Tassajara Hot Springs; [37.339° N, 121.442° W]; 27 May 1920; L.S. Slevin leg.; CAS • 1 ♀; Monterey Co., Tularcitos Ranch, Carmel Valley; [36.442° N, 121.646° W]; 27 Apr. 1955; J. Powell leg.; EMEC • 1 ♂; Napa Co., Mount Saint Helena; [37.339° N, 121.442° W]; 9 Jun. 1918; E.P. Van Duzee leg.; CAS (Fig. 82) • 1 ♀; Nevada Co., 2 mi. S of Grass Valley; [39.19° N, 121.061° W]; 27 Jun. 1967; J. Powell leg.; EMEC • 1 ♀; Riverside Co., 12 mi. NW Oak Grove on Hwy 79; [33.469° N, 116.946° W]; 5 Apr. 1969; S. Frommer, K. Reed, M. Reed leg.; UCRC • 1 ♀; Riverside Co., Riverside; [33.9556° N, 117.3722° W]; elev. 290 m; 10 May 1926; P.H. Timberlake leg.; ex *Eschscholzia californica*; UCRC • 1 ♀; same data as for preceding; 13 Apr. 1927; P.H. Timberlake leg.; ex *Lasthenia gracilis* (verbatim: *Baeria gracilis*); UCRC • 1 ♀; same data as for preceding; 15 Jul. 1934; P.H. Timberlake leg.; ex *Gilia achilleifolia* subsp. *multicaulis* (verbatim: *Gilia multicaulis*); UCRC • 1 ♀; San Diego Co., Cuyumaca; [32.946° N, 116.576° W]; 19 Apr. 1950; E.G. Linsley leg.; ex *Lasthenia* (verbatim: *Baeria*); EMEC • 1 ♀; same data as for preceding; 19 Apr. 1950; J.W. MacSwain leg.; ex *Gilia*; EMEC • 1 ♀; San Diego Co., Lake

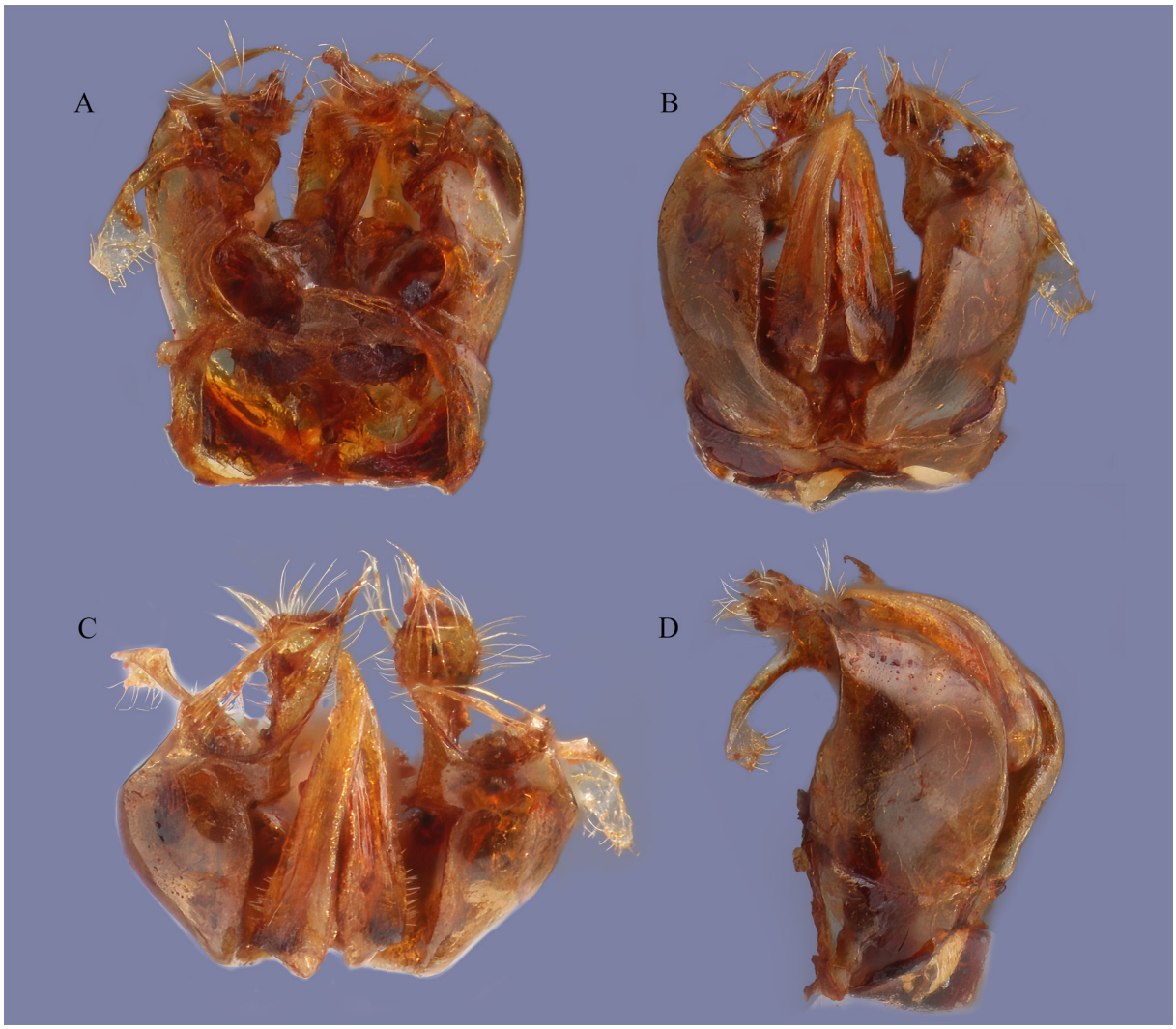


Fig. 82. Genitalia of *Lasioglossum* (*Hemihalictus*) *sequoiae* (Michener, 1936), ♂ (CAS). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

Cuyamaca; [32.987° N, 116.583° W]; 5 Jul. 1945; A. Melander leg.; UCRC • 1 ♀; San Diego Co., Lake Henshaw; [33.242° N, 116.763° W]; 10 Apr. 1950; P.E. Hurd leg.; EMEC • 1 ♀; San Diego Co., Mount Palomar; [33.363° N, 116.836° W]; 28 Jun. 1963; P.D. Hurd leg.; ex *Cryptantha intermedia*; EMEC • 1 ♀; San Francisco Co., Portola; [37.726° N, 122.409° W]; 25 Apr. 1915; EMEC • 1 ♀; San Luis Obispo Co., 10 mi. SE of Creston; [35.416° N, 120.398° W]; 1 May 1962; J. Powell leg.; EMEC • 1 ♀; San Luis Obispo Co., 7 mi. SW of Atascadero; [35.488° N, 120.814° W]; 4 Apr. 1968; C.A. Toschi leg.; EMEC • 1 ♀; same data as for preceding; 4 Apr. 1968; J. Powell leg.; ex *Plagiobothrys nothofulvus*; EMEC • 1 ♀; San Luis Obispo Co., 8 mi. W of Atascadero; [35.489° N, 120.834° W]; 3 Jul. 1956; P.D. Hurd leg.; ex *Anthemis cotula*; EMEC • 2 ♀♀; San Luis Obispo Co., Atascadero; [37.339° N, 121.442° W]; 26 Apr. 1919; E.P. Van Duzee leg.; CAS • 3 ♀♀; San Luis Obispo Co., Pozo; [37.339° N, 121.442° W]; 1 May 1962; P.D. Hurd leg.; ex *Lupinus nanus*; EMEC • 1 ♀; same data as for preceding; 30 Apr. 1962; R.L. Langston leg.; EMEC • 1 ♀; San Mateo Co., Kings Mtn; [37.421° N, 122.323° W]; 12 Apr. 1948; P.E. Hurd leg.; ex *Frangula californica* (verbatim: *Rhamnus californica*); EMEC • 2 ♀♀; San Mateo Co., Portola; [37.339° N, 121.442° W]; 30 May 1959; P.H. Arnaud Jr leg.; ex *Verbena hastata*; CAS • 1 ♀; Santa Barbara Co., Cachuma campground; Los Padres National Forest; [34.574° N, 119.956° W]; 24–25 May 1976; ex *Frangula californica* (verbatim: *Rhamnus californica*); LACM • 2 ♀♀; Santa Barbara Co., Los Prietos; [34.541° N, 119.802° W]; 14 Mar. 1967; J. Powell leg.; ex *Plagiobothrys*; EMEC • 1 ♀; same data as for preceding; 14 Mar. 1967; J. Powell leg.; EMEC • 10 ♀♀; Santa Clara Co., 11 mi. E of Mount Hamilton; [37.339° N, 121.442° W]; 19 Apr. 1956; D.J. Burdick leg.; EMEC • 9 ♀♀; Santa Clara Co., 5 mi. E of Mount Hamilton; [37.341° N, 121.551° W]; 16 Apr. 1955; D.J. Burdick leg.; EMEC • 18 ♀♀; Santa Clara Co., 8 mi. E of Mount Hamilton; [37.342° N, 121.496° W]; 16 Apr. 1955; D.J. Burdick leg.; EMEC • 1 ♀; Santa Clara Co., Mount Hamilton; [37.342° N, 121.643° W]; 15 Apr. 1947; G.E. Bohart leg.; ex *Mimulus*; EMEC • 19 ♀♀; same data as for preceding; 16 Apr. 1955; D.J. Burdick leg.; EMEC • 3 ♀♀; Santa Clara Co., San Antonio Valley; [37.344° N, 121.453° W]; 8 Apr. 1947; R.F. Smith leg.; EMEC • 3 ♀♀; same data as for preceding; 20 Apr. 1947; R.F. Smith leg.; EMEC

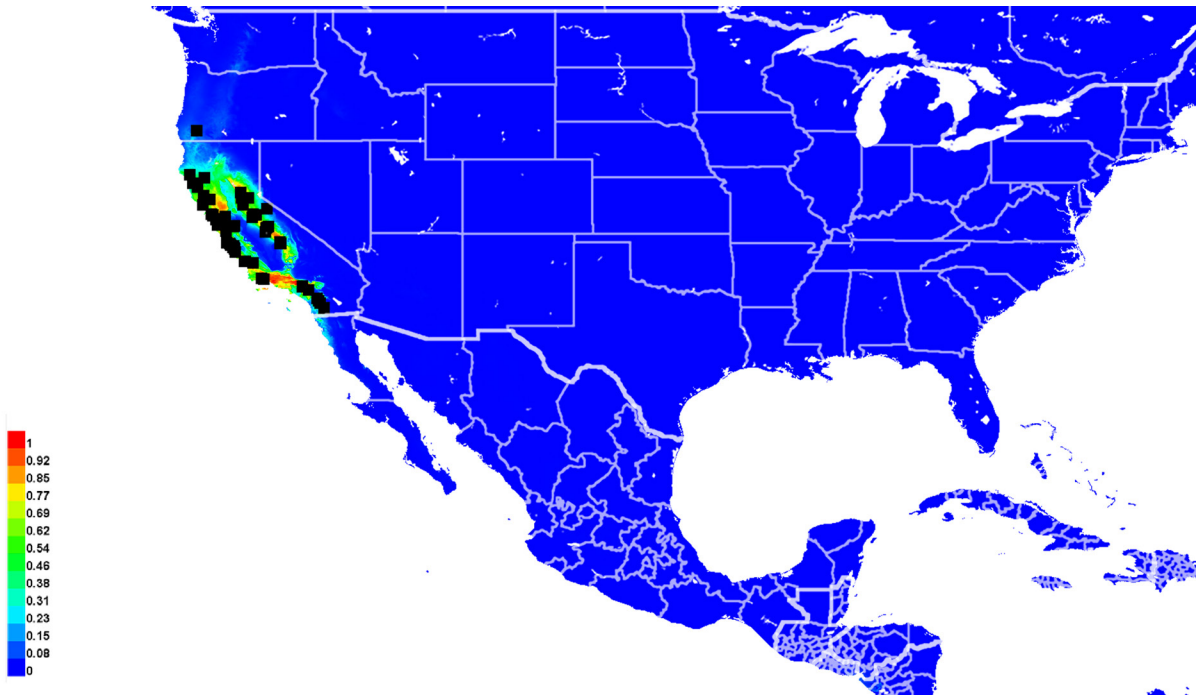


Fig. 83. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *sequoiae* (Michener, 1936) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

• 2 ♀♀; Santa Clara Co., Stanford University; [37.430° N, 122.170° W]; 19 May 19(??); UCRC • 2 ♀♀; Sonoma Co., Cazadero; [38.533° N, 123.085° W]; 29 Mar. 1935; R.M. Bohart and G.C. Bohart leg.; CAS • 1 ♀; Stanislaus Co., Adobe Creek W; [37.396° N, 121.375° W]; 20 Apr. 1948; R.F. Smith leg.; EMEC • 1 ♀; Tulare Co., 3 mi. W of Three Rivers; [36.437° N, 118.958° W]; 1 Apr. 1939; P.H. Timberlake leg.; ex *Phacelia douglasii*; UCRC (Fig. 80C) • 1 ♀; Tulare Co., 4 mi. N of Kaweah; [36.528° N, 118.918° W]; 13 May 1963; S.W. Earnshaw leg.; EMEC • 1 ♀; Tulare Co., Three Rivers; [36.454° N, 118.886° W]; 1 Apr. 1939; P.H. Timberlake leg.; ex (?); UCRC (Fig. 80A–B, D) • 1 ♀; Tuolumne Co., 2 mi. N of Sonora; [38.016° N, 120.382° W]; 29 Apr. 1952; ex *Nemophila menziesii*; LACM • 1 ♀; Tuolumne Co., Ackerson Meadow; [37.339° N, 121.442° W]; elev. 1524 m; 24 May 1969; T.W. Davies leg.; CAS • 1 ♀; Tuolumne Co., Basin Creek Campground; [37.339° N, 121.442° W]; 1 Jun. 1963; P.H. Arnaud Jr leg.; CAS • 1 ♀; Tuolumne Co., Chinese Camp; [37.870° N, 120.434° W]; 1 Apr. 1961; ex *Ranunculus*; LACM • 1 ♀; same data as for preceding; 2 Apr. 1960; ex *Ranunculus*; LACM • 1 ♀; Tuolumne Co., Sonora Pass; [38.328° N, 119.636° W]; 26 Apr. 1951; P.E. Hurd leg.; EMEC • 1 ♀; Tuolumne Co., Tuolumne; [37.962° N, 120.237° W]; elev. 1066.8 m; 9 Jun. 1938; N.F. Hardman leg.; EMEC • 1 ♂; Tuolumne Co., Twain-Harte; [37.339° N, 121.442° W]; elev. 1219.2 m; 1–31 Jul. 1937; F.E. Blaisdell leg.; CAS. – **Oregon** • 1 ♀; Josephine Co., Merlin; [42.518° N, 123.420° W]; 1 May 1970; F.A. Rushmore leg.; OSAC.

Description

Genitalia (Figs 82, 120O). *Lasioglossum sequoiae* has diagnostically distinct genital morphology when compared to other species. Gonostylus gradually widens distally, terminating in a broad apex, with long setae. The gonocoxite apex with elongate setae oriented toward broad gonostylus. Retrorse lobe curved, narrow at base, medially expanded, then gradually tapering to a pointed apex; about 4 times as long as broad and covered in fine, sparse setae.

Range

Almost exclusively recorded from California. USA (California, Oregon) (Fig 83).

Floral hosts

ASTERACEAE: *Anthemis cotula* L., *Eriophyllum confertiflorum* (DC.) A.Gray, *Eriophyllum lanatum* (Pursh) J.Forbes, *Lasthenia gracilis* (DC.) Greene, *Lasthenia* sp., *Layia platyglossa* (Fisch. & C.A.Mey.) A.Gray • BORAGINACEAE: *Cryptantha intermedia* (A.Gray) Greene, *Cryptantha* sp., *Plagiobothrys nothofulvus* (A.Gray) A.Gray, *Plagiobothrys* sp. • FABACEAE: *Lupinus nanus* Douglas ex Benth. • HYDROPHYLLACEAE: *Nemophila* sp., *Nemophila menziesii* Hook. & Arn., *Phacelia douglasii* (Benth.) Torr. • IRIDACEAE: *Sisyrinchium bellum* S.Watson • LAMIACEAE: *Salvia carduacea* Benth. • LILIACEAE: *Triteleia hyacinthina* (Lindl.) Greene • ONAGRACEAE: *Oenothera* sp. • PAPAVERACEAE: *Eschscholzia* sp. • POLEMONIACEAE: *Gilia achilleifolia* subsp. *multicaulis* (Benth.) A.D.Grant & V.E.Grant, *Gilia* sp., *Leptosiphon parviflorus* Benth. • RANUNCULACEAE: *Ranunculus* sp., *Ranunculus californicus* Benth. • RHAMNACEAE: *Frangula californica* (Eschsch.) A.Gray • SCROPHULARIACEAE: *Mimulus* sp. • VERBENACEAE: *Verbena hastata* L.

Lasioglossum* (*Hemihalictus*) *subobscurum (Cockerell, 1895)
Figs 84–87, 100D, 103B, 107B, 115F, 117E, 119D, 120P

Halictus subobscurus (Cockerell, 1895): 65.
Halictus Cockerelli Crawford, 1902: 236 (synonymy by Crawford 1907a).

Halictus subobscurus – Cockerell 1898: 46 (key). — Crawford 1907a: 185 (key).
Lasioglossum (*Evylaeus*) *subobscurum* – Michener 1951: 1110 (catalogue).

Evylaeus subobscurus – Hurd 1979: 1962 (catalogue). — Moure & Hurd 1987: 83 (catalogue).

Etymology

The specific epithet is treated as a Latin adjective combing '*obscurus'* for 'obscure' and prefix '*sub-*' meaning 'slightly' or 'somewhat'.

Diagnosis

Females of *L. subobscurum* can be recognised by the combination of small size, length 5.86 mm (±0.20 SD); head wide, length/width ratio 0.88 (±0.01 SD); mesoscutum imbricate-tessellate throughout with moderately sparse (IS = 1–2 PD) fine punctures; mesoscutum conspicuously covered by a layer of appressed short (<0.5 OD) pubescence; legs brown, except tarsi, bases and apices of tibiae light brown; metasoma brown with pale marginal areas; and terga with basal tomentose bands.

Males of *L. subobscurum* can be recognised by the combination of small size, body length 5.13 mm (±0.38 SD); wide to round head, length/width ratio 0.93 (±0.08 SD); clypeus with yellow apical ¾; mandible short, nearly reaching opposing clypeal angle; mesoscutum largely imbricate with moderately sparse (IS = 1–2 PD), fine punctures; mesoscutum conspicuously covered by a layer of appressed short (<0.25 OD) pubescence; and legs brown, except tarsi, bases and apices of tibiae yellow.

Females of *L. subobscurum* are superficially similar to *L. swenki*, but the latter species are usually larger, body length 7.18 mm (±0.78 SD), possibly with orange metasoma and have doubly punctate mesoscutum, sharply angled pronotal ridge, and inner metatibial spur with basal teeth longer than width of rachis. Mesoscutum of female *L. subobscurum* have no double punctation on mesoscutum, and inner metatibial spur with basal teeth shorter than width of rachis.

Males and females of *L. subobscurum* closely resemble the *L. arizonense* group. However, *L. subobscurum* is characterized by a brown metasoma with pale marginal areas, mesoscutum and overall body with a dull appearance due to microsculpturing; and a mesepisternum without distinct punctures.

Type material

Syntypes of *Halictus subobscurus* (only the first specimen examined)
UNITED STATES – **New Mexico** • 1 ♀; Doña Ana Co., Mesilla; [32.270° N, 106.801° W]; 12 Apr. 1895; W.P. Cockerell leg.; ex Yellow *Sisymbrium*; USNM • 1 ♀; same data as for preceding; Las Cruces "College Farm, Mesilla Valley"; [32.28° N, 106.75° W]; 12 Apr. 1895; W.P. Cockerell leg.; ex *Descurainia pinnata* (verbatim: *Sisymbrium canescens*); USNM Type No. 3706.

Specimen labels
"On yellow / *Sisymbrium* // Mesilla / apr. 12. / (Ckll.) // *Halictus subobscurus* // Cotype No 3706 / U.S.N.M. // *Halictus subobscurus* Ckll."

Syntypes of *Halictus Cockerelli*
Not examined; current location unknown. ♀.

Type notes

Cockerell does not designate a type explicitly. A USNM specimen labeled by Cockerell as a *Halictus subobscurus* co-type was examined. Following the Code (Article 72.4.1.1), even though the label does not match Cockerell's text verbatim, since Cockerell labeled it as a cotype, it is considered part of the type series, and we treat this as a syntype; it may be that there are no other extant specimens from the type series, but this is difficult to determine. The location of the other cotype(s) of *L. subobscurum* is unknown and was not reported by Moure & Hurd (1987).

The original description of *Halictus cockerelli* was based on specimens collected in New Mexico (Santa Fe and Mesilla) from 22 April to July, on old flower clusters of Virginia creeper and flowers of yellow *Sisymbrium* (Cockerell 1895). A syntype belonging to UCMC was not found among their material, and its current whereabouts are unknown.

Material examined

MEXICO – **Sonora** • 1 ♀; 30 km E of Agua Prieta; 31.300278° N, 109.2625° W; 3 May 2002; A. Romero leg.; ex *Brassica*?; PCYU • 1 ♀; Rancho San Bernardino, 28 km E of Agua Prieta; [31.327° N, 109.255° W]; 6 Jul. 2000; R. Minckley leg.; ASUHIC • 1 ♂; 30 km E of Agua Prieta; 31.316944° N, 109.259167° W; 6 Jun. 2004; N. de la Torre leg.; ex *Tamarix ramosissima*; ASUHIC (Fig. 86).

UNITED STATES – **Arizona** • 1 ♀; Cochise Co., 3 mi. SW of Portal, along Cave Creek; 31.88687° N, 109.17358° W; elev. 1550 m; 15 Jul. 1987; SEMC • 1 ♀; same data as for preceding; 25 Jul. 1987; SEMC • 1 ♀; Cochise Co., Southwestern Research Station, Chiricahua Mountains; [31.884° N, 109.206° W]; 29 Jul. 1955; P.D. Hurd leg.; ex *Melilotus alba*; EMEC (Fig. 84) • 1 ♀; Cochise Co., Portal; [31.914° N, 109.141° W]; 4 Jun. 1968; A.G. Raske leg.; ex *Sorbus*; EMEC • 1 ♀; Cochise Co., Southwestern Research Station; Chiricahua Mountains; [31.884° N, 109.206° W]; 1 Jun. 1965; V. Roth leg.; UCRC • 1 ♀; Coconino Co., 3 mi. N of Sedona; [34.903° N, 111.758° W]; 23543; J. Powell leg.; ex *Nolina* flowers; EMEC • 2 ♂♂; Santa Cruz Co., Nogales; [31.340° N, 110.936° W]; 24 Aug. 1955; G.D. Butler and F.G. Werner leg.; ASUHIC (Fig. 85) • 1 ♀; Yavapai Co., Camp Verde; [34.564° N, 111.854° W]; 30 Aug. 1964; C.D. Michener leg.; ex *Cleome lutea*; SEMC • 1 ♂; Yavapai Co., Dead Horse Ranch State Park; 34.7502° N, 112.0217° W; elev. 1001 m; 5 Jun. 2011; BioBus 2011 leg.; CBG. – **New Mexico** • 2 ♀♀; Hidalgo Co., 16 mi. S of Animas; 31.7200° N, 108.8220° W; 16 Aug. 2024; J. Gibbs leg.; WRME. – **Texas** • 4 ♀♀; Presidio Co., Presidio; [29.564° N, 104.372° W]; 2 Apr.– 9 May 1941; W.L. Lowry leg.; EMEC. – **Utah** • 1 ♀; Washington Co., St George; [37.104° N, 113.584° W]; 14 Apr. 1962; G.F. Knowlton leg.; ex *Tamarix*; SEMC.

