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A revision of the *simplex* species group of the cleptoparasitic bee genus *Triepeolus* Robertson, 1901 (Hymenoptera: Apidae)

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Abstract. Species of the cleptoparasitic bee genus *Triepeolus* Robertson, 1901 (Hymenoptera: Apidae: Nomadinae) of which the female has a trapezoidal or triangular pseudopygidial area with bright, reflective setae and a concave apical margin are revised. This entirely New World group includes the widely known species *T. simplex* Robertson, 1903 and is thus termed the *simplex* species group. A total of 18 species in the *T. simplex* group are recognized as valid, of which seven are newly named and described—*T. apache* sp. nov., *T. eumeniformis* sp. nov., *T. hirsutus* sp. nov., *T. oblongimacula* sp. nov., *T. parahirsutus* sp. nov., *T. paucipunctatus* sp. nov., and *T. shoshone* sp. nov., all from North America. Eleven redundant names are newly synonymized under three valid ones as follows: *Epeolus rugulosus* Cockerell, 1917 syn. nov., *E. metatarsalis* Friese, 1921 syn. nov., and *T. bilunatus* Cockerell, 1949 syn. nov. under *Triepeolus mexicanus* (Cresson, 1878); *E. lectiformis* Cockerell, 1925 syn. nov., *T. lusor* Cockerell, 1925 syn. nov., and *T. junctus* Mitchell, 1962 syn. nov. under *T. rhododontus* Cockerell, 1921; and *E. permixtus* Cockerell, 1923 syn. nov., *T. brunnescens* Cockerell & Sandhouse, 1924 syn. nov., *T. pacis* Cockerell, 1925 syn. nov., *E. sarothrinus* Cockerell, 1929 syn. nov., and *E. sarothrinus* var. *confluens* Cockerell, 1929 syn. nov. under *T. segregatus* (Cockerell, 1900). Species limits were established using an integrative systematics approach, namely considering morphological and biogeographic evidence as well as DNA barcode data. Taxon concepts are revised for all species in the *T. simplex* group, with morphological diagnoses and keys presented to enable their identification. Known information on the ranges and ecology of the treated species is summarized.

Keywords. DNA barcode, Epeolini, identification key, integrative systematics, North and South America.

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Introduction

Triepeolus Robertson, 1901 (Hymenoptera: Apidae: Nomadinae) is the most species-rich genus in the tribe Epeolini Robertson, 1903 and second largest genus of cleptoparasitic nomadine bees after *Nomada* Scopoli, 1770. The only global revision of the genus was by Rightmyer (2008), who revised taxon concepts for most species. Notable exceptions include those in two taxonomically problematic species groups comprised of *T. simplex* Robertson, 1903 and similar species, and *T. verbesinae* (Cockerell, 1897) and similar species. Although Rightmyer (2008) included species of these groups in keys that covered limited geographic regions (Eastern North America, South America, and the Caribbean), the keys included new species that were only later named and described (Gibbs *et al.* 2017; Onuferko *et al*. 2024), species for which some synonymies were implied by omission of suspected junior synonyms but not actually published, and a species no longer recognized as valid (Onuferko *et al*. 2024). The South American species in these groups, which are the only *Triepeolus* represented in South America, were recently revised (Onuferko *et al*. 2024). However, both groups exhibit their greatest diversity in North America (Rightmyer 2008), and the taxonomy of the North American species has remained problematic.

In the present study, the *T. simplex* group is revised for all species. Morphological means of separating females and males in this species group from other *Triepeolus* are presented. Diagnoses for and a key to all species are provided, and all species are fully described/redescribed except those occurring in South America, which were treated in detail by Onuferko *et al*. (2024). Finally, known information about the ecology of the species in the *T. simplex* group is presented and their known geographic ranges are mapped.

Material and methods

An integrative systematics approach was used to establish taxon concepts for the treated species, which were delineated based on morphological, geographic, and (if available) molecular evidence. Molecular work consisted of amplifying and sequencing a fragment (up to 658 base pairs (bp) in length) of the cytochrome *c* oxidase subunit I (COI) mitochondrial gene, dubbed the DNA barcode region (Hebert *et al*. 2003a, 2003b). DNA barcoding took place at the Canadian Museum of Nature (CMN) Laboratory of Molecular Biodiversity (for specimens with sample IDs that start with 'CMNTO') and the Centre for Biodiversity Genomics (CBG) at the University of Guelph in Guelph, Ontario, Canada (for all other specimens). In most cases (and all involving the CBG), DNA extraction involved removing one or two legs or parts thereof (usually just the midleg on the specimen's right side). Legs sent to the CBG for further processing (i.e., DNA extraction, PCR, sequencing, and sequence assembly) were placed in 96-well plastic plates, with a few drops of ≥95% ethanol added to each well. Those processed at the CMN were placed into G-Tube® 2.0 mL Microcentrifuge Tubes (Bio Plas Inc., San Rafael, California, USA) containing 1.0 mm silicon carbide sharp particles (enough to fill the tube's cap). The prepared tubes were loaded into a BeadBeater to mechanically break down the insects' chitinous exoskeleton before proceeding to lysis of the ground tissues and DNA extraction following a protocol adapted from Ivanova *et al*. (2006). Some specimens were immersed in 70–80% ethanol for several days in a freezer (between -10 and -20°C), after which the head, fore legs, propleura, and prosternum (and in some cases also the entire pronotum) were detached using sterilized fine tip forceps, which were then used to remove (and transfer into 1.5 mL Eppendorf Tubes®) muscle tissues from within the mesosomal cavity. Following tissue removal, the detached structures were glued back to the rest of the (repinned) specimens using a small amount of Elmer's Washable Clear School Glue and/or shellac gel. A procedure for animal extraction adapted from Ivanova *et al*. (2006) was used to extract DNA from the softened muscle tissues. A few specimens were subjected to the non-destructive sampling method proposed by Santos *et al*. (2018), which involves using Proteinase K to digest protein tissues from whole specimens while preserving the exoskeleton. Following a 16-hour incubation period at ≤56°C fully immersed in 200 µL digestion buffer (prepared using the *Quick*-DNA Miniprep Plus Kit (Zymo Research) or as follows:

194 µL WID buffer + 6 µL Proteinase K (20 mg/mL)), which was subsequently removed and transferred to new 1.5 mL Eppendorf Tubes® by pipette, the intact specimens were cleaned by immersion in 70% ethanol and again pinned, dried, and labeled. DNA was extracted from the collected lysate following a protocol adapted from Ivanova *et al*. (2006). The extraction method (destructive or non-destructive) and tissue source (e.g., right midleg) used are indicated on the specimen page for each record on the Barcode of Life Data System (BOLD).

The barcode region was amplified using one or more of the following primer pairs: BEEf / BEEr (Creedy *et al*. 2020), C_LepFolF / C_LepFolR (Hernández-Triana *et al*. 2014), LCO1490 / HCO2198 (Folmer *et al*. 1994), LepF1 / LepR1 (Hebert *et al*. 2004), LepF1 / C_ANTMR1D (Smith & Fisher 2009), MLepF1 (Hajibabaei *et al*. 2006) / LepR1, and/or RonMWASPdeg_t1 (direct submission to BOLD by A. Smith) / LepR1. For PCR at the CMN, reaction volumes of 15 µL and 50 µL were used. The reaction mixtures consisted of 47 to 65 parts DNA-grade H_2O (depending on how much DNA template was used), 20 parts 5× Q5® Reaction Buffer (New England Biolabs (NEB), Ipswich, Massachusetts, USA), two parts dNTPs (10 mM), five parts forward primer (10 µM), five parts reverse primer (10 µM), one part Q5® High Fidelity DNA polymerase (0.3 U/rxn) (NEB), and two to 20 parts DNA template. The following PCR conditions, which were programed into an Eppendorf® Mastercycler® Pro Thermal Cycler, were used: one minute at 94°C (initial denaturation), five cycles of 40 seconds at 94°C (denaturation), 40 seconds at 45°C (annealing), and one minute at 72°C (extension) followed by 35–40 cycles of 40 seconds at 94°C (denaturation), 40 seconds at 51°C (annealing), and one minute at 72°C (extension), and five minutes at 72°C (final extension). Sanger sequencing (in both directions) at the CMN followed the procedure described in Onuferko *et al*. (2019). The same primers used in PCR were used in the sequencing reactions, except M13F (Messing 1983) was used as the forward sequencing primer for amplicons obtained using the primer pair RonMWASPdeg_t1 / LepR1, and amplicons obtained using the primer pair LepF1 / C_ANTMR1D were sequenced only in the forward direction. The PCR and sequencing primers used are indicated on the sequence page for each record on BOLD.

Trace files obtained at the CMN were imported into Geneious ver. 11.1.5 (Kearse *et al*. 2012) for assembly into consensus sequences, which were checked therein for quality and to ensure that no stop codons were present in the correct reading frame before being uploaded to the BOLD website (https://www.boldsystems.org/). Except for four sequences that were each comprised of a single trace mapped to a reference sequence, all DNA barcodes were assembled from two or more ABI trace files, which were also uploaded to BOLD. In an automated process implementing the Refined Single Linkage (RESL) clustering algorithm, high-quality DNA barcode sequences were assigned barcode index numbers (BINs) representing molecular operational taxonomic units (MOTUs) that typically correspond to real species (Ratnasingham & Hebert 2007, 2013). To visualize sequence similarity/dissimilarity and check for potential instances of contamination, a neighbor-joining (NJ) tree based on the Kimura 2 Parameter distance model (Kimura 1980) was generated on BOLD. New DNA barcode sequences are deposited in GenBank (https://www.ncbi.nlm.nih.gov/genbank/), and the complete records and sequence data are published in the dataset DS-TSSG entitled '*Triepeolus simplex* species group' on BOLD. Specimens for which DNA barcoding was attempted (with or without success) are indicated in Supp. file 1.

Morphological features were studied under a dissecting microscope with an ocular micrometer within the eyepiece calibrated with a microscope micrometer calibration ruler to take measurements. Specimens were also observed and photographed using the Leica Z16 APO apochromatic zoom system together with the Leica DFC495 and DMC5400 cameras and Leica Applications Suite. The resulting high-quality focus-stacked digital images were cropped, resized, and in some cases minimally edited (to enhance brightness/contrast) and marked with arrows and lines in PaintShop Pro (Jasc Software, Inc.) and subsequently assembled into labeled figure plates in Adobe Photoshop 2020 (Adobe Inc.).

Morphological terminology mostly follows Rightmyer (2008), which generally followed Michener (2007) but introduced some additional terms redefined and illustrated in part here for clarity (see Fig. 1). 'Paramedian bands' refer to the paired, longitudinal bands of pale tomentum originating in the anterior half of the mesoscutum. 'Discal patch' refers to the dark (brown or black) region of short, appressed setae surrounded on one or more sides by pale tomentum that in most species of *Triepeolus* appears as four distinct bands: a 'basal transverse band', an 'apical transverse band', and a pair of 'lateral longitudinal bands' joining them. 'Bigibbous' is an adjective meaning with two convexities or protuberances. Deviations from Michener (2007) and Rightmyer (2008) include the use of 'frontal area', 'genal area', and 'vertexal area' rather than 'frons', 'gena', and 'vertex', respectively, as these parts of the head are not clearly differentiated on the exterior surface (Prentice 1998; see also Packer & Graham 2020 for an example of the use of these terms). Additionally, here 'length' and 'width' do not refer to the longer and shorter sides of an object, as in geometry. Rather, they refer to measurements made along the longitudinal and transverse anatomical planes, respectively, or, for appendages and structures (e.g., setae) protruding from the body, 'length' is used in reference to measurements made along the basal-apical axis and 'width' to measurements perpendicular to it.

Abbreviated terms

d	=	diameters of punctures
F	=	flagellomere
i	=	interspaces between punctures
ITW	=	intertegular width (shortest distance between tegulae)
MOD	=	median ocellar diameter
S	=	Metasomal sternum
T	=	Metasomal tergum

Specimens were studied from 47 entomological collections. The primary types of all species in the *T. simplex* group described/redescribed herein, including their junior synonyms, were personally examined by the co-authors of this revision except those of *Epeolus metatarsalis* Friese, 1921, whose whereabouts are unknown, and *T. roni* Genaro, 1999, which was studied exclusively from detailed images made available by contacts in Cuba (see Acknowledgements). Syntypes of *T. obliteratus* Graenicher, 1911 were examined by the second author in 2005 but studied recently by both co-authors from images kindly supplied by staff at the institution where the specimens are housed. Images of primary types and associated labels are presented in Supp. file 2. Specimen records associated with images submitted to BugGuide (https://bugguide.net/) and iNaturalist (https://www.inaturalist.org/) by various contributors are also presented, under 'Non-preserved material', with all identifications made or verified by TO.

Abbreviated names of institutions/collections where studied specimens are/will be deposited

Names of curators and/or collection managers are in parentheses.

AMNH	=	American Museum of Natural History, New York, NY, USA (J.M. Carpenter, J.G. Rozen, Jr and C. Smith)
ANSP	=	Academy of Natural Sciences of Drexel University, Philadelphia, PA, USA (J.D. Weintraub)
ASU	=	Arizona State University Hasbrouck Insect Collection, Tempe, AZ, USA (N. Franz and S. Lee)
BBSL	=	Utah State University, USDA Bee Biology and Systematics Laboratory, Logan, UT, USA (T.L. Griswold)
BIML	=	Patuxent Wildlife Research Center USGS Native Bee Inventory and Monitoring Lab, Laurel, MD, USA (S.W. Droege)
CAS	=	California Academy of Sciences, San Francisco, CA, USA (C. Grinter and R. Zuparko)

CMNC	=	Canadian Museum of Nature Insect Collection, Gatineau, QC, Canada (J.-M. Gagnon and F. Génier)
CNC	=	Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, ON, Canada (S. Cardinal and J. Fernández-Triana)
CSUC	=	C.P. Gillette Museum of Arthropod Diversity, Fort Collins, CO, USA (P.A. Opler)
CTMI	=	Central Texas Melittological Institute, Austin, TX, USA (J.L. Neff)
CUIC	=	Cornell University Insect Collection, Ithaca, NY, USA (J. Dombroskie)
DEBU	=	University of Guelph Insect Collection, Guelph, ON, Canada (S.M. Paiero)
ECOSUR	=	El Colegio de la Frontera Sur, Tapachula, CS, Mexico (on indefinite loan from R. Ayala-Barajas, Estación de Biología Chamela, Universidad Nacional Autónoma de México to L. Packer, York University)
EMEC	=	University of California, Essig Museum of Entomology, Berkeley, CA, USA (P. Oboyski)
ERM	=	Eugene R. Miliczky personal collection, Wapato, WA, USA
FSCA	=	Florida State Collection of Arthropods, Gainesville, FL, USA (E. Talamas)
INHS	=	Illinois Natural History Survey, Champaign, IL, USA (T. McElrath)
IRSNB	=	Royal Belgian Institute of Natural Sciences, Brussels, Belgium (W. Dekoninck)
KUNHM	=	University of Kansas, Biodiversity Institute and Natural History Museum, Lawrence, KS, USA (R. Osborn)
LACM	=	Natural History Museum of Los Angeles County, Los Angeles, CA, USA (B.V. Brown and G. Kung)
LEM	=	Lyman Entomological Museum, Sainte-Anne-de-Bellevue, QC, Canada (J. Gillung and S. Boucher)
MHNTSN	=	Museo de Historia Natural Tranquilino Sandalio de Noda, Pinar del Río, Cuba (D. Breto)
MNDNR	=	Minnesota Department of Natural Resources, MN, USA (presently with Z. Portman at the Cariveau Native Bee Lab, University of Minnesota, Saint Paul, MN, USA)
MNHNCU	=	Museo Nacional de Historia Natural de Cuba, Havana, La Habana, Cuba (E. Gutiérrez)
MPM	=	Milwaukee Public Museum, Milwaukee, WI, USA (J. Colby)
NCSU	=	North Carolina State University Insect Museum, Raleigh, NC, USA (R. Blinn)
NHMUK	=	Natural History Museum, London, United Kingdom (J. Monks)
OKBS	=	Oklahoma Biological Survey, University of Oklahoma, Norman, OK, USA (K.L.J. Hung)
OSAC	=	Oregon State Arthropod Collection, Corvallis, OR, USA (C.J. Marshall)
PCYU	=	Packer Collection at York University, Toronto, ON, Canada (L. Packer)
RAM	=	Royal Alberta Museum, Edmonton, AB, Canada (T. Cobb and M. Buck)
RJC	=	Robert Jean collection, Indiana State University, Terre Haute, IN, USA
RLM	=	Robert L. Minckley collection, University of Rochester, Rochester, NY, USA
RSKM	=	Royal Saskatchewan Museum, Regina, SK, Canada (C.S. Sheffield)
SCPC	=	Sophie Cardinal personal collection, Ottawa, ON, Canada
SDNHM	=	San Diego Natural History Museum, San Diego, CA, USA (S. Derkarabetian and P. Horsley)
TOPC	=	Thomas M. Onuferko personal collection, Ottawa, ON, Canada
UAIC	=	University of Arizona Insect Collection, Tucson, AZ, USA (W.E. Hall)
UCBME	=	University of California, Bohart Museum of Entomology, Davis, CA, USA (S. Heydon)
UCMC	=	University of Colorado Museum of Natural History Entomology Collection, Boulder, CO, USA (V. Scott)
UCR	=	University of California, Riverside – Entomology Research Museum, Riverside, CA, USA (D. Yanega)
UMSP	=	University of Minnesota Insect Collection, Saint Paul, MN, USA (R.E. Thomson)

UNAM	=	Estación de Biología Chamela, Universidad Nacional Autónoma de México, Chamela, JA, Mexico (R. Ayala-Barajas)
USNM	=	U.S. National Entomological Collection, National Museum of Natural History, Washington, D.C., USA (S.G. Brady and E. Okonski)
VCE	=	Vermont Center for Ecostudies, Norwich, VT, USA (S. Hardy)
WRME	=	J.B. Wallis/R.E. Roughley Museum of Entomology, Winnipeg, MB, Canada (J. Gibbs)
ZMB	=	Museum für Naturkunde, Berlin, Germany (B. Blaimer and S. Krause)

Descriptions/redescriptions follow the format of Onuferko *et al*. (2024), with the name-bearing types forming the basis of the descriptions and measurements. As there is generally little sexual dimorphism in *Triepeolus*, lengthy descriptions applicable to both sexes are provided (for species known from females and males), which are followed by shorter descriptions listing female- and male-specific features. Except in the case of ITW, which represents the shortest distance between the tegulae, anatomical features were measured at their longest and/or widest extents.

A morphological diagnosis is provided for the *T. simplex* group based on the female whereas a key is presented to separate males in this species group from other *Triepeolus*. Morphological diagnoses are also provided for all the treated species, and the features that separate them from others in the *T. simplex* group if not all other *Triepeolus* are listed therein. A fully illustrated dichotomous key is presented to separate the species within the *T. simplex* group from one another, which continues from couplet 18 in Rightmyer's (2008) key to females for North and Central American species, apart from *T. mexicanus* (Cresson, 1878), which is keyed out in a preceding couplet.

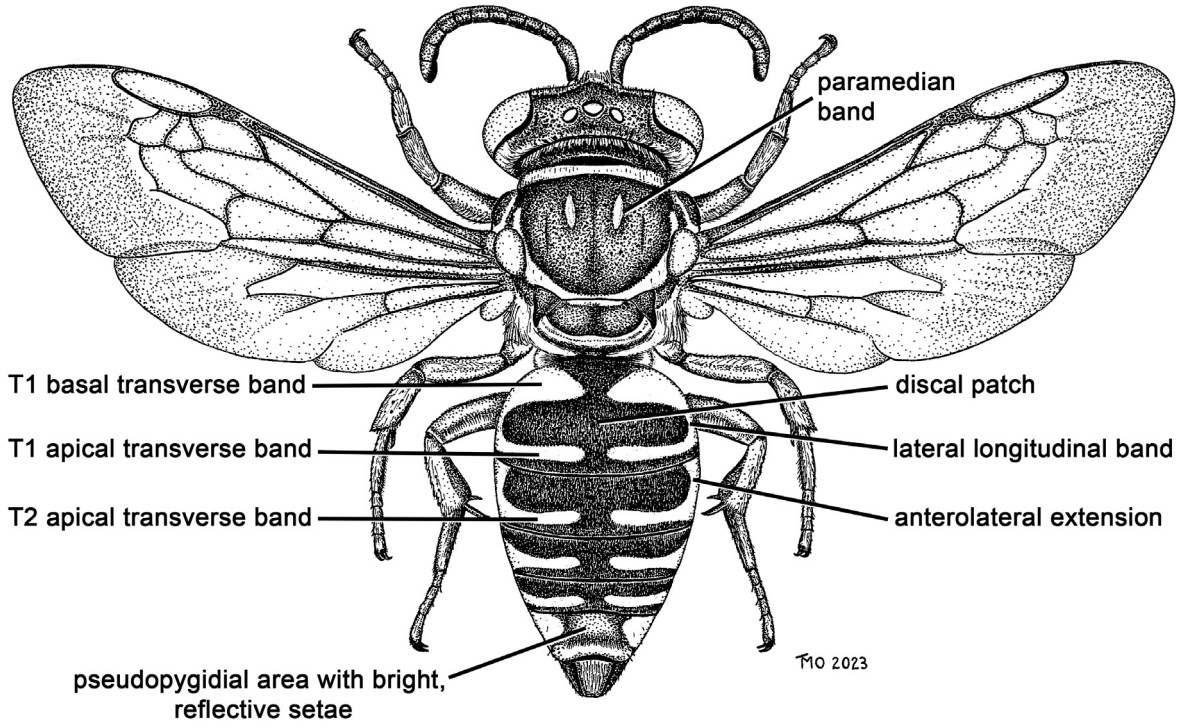

Fig. 1. Female *T. tuberculifer* Onuferko, Rightmyer & Roig-Alsina, 2024 illustrating the mesosomal and metasomal bands of tomentum commonly present in *Triepeolus* Robertson, 1901.