Redescription

Female

Body measurements. Length 5.86 mm (±0.22 SD). Head length 1.39 mm (±0.01 SD). Face length 1.21 mm (±0.03 SD). Head width 1.55 mm (±0.04 SD). Wing length 4.00 mm (±0.10 SD). n = 6.

Colouration. Head and mesosoma black to dark brown. Clypeus apex dark brown. Labrum dark brown. Mandible brown basally, becoming light brown medially and slightly reddish brown apically. Flagellum brown dorsally, paler ventrally with apical segments light brown. Pronotal lobe light brown. Tegula translucent light brown. Wing membrane hyaline, faintly dusky, veins with subcosta brown, otherwise light brown. Legs brown, except tarsi, bases and apices of tibiae light brown. Metasoma dark brown or brown with rims of terga, sterna and downcurved lateral areas of terga broadly pale.

Pubescence. Body hair colour off-white. Tomentum dense on paraocular area, gena, pronotal angle, lobe and collar, space between pronotal lobe and tegula, anterolateral angle and marginally on mesoscutum, metanotum anteromedially, propodeum lateral surface anterodorsally, T2 basolaterally, and T3–T4 as basal bands (sometime obscured by preceding segment); moderately dense on frons, preëpisternum, and other areas of propodeum lateral surface. Mesosoma covered by appressed, simple to weakly plumose, very short hairs (<0.5 OD) mixed with sparse, erect, weakly plumose, short hairs (<1 OD) on mesoscutum and erect, plumose, long hairs (<2.5 OD) on other areas. Metasomal sterna with moderately sparse, erect, weakly plumose, long (<2.5 OD) hairs. Metafemoral scopa with dense plumose hairs. Wing hairs brown, very short and sparse.

Surface sculpturing. Clypeus polished apically, becoming imbricate basally; punctures large, irregularly spaced (IS<3 PD) on apically, becoming small and sparse (IS = 1–2 PD) basally. Supraclypeal area imbricate throughout; punctures fine, moderately dense (IS = 1–2 PD) and sometime punctures very fine and not visible. Frons strongly imbricate; punctures dense (IS<1 PD). Ocellocular area imbricate;

punctures moderately dense (IS = 1–2 PD). Gena polished, becoming weakly rugulose posteriorly; punctures moderately sparse (IS = 1–2 PD). Postgena polished, becoming imbricate posteriorly. Tegula broadly impunctate. Mesoscutum imbricate-tessellate throughout; punctures fine, punctures dense (IS≤1PD). Mesoscutellum somewhat polished or weakly imbricate submedially, becoming imbricate marginally and on median line, punctures dense (IS≤1PD) on marginally and on median line, sparse submedially (IS = 2–4 PD), diversopunctate. Metanotum imbricate to rugulose, punctures obscure. Propodeal triangle with rugae moderately strong, reaching ¾ towards posterior margin at middle, anastomosing; sculpture imbricate to tessellate. Preëpisternum rugulose. Hypoepimeron rugulose to imbricate; punctures fine and obscure. Mesepisternum rugulose dorsally, becoming imbricate ventrally; punctures obscure. Propodeum lateral face imbricate, punctures obscure; posterior face imbricate,



Fig. 84. *Lasioglossum* (*Hemihalictus*) *subobscurum* (Cockerell, 1895), ♀ (EMEC). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

punctures obscure. T1 anterior face polished, becoming weakly coriarious dorsally, punctures present laterally, sparse (IS = 2–5 PD); dorsal surface weakly coriarious to polished, with punctures moderately dense (IS = 1–2 PD), becoming sparser towards premarginal line (IS = 1–4 PD) and nearly impunctate in small subapicolateral boss, punctures minute and moderately dense (IS = 1–2 PD) on rim, becoming impunctate apical half and medially on rim. T2 disc polished, becoming coriarious apically, punctures moderately dense (IS =1–2 PD) basally, becoming sparse (IS = 1–3 PD) apically; rim coriarious, punctures fine, minute and sparse (IS = 1–3 PD), becoming impunctate apically.

Structure. Head wide, length/width ratio 0.88 (±0.01 SD). Face length/width ratio 0.78 (±0.02 SD). Clypeus projecting ~55% below suborbital tangent; clypeus length/width ratio (±0.07 SD). Mandible short, reaching opposing clypeal angle. Eyes convergent below, UOD/LOD ratio 1.13 (±0.03 SD).

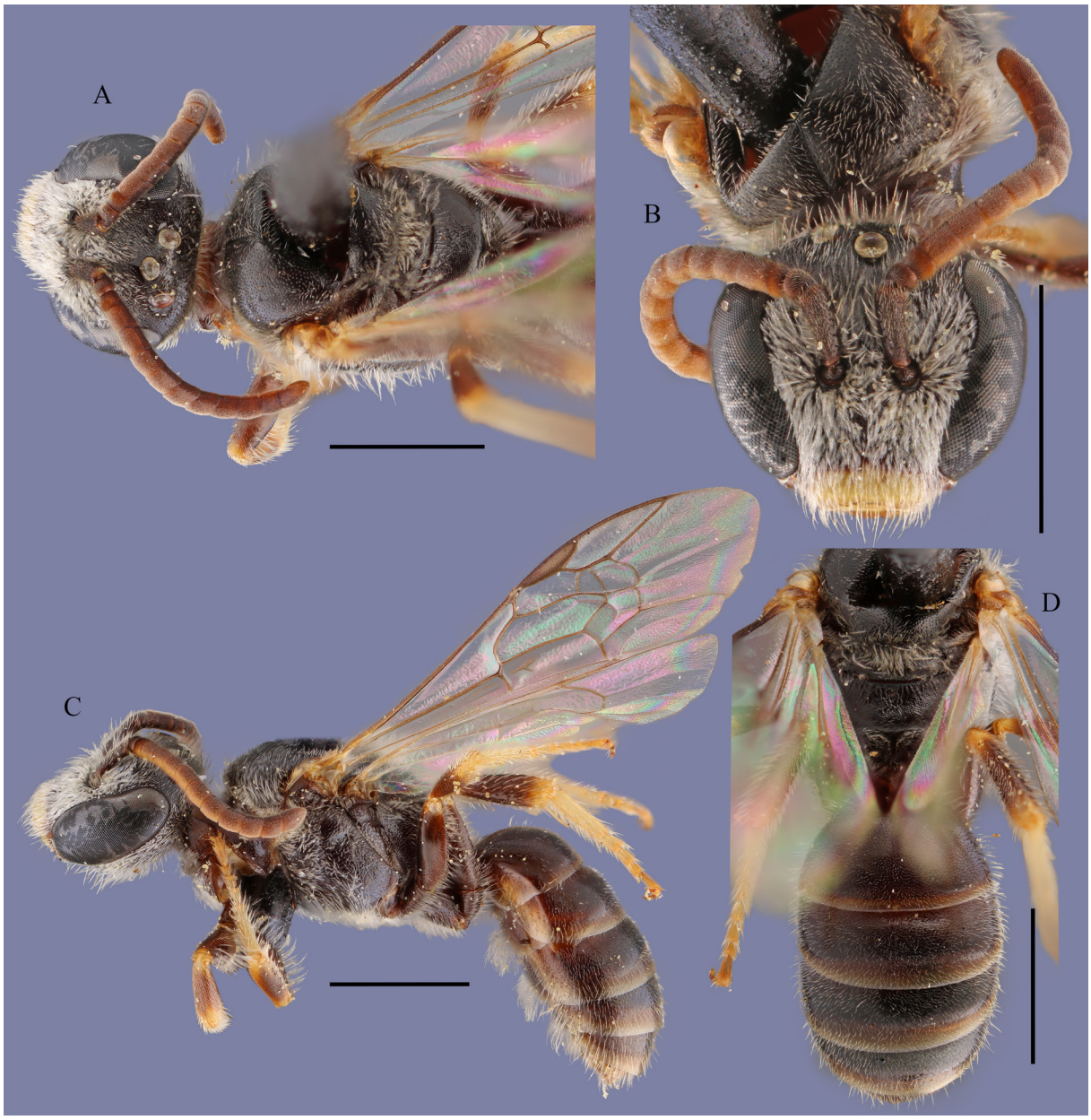


Fig. 85. *Lasioglossum* (*Hemihalictus*) *subobscurum* (Cockerell, 1895), ♂ (ASUHIC). **A**. Dorsal habitus showing head and mesosoma. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

Ocelli normal. Gena/eye width ratio 0.61 (±0.07 SD). Pronotal angle obtuse. Intertegular span 1.09 mm (±0.04 SD). Mesoscutum length/width ratio 0.83 (±0.05 SD); mesoscutum/scutellum length ratio 2.54 (±0.16 SD); scutellum/metanotum length ratio 1.58 (±0.17 SD); metanotum/propodeal triangle length ratio 0.76 (±0.14 SD). Protibial spur with apical serrations shorter than width of malus. Inner metatibial spur pectinate, teeth 3–4, basal teeth usually shorter than width of rachis. Propodeal triangle posterior margin angled onto posterior propodeal surface. Propodeal lateral carina not reaching dorsal margin; oblique carina absent. n = 6.

Description

Male

Body measurements. Length 5.13 mm (±0.38 SD). Head length 1.28 mm (±0.05 SD). Face length 1.01 mm (±0.12 SD). Head width 1.39 mm (±0.08 SD). Wing length 3.80 mm (±0.26 SD). n = 3.

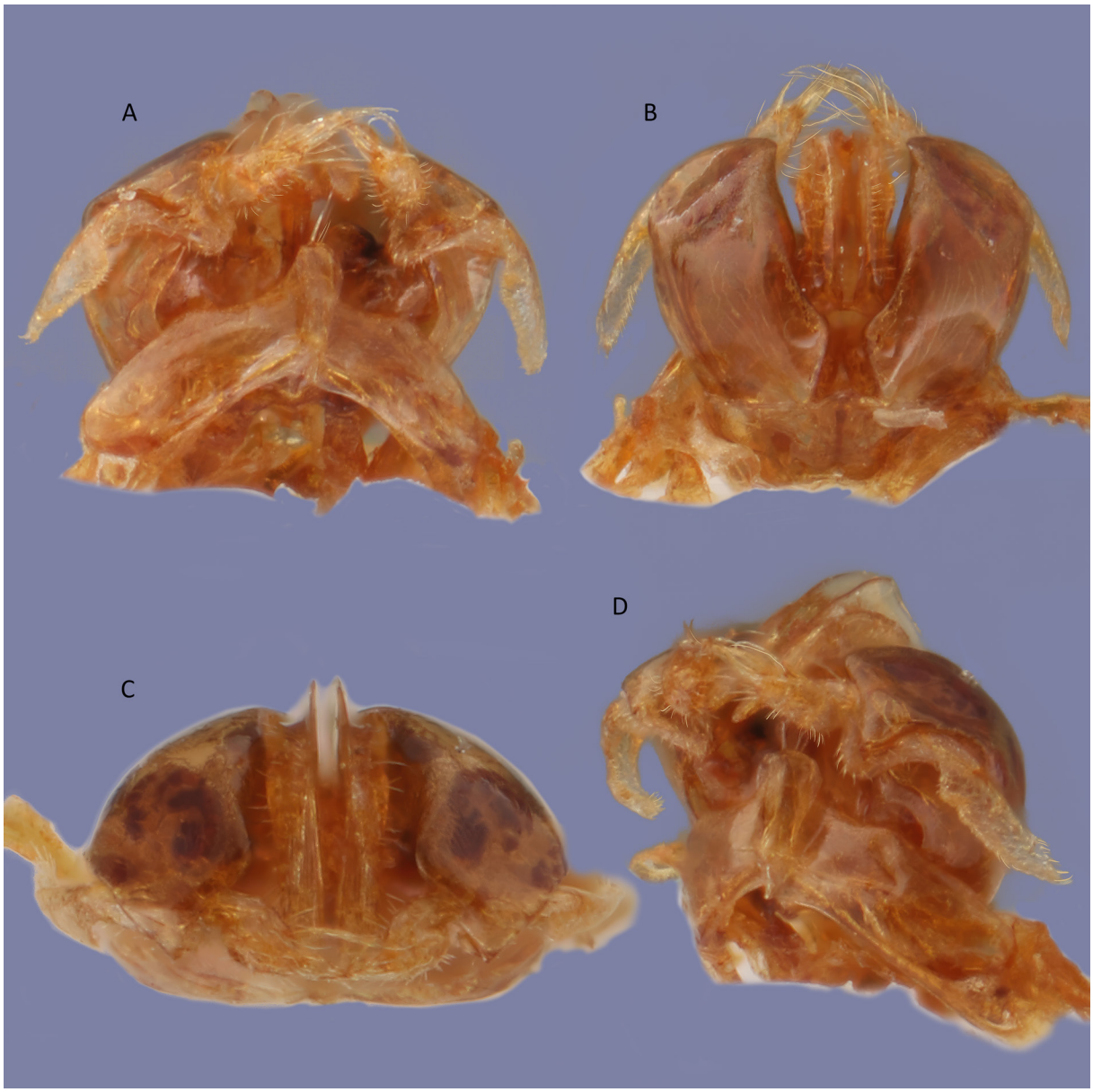


Fig. 86. Genitalia of *Lasioglossum* (*Hemihalictus*) *subobscurum* (Cockerell, 1895), ♂ (ASUHIC). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

Colouration. Head and mesosoma black to dark brown. Clypeus yellow on apical ¾. Labrum yellow. Mandible brown basally, becoming more yellow and reddish brown on apical ⅓. Flagellum brown dorsally, light brown ventrally. Pronotal lobe yellow. Tegula translucent light brown. Wing membrane hyaline, veins with subcosta brown, otherwise light brown. Legs brown, except tarsi, bases and apices of tibiae yellow. Metasoma brown with rims of terga, sterna and downcurved lateral areas of terga broadly light brown.

Pubescence. Body hair colour white. Tomentum dense on face except clypeus, frons dorsally and vertex, gena, pronotal angle, lobe and collar, space between pronotal lobe and tegula, and metanotum anteromedially; moderate or sparse on frons dorsally, gena, marginally on mesoscutum preëpisternum, and propodeum lateral surface. Mesosoma covered by appressed, simple, very short hairs (< 0.25 OD) mixed with very sparse, erect, weakly plumose, short hairs (< 1 OD) on mesoscutum and erect, plumose, long hairs (< 2OD) on other areas. Metasomal sterna with moderately sparse, erect, plumose, long (< 2.5 OD) hairs. Wing hairs brown, very short and sparse.

Surface sculpture. Clypeus polished, becoming weakly rugulose basally, punctures obscure apically and dense basally (IS < 1 PD). Supraclypeal area weakly rugulose to imbricate, punctures obscure. Frons strongly imbricate, punctures dense (IS < 1 PD). Ocellocular area imbricate; punctures moderately dense (IS = 1–2 PD). Gena polished, becoming weakly rugulose posteriorly; punctures sparse (IS = 1–3 PD). Postgena polished, becoming lineolate posteriorly. Tegula broadly impunctate. Mesoscutum imbricate, becoming polished submedially; punctures fine, punctures dense (IS ≤ 1PD). Mesoscutellum polished or weakly imbricate submedially, becoming imbricate marginally and on median line, punctures dense (IS ≤ 1PD) marginally and on median line, sparse submedially (IS = 2–4 PD), diversopunctate. Metanotum rugulose, punctures obscure. Propodeal triangle with rugae weak, weakly anastomosing; sculpture imbricate to tessellate. Preëpisternum rugulose. Hypoepimeron weakly rugulose; punctures minute and sparse (IS = 1–3 PD) becoming obscure dorsally. Mesepisternum weakly rugulose; punctures sparse (IS = 1–3 PD) and obscure in some angles. Propodeum lateral face imbricate, punctures obscure;

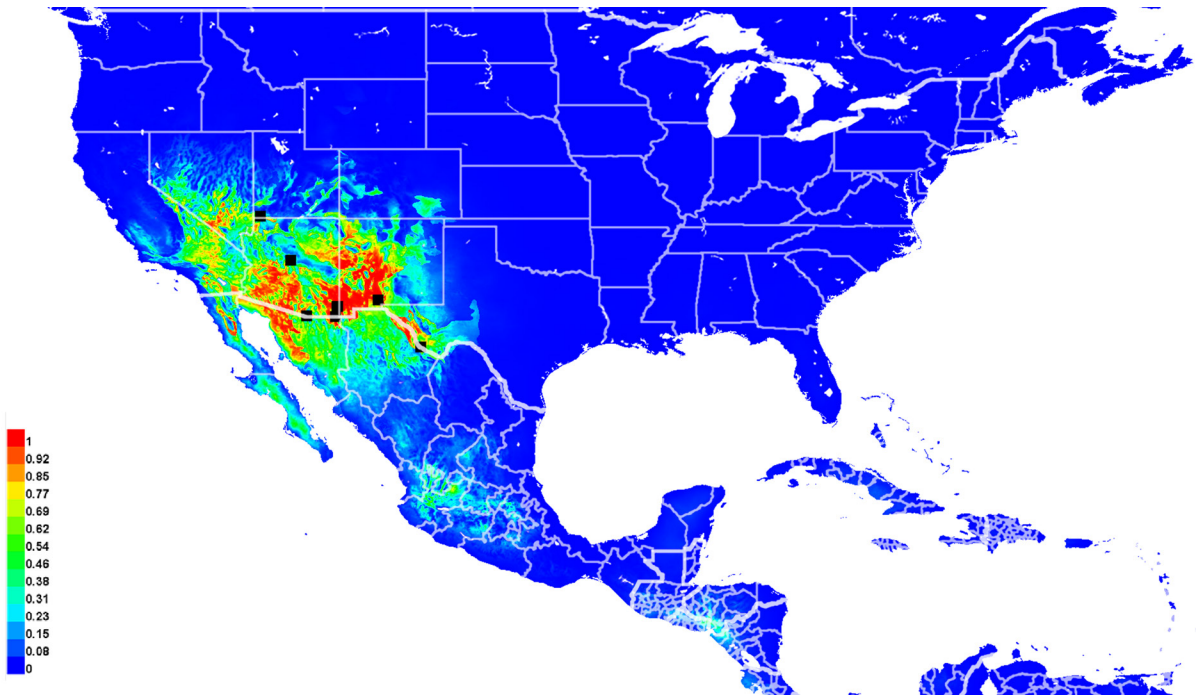


Fig. 87. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *subobscurum* (Cockerell, 1895) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

posterior face imbricate, punctures obscure. T1 anterior face polished, punctures present laterally, sparse (IS = 1–3 PD); dorsal surface polished, with punctures dense (IS ≤ 1 PD), becoming moderately dense (IS = 1–2 PD) towards premarginal line and sparse (IS = 1–4 PD) in small subapicolateral boss; rim coriarious, punctures fine, minute and moderately sparse (IS = 1–2 PD), becoming impunctate on apical half and medially on rim. T2 disc polished, becoming coriarious apically, punctures dense (IS ≤ 1 PD) basally, becoming moderately dense (IS =1–2 PD) apically; rim coriarious, punctures fine, minute and sparse (IS = 1–3 PD), becoming narrowly impunctate apically.

Structure. Head wide to round, length/width ratio 0.93 (± 0.08 SD). Face length/width ratio 0.73 (± 0.13 SD). Clypeus projecting ~45% below suborbital tangent. Mandible short, nearly reaching opposing clypeal angle. Flagellomeres short, F1/pedicel length ratio 0.92 (± 0.09 SD); F2/F1 length ratio 1.60 (± 0.03 SD); F2 length/width ratio 1.03 (± 0.06 SD). Gena/eye width ratio 0.46 (± 0.07 SD). Pronotal angle obtuse. Intertegular span 0.91 mm (± 0.15 SD). Mesoscutum length/width ratio 0.90 (± 0.09 SD). Propodeal lateral carina nearly reaching dorsolateral slope; oblique carina absent. n = 3.

Genitalia (Figs 86, 120P). Gonostylus elongate and directed towards opposite one, 2.5 times as long as broad, with long setae. A prominent medial keel marks the point where the penis valves oppose each other. Retrorse lobe curved, narrow at base, medially expanded, then gradually tapering to a pointed apex; about 4 times as long as broad and covered in fine, sparse setae.

Range

Southern Utah to Chihuahuan Desert of southern Arizona, New Mexico, and Texas (Fig. 87).

Floral hosts

BRASSICACEAE: *Brassica* sp., *Descurainia pinnata* (Walter) Britton, *Rorippa sinuata* (Nutt.) Hitchc., *Sisymbrium* sp. • CAPPARACEAE: *Cleome lutea* Hook. • FABACEAE: *Melilotus albus* Medik. • LILIACEAE: *Nolina* sp. • ROSACEAE: *Sorbus* sp. • TAMARICACEAE: *Tamarix* sp., *Tamarix ramosissima* Ledeb.

DNA barcodes

Five DNA barcodes are available from Arizona, which form a discrete cluster.

Lasioglossum* (*Hemihalictus*) *villosulum subsp. ***villosulum*** (Kirby, 1802)
Figs 88–91, 100A, 106E, 112F, 115E, 119F, 120Q

Melitta villosula Kirby, 1802: 62.
Melitta punctulata Kirby, 1802: 66 (synonymy by Dalla Torre 1896: 90).
Halictus hirtellus Schenck, 1869: 311 (synonymy by Blüthgen 1920: 278; 1930: 743).
Halictus pauperatulellus Strand, 1909: 44 (synonymy by Blüthgen 1922: 318).
Halictus villosulus perlautus Cockerell, 1938b: 82 (synonym by Warncke 1973: 290).
Halictus (*Evylaeus*) *rufotegularis* Cockerell, 1938a: 44 (synonym by Ebmer 1976: 253).
Halictus villiersi Benoist, 1941: 80 (synonym by Warncke 1973: 290).

Lasioglossum (*Evylaeus*) *villosulum* – Ebmer 1971: 74, 88 (key), 106 (taxonomy).
Lasioglossum (*Evylaeus*) *villosulum villosulum* – Ebmer 1988: 649 (catalogue).
Evylaeus villosulus – Pesenko *et al.* 2000: 234 (key), 291 (taxonomy).
Evylaeus (*Truncevylaeus*) *villosulus* – Pesenko 2007a: 24 (taxonomy); 2007b: 84, 93 (key).