Projected maps were constructed in RStudio (ver. 2022.07.0+548) (RStudio Team 2022) using the packages sp (Pebesma & Bivand 2005; Bivand *et al*. 2013), rmapshaper (Teucher & Russell 2023), raster (Hijmans 2022), and sf (Pebesma 2018; Pebesma & Bivand 2023). Spatial data for global administrative boundaries were downloaded from https://gadm.org/ using the function 'getData' in raster. A shapefile of lakes (ne_10m_lakes.shp) was obtained from the Natural Earth website (https://www.naturalearthdata.com/). Splined convex hull polygons representing approximate species ranges were generated from given or approximated GPS coordinates corresponding to known collection/observation localities (see Supp. file 1 for the complete list for all species except those occurring in South America, for which these data were obtained from Onuferko *et al*. 2024) using customized unpublished code (available from the first author upon request), as in Onuferko (2017, 2018) and Onuferko & Sheffield (2022).

Floral records were compiled from specimen labels, images of bees visiting flowers, and published literature sources. Botanical nomenclature follows the World Flora Online (http://www.worldfloraonline.org/).

Results

Taxonomy

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Superfamily Apoidea Latreille, 1802
Family Apidae Latreille, 1802
Subfamily Nomadinae Latreille, 1802
Tribe Epeolini Robertson, 1903

Genus ***Triepeolus*** Robertson, 1901

Diagnosis for the *simplex* species group within *Triepeolus*

Females of the presumably monophyletic *T. simplex* group are easily recognized by the well-defined trapezoidal or triangular pseudopygidial area, which has reflective (golden/coppery to silvery) setae, and concave apical margin of T5 (Fig. 1; see also photographs in species treatments below, but note the reflective setae are not clearly visible in some images of the pseudopygidial area due to diffused lighting). Females of three other *Triepeolus* spp. from the Nearctic also have a concave apical margin to T5 but differ in the pseudopygidial area. In two of these—*T. dacotensis* (Stevens, 1919) and *T. mojavensis* Linsley, 1939—the pseudopygidial area has only dark brown/black setae and is poorly differentiated from the rest of T5 (Fig. 2A). The two species are also unusual among *Triepeolus* in that both lack a well-defined preoccipital carina, which is present at least on the genal area in all other *Triepeolus*, including the species comprising the *T. simplex* group. In the third species, *T. distinctus* (Cresson, 1878), the pseudopygidial area of the female has golden to silvery setae but is more or less rectangular in shape (Fig. 2B). Males of the *T. simplex* group are not easily recognized as no single morphological feature or unique combination of features has been identified that can be considered diagnostic, not in the external morphology or terminalia. Rightmyer (2004) did not find a character state unique to the *simplex* species group, represented by *T. kathrynae* Rozen, 1989, among the 21 morphological characters pertaining to the male S7, S8, or genitalia assessed for 11 markedly different species in the genus. Although several morphological features have been identified as common to males of the *T. simplex* group, determining conclusively diagnostic features is complicated by the fact that males remain unknown for 31 species of *Triepeolus* outside the *T. simplex* and *T. verbesinae* species groups (see Supp. file 3 for the complete list). In lieu of a diagnosis, a fully illustrated key is presented to enable the identification of males of the *T. simplex* group among the species of *Triepeolus* for which the male has been described (i.e., all other species of *Triepeolus* except those listed in Supp. file 3, for which the key could not be tested).

Key to separate males of the *Triepeolus simplex* group from other *Triepeolus*

1. Any of the following (alone or in combination): clypeus with well-defined glabrous midline, which may extend its entire length (Fig. 3A); F2 shorter than F1 (Fig. 4A); mesoscutellum to some extent reddish brown (Fig. 5A); mesopleuron ventrolaterally with dense, long (≥½ MOD), erect/suberect, simple or minutely branched setae (Fig. 6A); propodeal triangle mostly covered in dense, appressed pale setae (Fig. 7A); and/or pygidial plate with well-defined basal or subapical transverse ridge (Fig. 8A) ..... most other *Triepeolus* spp. (not treated herein)
– The following in combination: clypeus without glabrous midline or rarely with ill-defined glabrous midline restricted to upper half (Fig. 3B); F2 as long as or longer than F1 (Fig. 4B); mesoscutellum black (Fig. 5B–D); mesopleuron ventrolaterally at most with sparse, long (≥½ MOD), erect/suberect, simple setae (Fig. 6B) in addition to usual appressed, branched setae or only short (<½ MOD), appressed setae (Fig. 6C–D); propodeal triangle mostly to entirely glabrous, with any pale setae usually restricted to small lateral patches (Fig. 7B); and pygidial plate without transverse ridge or rarely with ill-defined basal transverse ridge (Fig. 8B) 2

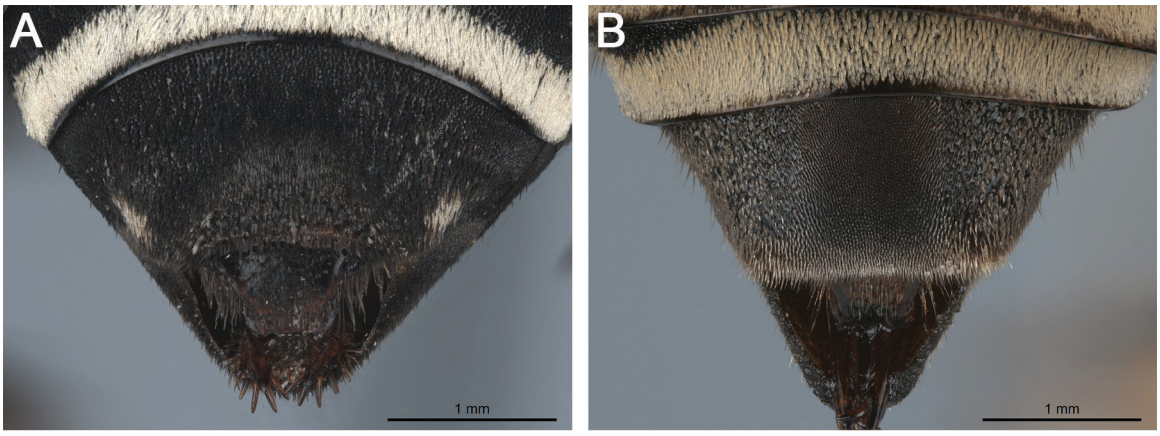

Fig. 2. Pseudopygidial area of female, dorsal view. **A**. *Triepeolus dacotensis* (Stevens, 1919) (BOLD sample ID: CCDB-32640 E03; RSKM RSKM_ENT_E-186200). **B**. *T. distinctus* (Cresson, 1878) (OKBS OKBS.POL.314).

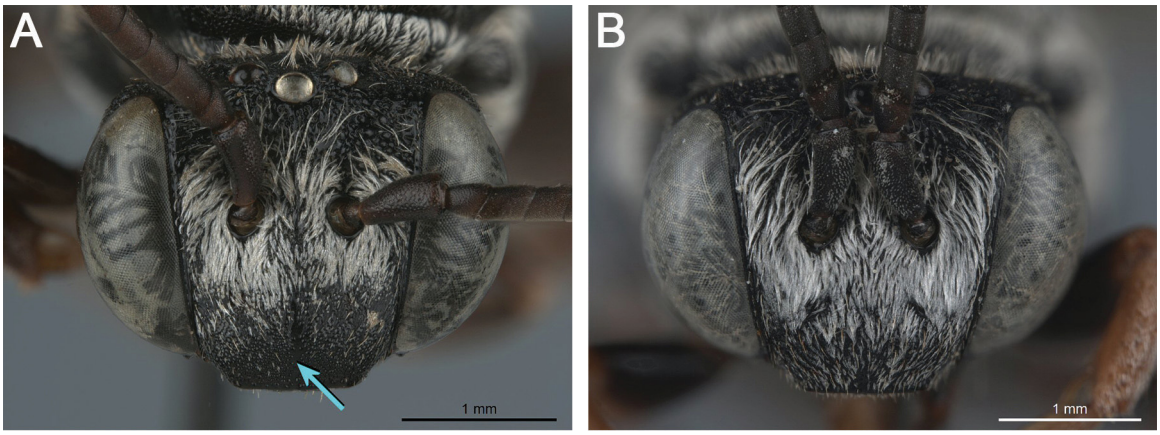

Fig. 3. Head of male, frontal view. **A**. *Triepeolus michiganensis* Mitchell, 1962 (CNC 719805), which has a strong glabrous clypeal midline (blue arrow). **B**. *T. obliteratus* Graenicher, 1911 (WRME WRME_EJH02370), which does not have a glabrous clypeal midline.

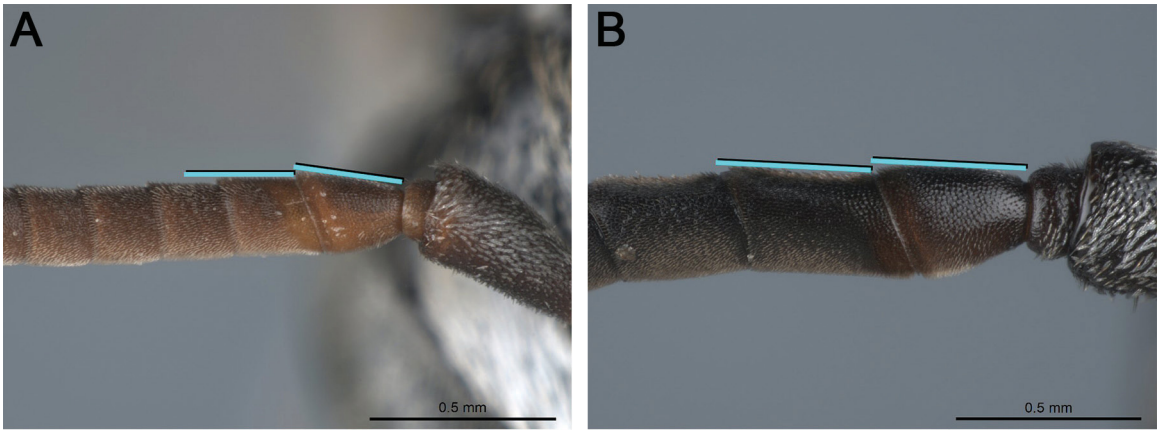

Fig. 4. Right antenna (basal portion) of male. **A**. *Triepeolus loomisorum* Rozen, 1989 (PCYU), showing the longer side of F1 noticeably longer than F2. **B**. *T. oblongimacula* sp. nov., allotype (BOLD sample ID: CMNTO_298; PCYU PCYU-SD09:28), showing the longer side of F1 and F2 subequal in length. Blue lines indicate the greatest length of F1.

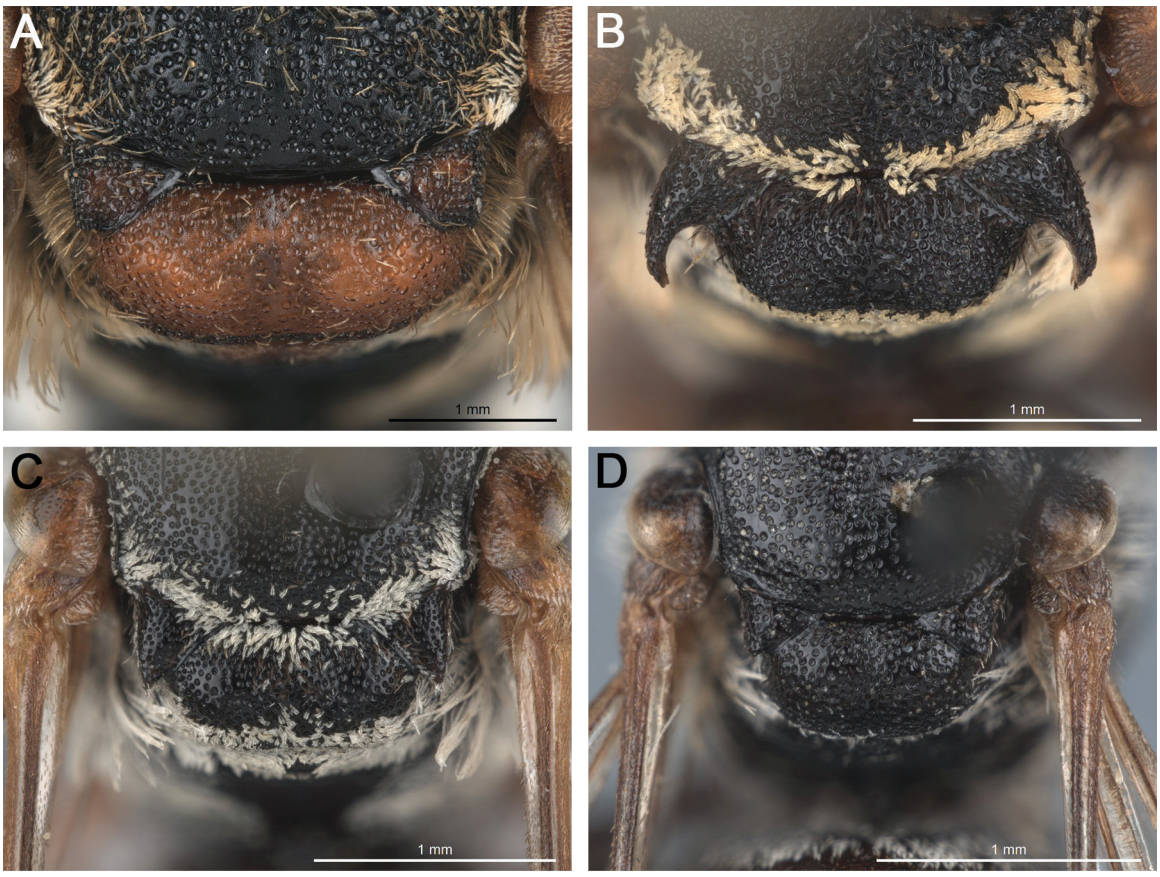

Fig. 5. Axillae and mesoscutellum of male, dorsal view. **A**. *Triepeolus intrepidus* (Smith, 1879) (PCYU PCYU-SD09:612). **B**. *T. roni* Genaro, 1999 (USNM M.G.R. Database No. 5922). **C**. *T. hirsutus* sp. nov., allotype (PCYU). **D**. *T. brittaini* Cockerell, 1931 (BOLD sample ID: 05-NS-0718; PCYU).

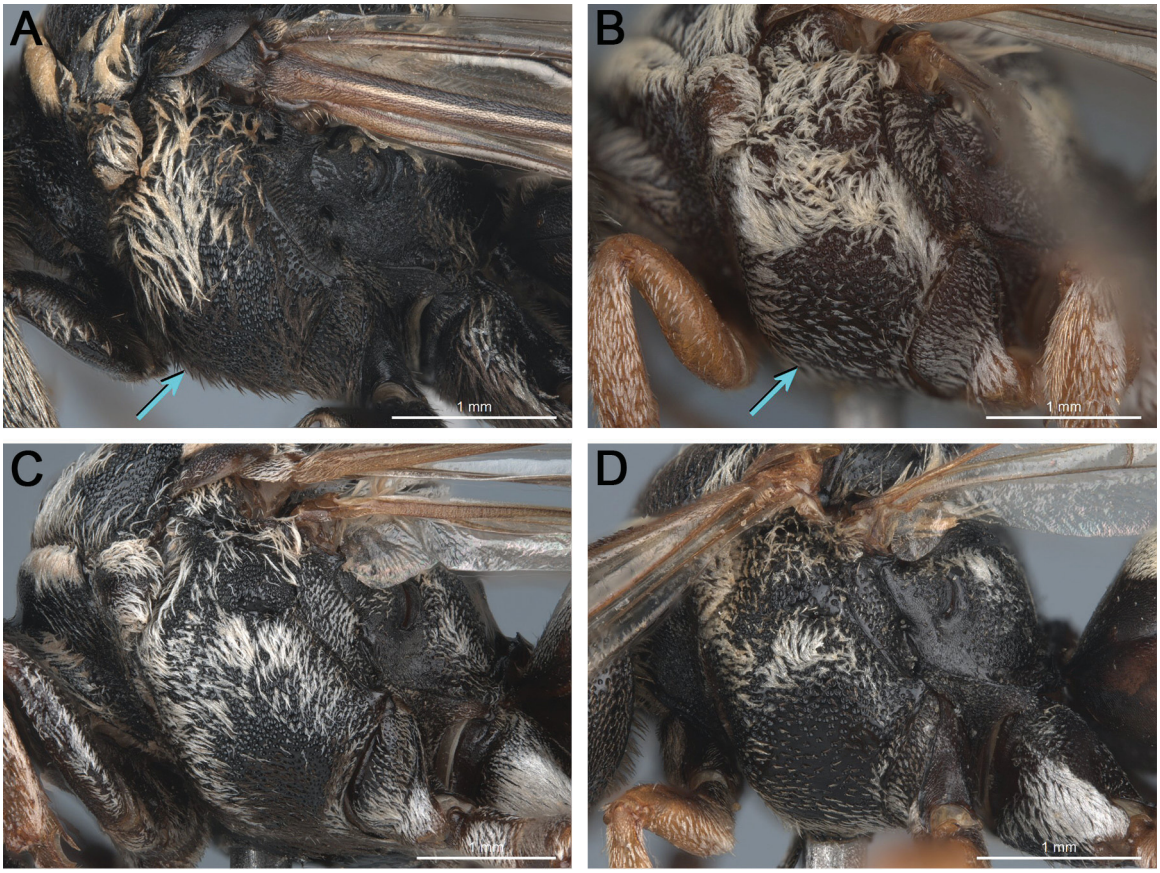

Fig. 6. Mesosoma of male, lateral view. **A**. *Triepeolus melanarius* Rightmyer, 2008 (CSUC), which ventrolaterally has dense, long (≥ ½ MOD), erect/suberect, minutely branched setae (blue arrow). **B**. *T. parahirsutus* sp. nov., allotype (ZMB 21261), which ventrolaterally has sparse, long (≥ ½ MOD), erect/suberect, simple setae among the usual appressed, branched setae (blue arrow). **C**. *T. joliae* Rightmyer, 2008 (CNC 1801918). **D**. *T. eumeniformis* sp. nov., paratype (ECOSUR ECO-TA-E-41271), which does not have dense, long (≥ ½ MOD), erect/suberect setae.

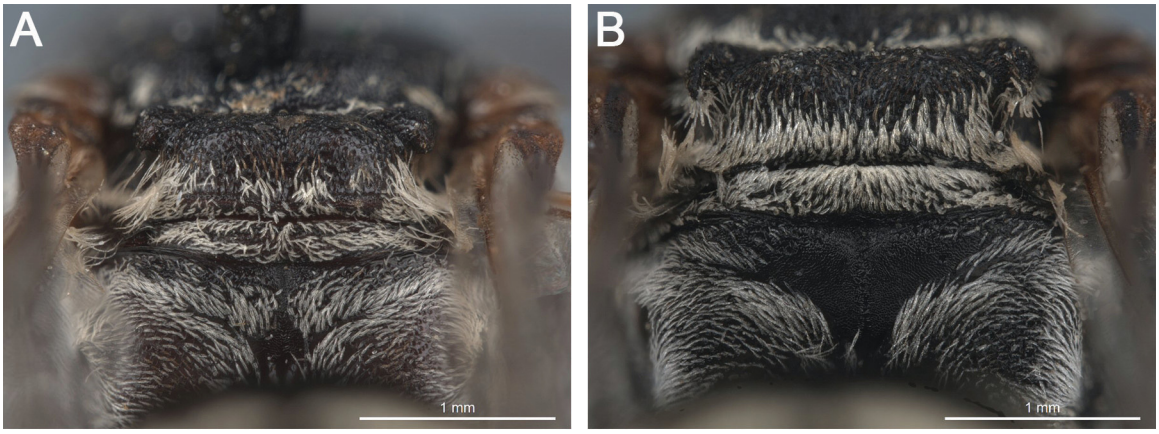

Fig. 7. Mesosoma of male, posterior view. **A**. *Triepeolus eliseae* Rightmyer, 2017 (INHS 356997), in which the propodeal triangle is mostly covered in dense, appressed pale setae. **B**. *T. obliteratus* Graenicher, 1911 (WRME WRME_EJH02370), in which the propodeal triangle is mostly to entirely glabrous.