Diagnosis

Lasioglossum villosulum females can be recognized by the following combination of characters: body entirely dark, head round, length/width ratio 0.95 (± 0.01 SD), mesoscutal punctation sparse (IS =

1–2.5 PD), inner metatibial spur with numerous short branches (subequal to length of main rachis), and metasoma without basolateral tomentum. They are most similar to *L. sequoiae*, which can be distinguished by the denser mesoscutal punctation (IS < 1.5 PD).

Male *L. villosulum* are similar to females but have a distinct yellow maculation on the clypeus. Further distinguishing characters are clypeus flat to medially depressed, mandibles and labrum dark; mesepisternum is distinctly punctate, mesoscutal punctation sparse, tegula ovoid, and retrorse lobe large and broad. They are perhaps most similar to dark males of *L. aspilurus*, which have the clypeus more evenly rounded, mandible and labrum yellow.

Etymology

The specific epithet is treated as a Latin adjective, a diminutive of the Latin '*villosus*' meaning 'hairy, shaggy'.

Material examined

CANADA – **British Columbia** • 1 ♂; BBR Barrowtown; 49.0417° N, 122.0417° W; 19 Aug. 2021; A. Braz leg.; RSKM • 2 ♀♀; Coquitlam, Widgeon Marsh R.P; 49.3625° N, 122.6435° W; 21 Sep. 2020; SEM Team leg.; UBCZ • 1 ♀; Delta; 49.098611° N, 123.043611° W; 17 May 2016; M. Clausen leg.; UBCZ • 1 ♀; same data as for preceding; 2 Jun. 2016; Hengel K. leg.; UBCZ • 1 ♀; Delta; 49.058611° N, 123.076111° W; 2 Jun. 2016; M. Clausen leg.; UBCZ • 2 ♂♂; Hornby Island; 49.524° N, 124.64905° W; 3–5 Sep. 2015; B. Zand leg.; RSKM • 1 ♂; Hornby Island, Helliwell Provincial Park; 49.5178° N, 124.59608° W; 21 Aug.–15 Sep. 2015; B. Zand leg.; RSKM • 1 ♀; Oakhaven Park, Central Saanich; 48.564167° N, 123.447778° W; 4 Jun. 2017; T. Kelly leg.; ex *Hypochaeris radicata*; SFU • 1 ♂; Vancouver, PSRP, Acadia Meadow; 49.27837° N, 123.24701° W; 17 Aug. 2020; SEM Team leg.; UBCZ • 1 ♀; Vernon, CFB Vernon; 50.24629° N, 119.28875° W; 15 Sep. 2017; T. Ehiers leg.; RSKM.

UNITED STATES – **Oregon** • 1 ♀; Lane Co., Coburg Ridge, near Eugene; 44.101614° N, 122.998153° W; 19 Jun. 2017; E. Merlo leg.; ex *Hypochaeris radicata*; SFU • 2 ♀♀; Benton Co., Bluebird Strip, William L. Finley National Wildlife Refuge; 44.418872° N, 123.330236° W; 27 May 2017; E. Merlo leg.; ex *Hypochaeris radicata*; SFU • 1 ♀; Clackamas Co., Milwaukie, 123; 45.448933° N, 122.620337° W; 21 Jun. 2017; G. Langellotto leg.; OSAC • 1 ♀; Clackamas Co., Milwaukie, 54; 45.448933° N, 122.620337° W; 26 Jun. 2017; G. Langellotto leg.; OSAC • 2 ♀♀; Clackamas Co., West Linn, 9; 45.381328° N, 122.633538° W; 21 Jun. 2017; G. Langellotto leg.; OSAC • 1 ♂; Clackamas Co., Milwaukie, 54; 45.448933° N, 122.620337° W; 26 Jun. 2017; G. Langellotto leg.; OSAC • 2 ♂♂; Clackamas Co., West Linn, 9; 45.381328° N, 122.633538° W; 24 Jun. 2017; G. Langellotto leg.; OSAC • 1 ♀; Clackamas Co., Boring Trailhead; 45.432° N, 122.375° W; 12 Jun. 2021; J.D. Engler leg.; ex *Taraxacum*; OSAC • 1 ♀; Clackamas Co., Eagle Creek, Heiple Rd; 45.31666° N, 122.36611° W; 10 Jun. 2011; J.D. Engler leg.; OSAC • 1 ♀; Malheur Co., Willow Creek, near Eugene; 44.028839° N, 123.173722° W; 22 May 2017; E. Merlo leg.; ex *Linum lewisii*; SFU • 2 ♀♀; Marion Co., Kingston Prairie, near Stayton; 44.777214° N, 122.744086° W; 28 May 2017; E. Elle leg.; ex *Hypochaeris radicata*; SFU • 2 ♀♀; same data as for preceding; 28 May 2017; T. Kelly leg.; ex *Potentilla gracilis*; SFU • 2 ♀♀; same data as for preceding; 29 May 2017; E. Merlo leg.; ex *Linum lewisii*; SFU • 3 ♀♀; same data as for preceding; 29 May 2017; E. Merlo leg.; ex *Hypochaeris radicata*; SFU • 1 ♀; same data as for preceding; 29 May 2017; T. Kelly leg.; ex *Linum lewisii*; SFU • 3 ♀♀; Multnomah Co., Portland; 45.484752° N, 122.608543° W; 28 Jun. 2017; G. Langellotto leg.; OSAC • 1 ♀; same data as for preceding; 23 Jun. 2017; G. Langellotto leg.; OSAC • 1 ♀; same data as for preceding; 29 Jun. 2017; G. Langellotto leg.; OSAC • 1 ♀; same data as for preceding; 26 Jun. 2017; G. Langellotto leg.; OSAC • 1 ♀; same data as for preceding; 21 Jun. 2017; G. Langellotto leg.; OSAC • 1 ♀; same data as for preceding; 27 Jun. 2017; G. Langellotto leg.; OSAC • 3 ♂♂; same data as for preceding; 25 Jun. 2017; G. Langellotto leg.; OSAC • 1 ♀; Multnomah Co., Oxbow Meadow; 45.485° N, 122.302° W; 12 Jun. 2021; J.D. Engler leg.; ex *Leucanthemum*; OSAC • 1 ♀; Multnomah Co., Oxbow

Meadow; 45.4844° N, 122.302° W; 28 May 2021; J.D. Engler leg.; ex *Spergula arvensis*; OSAC • 1 ♀; same data as for preceding; 28 May 2021; J.D. Engler leg.; ex *Geranium molle*; OSAC • 1 ♀; same data as for preceding; 4 Aug. 2020; J.D. Engler leg.; ex Asteraceae; OSAC • 1 ♀; same data as for preceding; 4 Aug. 2020; J.D. Engler leg.; OSAC • 2 ♀♀; same data as for preceding; 19 May 2021; J.D. Engler leg.; ex *Taraxacum*; OSAC • 1 ♂; Multnomah Co., Bensen Sp.; 45.577° N, 122.131° W; 30 Jun. 2021; J.D. Engler leg.; ex *Tarax*/ *Hypochaeris*; OSAC • 2 ♀♀; Multnomah Co., Oxbow Meadow; 45.485° N, 122.302° W; 2 Jul. 2021; J.D. Engler leg.; OSAC • 2 ♂♂; same data as for preceding; 28 Jul. 2021; J.D. Engler leg.; ex *Tarax*/*Hypochaeris*; OSAC • 3 ♀♀; same data as for preceding; 12 Oct. 2021; J.D. Engler leg.; ex *Hypochaeris*; OSAC • 1 ♀; Multnomah Co., Oxbow Meadow; 45.484° N, 122.302° W; 2 Jun. 2021; J.D. Engler leg.; OSAC • 1 ♀; Multnomah Co., Oxbow Meadow; 45.485° N, 122.302° W; 7 Jun. 2021; J.D. Engler leg.; ex *Hypochaeris*; OSAC • 1 ♀; same data as for preceding; 15 Jun. 2022; J.D. Engler leg.; OSAC • 1 ♂; same data as for preceding; 24 Sep. 2021; J.D. Engler leg.; ex *Taraxacum*; OSAC (Fig. 90) • 1 ♂; same data as for preceding; 24 Sep. 2021; J.D. Engler leg.; ex *Hypochaeris*; OSAC • 1 ♂; same data as for preceding; 16 Sep. 2021; J.D. Engler leg.; OSAC • 4 ♂♂; same data as for preceding; 23 Jul. 2021; J.D. Engler leg.; ex *Tarax*/*Hypochaer*; OSAC • 1 ♀; Tillamook Co., Nestucca Bay; 46.1678° N, 123.9523° W; 4–5 Jun. 2017; W. Medlen leg.; OSAC • 1 ♀; Tillamook Co., Nestucca Bay; 46.1653° N, 123.9544° W; 4–5 Jun. 2017; W. Medlen leg.; OSAC • 1 ♀; Tillamook Co., Nestucca Bay; 46.1643° N, 123.9531° W; 4–5 Jun. 2017; W. Medlen leg.; OSAC • 1 ♀; same data as for preceding; 2–3 Jul. 2017; W. Medlen leg.; OSAC • 2 ♀♀; Tillamook Co., Nestucca Bay; 46.1653° N, 123.9544° W; 2–3 Jul. 2017; W. Medlen leg.; OSAC • 1 ♀; Tillamook Co., Nestucca Bay; 46.1643° N, 123.9531° W; 21–22 May 2017; W. Medlen leg.; OSAC • 4 ♀♀; Tillamook Co., Nestucca Bay; 46.1653° N, 123.9544° W; 4–5 Jul. 2017; W. Medlen leg.; OSAC • 1 ♀; Tillamook Co., Nestucca Bay; 46.1643° N, 123.9531° W; 4–5 Jul. 2017; W. Medlen leg.; OSAC • 1 ♀; same data as for preceding; 18–19 Jun. 2017; W. Medlen leg.; OSAC • 6 ♀♀; Tillamook Co., Nestucca Bay; 46.1643° N, 123.9523° W; 21–22 Jun. 2017; W. Medlen leg.; OSAC • 2 ♀♀; Tillamook Co., Nestucca Bay; 46.1643° N, 123.9531° W; 30 Apr.–1 May 2017; W. Medlen leg.; OSAC • 1 ♀; Tillamook Co., Nestucca Bay; 46.1653° N, 123.9544° W; 30 Apr.–1 May 2017; W. Medlen leg.; OSAC • 3 ♀♀; Tillamook Co., Nestucca Bay; 46.1643° N, 123.9531° W; 4–5 May 2017; W. Medlen leg.; OSAC. – **Washington** • 1 ♀; Clark Co., Steigerwald Lake National Wildlife Refuge; 45.57215° N, 122.30483° W; 6 Jun. 2011; G. Fuquay leg.; OSAC • 1 ♀; same data as for preceding; 24 Jun. 2011; G. Fuquay leg.; OSAC • 1 ♀; Clark Co., Steigerwald Lake National Wildlife Refuge; 45.5698° N, 122.2981° W; 6 Jun. 2011; G. Fuquay leg.; OSAC • 2 ♀♀; Clark Co., Ridgefield National Wildlife Refuge, Wig Lk; 45.817° N, 122.773° W; 24 May 2011; A. Chmielewski leg.; OSAC • 2 ♀♀; Clark Co., Lacamas Lake Regional Park, near Camas; 45.601733° N, 122.398961° W; 1 Jun. 2017; T. Kelly leg.; ex *Hypochaeris radicata*; SFU • 1 ♀; same data as for preceding; 31 May 2017; E. Merlo leg.; ex *Hypochaeris radicata*; SFU • 1 ♀; same data as for preceding; 1 Jun. 2017; E. Merlo leg.; ex *Hypochaeris radicata*; SFU • 1 ♀; same data as for preceding; 31 May 2017; E. Merlo leg.; ex *Hypochaeris radicata*; SFU • 2 ♀♀; King Co., Seattle; 47.4238° N, 122.3071° W; 8 Aug. 2015; R. Redmond and E.A. Sugden leg.; WRME • 1 ♀; same data as for preceding; 29 Sep. 2014; R. Redmond and E.A. Sugden leg.; WRME • 1 ♀; same data as for preceding; 29 Apr. 2019; R. Redmond and E.A. Sugden leg.; WRME • 1 ♀; King Co., Seattle; 47.9307° N, 122.2853° W; 12 Jul. 2015; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; King Co., Seattle; 47.4301° N, 122.3051° W; 11 Jul. 2015; R. Redmond and E.A. Sugden leg.; WRME • 1 ♀; King Co., Seattle; 47.4233° N, 122.3085° W; 29 May 2019; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; King Co., Seattle; 47.4292° N, 122.3035° W; 29 May 2019; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; King Co., Seattle; 47.423° N, 122.3076° W; 29 May 2019; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; King Co., Seattle; 47.4236° N, 122.3102° W; 29 May 2019; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; King Co., Seattle; 47.4285° N, 122.3063° W; 29 May 2019; E.A. Sugden and W. Peterman leg.; WRME • 2 ♂♂; King Co., Seattle; 47.4263° N, 122.3061° W; 6 Aug. 2018; E.A. Sugden and W. Peterman leg.; WRME • 1 ♂; King Co., Seattle; 47.4285° N, 122.3063° W; 5 Jul. 2019; E.A. Sugden and W. Peterman leg.; WRME • 5 ♂♂; same data as for preceding; 31 Jul. 2019; E.A. Sugden and W. Peterman leg.; WRME • 3 ♂♂; King Co., Seattle; 47.4276° N, 122.3087° W; 21

Sep. 2019; E.A. Sugden and W. Peterman leg.; WRME • 3 ♂♂; King Co., Seattle; 47.506° N, 122.2674° W; 11 Jul. 2015; E.A. Sugden and W. Peterman leg.; WRME • 1 ♂; same data as for preceding; 11 Jul. 2015; R. Redmond and W. Peterman leg.; WRME • 2 ♂♂; King Co., Seattle; 47.5039° N, 122.2757° W; 11 Jul. 2015; R. Redmond and W. Peterman leg.; WRME • 1 ♂; King Co., Seattle; 47.5029° N, 122.2851° W; 14 Jul. 2014; R. Redmond and W. Peterman leg.; WRME • 1 ♂; King Co., Seattle; 47.5053° N, 122.2655° W; 16 Jul. 2016; R. Redmond and W. Peterman leg.; WRME • 3 ♂♂; King Co., Seattle; 47.4301° N, 122.3051° W; 11 Jul. 2015; R. Redmond and W. Peterman leg.; WRME (Fig. 89) • 1 ♂; King Co., Seattle; 47.4292° N, 122.3035° W; 31 Jul. 2019; E.A. Sugden and W. Peterman leg.; WRME • 2 ♀♀; Pacific Co., Wallapa National Wildlife Refuge; 46.3689° N, 124.0273° W; 10 Jun. 2017; W. Ritchie leg.; OSAC • 1 ♀; Pacific Co., Wallapa National Wildlife Refuge; 46.36886° N, 124.02731° W; 30 May 2016; W. Ritchie leg.; OSAC • 3 ♀♀; Pacific Co., Wallapa National Wildlife



Fig. 88. *Lasioglossum* (*Hemihalictus*) *villosulum* (Kirby, 1802), ♀ (OSAC). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. **E**. Metatibial spur. **F**. Protibial spur. Scale bars = 1 mm.

Refuge, OSB3; 46.3689° N, 124.0273° W; 21 Apr. 2017; W. Ritchie leg.; OSAC • 7 ♀♀; Pacific Co., Wallapa National Wildlife Refuge, TRL; 46.36886° N, 124.02731° W; 8 Jun. 2015; W. Ritchie leg.; OSAC • 2 ♂♂; Pierce Co.; 47.013° N, 122.448° W; elev. 115 m; 24 Jul. 2009; C. Fimbel leg.; PCYU • 7 ♀♀; Pierce Co.; 47.056° N, 122.457° W; elev. 120 m; 23 Jun. 2009; C. Fimbel leg.; PCYU • 1 ♀; Pierce Co.; 47.03828° N, 122.504° W; elev. 117 m; 23 Jun. 2009; C. Fimbel leg.; PCYU • 1 ♀; Pierce Co.; 47.012° N, 122.429° W; elev. 125 m; 24 Jul. 2009; C. Fimbel leg.; PCYU • 3♀♀, 1 ♂; Pierce Co.; 47.105° N, 122.505° W; elev. 88 m; 24 Jul. 2009; C. Fimbel leg.; PCYU • 1 ♀; Pierce Co.; 47.105° N, 122.505° W; elev. 88 m; 39974; C. Fimbel leg.; PCYU• 1 ♀; Snohomish Co., Everett; 47.9297° N, 122.285° W; 29 May 2019; E.A. Sugden and W. Peterman leg.; WRME • 1 ♀; Snohomish Co., Everett; 47.93° N, 122.2852° W; 29 May 2019; E.A. Sugden and W. Peterman leg.; WRME • 1 ♂; Snohomish Co., Everett; 47.933° N, 122.2741° W; 30 Jul. 2018; E.A. Sugden and W. Peterman leg.; WRME • 1 ♂;



Fig. 89. *Lasioglossum* (*Hemihalictus*) *villosulum* (Kirby, 1802), ♂ (WRME). **A**. Dorsal habitus. **B**. Face. **C**. Lateral habitus. **D**. Metasoma. Scale bars = 1 mm.

Snohomish Co., Everett; 47.4285° N, 122.3036° W; 7 Jul. 2018; E.A. Sugden and W. Peterman leg.; WRME • 4 ♂♂; Snohomish Co., Everett; 47.93° N, 122.2852° W; 5 Jul. 2019; E.A. Sugden and W. Peterman leg.; WRME • 3 ♂♂; Snohomish Co., Everett; 47.9297° N, 122.285° W; 31 Jul. 2019; E.A. Sugden and W. Peterman leg.; WRME • 1 ♂; Snohomish Co., Everett; 48.9328° N, 122.2748° W; 31 Jul. 2019; E.A. Sugden and W. Peterman leg.; WRME • 1 ♂; Thurston Co.; 46.914° N, 122.718° W; elev. 120 m; 30 May 2009; C. Fimbel leg.; PCYU • 3 ♂♂; Thurston Co.; 46.953° N, 123.025° W; elev. 57 m; 23 May 2009; C. Fimbel leg.; PCYU • 2 ♂♂; Thurston Co.; 46.914° N, 122.709° W; elev. 170 m; 23 Jun. 2009; C. Fimbel leg.; PCYU • 2 ♂♂; Thurston Co.; 46.903° N, 122.739° W; elev. 125 m; 23 Jun. 2009; C. Fimbel leg.; PCYU • 1 ♂; Thurston Co.; 46.924° N, 122.735° W; elev. 113 m; 27 May 2009; C. Fimbel leg.; PCYU• 2 ♀♀; Wahkiakum Co., Julia Butler Hansen Refuge; 46.241° N, 123.4487° W; 31 May–1 Jun. 2016; K. Brenner leg.; OSAC.

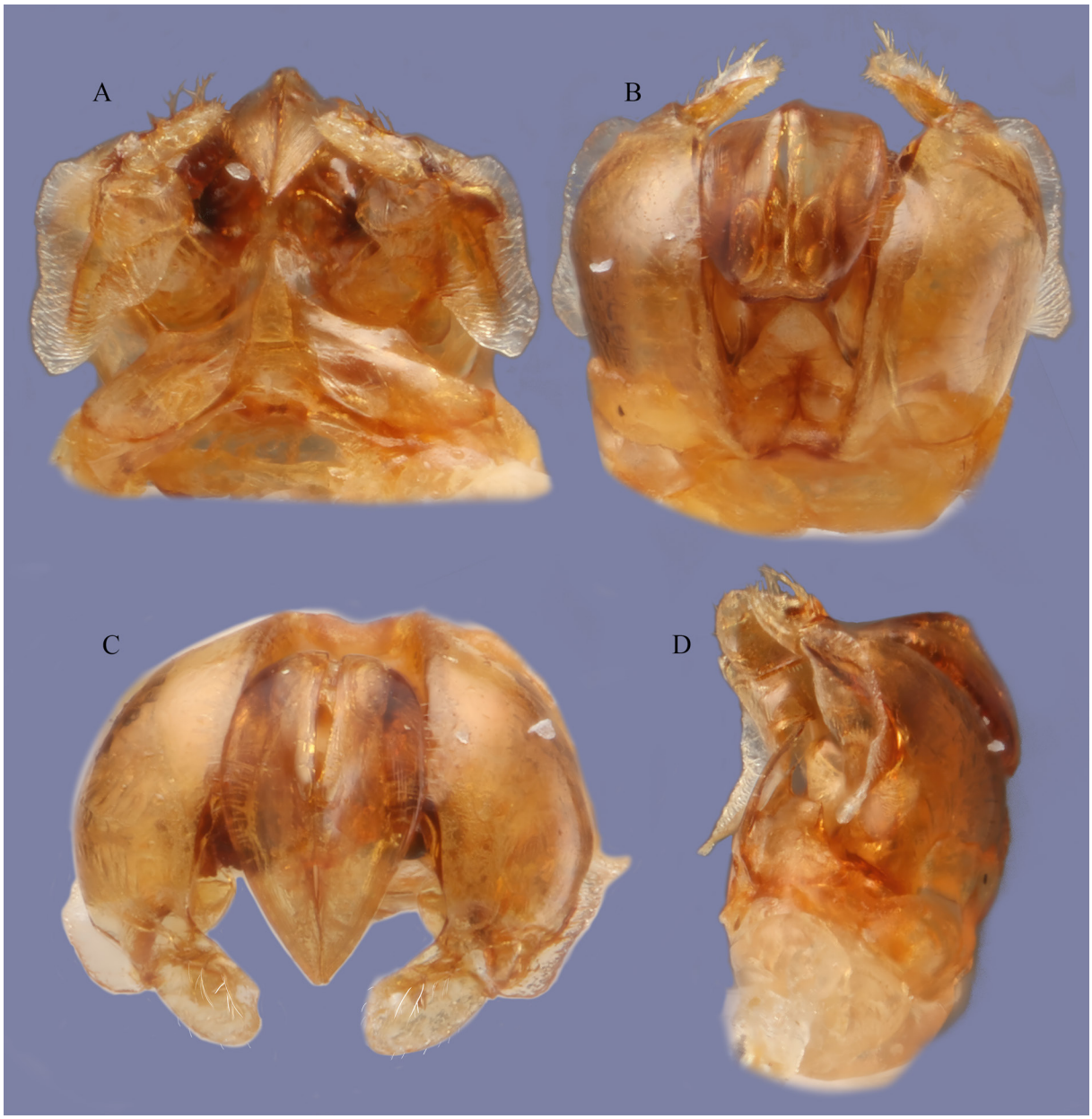


Fig. 90. Genitalia of *Lasioglossum* (*Hemihalictus*) *villosulum* (Kirby, 1802), ♂ (OSAC). **A**. Dorsal view. **B**. Ventral view. **C**. Apical view. **D**. Lateral view.

Description

Genitalia (Figs 90, 120Q). Gonostylus broad and develops into a plate from the apical view, 1.5 times as long as broad, with setae short, clearly branched. Retrorse lobe about 2 times as long as broad, with irregular margin, and rounded at apex.

Range

Pacific northwest of USA (Oregon, Washington) and southern British Columbia (Fig. 91).

Floral hosts

ASTERACEAE: *Hypochaeris* sp., *Hypochaeris radicata* L., *Leucanthemum* sp., *Taraxacum* sp. or *Hypochaeris* sp., *Taraxacum* sp. • CARYOPHYLLACEAE: *Spergula arvensis* L. • GERANIACEAE: *Geranium molle* L. • LINACEAE: *Linum lewisii* Pursh • ROSACEAE: *Potentilla gracilis* Douglas ex Hook.

Remarks

The earliest North American record of *L. villosulum* dates back to 2009 in Pierce County, Washington, based on the available data. Recent samples indicate that this species is increasing in abundance, suggesting a potential population expansion.

DNA barcodes

Pauly *et al.* (2019) analyzed DNA barcodes of *L. villosulum* from across its range. North American sequences from British Columbia, Oregon, and Washington match Palaearctic data.

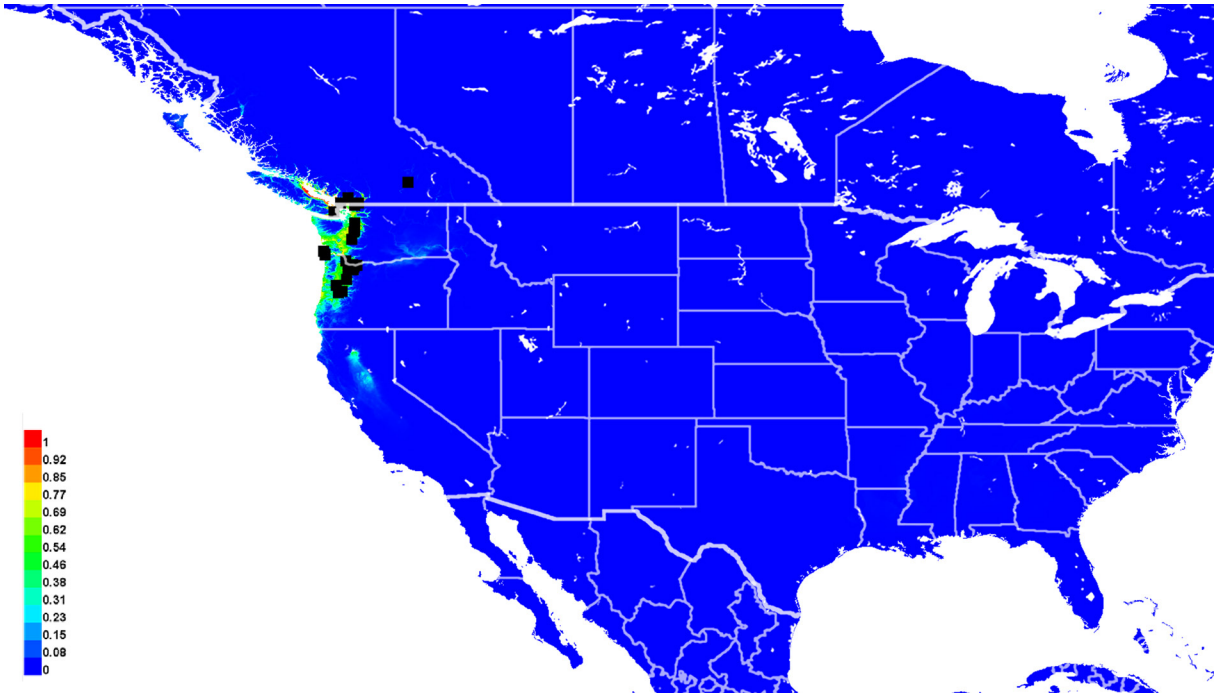


Fig. 91. Georeferenced collection records of *Lasioglossum* (*Hemihalictus*) *villosulum* (Kirby, 1802) (black squares) and predicted distribution by maximum entropy ecological niche modeling in Maxent (colour shading). Warmer colours indicate higher cloglog probability of occurrence.

Dubious record section

This species is retained in this section due to the unavailability of the holotype. The original description hints at a possible affiliation with the subgenus *Evylaeus*, as indicated by the metatibial spur described with 3–4 oblique, nearly obsolete serrations and wide head – characteristics commonly observed in the subgenus *Evylaeus*.

Lasioglossum (incertae sedis) ***pecosense*** Crawford, 1906

Halictus Pecosensis Crawford, 1906a: 6.

Lasioglossum (*Evylaeus*) *pecosense* – Michener 1951: 1109 (catalogue).
Evylaeus pecosensis – Hurd 1979: 1961 (catalogue). — Moure & Hurd 1987: 78 (catalogue).

Etymology

The specific epithet is a reference to the type locality, Pecos, New Mexico, with the adjectival suffix -*ensis* denoting place.

Floral hosts

ROSACEAE: *Holodiscus australis* A.Heller.

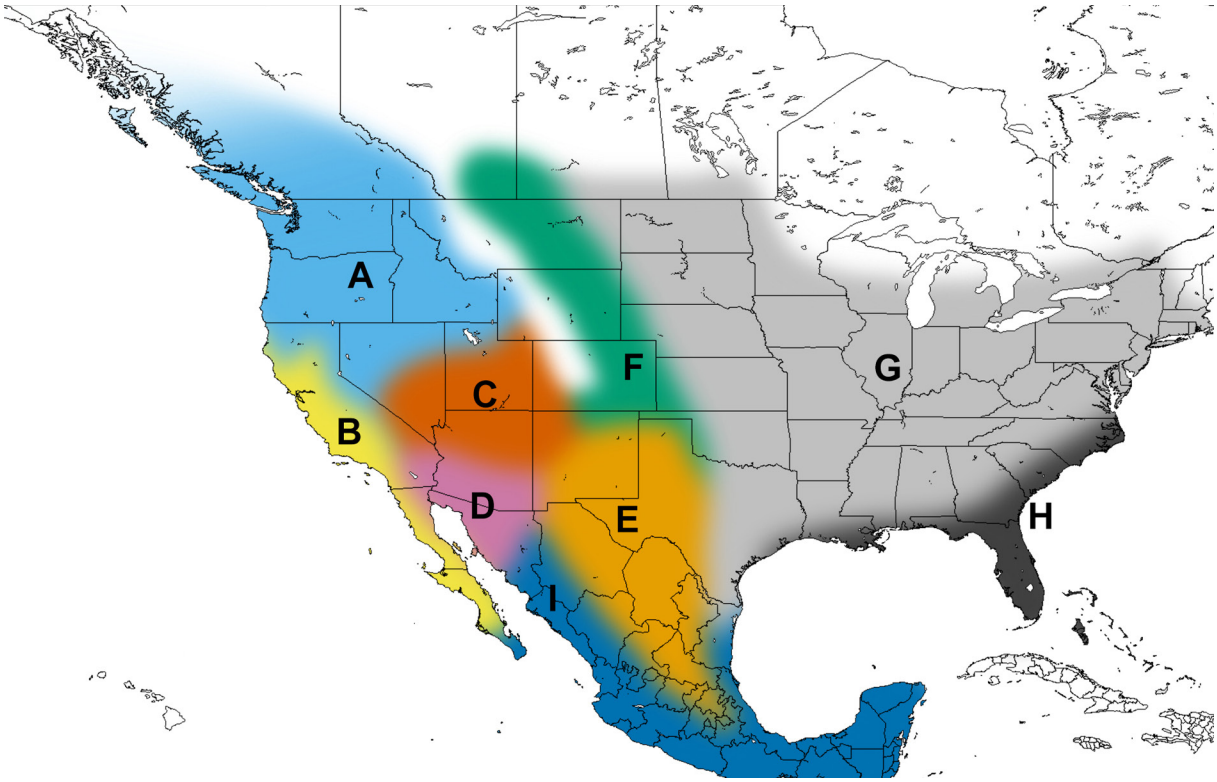


Fig. 92. Major geographic regions with species of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897. Borders are intentionally blurred because the limits of these regions are approximate, and spillover near transition zones is well known. **A**. Cascadia (also including northern Great Basin). **B**. California. **C**. High desert (including southern Great Basin, Mojave Desert, and Colorado Plateau). **D**. Western low desert (including Sonoran Desert and western Chihuahuan Desert). **E**. Eastern low desert (including most of Chihuahuan Desert). **F**. Western Great Plains. **G**. Eastern. **H**. Southeastern. **I**. Neotropical. (Reproduced from Gardner & Gibbs 2023: fig. 77).

Table 3. List of species of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 associated with the major geographic regions defined in Fig. 92. These lists are not intended to be exhaustive, but they should be reliable near the centre of each region and become less inclusive toward transition zones.

Region	Associated species
Cascadia	*L. absurdiceps*, *L. aspilurus*, *L. buccale*, *L. diatretum*, *L. engleri* sp. nov., *L. glabriventre*, *L. kincaidii*, *L. ovaliceps*, *L. ruficorne*, *L. sequoiae*, *L. synthyridis*, *L. villosulum*
California	*L. absurdiceps*, *L. aspilurus*, *L. diatretum*, *L. engleri*, *L. glabriventre*, *L. kincaidii*, *L. ovaliceps*, *L. pathiranae* sp. nov., *L. ruficorne*, *L. sequoiae*, *L. synthyridis*. *L. vanduzeei* stat. rev.
High desert	*L. absurdiceps*, *L. angusticulum* sp. nov., *L. diatretum*, *L. glabriventre*, *L. kincaidii*, *L. ovaliceps*, *L. pectoraloides*, *L. ruficorne*, *L. subobscurum*, *L. swenki*, *L. synthyridis*, *L. tomentosum* sp. nov.
Western low desert	*L. arizonense*, *L. angusticulum* sp. nov., *L. pathiranae* sp. nov., *L. pectoraloides*, *L. ruficorne*, *L. subobscurum*, *L. swenki*
Eastern low desert	*L. angusticulum* sp. nov., *L. angustius*, *L. pathiranae* sp. nov., *L. pectoraloides*, *L. opata* sp. nov., *L. subobscurum*, *L. swenki*
Western Great Plains	*L. angusticulum* sp. nov., *L. diatretum*, *L. engleri* sp. nov., *L. glabriventre*, *L. ovaliceps*, *L. pectoraloides*, *L. ruficorne*, *L. swenki*, *L. synthyridis*
Eastern	*L. birkmanni*, *L. fedorense*, *L. foxii*, *L. lustrans*, *L. macoupinense*, *L. nelumbonis*, *L. pectinatum*, *L. pectorale*, *L. robertsoni*, *L. sopinci*, *L. swenki*, *L. synthyridis*
Southeastern	*L. birkmanni*, *L. lustrans*, *L. nelumbonis*, *L. pectorale*, *L. sopinci*
Neotropical	*L. opata* sp. nov., *L. vanduzeei* stat. rev.

Remarks

The location of the type is unknown and no specimens identified as this species have ever been seen. The depository should be the USNM (Moure & Hurd 1987), but it has not been located there to date. Crawford (1906a) compares it to three species of *L.* (*Hemihalictus*), although based on the description and characters provided in a subsequent key (Crawford 1907a), this may belong to the subgenus *L.* (*Evylaeus*). Based on the type locality it could plausibly be a junior synonym of *L. amicus* (Cockerell, 1897).

Keys to species of L. (Hemihalictus) in North America

Geographic data can help discriminate species (see Fig. 92, Table 3), but readers should refer to the following key and the species diagnoses to confirm identifications.

Key to sexes

1. Flagellomeres 10; metasomal terga 6; T5 with distinct prepygidial area; scopa present ..... females
– Flagellomeres 11; metasomal terga 7; T5 without distinct prepygidial area; scopa absent ..... males

Key to females

1. Mesepisternum coarsely rugose throughout (as in Fig. 93A) 2
– Mesepisternum varying between polished to partially rugose, never coarsely rugose in hypoepimeral area and region adjacent to metepisternum (as in Figs 93B–F, 98) 4

2. Mesoscutum anterior margin rugulose (as in Fig. 94A–B) 3
– Mesoscutum anterior margin distinctly punctate (eastern) (Fig. 94C) .....***L. pectorale*** (Smith, 1853)

3. Tegulae enlarged and strongly punctate throughout; lateral and posterior surfaces of propodeum with sparse erect hairs, not obscuring integument or sharply contrasting against propodeal triangle (west of the Rocky Mountains) (Fig. 94A) ..... ***L. kincaidii*** (Cockerell, 1898)
– Tegulae normal and with large impunctate areas; lateral and posterior surfaces of propodeum covered with dense appressed tomentum, obscuring integument and sharply contrasting against bare propodeal triangle (east of the Rocky Mountains) (Fig. 94B) .....***L. nelumbonis*** (Robertson, 1890)

4. Metasoma orange (as in Figs 18A, 24A–B) 5
– Metasoma always black to brown (as in Figs 18B, 24C, 27D) 12

5. Paraocular area and frons with dense tomentum, often very dense (as in the Fig. 95A–C) 6
– Paraocular area and frons without obvious tomentum (as in the Fig. 95D–I) 10

6. Small bees (4.5–6.5 mm); mesoscutum largely polished between punctures; propodeal triangle polished posteriorly; metasoma sometimes with irregular dark spots (southwestern USA/Baja California) 7
– Large bees (6.5–9 mm); mesoscutum dull between punctures; propodeal triangle imbricate posteriorly; metasomal T5–T6 dark brown basally (primarily Great Plains) ....***L. swenki*** (Crawford, 1906) (in part, light morph)

7. Hair colour pale yellow (Fig. 96A); head and mesosoma densely covered in tomentum, including the posterior surface of the propodeum (high desert) ..... ***L. tomentosum*** sp. nov.
– Hair colour white or off-white (as in Fig. 96B–C); head and mesosoma lacking dense tomentum, posterior surface of propodeum not covered 8

8. Mesoscutum highly polished with very shallow and sparser punctures (IS = 2–7 PD) (Fig. 10D); mesoscutum and mesepisternum distinctly doubly punctate with minute punctures (Fig. 10D); clypeal apex always yellow (Figs 13B, 14B) (western low desert) ..... ***L. arizonense*** (Crawford, 1907)
– Mesoscutum polished but becoming imbricate to tessellate anteromedially, with deeper and denser punctures (IS = 1–2 PD, laterad of the parapsidal line) (as in Fig. 10A–B); mesoscutum and mesepisternum lacking doubly punctate minute punctures (as in Fig. 10A–B); clypeal apex mostly brown (as in Figs 6B, 17B) (rarely yellow in *L. absurdiceps*) 9

9. T3 fully covered by tomentum (Fig. 6D); frons ruguloso-punctate to polished, punctures dense (IS < 1 PD) (Fig. 9B); protibial spur with malus not extending appreciably beyond the velum (Fig. 6F) (Cascadia, California, and high desert regions) .....***L. absurdiceps*** (Timberlake, 1960)
– T3 with basal tomentum (Fig. 17D); frons polished, punctures sparser (IS = 2–4 PD), distinctly doubly punctate with minute punctures (Fig. 9A); protibial spur with malus about ⅓ the length of the velum (Fig. 17F) (Baja California, neotropical) ....***L. vanduzeei*** (Sandhouse & Cockerell, 1924) stat. rev. (in part, light morph)

10. Pronotal angle nearly 90 degrees (Fig. 97B); hypoepimeral area rugulose, and impunctate (Fig. 98A); propodeal triangle with strong rugae, posterior margin sharply angled, forming an apical carina (Fig. 104I) (eastern coastal states) .... ***L. sopinci*** (Crawford, 1932) (in part, light morph)

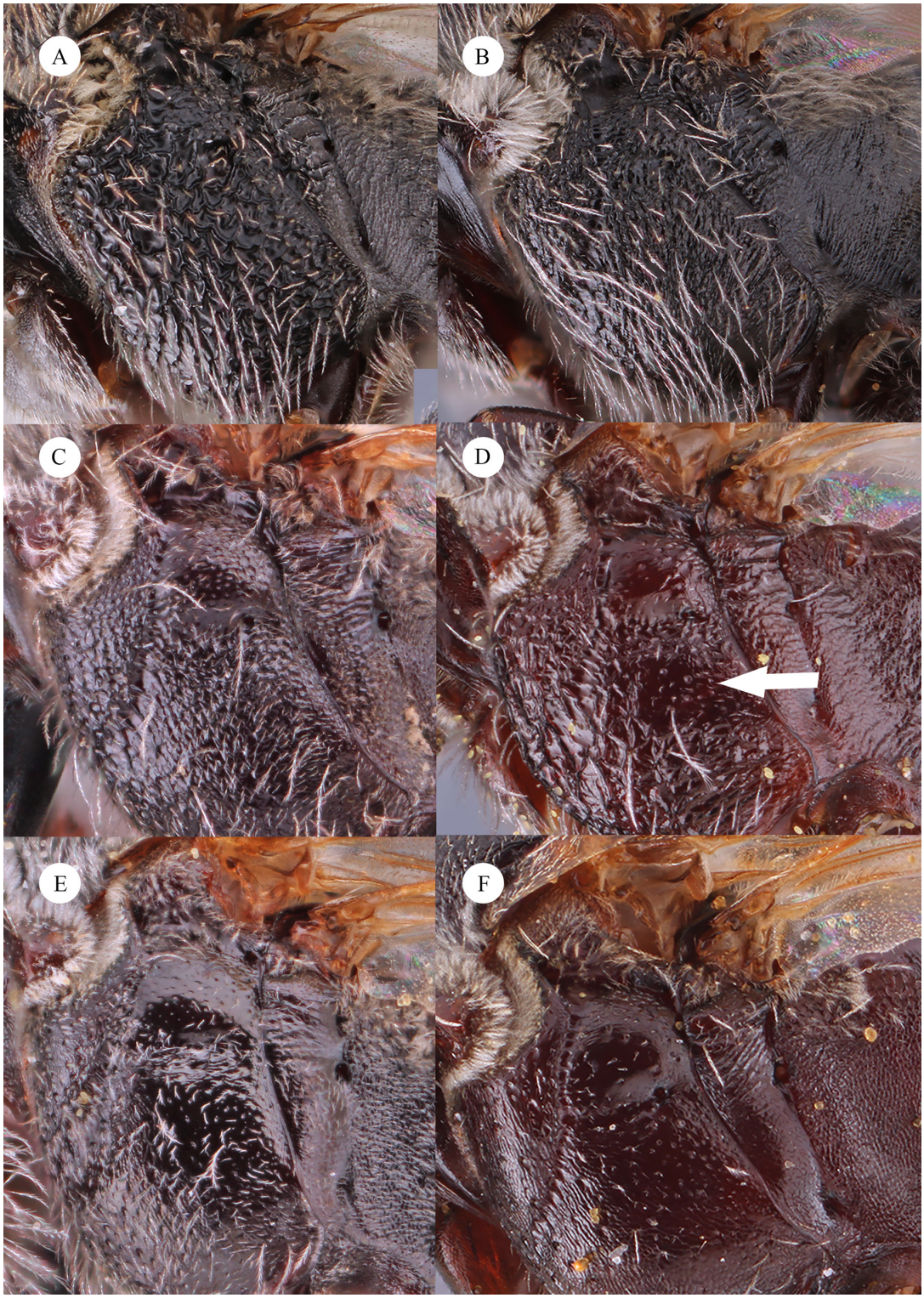


Fig. 93. Mesepisternal sculpturing in females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species. **A**. *L. kincaidii* (Cockerell, 1898) – coarsely rugose throughout. **B**. *L. opata* sp. nov. – rugulose, becoming strigate-rugulose anteroventrally. **C**. *L. angustius* (Cockerell, 1897) – reticulate-rugose, rugose ventrally. **D**. *L. pectoraloides* (Cockerell, 1895) – partially rugose but polished with distinctive punctures (white arrow). **E**. *L. birkmanni* (Crawford, 1906) – smooth with distinctive punctures. **F**. *L. glabriventre* (Crawford, 1907) – smooth with distinctive punctures.

– Pronotal angle obtuse (as in Fig. 97C–E); hypoepimeral area smooth, and punctate (as in Fig. 98B–C); propodeal triangle with fine rugae, posterior margin smoothly rounded, without an apical carina (as in Fig. 104K–L) (West of 100th meridian) 11

11. Head short, length/width ratio 0.92 (±0.01 SD) (Fig. 95E); mesepisternum rugulose, without distinct punctures (Fig. 98B); propodeal triangle with rugae reaching posterior margin (Fig. 104K) ....***L. aspilurus*** (Cockerell, 1925) (in part, light morph)
– Head long, length/width ratio 1.10 (±0.02 SD) (Fig. 95F); mesepisternum polished with distinct punctures everywhere (Fig. 98C); propodeal triangle with rugae ending halfway to posterior margin (Fig. 104L) .....***L. ovaliceps*** (Cockerell, 1898)

12. Inner metatibial spur denticulate-serrate or serrate, teeth shorter than width of rachis or pectinate with more than 9 teeth, teeth not longer than the width of rachis (as in Fig. 99A–E) 13
– Inner metatibial spur pectinate with fewer than 7 teeth, basal teeth length longer than the width of rachis (as in Fig. 99F–H) 17

13. Mesepisternum rugulose and impunctate; submarginal cells usually two (eastern; oligolege on tribe Cichorieae) ..... ***L. lustrans*** (Cockerell, 1897)
– Mesepisternum smooth and punctate; submarginal cells three 14

14. Inner metatibial spur with more than 9 fine teeth, length greater than width (as in Fig. 99A–B) 15
– Inner metatibial spur with fewer than 9 rounded teeth, length subequal to width (as in Fig. 99C, 99E–H) 16

15. Head remarkably long, length/width 1.25 (±0.04) (Fig. 95I); pronotal angle obtuse (Fig. 97E); mesoscutum weakly tesselate, punctures dense (IS≤1 PD) (Fig. 97E) (exotic, introduced to Pacific northwest) .....***L. buccale*** (Pérez, 1903)
– Head moderately long, length/width 1.03 (±0.01) (Fig. 95H); pronotal angle nearly 90 degrees (Fig. 97A); mesoscutum highly polished throughout, punctures sparse (IS = 1–4 PD) (Fig. 97A) (Midwest / eastern USA; oligolege on *Physalis*) ..... ***L. pectinatum*** (Robertson, 1890)

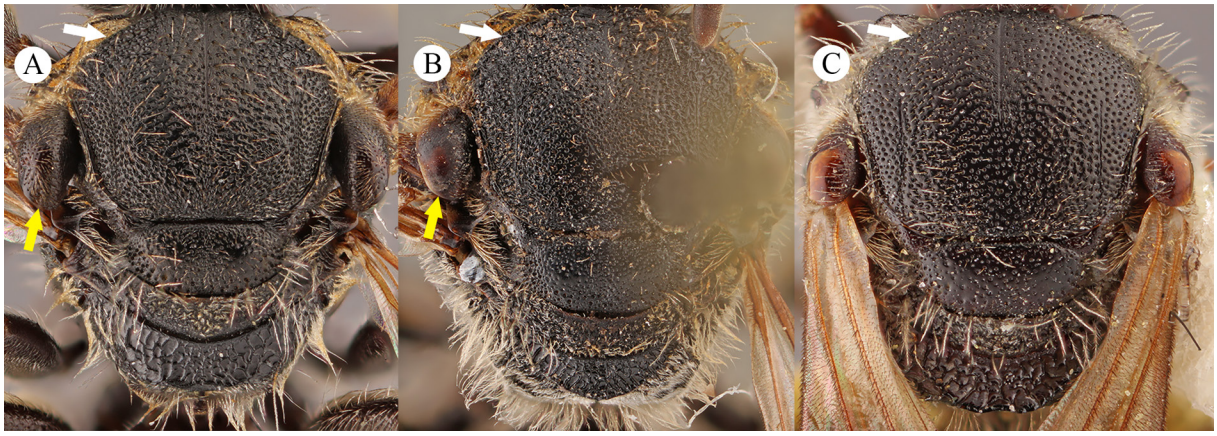


Fig. 94. Dorsal mesosoma views of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species; white arrows mark the anterior margin of the mesoscutum, yellow arrows mark the tegula. **A**. *L. kincaidii* (Cockerell, 1898) – anterior margin rugulose; tegula enlarged and punctate. **B**. *L. nelumbonis* (Robertson, 1890) – anterior margin rugulose; tegula normal and largely impunctate. **C**. *L. pectorale* (Smith, 1853) –anterior margin distinctly punctate.