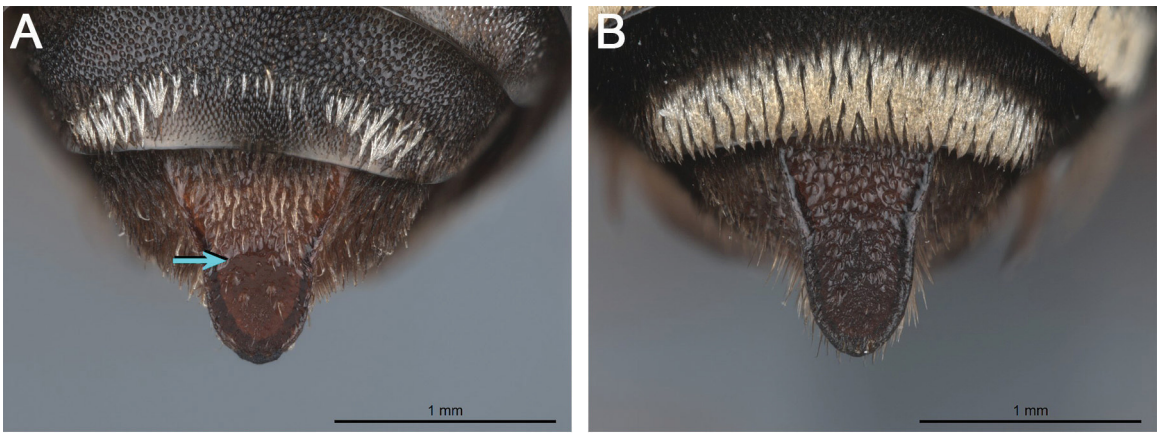

Fig. 8. Pygidial plate of male, dorsal view. **A**. *Triepeolus rufithorax* Graenicher, 1928 (PCYU), which has a well-defined transverse ridge (blue arrow). **B**. *T. oblongimacula* sp. nov., allotype (BOLD sample ID: CMNTO_298; PCYU PCYU-SD09:28), which does not have a transverse ridge.

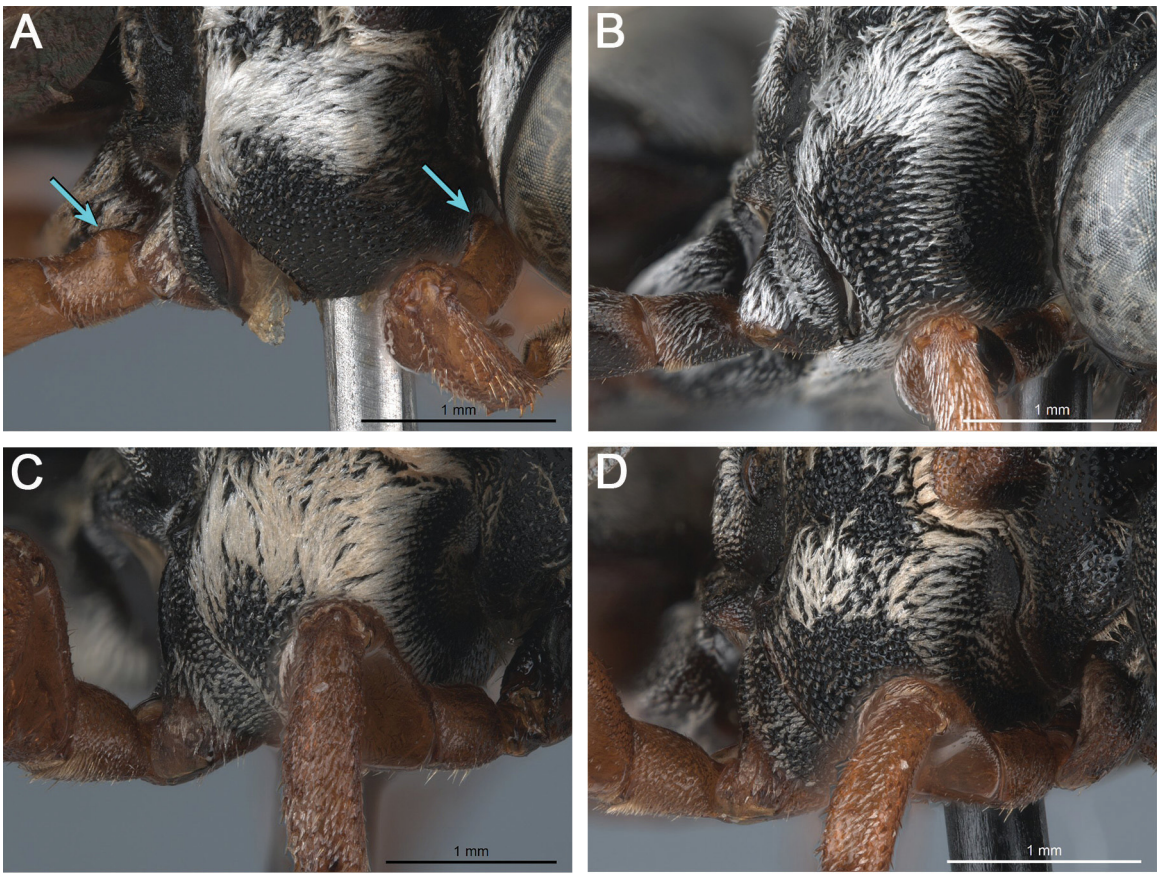

Fig. 9. Right pro- and mesotrochanters of male (anterior facing right). **A**. *Triepeolus tuberculifer* Onuferko, Rightmyer & Roig-Alsina, 2024, allotype (FSCA M.G.R. Database No. 3704), showing distinct protuberances (blue arrows). **B**. *T. obliteratus* Graenicher, 1911 (WRME WRME_EJH02370). **C**. *T. oblongimacula* sp. nov., allotype (BOLD sample ID: CMNTO_298; PCYU PCYU-SD09:28). **D**. *T. rhododontus* Cockerell, 1921 (BOLD sample ID: CMNTO_139; PCYU).

2. Pro- and mesotrochanters distinctly tuberculate (Fig. 9A) ..... ***T. tuberculifer*** Onuferko, Rightmyer & Roig-Alsina, 2024 (*T. simplex* group)
– Pro- and mesotrochanters not tuberculate (Fig. 9B–D) 3

3. Both S4 with apical/subapical fringe of dense, long (> 1 MOD), curved, brown setae and S5 with short, straight subapical setae (Fig. 10A) ..... ***T. simplex*** Robertson, 1903
– S4 with apical/subapical fringe of dense, long (> 1 MOD), curved, coppery to silvery setae (Fig. 10B–D) and/or S5 with long, curved subapical setae (Fig. 10C–D) 4

4. T1 discal patch trapezoidal with semicircular anteromedial projection, apical transverse band conspicuously narrowed sublaterally at posterior corner of discal patch (Fig. 11A). Axilla extending well beyond midlength of mesoscutellum; tip distinctly pointed and hooked (i.e., concave along medial margin), mesally unattached to mesoscutellum for approximately half medial length of axilla (Fig. 5B) [The Bahamas and Cuba] ..... ***T. roni*** Genaro, 1999 (*T. simplex* group)
– Mesosoma and metasoma without the combination of features listed above [other regions] 5

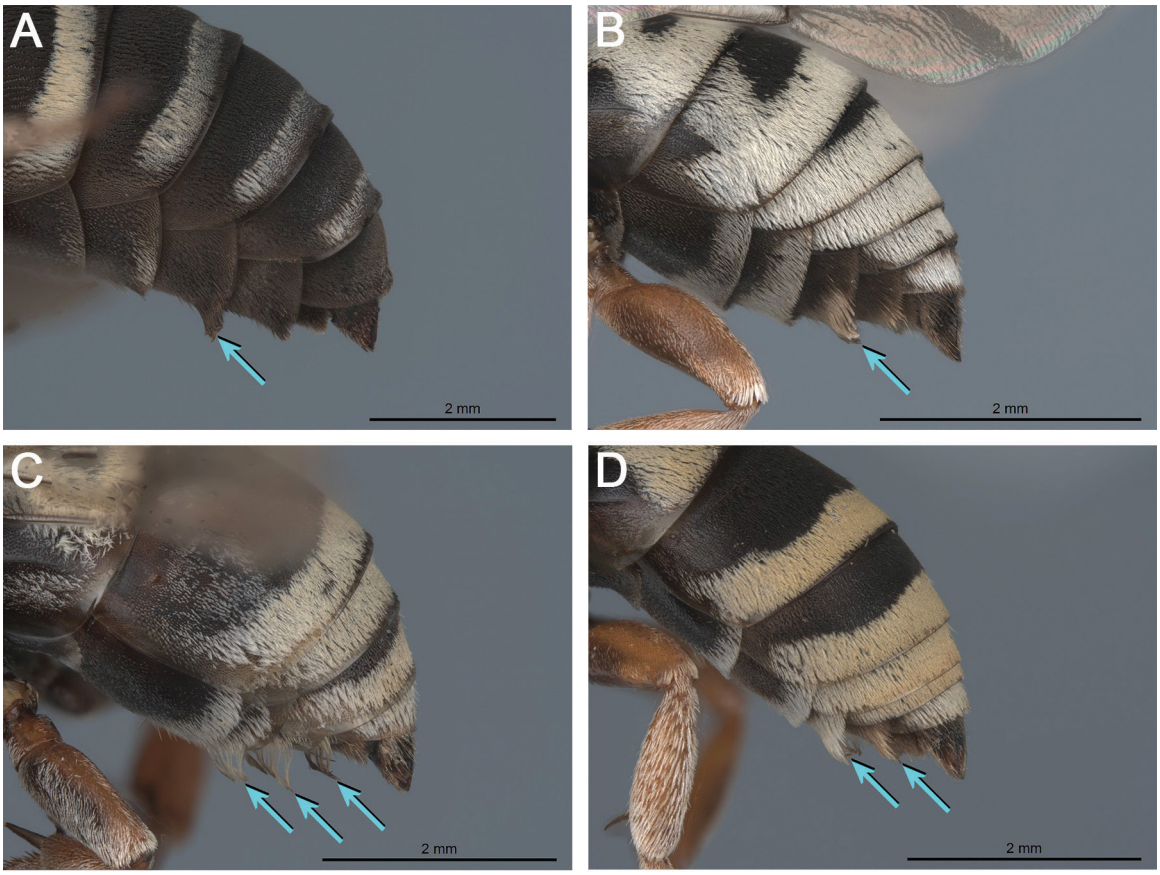

Fig. 10. Metasoma of male, lateral view. **A**. *Triepeolus simplex* Robertson, 1903 (BOLD sample ID: QUBS0291G11; PCYU) showing S4 with apical/subapical fringe of dense, long (> 1 MOD), curved setae (blue arrow). **B**. *T. diffusus* Rightmyer, 2008 (RAM pmae00146019) showing S4 with apical/subapical fringe of dense, long (> 1 MOD), curved setae (blue arrow). **C**. *T. rufoclypeus* (Fox, 1891) (PCYU) showing S3–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved setae (blue arrows). **D**. *T. eumeniformis* sp. nov., paratype (ECOSUR ECO-TA-E-41271) showing S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved setae (blue arrows).