Fig. 95. Heads of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species. **A–C**. Species with dense facial tomentum. **A**. *L. tomentosum* sp. nov. **B**. *L. absurdiceps* (Timberlake, 1960) **C**. *L. swenki* (Crawford, 1906). **D–H**. Species without obvious facial tomentum. **D**. *L. sopinci* (Crawford, 1932). **E**. *L. aspilurus* (Cockerell, 1925). **F**. *L. ovaliceps* (Cockerell, 1898). **G**. *L. pathiranae* sp. nov. **H**. *L. pectinatum* (Robertson, 1890). **I**. *L. buccale* (Pérez, 1903). Scale bar = 1 mm.

16. Mesoscutum punctures sparse (IS = 1–4 PD) submedially; anterior face of T1 with a fan (Fig. 106E) ..... ***L. villosulum*** (Kirby, 1802)
– Mesoscutum punctures dense (IS < 1.5 PD) submedially; anterior face of T1 without a fan (Fig. 106F) ..... ***L. sequoiae*** (Michener, 1936)

17. Mesepisternum with distinct punctures below hypoepimeron area, may be fine or limited to small area (as in Fig. 93D–F) 18
– Mesepisternum without distinct punctures below hypoepimeron area (as in Fig. 93B–C) 22

18. Tegula elongate (Fig. 101A–B) ..... ***L. glabriventre*** (Crawford, 1907)
– Tegula ovate (as in Fig. 101C–D) 19

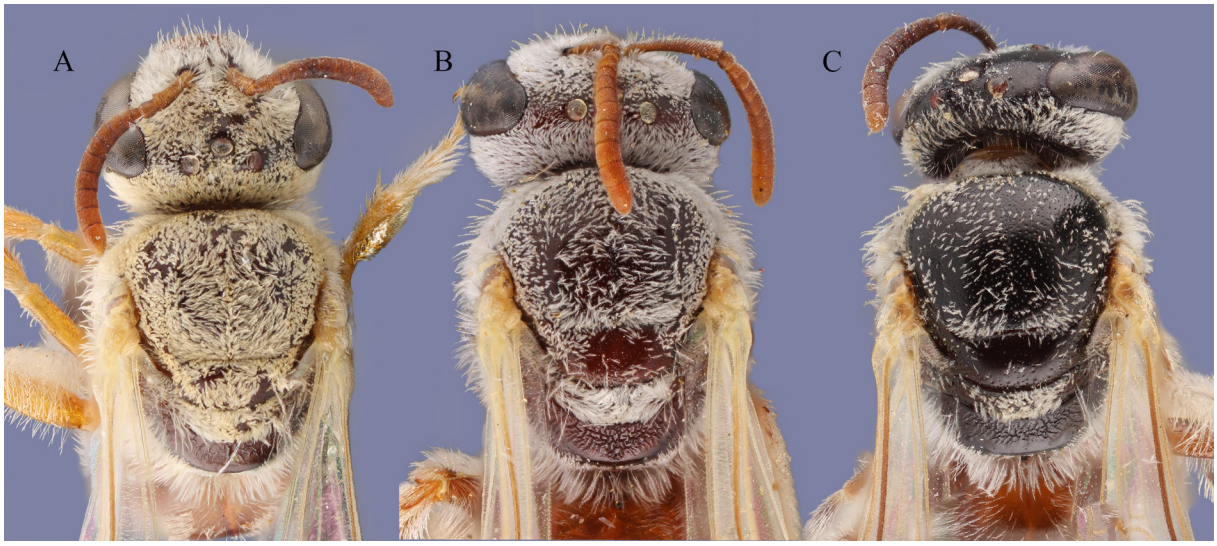


Fig. 96. Head and mesosoma females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species showing tomentum density and colour. **A**. *L. tomentosum* sp. nov. **B**. *L. absurdiceps* (Timberlake, 1960). **C**. *L. vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev.

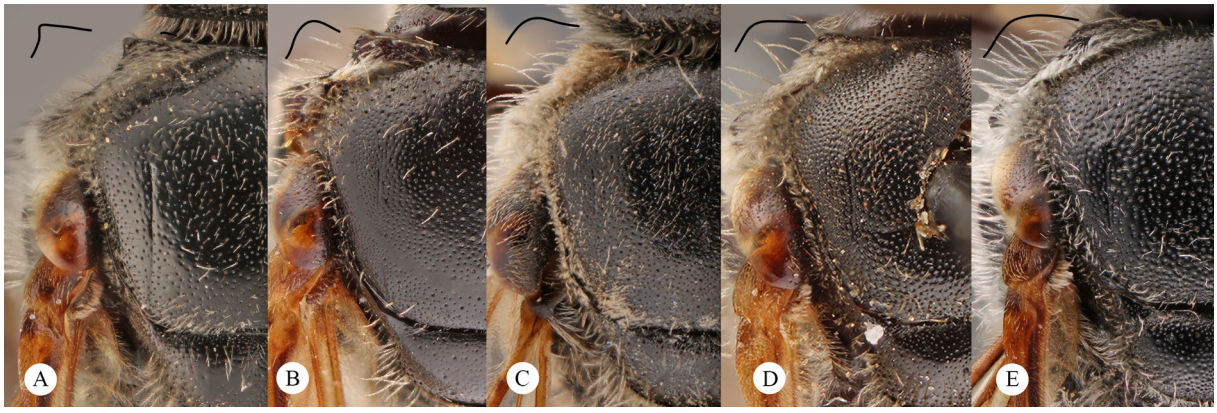


Fig. 97. Dorsal mesosoma views of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species, highlighting pronotal angle (outlined in top left corner of each panel). **A–B**. Species with pronotal angle ~90 degrees. **A**. *L. pectinatum* (Robertson, 1890). **B**. *L. sopinci* (Crawford, 1932). **C–E**. Species with pronotal angle obtuse. **C**. *L. opata* sp. nov. **D**. *L. angustius* (Cockerell, 1897). **E**. *L. buccale* (Pérez, 1903).

19. Mesepisternum punctures coarse (Fig. 93D); propodeal triangle with rugae reaching posterior margin, this margin with a distinct apical carina forming a sharp edge (Fig. 104G) .... ***L. pectoraloides*** (Cockerell, 1895)
– Mesepisternum punctures fine (as in Fig. 93E); propodeal triangle with rugae not reaching posterior margin, this margin smoothly rounded, no apical carina (as in Fig. 104L) 20

20. Head short, length/width ratio 0.99 (±0.04 SD); supraclypeal area with close punctures (IS≤PD) (eastern) ..... ***L. birkmanni*** (Crawford, 1906)
– Head long, length/width ratio 1.01–1.09; supraclypeal area with sparse punctures (IS =1–2PD) … 21

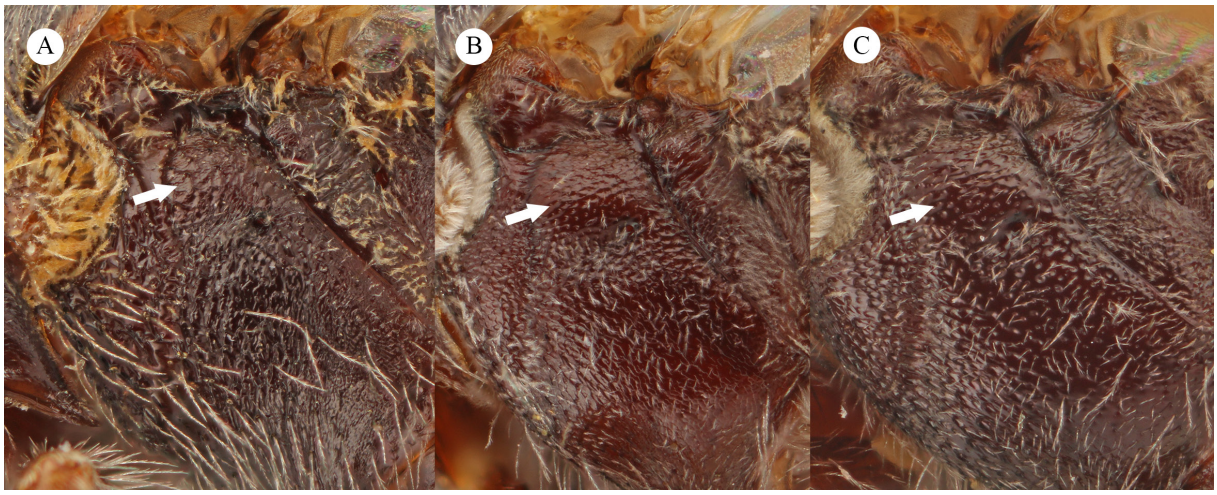


Fig. 98. Mesepisternal sculpturing in females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species; white arrow indicates the hypoepimeron. **A**. *L. sopinci* (Crawford, 1932) – mesepisternum rugulose and impunctate. **B**. *L. aspilurus* (Cockerell, 1925) – mesepisternum rugulose and without distinct punctures, except the hypoepimeron, which is smooth and punctate. **C**. *L. ovaliceps* (Cockerell, 1898) – mesepisternum smooth with distinct punctures.

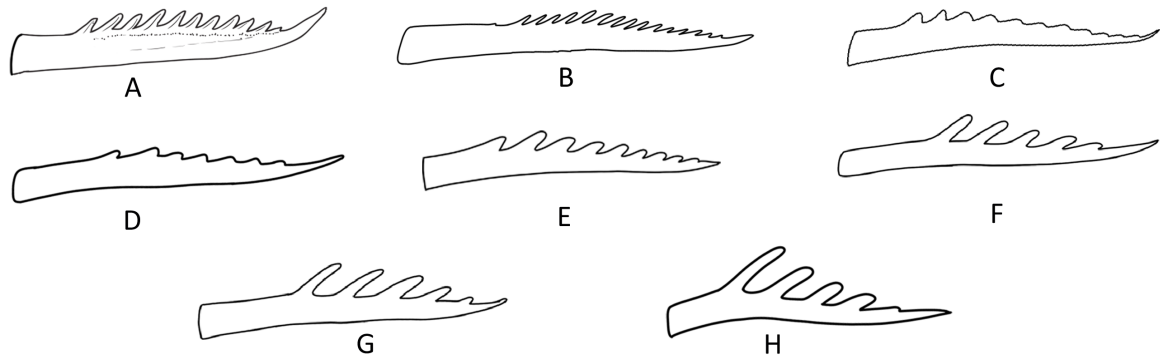


Fig. 99. Inner metatibial spur of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species. **A–E**. Teeth shorter than the width of rachis. **A**. *L. buccale* (Pérez, 1903). **B**. *L. pectinatum* (Robertson, 1890). **C**. *L. sequoiae* (Michener, 1936). **D**. *L. lustrans* (Cockerell, 1897). **E**. *L. villosulum* (Kirby, 1802). **F–H**. Basal teeth length longer than the width of rachis. **F**. *L. pectoraloides* (Cockerell, 1895). **G**. *L. engleri* sp. nov. **H**. *L. angusticulum* sp. nov..

21. Hairs of apical rims of T2–3 long and dense (Fig. 102A); T2 apical impressed area without coriarious microsculpture or with very weak microsculpture (Fig. 102A) (west of the Rockies) ..... ***L. engleri*** sp. nov.
– Hairs of apical rims of T2–3 shorter and sparser (Fig. 102B); T2 apical impressed area with coriarious microsculpture (Fig. 102B) (eastern) ..... ***L. macoupinense*** (Robertson, 1895)

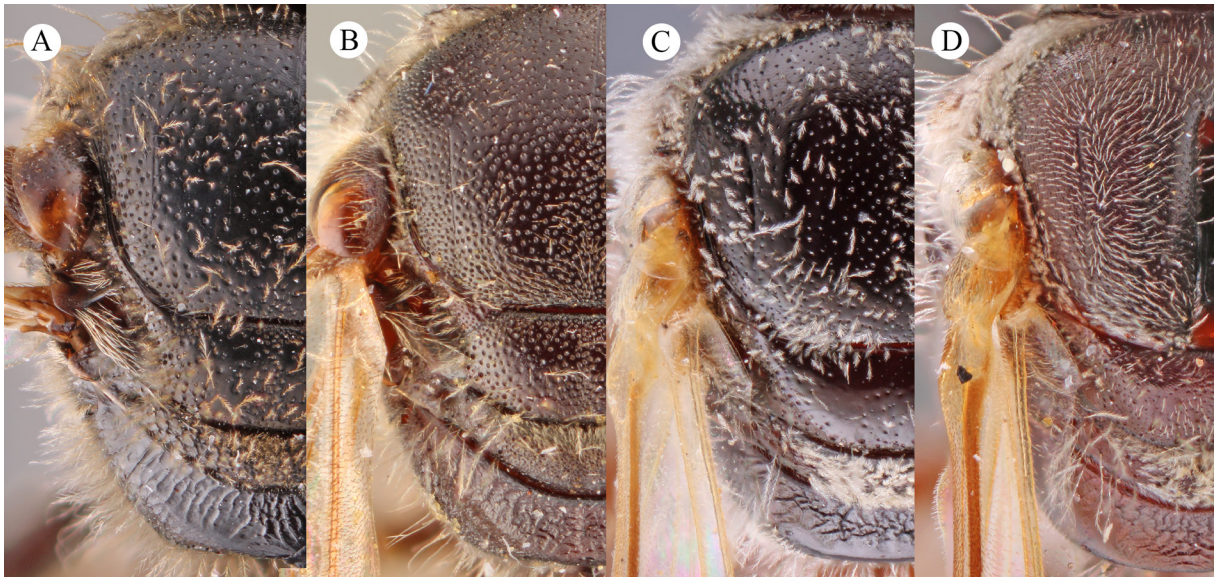


Fig. 100. Dorsal mesosoma views of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species. **A**. *L. villosulum* (Kirby, 1802). **B**. *L. sequoiae* (Michener, 1936). **C**. *L. vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev. **D**. *L. subobscurum* (Cockerell, 1895).

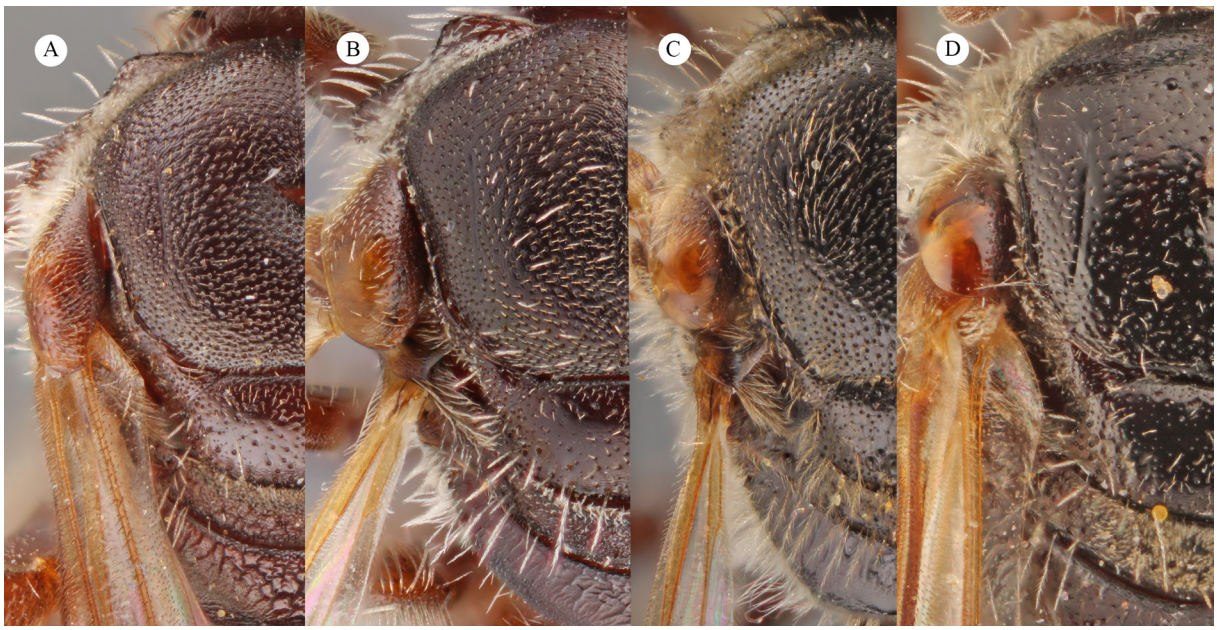


Fig. 101. Variation in tegula among selected females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species. **A**. *L. glabriventre* (Crawford, 1907) – elongate and punctate. **B**. *L. glabriventre* – variation showing fewer punctures and subtle shape differences. **C**. *L. birkmanni* (Crawford, 1906) – ovate and broadly impunctate. **D**. *L. pectoraloides* (Cockerell, 1895) – ovate and broadly impunctate.

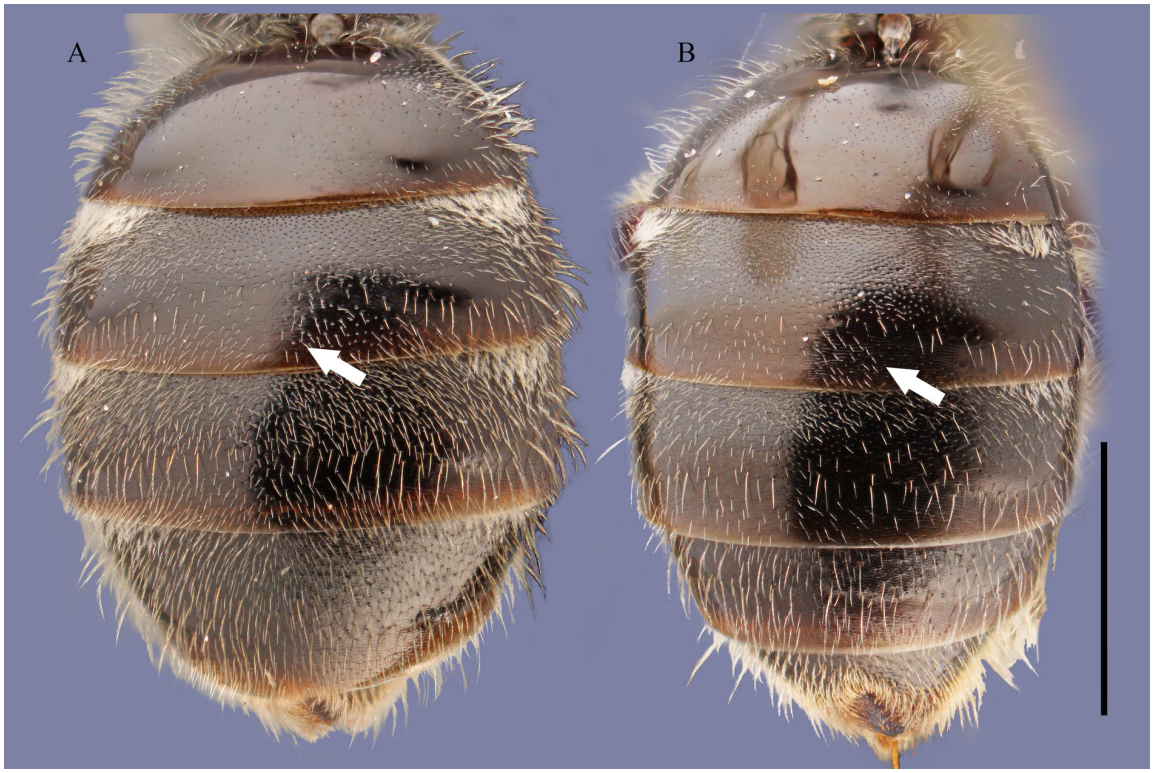


Fig. 102. Metasoma of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897; white arrows indicate the apical impressed area of T2. **A**. *L. engleri* sp. nov. – lacking coriarious microsculpture; metasomal hairs dense. **B**. *L. macoupinense* (Robertson, 1895) – with coriarious microsculpture; metasomal hairs sparse. Scale bars = 1 mm.



Fig. 103. Metasoma of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species. **A–B**. Metasoma with basal patches. **A**. *L. pathiranae* sp. nov. **B**. *L. subobscurum* (Cockerell, 1895). **C**. Metasoma without basal patches, *L. foxii* (Robertson, 1895).

22. T2–T3 with basal patches or bands of tomentum (as in Fig. 103A–B) 23
– T2–T3 without basal patches or bands of tomentum (as in Fig. 103C) 33

23. Propodeal triangle with rugae reaching posterior margin (as in Fig. 104A–F) 24
– Propodeal triangle with rugae not clearly reaching posterior margin (as in Fig. 104H, 104J, 104L) 28



Fig. 104. Propodeum of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 showing variation in propodeal triangle sculpture. **A–I**. Propodeal triangle posterior margin with an apical carina. **A**.*L. pathiranae* sp. nov. **B**. *L. robertsoni* (Crawford, 1906). **C**. *L. nelumbonis* (Robertson, 1890). **D**. *L. kincaidii* (Cockerell, 1898). **E**. *L. angusticulum* sp. nov. **F**. *L. angustius* (Cockerell, 1897). **G**. *L. pectoraloides* (Cockerell, 1895). **H**. *L. opata* sp. nov. **I**. *L. sopinci* (Crawford, 1932). **J–L**. Propodeal triangle posterior margin smoothly rounded without an apical carina. **J**. *L. swenki* (Crawford, 1906). **K**. *L. aspilurus* (Cockerell, 1925). **L**. *L. ovaliceps* (Cockerell, 1898). **A–F, K**. Propodeal triangle with rugae clearly reaching posterior margin. **G–I**. Propodeal triangle with rugae appears reaching posterior margin medially.. **H, J, L**. Propodeal triangle with rugae not reaching posterior margin. White arrows indicate the posterior surface of the propodeum, showing the presence or absence of dense appressed tomentum. Yellow arrow indicates the apical carina.

24. Pronotal angle nearly 90 degrees (Fig. 97B) .....***L. sopinci*** (Crawford, 1932) (in part, dark morph)
– Pronotal angle obtuse (as in Fig. 97C–D) 25

25. Head remarkably long, length/width ratio 1.18 (±0.01 SD) (Fig. 95G). Propodeal triangle with apical carina well-developed and prominently raised (Fig. 104A) .....***L. pathiranae*** sp. nov.
– Head shorter, length/width ratio 1.01–1.13. Propodeal triangle with apical carina present but less prominently raised (as in Fig. 104B–F) 26

26. Mesoscutum mostly polished, with distinctly double punctation and punctures moderately sparse (IS = 1–2 PD) on mesad of parapsidal line (Fig. 105A); T1 anterior face mostly polished (Fig. 106D) .....***L. angusticulum*** sp. nov.
– Mesoscutum imbricate, without distinctly double punctuation and punctures dense (IS ≤ 1 PD) (as in Fig. 105B); T1 anterior face strongly coriarious (as in Fig. 106A, 106C) 27

27. Paraocular area and posterior surface of propodeum with dense tomentum (Fig. 104B); hypoepimeron rugulose, punctures obscure; T1 fan opening narrow (≈0.5 OD) (coastal and central regions of Texas) (Fig. 106A) .....***L. robertsoni*** (Crawford, 1906)
– Paraocular area and posterior surface of propodeum with sparse tomentum (Fig. 104F); hypoepimeron broadly polished with distinct punctures; T1 fan opening slightly broader (≈1.5 OD) (eastern low desert) (Fig. 106C) .....***L. angustius*** (Cockerell, 1897)

28. Propodeal triangle with apical carina on posterior margin (as in Fig. 104H–I) 29
– Propodeal triangle without apical carina on posterior margin (as in Fig. 104J–L) 30

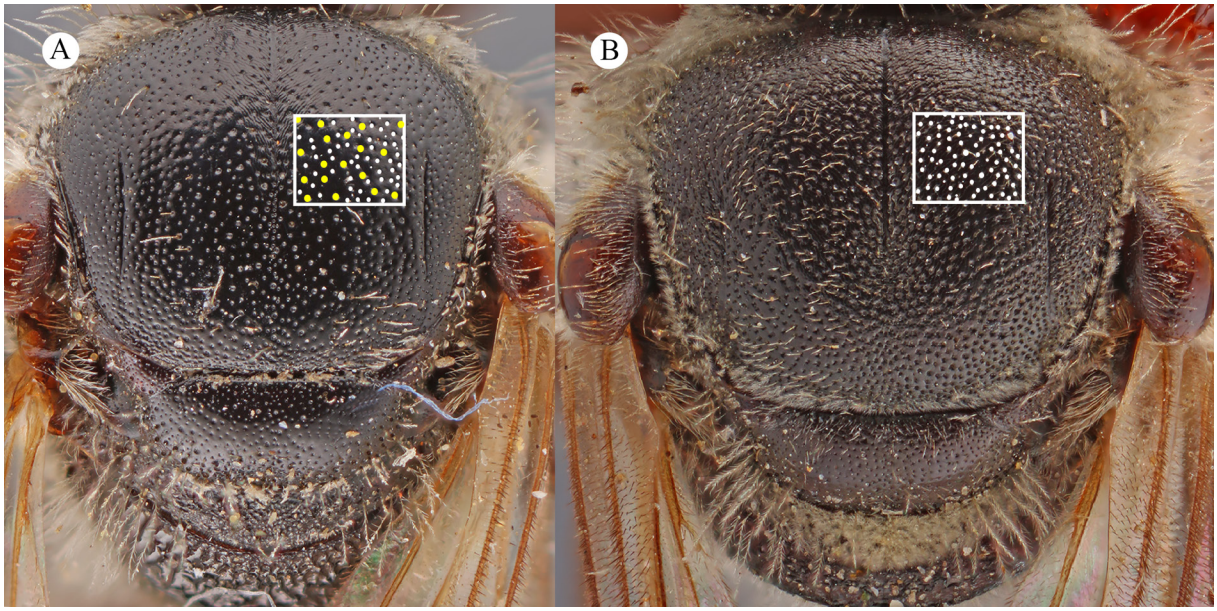


Fig. 105. Dorsal mesosoma views of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897; inset boxes highlight mesoscutal punctation, 'doubly punctate' refers to the presence of two distinct puncture sizes – large punctures intermixed with minute punctures. **A**. *L. angusticulum* sp. nov. – mesoscutum mostly polished and with a distinctly double punctation. **B**. *L. angustius* (Cockerell, 1897) – mesoscutum imbricate without a distinct double punctation.

29. Pronotal angle nearly 90 degrees (Fig. 97B); propodeal triangle with strong rugae, posterior margin sharply angled, forming a distinct apical carina (Fig. 104I); anterior face of T1 lacking a well-developed setose fan of sub-appressed hairs (as in Fig. 106E) (eastern coastal states) .....
.....***L. sopinci*** (Crawford, 1932) (in part, dark morph)

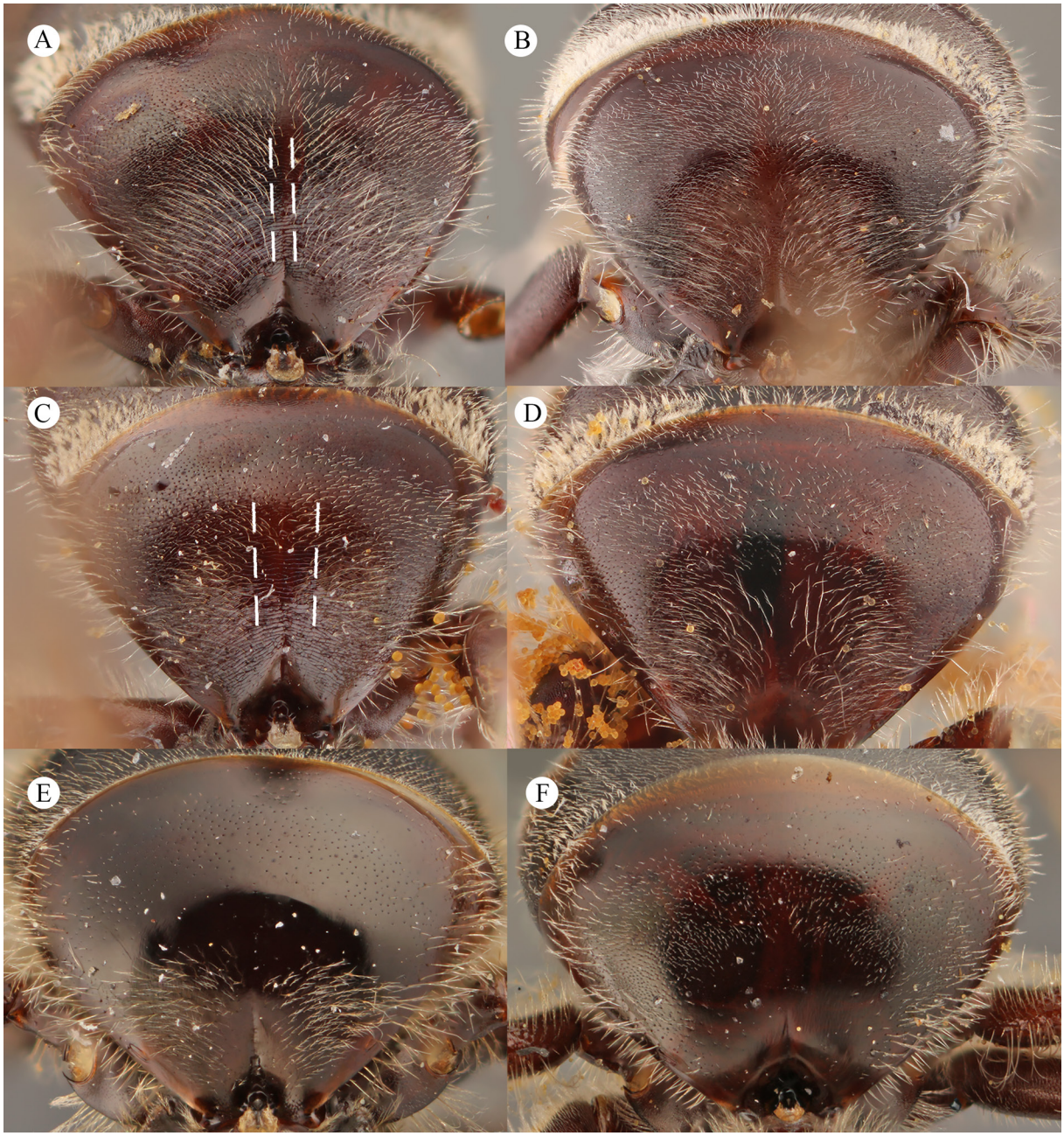


Fig. 106. T1 of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897. **A–B**. Anterior face strongly coriarious with a very narrow dorsal opening on the fan. **A**. *L. robertsoni* (Crawford, 1906). **B**. *L. opata* sp. nov. **C**. Anterior face strongly coriarious with a very broad dorsal opening on the fan, *L. angustius* (Cockerell, 1897). **D**. Anterior face mostly polished with a very broad dorsal opening on the fan, *L. angusticulum* sp. nov. **E**. Anterior face polished with the fan, *L. villosulum* (Kirby, 1802). **F**. Anterior face polished without a fan, *L. sequoiae* (Michener, 1936).

– Pronotal angle obtuse (Fig. 97C); propodeal triangle with weak rugae, posterior margin angled with a faint apical carina (Fig. 104H); anterior face of T1 with a well-developed setose fan of sub-appressed hairs (Fig. 106B) (Sonoran Deserts to southern Arizona) .....***L. opata*** sp. nov.

30. Small bees (4.5–6.5 mm); genal surface obscured by tomentum (as in Fig. 107A–B) (western deserts/ Baja California) 31
– Large bees (6.5–9 mm); genal surface not obscured by tomentum (as in Fig. 107C–D) (primarily Great Plains) 32

31. Frons polished with distinctly doubly punctate with minute punctures, punctures sparse (IS = 2–4 PD); mesoscutum mostly polished, punctures sparse (IS = 1–5 PD), with a distinct tomentum (Fig. 100C); mesepisternum polished with distinct punctures (Baja California, neotropical) ....***L. vanduzeei*** (Sandhouse & Cockerell, 1924) stat. rev. (in part, dark morph)

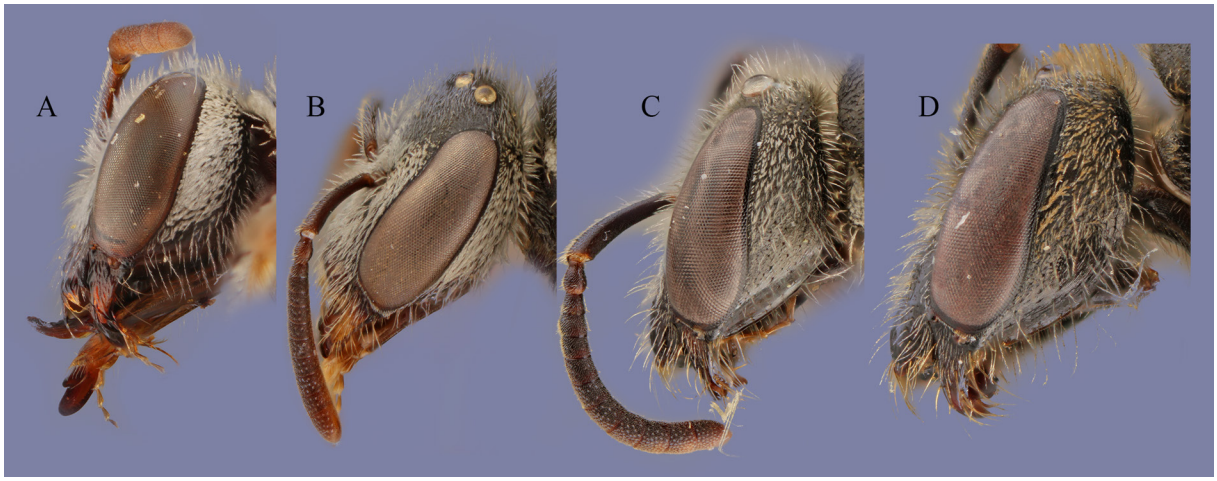


Fig. 107. Lateral view of heads of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 showing variation in genal tomentum. **A–B**. Genal surface obscured by tomentum. **A**. *L. vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev. **B**. *L. subobscurum* (Cockerell, 1895). **C–D**. Genal surface not obscured by tomentum. **C**. *L. swenki* (Crawford, 1906). **D**. *L. fedorense* (Crawford, 1906).

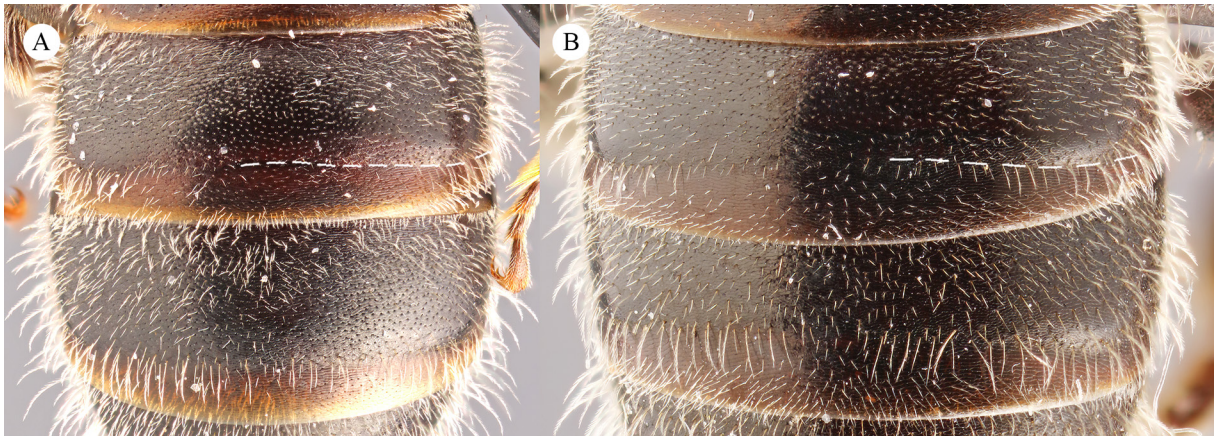


Fig. 108. T2–T3 of females of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897; white line drawing shows the premarginal line of T1. **A**. *L. ruficorne* (Crawford, 1907). **B**. *L. foxii* (Robertson, 1895).

– Frons ruguloso-punctate, punctures dense (IS < 1 PD); mesoscutum imbricate-tessellate throughout, punctures dense (IS ≤ 1PD), without tomentum (Fig. 100D); mesepisternum duller without punctures (desert areas of western North America) ..... ***L. subobscurum*** (Cockerell, 1895)

32. Hypoepimeral area polished and punctate; dorsolateral ridge of pronotum with carina ending posterior of oblique sulcus ..... ***L. swenki*** (Crawford, 1906) (in part, dark morph)
– Hypoepimeral area imbricate and impunctate; dorsolateral ridge of pronotum with carina extending anterior of oblique sulcus ..... ***L. fedorense*** (Crawford, 1906)

33. Head short, length/width ratio 0.92 (±0.01 SD); propodeum with faint oblique carina, nearly continuous with lateral carina ..... ***L. aspilurus*** (Cockerell, 1925) (in part, dark morph)
– Head long, length/width ratio = 1.03–1.12; propodeum without oblique carina 34

34. Propodeal triangle with rugae reaching posterior margin ..... ***L. synthyridis*** (Cockerell, 1906)
– Propodeal triangle with rugae not reaching posterior margin 35

35. Mesoscutum mostly polished, becoming imbricate anteromedially, punctures dense (IS < 1 PD), becoming sparser submedially (IS = 1–3 PD) (Fig. 40A–C) ..... ***L. diatretum*** (Vachal, 1904)
– Mesoscutum imbricate throughout or with a subtle weakening submedially, punctures dense throughout (IS ≤ 1 PD) or slightly sparser submedially (IS = 1–2 PD) (as in Fig. 40D–F) 36

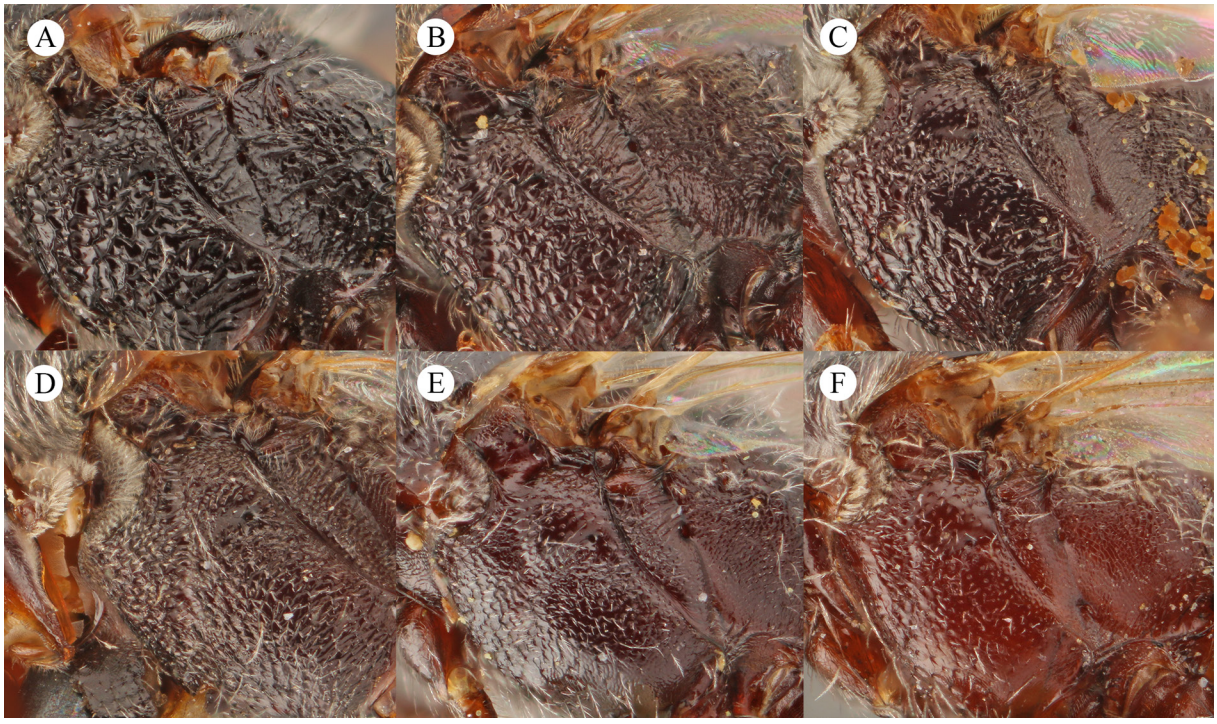


Fig. 109. Mesepisternal sculpturing in males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species. **A**. *L. pectorale* (Smith, 1853) – coarsely rugose throughout and impunctate. **B**. *L. kincaidii* (Cockerell, 1898) – coarsely rugose throughout and impunctate. **C**. *L. pectoraloides* (Cockerell, 1895) – mostly rugose with distinctive punctures (appearing smoother in some specimens). **D**. *L. angusticulum* sp. nov. – reticulate-rugose, impunctate. **E**. *L. ruficorne* (Crawford, 1907) – rugulose/reticulate-punctate, imbricate ventrally. **F**. *L. glabriventre* (Crawford, 1907) – smooth with distinctive punctures.

36. T2–T3 punctures moderately dense (IS = 1–2 PD) near or on the premarginal line (Fig. 108A) (western) .....***L. ruficorne*** (Crawford, 1907)
– T2–T3 punctures sparse (IS = 2–6 PD) near the premarginal line (Fig. 108B) (eastern) .... ***L. foxii*** (Robertson, 1895)

Key to males

Note: it is recommended to extrude the terminalia to ensure the gonostylus and retrorse lobe are clearly visible. Males of *L. angustius*, *L. arizonense*, *L. tomentosum* sp. nov., *L. opata* sp. nov., and *L. robertsoni* are unknown.

1. Mesepisternum rugose (as in Fig. 109A–D) 2
– Mesepisternum varying between polished to rugulose (as in Fig. 109E–F) 7

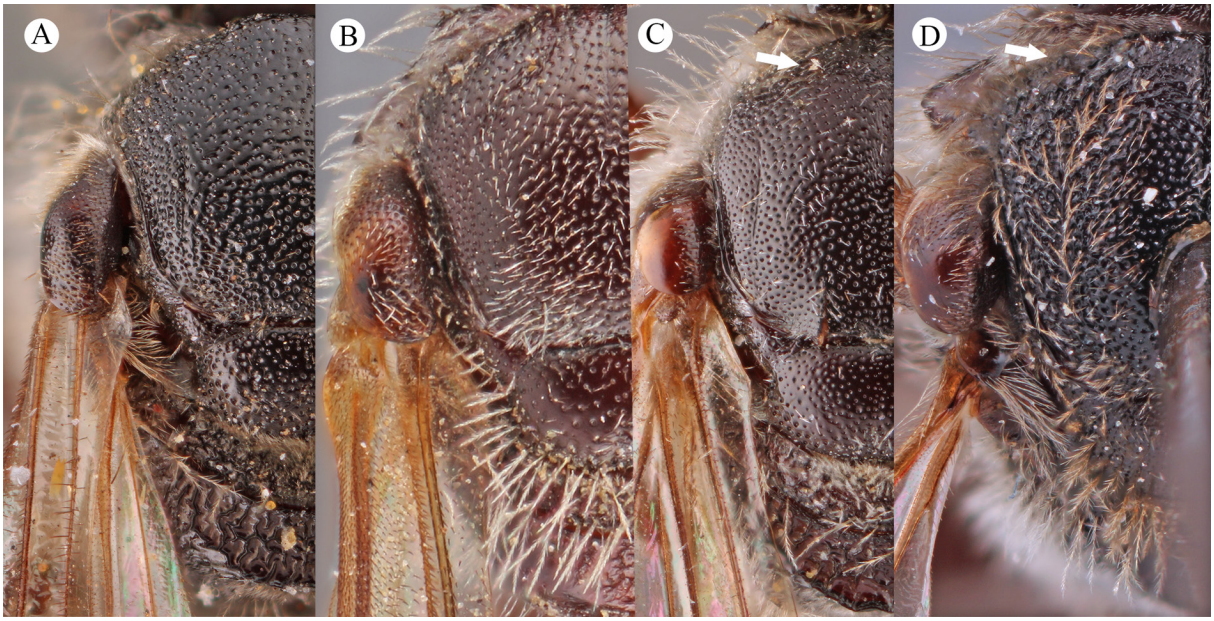


Fig. 110. Dorsal mesosoma views of males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species; white arrows mark the anterior margin of the mesoscutum. **A–B**. Enlarged, broadly punctate tegula. **A**. *L. kincaidii* (Cockerell, 1898). **B**. *L. glabriventre* (Crawford, 1907). **C–D**. Normal, broadly impunctate tegula. **C**. *L. pathiranae* sp. nov. **D**. *L. nelumbonis* (Robertson, 1890).