5. T1 with basal band of pale tomentum arched, on each side (or each if medially interrupted) continuous with (and indistinguishable from) lateral longitudinal band, such that discal patch triangular, semicircular, or crescent-shaped (Fig. 11B–C) 6

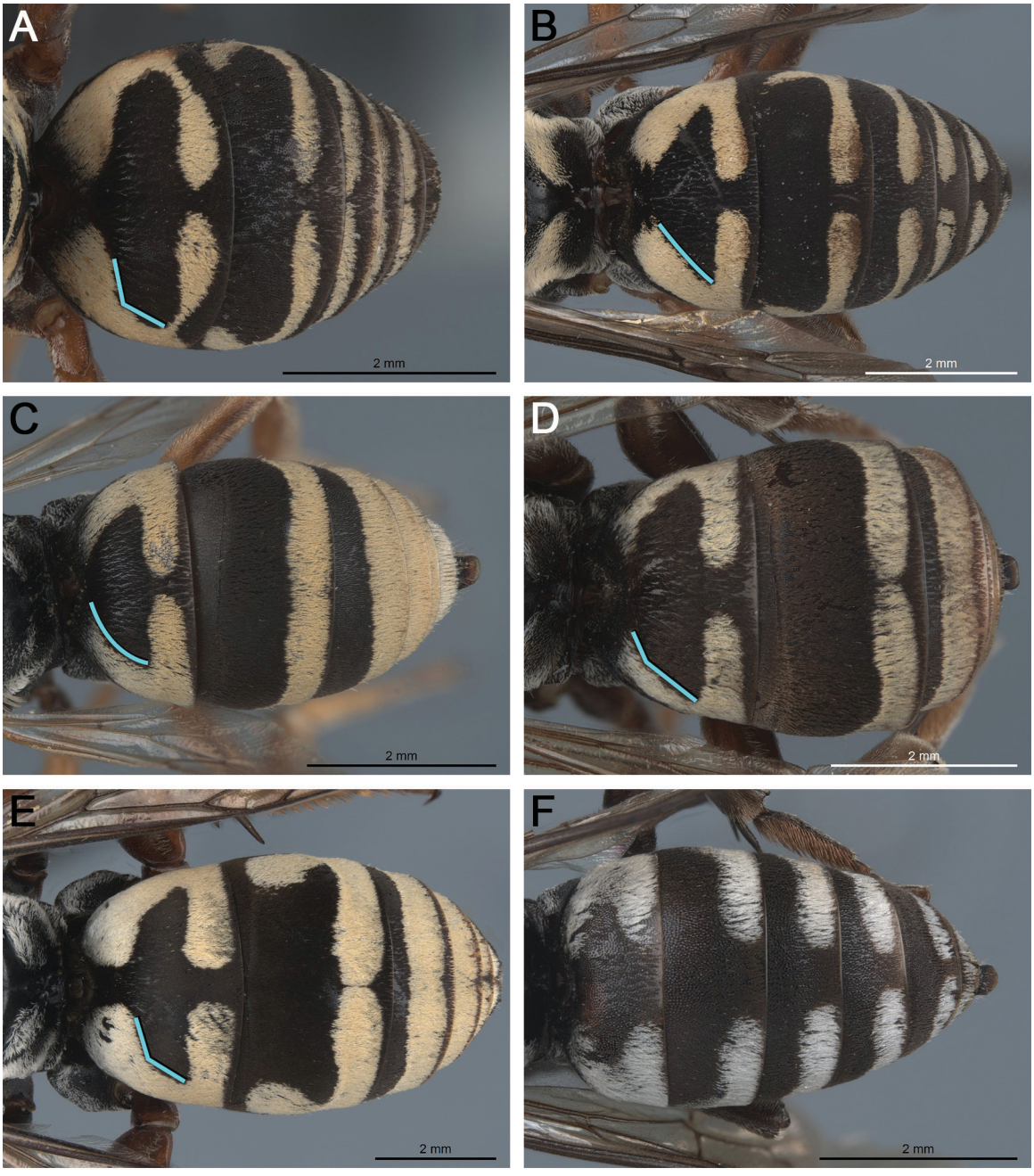

Fig. 11A–F (continued on next page). Metasoma of male, dorsal view. **A**. *Triepeolus roni* Genaro, 1999 (USNM M.G.R. Database No. 5922). **B**. *T. buchwaldi* (Friese, 1908) (INHS 387483). **C**. *T. eumeniformis* sp. nov., paratype (ECOSUR ECO-TA-E-41271). **D**. *T. eumeniformis* sp. nov., paratype (CNC 1801914). **E**. *T. kathrynae* Rozen, 1989 (RSKM RSKM_ENT_E-168244). **F**. *T. tristis* (Smith, 1854) (BOLD sample ID: CCDB-30345 C09; PCYU). Blue lines indicate an abrupt (A, D–E) or seamless (B–C) transition between the basal band and lateral longitudinal band.

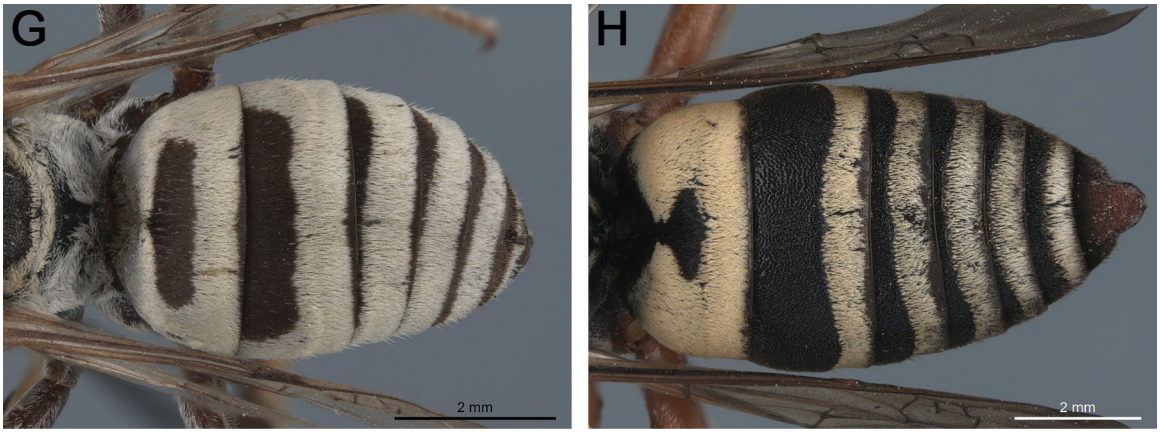

Fig. 11G–H (continued). Metasoma of male, dorsal view. **G**. *Triepeolus paenepectoralis* Viereck, 1905 (CNC 719831). **H**. *T. distinctus* (Cresson, 1878) (OKBS OKBS.POL.488).

– Not as above. T1 basal and apical transverse bands (if present, distinct, and joined laterally) with abrupt transition between basal band and lateral longitudinal band (Fig. 11D–E) (at least if transverse bands not effectively mirror images, as in Fig. 11F–H), such that discal patch quadrangular or transversely oblong or elliptic (Fig. 11D–H) 7

6. Any of the following (alone or in combination): T1 discal patch forming trapezoid or triangle with concave or straight anterolateral sides (basal/lateral band (or patch) of off-white to yellow tomentum on each side (or each) mesally convex or straight) (Fig. 11B); T1–T4 with medially interrupted apical transverse bands (Fig. 11B); and/or S3 with long, curved subapical setae (Fig. 10C) .... other *Triepeolus* spp. (not treated herein)
– The following in combination: T1 discal patch semicircular or crescent-shaped (basal/lateral band (or patch) of yellow tomentum on each side (or each) mesally concave) (Fig. 11C); T3–T4 and usually also T2 with complete apical transverse bands (Fig. 11C); and S3 with short, straight subapical setae (Fig. 10D) ..... *T. simplex* group

7. The following in combination: legs to some extent orange (Figs 3B, 6B, 9B–D, 11E); axilla with tip acute and distinctly pointed (Fig. 5C); T1 basal band distinctly interrupted medially or notched posteromedially (Fig. 11E); T2 with complete or medially narrowly interrupted apical transverse band with pair of basomedially strongly convergent anterolateral extensions (except sometimes in *T. rhododontus* Cockerell, 1921) (Fig. 11E); and T3–T4 with complete apical transverse bands (Fig. 11E) ..... *T. simplex* group
– Any of the following (alone or in combination): legs entirely dark brown/black (Fig. 11F–G); axilla with tip right angled or obtuse and somewhat blunt if not broadly rounded (Fig. 5D); T1 basal band (if present) not distinctly interrupted medially or notched posteromedially (Fig. 11G); T2–T4 apical transverse bands (if present) interrupted medially (Fig. 11F); and/or that of T2 (if present) without anterolateral extensions (Fig. 11H) or with pair of basomedially weakly convergent, perpendicular, or basolaterally divergent anterolateral extensions (Fig. 11F–G) 8

8. Any of the following (alone or in combination): legs entirely dark brown/black (Fig. 11F–G); mesopleuron densely punctate (i≤1d) (Fig. 6C); T1 basal (Fig. 11G) and/or apical (Fig. 11G–H) transverse bands (if present) complete; T2–T4 with medially interrupted apical transverse bands (Fig. 11F); and/or that of T2 with pair of well-defined anterolateral extensions (Fig. 11F–G) .... other *Triepeolus* spp. (not treated herein)

– The following in combination: legs to some extent orange (Figs 6D, 10D, 11C–D); mesopleuron somewhat sparsely punctate (i≤3d) (Fig. 6D); T1 with medially interrupted basal and apical transverse bands (Fig. 11D); T2 with complete (Fig. 11C) or medially narrowly interrupted (Fig. 11D) apical transverse band without well-defined anterolateral extensions; T3–T4 with complete apical transverse bands (Fig. 11C–D) ..... *T. simplex* group

Distribution of the *Triepeolus simplex* group

Canada (Ontario to British Columbia) to central Argentina including the Antilles (Fig. 12A).