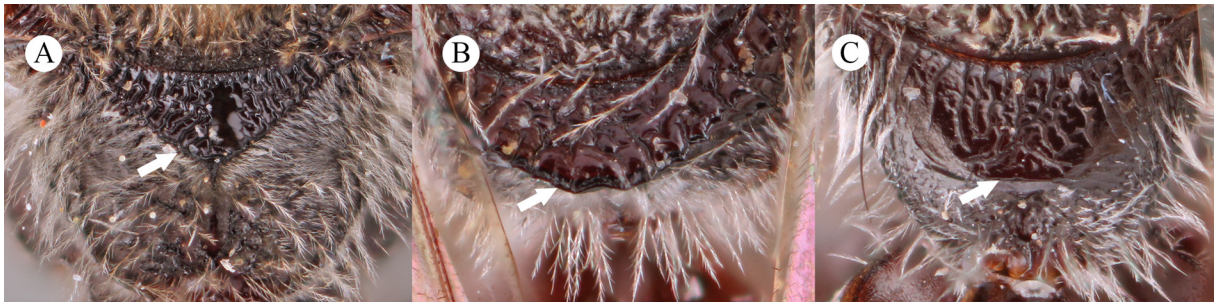


Fig. 111. Propodeum of males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 showing variation in propodeal triangle sculpture; white arrows mark the apical carina. **A–B**. Apical carina prominently raised. **A**. *L. nelumbonis* (Robertson, 1890). **B**. *L. pathiranae* sp. nov. **C**. Apical carina not distinctly raised, *L. pectoraloides* (Cockerell, 1895).

2. Tegulae enlarged and punctured all over (Fig. 110A) (west of the Rockies) ..... ***L. kincaidii*** (Cockerell, 1898)
– Tegulae normal and broadly impunctate (as in Fig. 110C–D) 3

3. Propodeal triangle with apical carina prominently raised (as in Fig. 111A–B) 4
– Propodeal triangle with apical carina not raised or indistinct (as in Fig. 111C) 5

4. Head remarkably longer, length/width ratio 1.12 (±0.05 SD) (Fig. 112A); mesoscutum punctate anteriorly (Fig. 110C) (western and eastern low desert) ..... ***L. pathiranae*** sp. nov.
– Head short, length/width ratio 0.95 (±0.01 SD) (Fig. 112B); mesoscutum rugose anteriorly (Fig. 110D) (eastern, mostly southeastern) ..... ***L. nelumbonis*** (Robertson, 1890)

5. Mesepisternum with distinct punctures below hypoepimeron area (Fig. 109C) ..... ***L. pectoraloides*** (Cockerell, 1895) (in part)
– Mesepisternum without punctures below hypoepimeron area (as in Fig. 109A, D) 6



Fig. 112. Heads of males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species. **A**. *L. pathiranae* sp. nov. **B**. *L. nelumbonis* (Robertson, 1890). **C**. *L. buccale* (Pérez, 1903). **D**. *L. ovaliceps* (Cockerell, 1898). **E**. *L. aspilurus* (Cockerell, 1925). **F**. *L. villosulum* (Kirby, 1802). Scale bar = 1 mm.

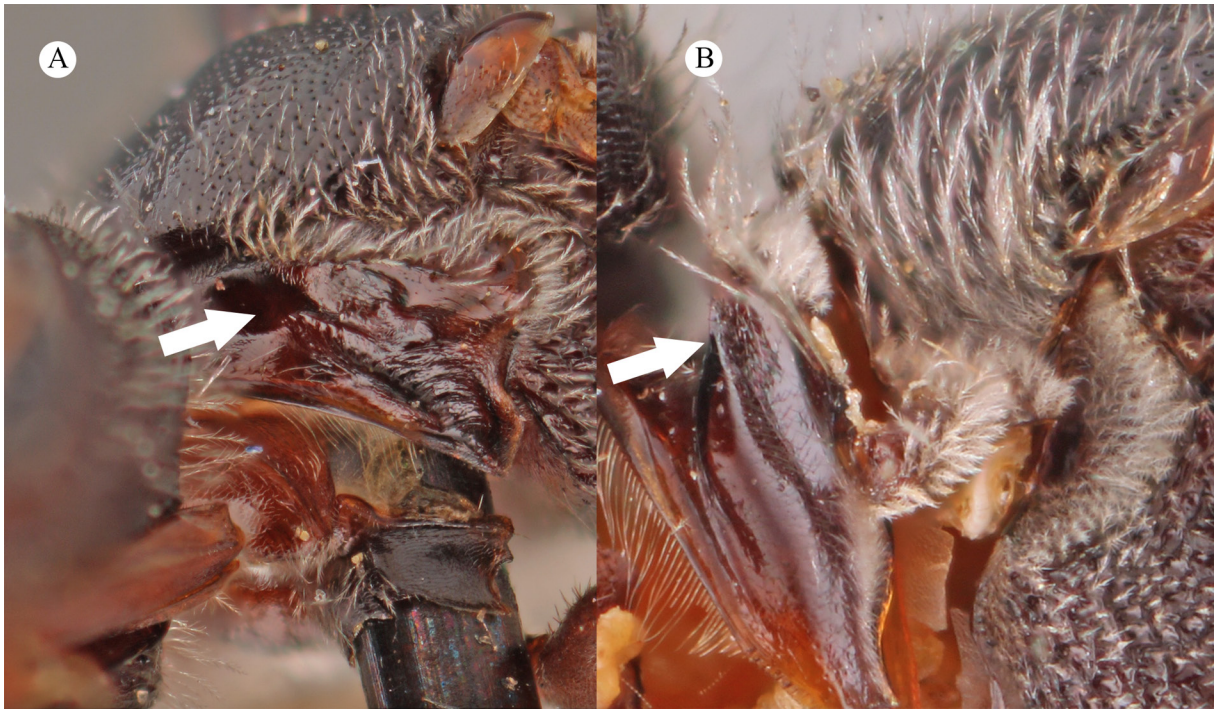


Fig. 113. Pronotal dorsolateral ridge of males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897. **A**. *L. pectorale* (Smith, 1853) – smoothly rounded. **B**. *L. angusticulum* sp. nov. – sharply angled. Note: panels are shown at slightly different viewing angles.

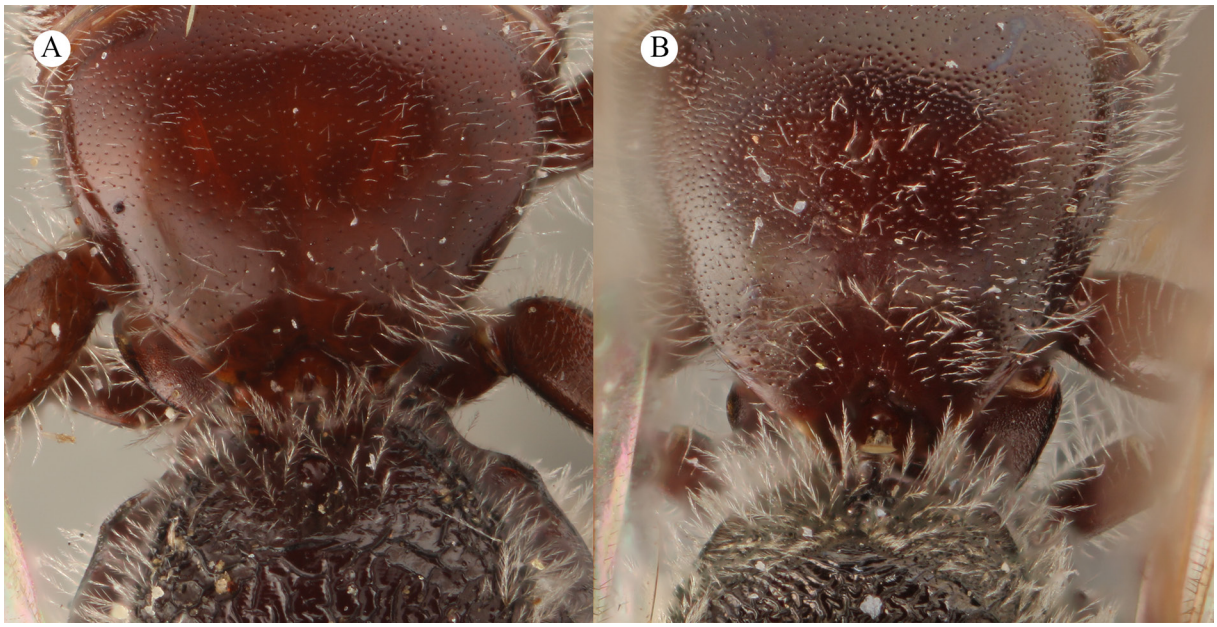


Fig. 114. T1 of males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897. **A**. *L. pectorale* (Smith, 1853) – anterior face lacking a fan, though scattered straight hairs are present. **B**. *L. angusticulum* sp. nov. – anterior face with a weak fan of overlapping, appressed hairs.

6. Pronotal dorsolateral ridge smoothly rounded (Fig. 113A); mesepisternum coarsely rugose (Fig. 109A); T1 anterior face without a fan (Fig. 114A) (eastern) .....***L. pectorale*** (Smith, 1853)
– Pronotal dorsolateral ridge sharply angled (Fig. 113B); mesepisternum not coarsely rugose (Fig. 109D); T1 anterior face with a fan (Fig. 114B) (western and eastern deserts, and western great plains) .....***L. angusticulum*** sp. nov.

7. Mandible elongate, extending well beyond opposing clypeal angle, nearly reaching opposing mandibular base (as in Fig. 115A–D) 8
– Mandible shorter, not reaching opposing clypeal angle or only slightly extending beyond it (as in Fig. 115E–F) 14

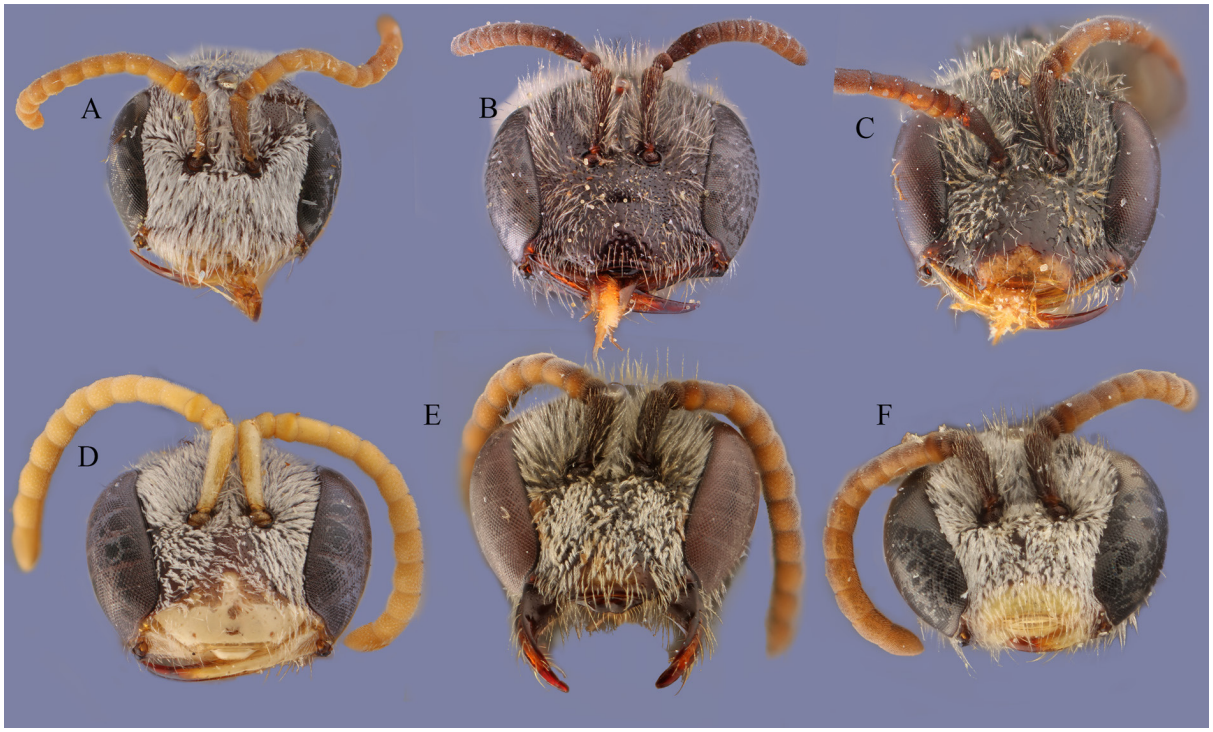


Fig. 115. Heads of males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 species in view showing the mandibles. **A–D**. Mandible elongate. **A**. *L. absurdiceps* (Timberlake, 1960). **B**. *L. lustrans* (Cockerell, 1897). **C**. *L. pectinatum* (Robertson, 1890). **D**. *L. swenki* (Crawford, 1906). **E–F**. Mandible short. **E**. *L. villosulum* (Kirby, 1802). **F**. *L. subobscurum* (Cockerell, 1895).

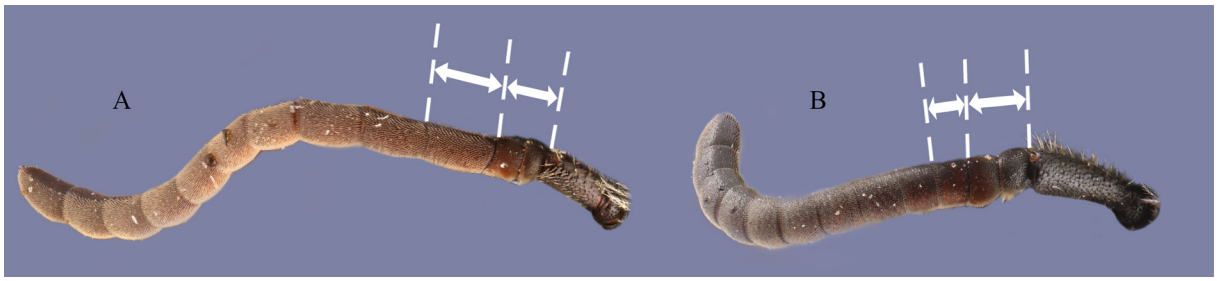


Fig. 116. Antenna of males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 showing the relative lengths of the pedicel, flagellomere 1, and flagellomere 2 (arrows). **A**. *L. diatretum* (Vachal, 1904) – long. **B**. *L. buccale* (Pérez, 1903) – short.

8. Clypeus covered by conspicuous tomentum (as in Fig. 115A); small bees (4–5 mm) (southwestern USA/Baja California) 9
– Clypeus not covered by conspicuous tomentum (as in Fig. 115B–D); large bees (5–8.5 mm) 10

9. Mesoscutum with distinct punctures, moderately sparse (IS = 1–2 PD), becoming more sparsely punctate (IS = 1–4 PD) submedially; gena tuberculate at midlength sometimes with elongated tubercular process (Figs 7C, 8C); metasoma orange (Figs 7D, 8D) ..... ***L. absurdiceps*** (Timberlake, 1960)
– Mesoscutum with indistinct sparse (IS = 2–7 PD) punctures; gena not tuberculate (Fig. 19A); metasoma brown (Fig. 19D) ..... ***L. vanduzeei*** (Sandhouse & Cockerell, 1924) stat. rev.

10. Clypeus entirely black (Fig. 115B); submarginal cells usually two .... ***L. lustrans*** (Cockerell, 1897)
– Clypeus yellow, in part (as in Fig. 115C–D); submarginal cells three 11

11. Clypeus black-brown with yellow distal band (Fig. 115C); mesoscutal punctation relatively sparse, interspaces laterad to parapsidal line approximately 2–3 PD; metasomal sterna with long hairs (1.5–2.5 OD) ..... ***L. pectinatum*** (Robertson, 1890)
– Clypeus yellow with brown basolateral patches (as in Fig. 115D); mesoscutal punctation relatively dense, interspaces laterad to parapsidal line approximately 1 PD; metasomal sterna with short hairs (1–1.5 OD) 12

12. Propodeal triangle with coarse rugae, posterior margin sharply angled (Eastern) ..... ***L. sopinci*** (Crawford, 1932)
– Propodeal triangle with fine rugae, posterior margin smoothly rounded (Midwestern) 13

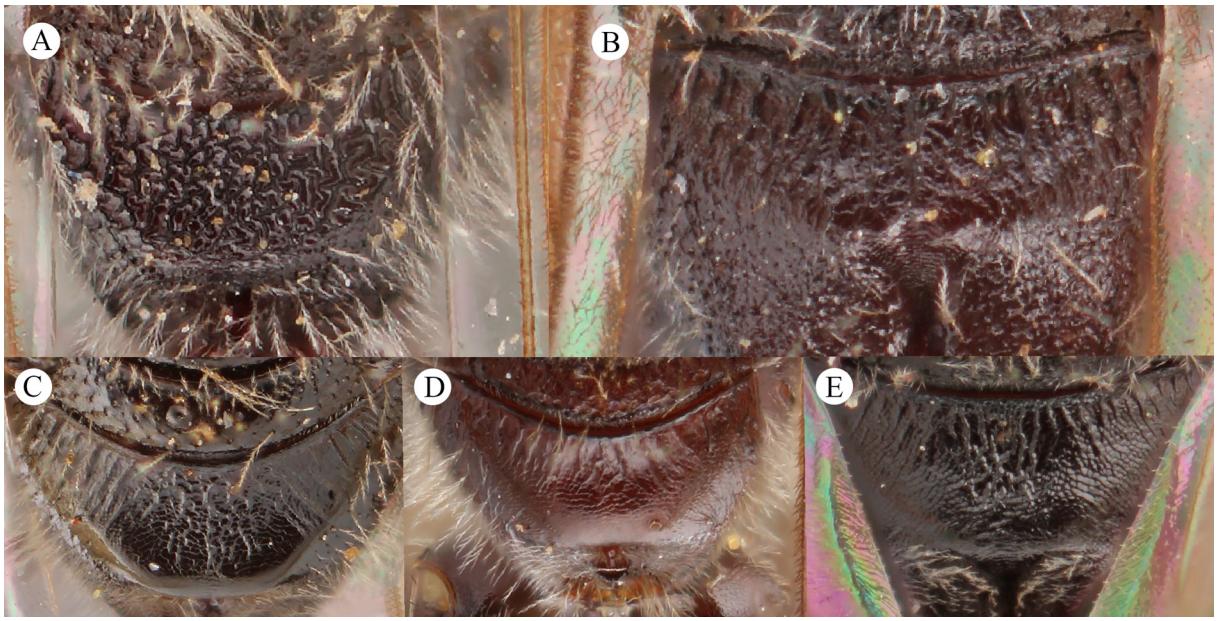


Fig. 117. Propodeal triangle of males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897. **A–D**. Rugae reaching posterior margin. **A**. *L. synthyridis* (Cockerell, 1906). **B**. *L. sequoiae* (Michener, 1936). **C–E**. Rugae not reaching posterior margin. **C**. *L. diatretum* (Vachal, 1904). **D**. *L. engleri* sp. nov. **E**. *L. subobscurum* (Cockerell, 1895).

13. Gena width subequal to eye, widest point below midlength of eye, towards mandible; mesepisternum mostly impunctate ..... ***L. fedorense*** (Crawford, 1906)
– Gena narrower than eye, widest point near midlength of eye; mesepisternum finely punctate ..... ***L. swenki*** (Crawford, 1906)

14. Tegula enlarged (Fig. 110B) ..... ***L. glabriventre*** (Crawford, 1907)
– Tegula normal (as in Fig. 110C–D) 15

15. Flagellomere 2 longer than the combined length of flagellomere 1 and pedicel (as in Fig. 116A) 16

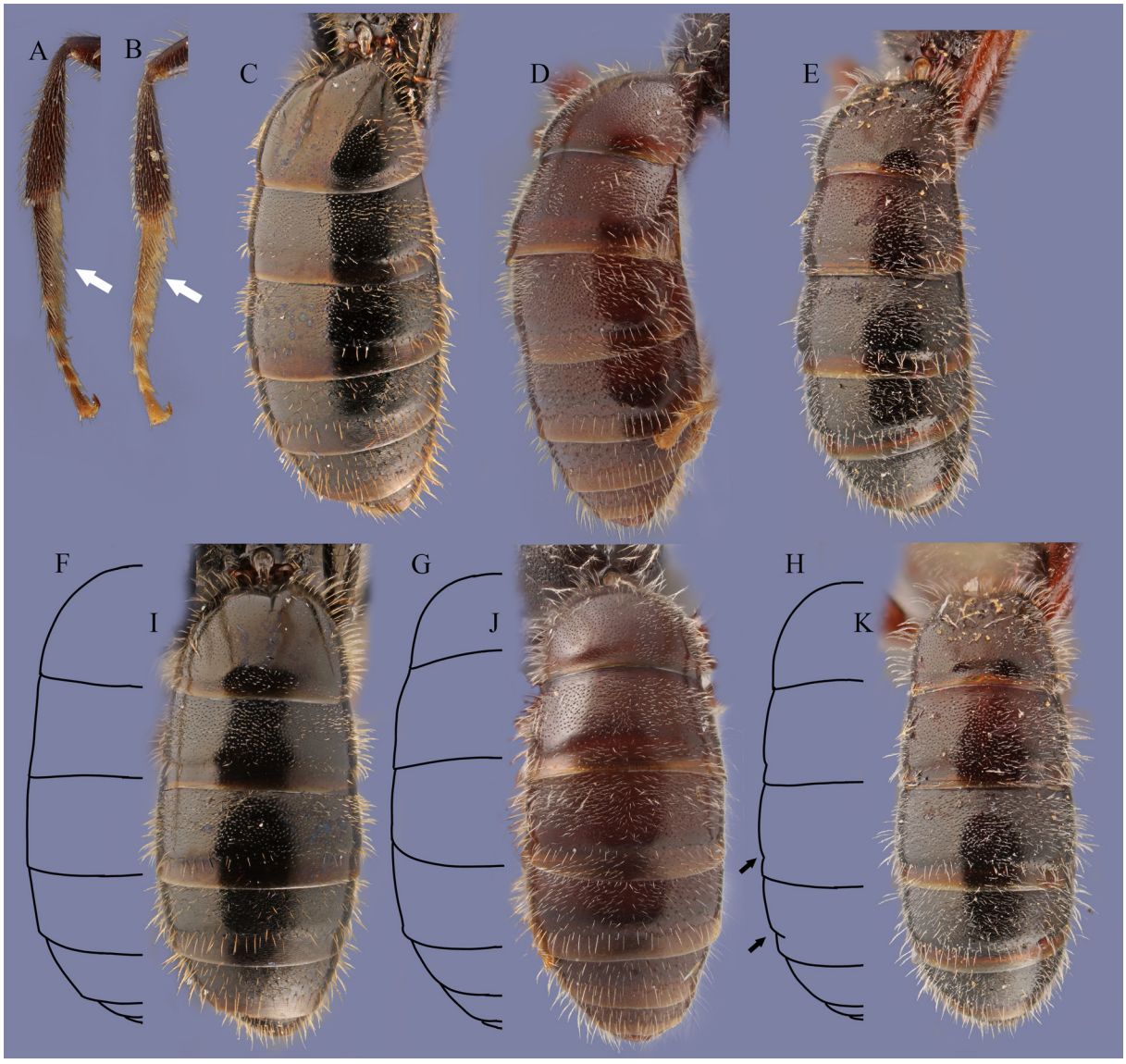


Fig. 118. A–B. Hind legs of males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897. **A.** *L. diatretum* (Vachal, 1904). **B**. *L. ruficorne* (Crawford, 1907). **C–E**. Dorso-lateral view of male abdomen. **C**. *L. foxii* (Robertson, 1895). **D**. *L. diatretum*. **E**. *L. ruficorne*. **F–H**. Line drawing showing T3–4 apical rim depression of the male abdomens. **F**. *L. foxii*. **G**. *L. diatretum*. **H**. *L. ruficorne*. **I–K**. Dorsal view of male abdomen. **I**. *L. foxii*. **J**. *L. diatretum*. **K**. *L. ruficorne*.

– Flagellomere 2 subequal to or shorter than the combined length of flagellomere 1 and pedicel (as in Fig. 116B) 19

16. Propodeal triangle with rugae reaching posterior margin (Fig. 117A) .... ***L. synthyridis*** (Cockerell, 1906)
– Propodeal triangle with rugae not reaching posterior margin (as in Fig. 117C) 17

17. T2–T3 densely punctate (IS ≤ 1 PD) to moderately dense (IS = 1–2 PD) up to the premarginal line (IS ≤ 1 PD), becoming nearly impunctate on the apical rim (as in Fig. 118D–E, J–K) 18
– T2–T3 with punctures becoming sparser (IS = 1–3 PD) near the premarginal line and impunctate on the apical rim (Fig. 118C, I) ..... ***L. foxii*** (Robertson, 1895)

18. Puncture density mesad of the parapsidal line moderately dense (IS = 1–2 PD) (Fig. 41D–F); flagellomeres more yellowish brown; legs brown except tibiae and tarsi largely yellowish brown (Fig. 118B); abdomen slender and T3–4 apical rim depressed relative to the disc (Fig. 118E, H, K); retrorse lobe slender and attenuated in the apex (Fig. 120H) .....***L. ruficorne*** (Crawford, 1907)
– Puncture density mesad of the parapsidal line sparse (IS = 1–4 PD) (Fig. 41A–C); flagellomeres largely brown; legs dark brown to brown (Fig. 118A); abdomen broad and T3–4 apical rim

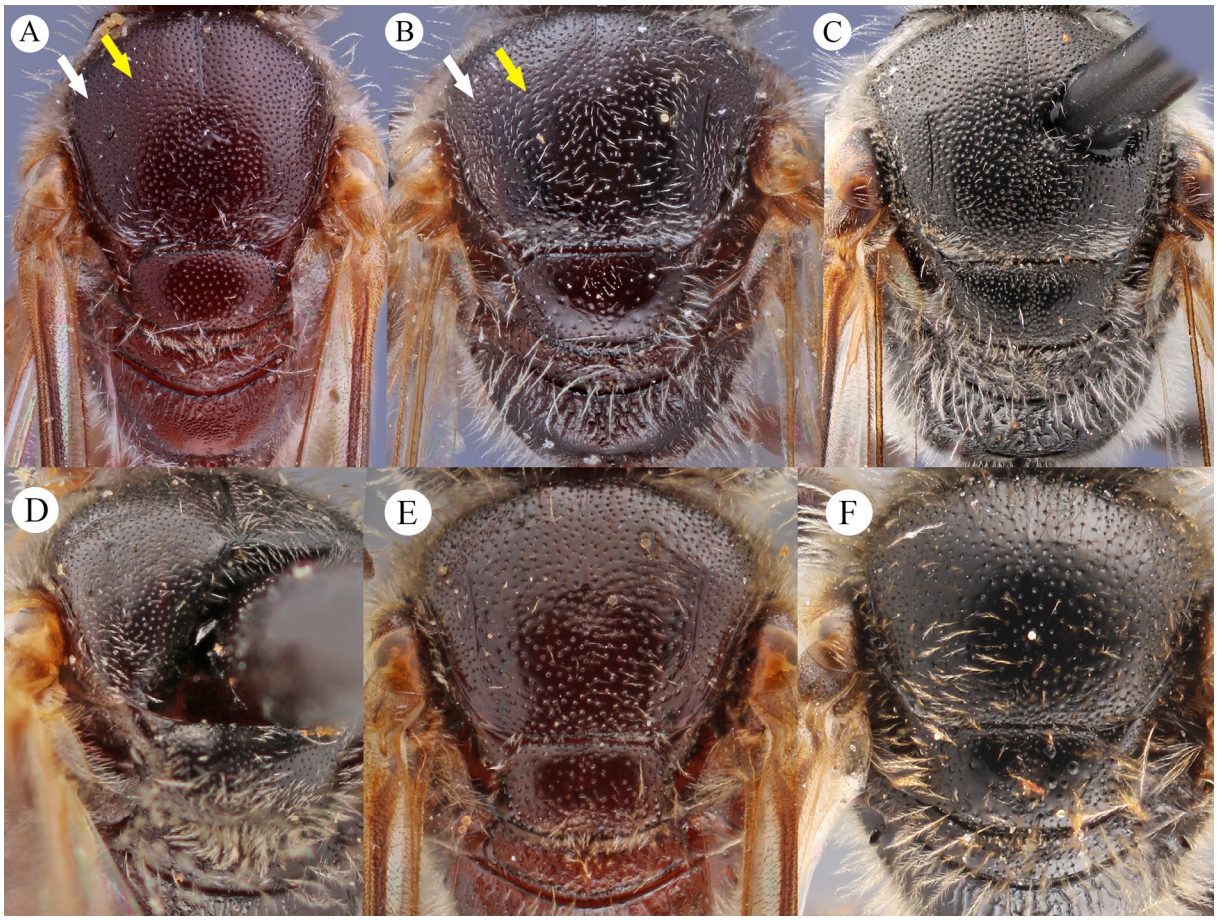


Fig. 119. Dorsal mesosoma of males of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897; white arrows indicate the laterad side of the parapsidal line, and yellow arrows indicate the mesad side. **A**. *L. ovaliceps* (Cockerell, 1898). **B**. *L. aspilurus* (Cockerell, 1925). **C**. *L. buccale* (Pérez, 1903). **D**. *L. subobscurum* (Cockerell, 1895). **E**. *L. engleri* sp. nov. **F**. *L. villosulum* (Kirby, 1802).

flat, continuous with the disc (Fig. 118D, G, J); retrorse lobe broad and rounded in the apex (Fig. 120G) ..... ***L. diatretum*** (Vachal, 1904)

19. Metasoma usually orange or light brown (as in Fig. 24D) 20
– Metasoma always black or brown (as in Fig. 24E) 21

20. Head longer, length/width ratio 1.22 (±0.01 SD) (Fig. 112D); puncture density between laterad and mesad side of the parapsidal line same (Fig. 119A). Propodeal triangle with rugae ending halfway to posterior margin (Fig. 119A) ..... ***L. ovaliceps*** (Cockerell, 1898) (in part, light morph)
– Head short, length/width ratio 0.96 (±0.02 SD) (Fig. 112E); puncture density between laterad and mesad side of the parapsidal line different (Fig. 119B). Propodeal triangle with rugae almost reaching posterior margin (Fig. 119B) ..... ***L. aspilurus*** (Cockerell, 1925) (in part, light morph)

21. Head longer (length/width ratio 1.20–1.30) (as in Fig. 112C–D) 22
– Head shorter (length/width ratio 0.80–1.10) (as in Fig. 112E–F) 23

22. Large bees (7.5–8.5 mm); clypeus slightly yellow only apically (Fig. 112C). Propodeal triangle with rugae reaching posterior margin (Fig. 119C) ..... ***L. buccale*** (Pérez, 1903)
– Smaller (<6.5 mm); nearly apical half of clypeus yellow (Fig. 112D). Propodeal triangle with rugae not reaching posterior margin (Fig. 119A) ..... ***L. ovaliceps*** (Cockerell, 1898) (in part, dark morph)

23. Propodeal triangle with posterior margin separated from posterior surface of propodeum by an apical carina/ sharp edge (Fig. 111C) ..... ***L. pectoraloides*** (Cockerell, 1895) (in part)
– Propodeal triangle with posterior margin merging smoothly with posterior surface of propodeum, without an apical carina or sharp edge (as in Fig. 117B–E) 24

24. Propodeal triangle with rugae reaching, or nearly reaching, the posterior margin (as in Figs 117B, 119B) 25
– Propodeal triangle with rugae ending about halfway to the posterior margin (as in Fig. 117D–E) 26

25. Legs dark brown to brown (Fig. 81C); head longer, length/width ratio 1.03 (±0.04 SD); mesoscutal puncture densities of mesad and laterad of parapsidal line similar (as in Fig. 100B) .... ***L. sequoiae*** (Michener, 1936)
– Legs brown except tarsi, bases and apices of meso- and metatibiae, and protibia largely orange (Fig. 23C); head short, length/width ratio 0.96 (±0.02 SD); mesoscutal puncture densities of mesad and laterad of parapsidal line different (Fig. 119B) .... ***L. aspilurus*** (Cockerell, 1925) (in part, dark morph)

26. Mesoscutum imbricate, becoming polished submedially between punctures (Fig. 119D); mesoscutum conspicuously covered by very short (<0.25 OD) appressed hairs (Fig. 119D) .... ***L. subobscurum*** (Cockerell, 1895)
– Mesoscutum polished all over, between punctures (as in Fig. 119E–F); mesoscutum covered mostly by sub-appresed and erect hairs (as in Fig. 119E–F) 27

27. T1 with conspicuous larger punctures; flagellum conspicuously two colour dorsally (brown) and ventrally (yellow) (Fig. 115E); mesoscutal punctures sparser (IS = 2–4 PD) mesad of parapsidal line (Fig. 119F) ..... ***L. villosulum*** (Kirby, 1802)
– T1 nearly impunctate, if present smaller punctures; flagellum light brown to brown, without having conspicuous colour change on dorsally and ventrally (as in Fig. 116B); mesoscutal punctures less sparse (IS = 1–3 PD) mesad of parapsidal line (as in Fig. 119E) 28

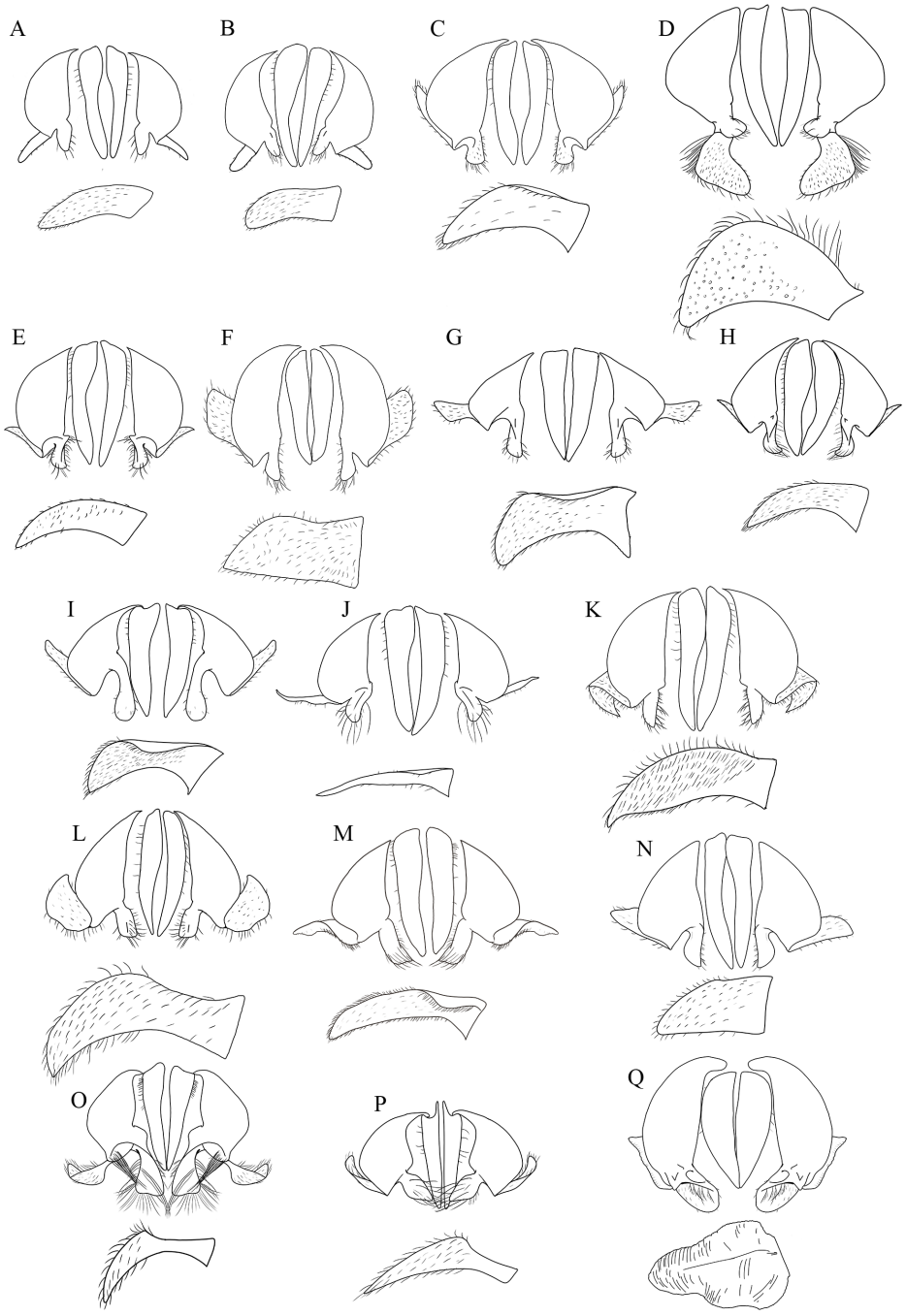


Fig. 120. Male genitalia of *Lasioglossum* (*Hemihalictus*) Cockerell, 1897 illustrated in dorsal view and positioned such that the gonostylus is parallel to the plane of vision. Retrorse lobes are also illustrated separately to the bottom of each figure, in lateral view, positioned parallel to the plane of vision. **A–B**. *L. arizonense* species group. **A**. *L. absurdiceps* (Timberlake, 1960). **B**. *L. vanduzeei* (Sandhouse & Cockerell, 1924) stat. rev. **C**. *L. aspilurus* (Cockerell, 1925). **D**. *L. buccale* (Pérez, 1903). **E**. *L. engleri* sp. nov. **F**. *L. glabriventre* (Crawford, 1907). **G–I.** *L. nitidiusculum* species group. **G**. *L. diatretum* (Vachal, 1904). **H**. *L. ruficorne* (Crawford, 1907). **I**. *L. synthyridis* (Cockerell, 1906). **J**. *L. ovaliceps* (Cockerell, 1898). **K–N**. *L. pectorale* species group. **K**. *L. angusticulum* sp. nov. **L**. *L. kincaidii* (Cockerell, 1898). **M**. *L. pathiranae* sp. nov. **N**. *L. pectoraloides* (Cockerell, 1895), **O**. *L. sequoiae* (Michener, 1936). **P**. *L. subobscurum* (Cockerell, 1895). **Q**. *L. villosulum* (Kirby, 1802).

28. Head shorter, length/width ratio 1.00 (±0.02 SD) ..... ***L. birkmanni*** (Crawford, 1906)
– Head long, length/width ratio 1.08 (±0.02 SD) 29

29. Supraclypeal area polished, with deep punctures ..... ***L. engleri*** sp. nov.
– Supraclypeal area imbricate, with shallow punctures ..... ***L. macoupinense*** (Robertson, 1895)

Discussion

Bee diversity is greater in western North America than in the east (Orr *et al.* 2021), but bees of this region are less well studied. Western North America has comparatively complex biogeography compared to eastern North America (Michener 1979; Almeida *et al.* 2023; Carril & Wilson 2023). This can be attributed to various factors like diverse topography, climatic variability, historic geological events, and so on (Coblentz & Riitters 2004; Badgley *et al.* 2017). These factors collectively are responsible for high biodiversity in the west. With its diverse topography, ranging from mountainous regions to arid deserts, and a spectrum of climates, this region provides a multitude of unique habitats. Bees, in particular, are known to be most diverse in xeric environments, and the southwestern USA includes contributions from the Sonoran and Chihuahuan deserts (Michener 1979; Minckley & Radke 2021). Rainfall patterns in xeric regions may lead to isolated floral resources that separate bee populations (Linsley 1958). Dry environments may also protect bees from fungal pathogens that target larval provisions (Michener 1979). These diverse environments contribute to the isolation of populations, fostering speciation as organisms adapt to specific ecological conditions (Minckley & Radke 2021). Taxonomic gaps in certain groups of organisms further highlight the potential for new species to be uncovered in less-studied pockets of western North America. By providing this review of western North American *L.* (*Hemihalictus*), we hope to draw increased attention to this interesting group. Due to the limited study to date, we expect additional diversity to be discovered.

Twenty-two species of *L.* (*Hemihalictus*) are recognized as valid from western North America. This includes 15 previously documented species, five newly described species, and two introduced species from the Palaearctic region. *Lasioglossum vanduzeei* was resurrected from synonymy with *L. arizonense* based on thorough morphological observations and morphometric analyses, which provided strong support for its reinstatement. This species has a neotropical distribution and is found in the Baja California Peninsula. It was included in this study because it was previously synonymized with *L. arizonense*, a species native to western North America. *Lasioglossum opata* sp. nov. is also likely to have a Neotropical distribution, based on current records of this species. Only one specimen has been recorded from Patagonia, Arizona, suggesting its presence in the region. Males of *L. tomentosum* sp. nov., *L. arizonense*, *L. robertsoni*, *L. angustius*, and *L. opata* are also unknown. *Lasioglossum tomentosum* is currently known from a very restricted distribution. Additional material from Utah and surrounding regions is needed to better understand its range. Similarly, *L. arizonense* is also known from very few specimens. The holotype of *L. arizonense* is from Arizona but no other specimens from Arizona have been examined. It seems probable the type is from near the western edge of the state, as the southeastern corner has been very well sampled for bees (Minckley & Ascher 2013; Minckley & Radke 2021). Other species, like *L. angustius*, are also known from few specimens. Notably, superficially similar species have been observed in various localities in Mexico, some of which display distinctive characteristics. All these highlight the importance of checking more material from their respective locations. The type of *Lasioglossum pecosense* remains unknown. While its description suggests it may belong to *L.* (*Evylaeus*), and is a possible junior synonym of *L. amicus*, this remains speculative without examination of its type.

The *L. nitidiusculum* species group now includes four accepted species from North America north of Mexico: *L. diatretum*, *L. foxii*, *L. synthyridis*, and *L. ruficorne*. *Lasioglossum foxii* is distributed in eastern North America. *Lasioglossum synthyridis* is now recognized as the senior subjective synonym of *L. inconditum*, as two paratypes of *L. synthyridis* match *L. inconditum*, despite the whereabouts of

the holotype being unknown. *Lasioglossum synthyridis* has a distribution throughout North America. All other species in the group were described from western North America. In this study, we recognized *L. diatretum* as a senior subjective synonym of *L. supranitens* and *L. ruficorne* as a senior subjective synonym of *L. vaporellum* and *L. pulveris* based on examination of their types. However, we highlight the presence of variation among populations and the possibility of additional new species within the *L. nitidiusculum* group.

Lasioglossum buccale and *L. villosulum* are recorded and documented as exotic species to North America. *Lasioglossum buccale* is a Palaearctic species, ranging from Europe to Central Asia (Ebmer 2003; Murao *et al.* 2017). It has been recorded in western Canada and the northwestern United States (Hatten *et al.* 2024). Nearly all the records for this species are quite recent, although a specimen from 1964 was examined and another from 1967 is in the Washington State University collection. This highlights the possibility that recent expansions of introduced species (e.g., Gutierrez *et al.*, 2023), might not be indications of recent introductions. This species seems to prefer plants with particular pollination syndromes (Hatten *et al.* 2024) and it may have escaped attention during more general collections. *Lasioglossum villosulum* is a widespread species throughout the Palaearctic (Pauly *et al.* 2019). It was originally confirmed in North America through DNA barcodes (Pauly *et al.* 2019). Most recent bee introductions are of cavity-nesting bees (Cane 2003; Russo 2016). Movement of ground-nesting species, like *L. villosulum*, is relatively rare (but see Magnacca *et al.* 2013). Anthropogenic activities, propelled by globalization, accelerate both intentional and unintentional introductions of alien species beyond their natural biogeographic boundaries. While many species are introduced globally, only a small proportion become invasive, leading to a diverse array of negative impacts (Núñez-González *et al.* 2024). Therefore, early detection of introduced species is crucial due to their possible undesirable effects on newly introduced environments, including competition with native flower visitors for floral resources, competition with native organisms for nest sites, transmission of parasites or pathogens to natives, changes in seed set of native organisms, and pollination of exotic weeds (Goulson 2003).

There are no evident host plant specialists found from the western region. A high proportion of specimens within the *L. arizonense* group were collected on *Tamarix* spp. (Tamaricaceae). Interestingly, *Tamarix* is a non-native plant in North America, with certain species classified as invasive (Gaffke *et al.* 2022). *Tamarix* blooms from spring to fall, providing an extended resource to bees (Tepedino *et al.* 2008). Most specimens of the *L. arizonense* group were collected from *Tamarix* in April, when there were few other resources as abundant at that time (Andersen & Nelson 2013). *Tamarix* pollen is used by many species, including *Lasioglossum* (Wiesenborn *et al.* 2008). The *L. arizonense* groups may be 'tourists', opportunistically using *Tamarix* early in the season (Durst *et al.* 2008).

In a conservation context, this study underscores the need for taxonomy to document both introduced species and previously undocumented diversity. Furthermore, clarifying the identity of existing names can dramatically affect their potential conservation status. For example, *L. angustius*, which was previously recorded fairly widely, is documented here from only five specimens, with another more widespread species, *L. angusticulum* sp. nov., accounting for all of the remaining former records. Similar changes have been seen in other groups of halictid bees (Portman *et al.* 2022). No records of *L. angustius* have been reported since June of 1915, marking a considerable gap in observations for this species. This species may be truly rare with need for conservation attention, or the limited data may signal specific habitat preferences that are not well understood. For example, *L. pectinatum* was considered a rare species in the east, until its association with *Physalis* was discovered (Gibbs *et al.* 2013). Although *L. pectinatum* remains uncommon in collections, focused collecting from *Physalis* has proved successful at locating the bee (Gibbs *et al.* 2013). Our separation of *L. angustius* from the more common *L. angusticulum* is critical for identifying potential conservation needs. When considering a species group like *L. arizonense*, which now consists of four species with narrow geographic ranges,

the conservation implications are significant. The fragmentation of their distribution results in restricted ranges and smaller populations, emphasizing the need for targeted conservation efforts in these specific areas.

Conclusion

In conclusion, our study provides another example of the continuing importance of alpha taxonomy, even in groups that are relatively well studied and receive substantial public attention, such as bees. Although bee conservation has been a hot topic for several years, in some respects we remain in the early stages of documenting species diversity, particularly in biodiversity hotspots like the western USA. This work is critical if we are to take the next steps of trying to monitor bee diversity going forward.

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