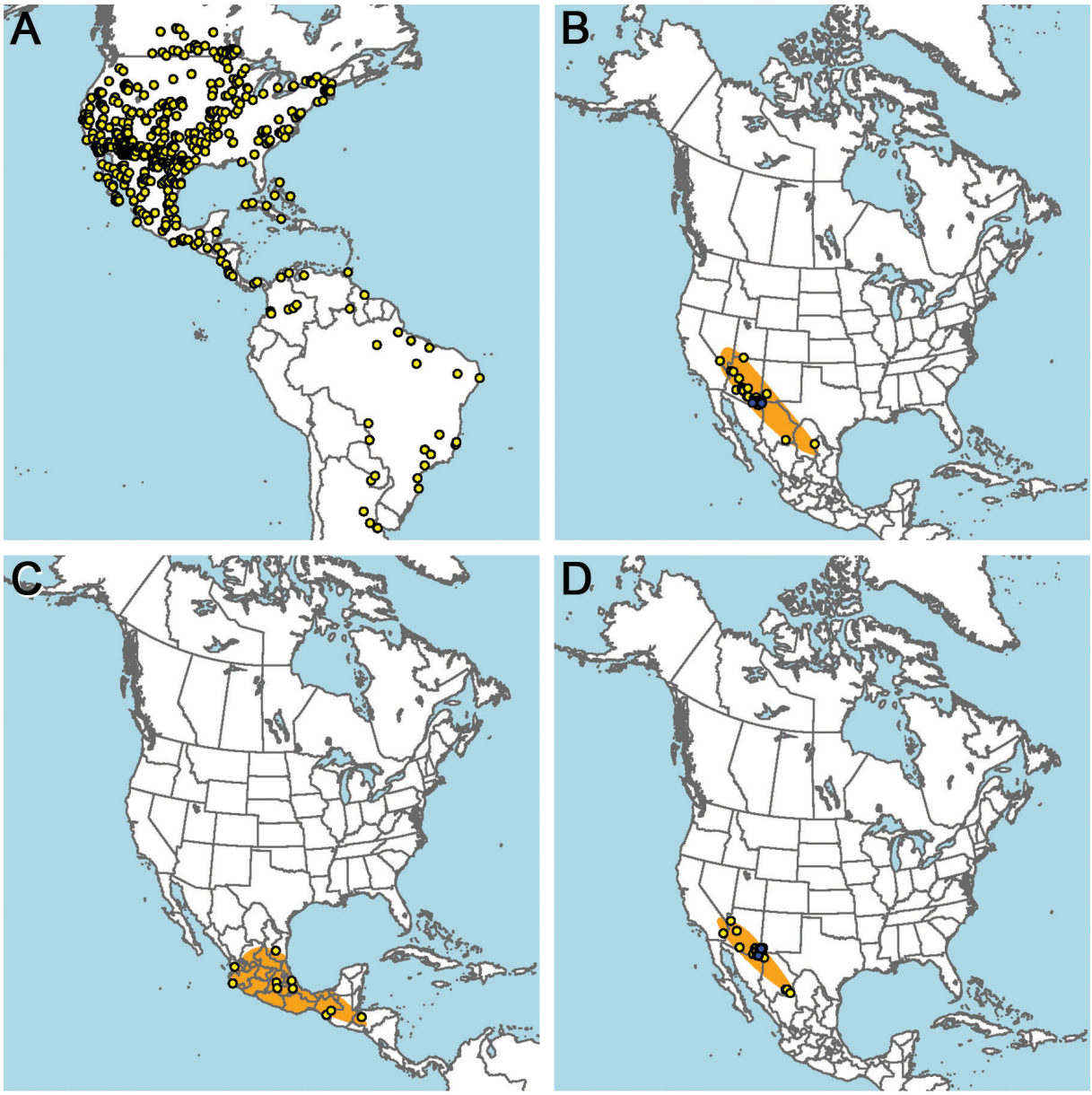

Fig. 12A–D (continued on next page). Distribution maps. **A**. All species in the *Triepeolus simplex* group. **B**. *T. apache* sp. nov. **C**. *T. eumeniformis* sp. nov. **D**. *T. hirsutus* sp. nov. Approximate geographic ranges are indicated in orange and were estimated from occurrence records known to the authors (yellow and blue circles, with the latter indicating localities of DNA barcoded specimens).

Included species

Triepeolus alvarengai Moure, 1955
Triepeolus apache sp. nov.
Triepeolus eumeniformis sp. nov.
Triepeolus hirsutus sp. nov.
Triepeolus kathrynae Rozen, 1989
Triepeolus mexicanus (Cresson, 1878)

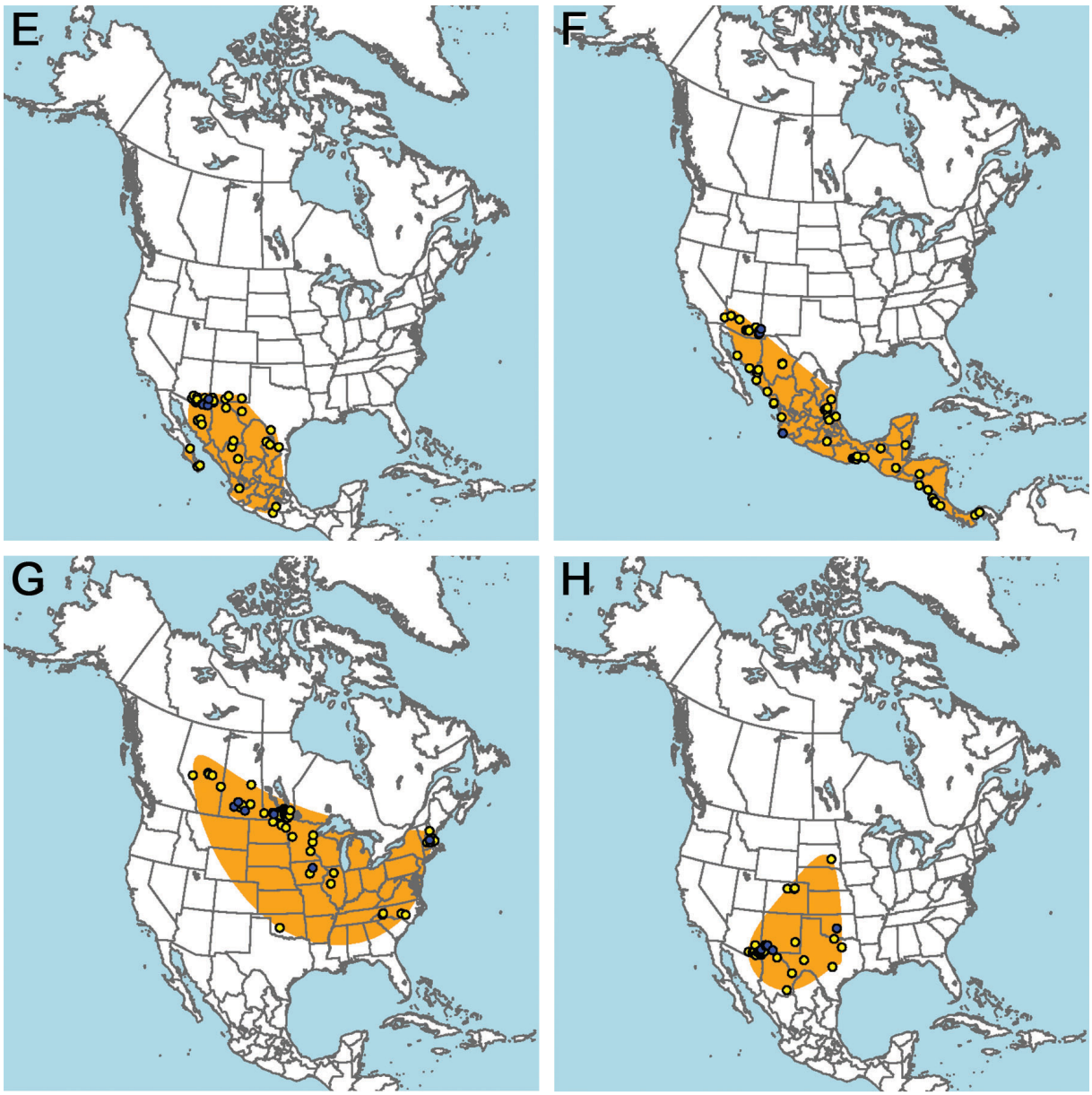

Fig. 12E–H (continued from preceding and on next page). Distribution maps. **E**. *Triepeolus kathrynae* Rozen, 1989. **F**. *T. mexicanus* (Cresson, 1878). **G**. *T. obliteratus* Graenicher, 1911. **H**. *T. oblongimacula* sp. nov. Approximate geographic ranges are indicated in orange and were estimated from occurrence records known to the authors (yellow and blue circles, with the latter indicating localities of DNA barcoded specimens).

Included species (continued)

Triepeolus nemoralis (Holmberg, 1886)
Triepeolus obliteratus Graenicher, 1911
Triepeolus oblongimacula sp. nov.
Triepeolus parahirsutus sp. nov.
Triepeolus paucipunctatus sp. nov.
Triepeolus rhododontus Cockerell, 1921

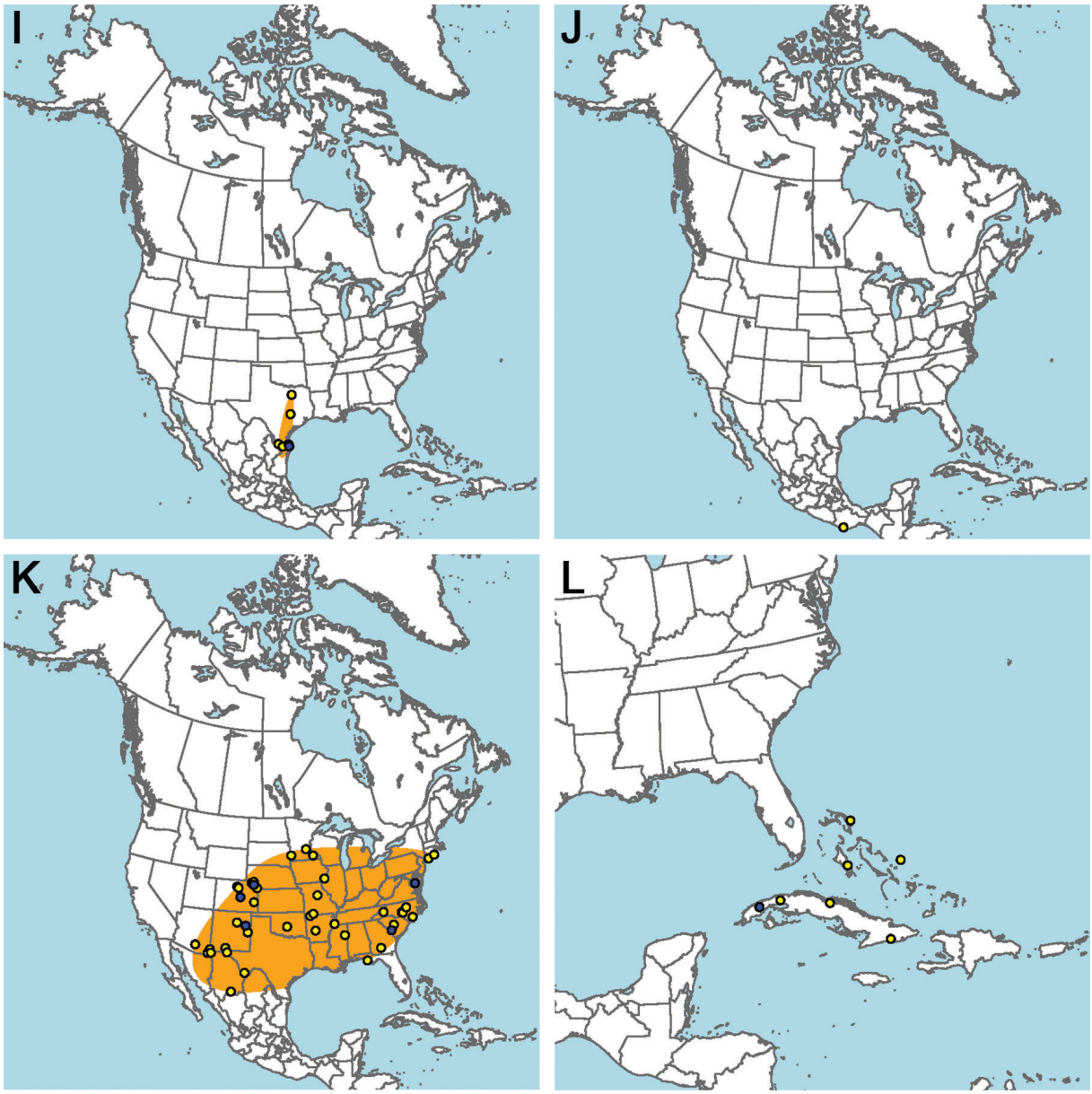

Fig. 12I–L (continued from preceding and on next page). Distribution maps. **I**. *Triepeolus parahirsutus* sp. nov. **J**. *T. paucipunctatus* sp. nov. **K**. *T. rhododontus* Cockerell, 1921. **L**. *T. roni* Genaro, 1999. Approximate geographic ranges are indicated in orange and were estimated from occurrence records known to the authors (yellow and blue circles, with the latter indicating localities of DNA barcoded specimens).

Included species (continued)

Triepeolus roni Genaro, 1999
Triepeolus saturninus Cockerell & Sandhouse, 1924
Triepeolus segregatus (Cockerell, 1900)
Triepeolus shoshone sp. nov.
Triepeolus simplex Robertson, 1903
Triepeolus tuberculifer Onuferko, Rightmyer & Roig-Alsina, 2024

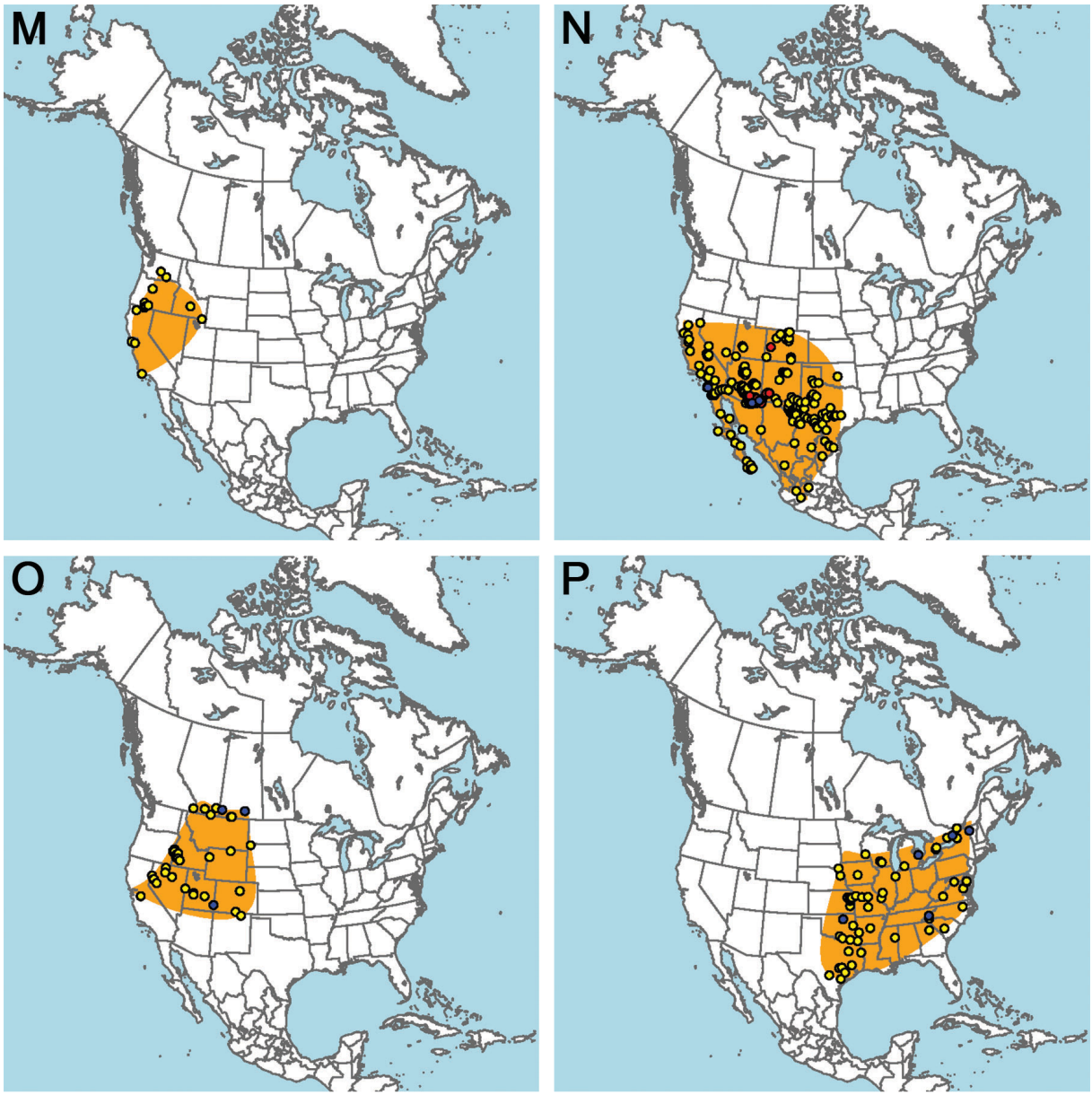

Fig. 12M–P (continued from preceding page). Distribution maps. **M**. *Triepeolus saturninus* Cockerell & Sandhouse, 1924. **N**. *T. segregatus* (Cockerell, 1900). **O**. *T. shoshone* sp. nov. **P**. *T. simplex* Robertson, 1903. Approximate geographic ranges are indicated in orange and were estimated from occurrence records known to the authors (yellow, blue, and red circles, with the latter two indicating localities of DNA barcoded specimens and the different colors corresponding to separate clusters of BINs assigned to the same species).

Triepeolus alvarengai Moure, 1955
Fig. 13A

Triepeolus alvarengai Moure, 1955: 126 (♀).

Triepeolus alvarengai – Onuferko *et al*. 2024: 7, figs 1a, 2, 3a (redescription of female, description of male).

Proposed common name

Alvarenga's triepeolus.

Diagnosis

The following morphological features in combination tell *T. alvarengai* apart from all other *Triepeolus* in the *simplex* species group: the mesoscutum has well-defined paramedian bands (Fig. 13A); the T1 basal band is arched, continuous with (and indistinguishable from) the lateral longitudinal bands, and mesally concave on each side, such that the discal patch is semicircular (Fig. 13A); the T1 apical transverse band (if present) is not more narrowly interrupted medially than the basal band (Fig. 13A); and T2–T4 have complete apical transverse bands of yellow tomentum that are about as broad as (if not broader than) the bands on T1 and do not have basomedially convergent anterolateral extensions (Fig. 13A). Specimens in which T1 has only a basal band or pair of anterolateral patches of pale tomentum (as opposed to both basal and apical transverse bands) may be confused with *T. mexicanus* or *T. nemoralis*, but in *T. mexicanus* pale tomentum on the mesoscutum is restricted to the lateral and posterior margins and in *T. nemoralis* the mesoscutum has a large anteromedial ovate patch of yellow tomentum, which may be sparser medially such that the patch is suggestive of ill-defined paramedian bands. Specimens in which T1 has an apical transverse band may be confused with *T. eumeniformis* sp. nov., but in *T. eumeniformis* the T1 basal band (if present) is more widely interrupted medially than the apical transverse band. Additionally, *T. alvarengai* can easily be separated from *T. eumeniformis* and *T. mexicanus* by geography; the former is known only from Brazil whereas the latter two species are known only from North and Central America.

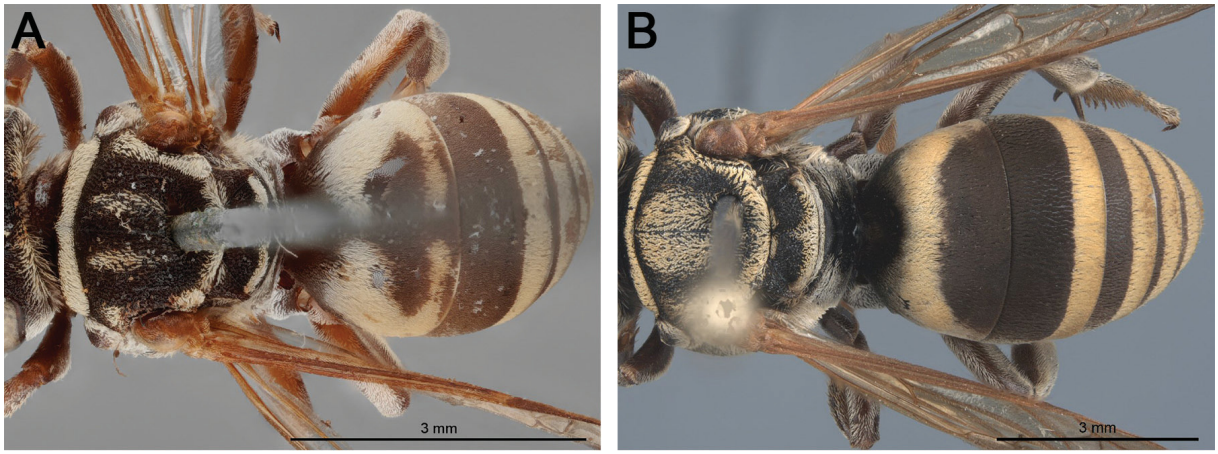

Fig. 13. Mesosoma and metasoma of male, dorsal view. **A**. *Triepeolus alvarengai* Moure, 1955 (ZMB ed1bbe/M.G.R. Database No. 11694) (image is copyright of the Museum für Naturkunde and reproduced here with permission). **B**. *T. nemoralis* (Holmberg, 1886) (CNC 1801912).

Etymology

See Onuferko *et al*. (2024).

Material examined

See Onuferko *et al*. (2024).

DNA barcoded material

Unavailable.

Redescription

This species was recently redescribed (Onuferko *et al*. 2024).

Distribution

Eastern Brazil (Onuferko *et al*. 2024: fig. 1a).

Ecology

Host records

Unknown.

Floral records

Unknown.

Remarks

Detailed morphological and taxonomic remarks about this species are given in Onuferko *et al*. (2024).

Triepeolus apache sp. nov.
urn:lsid:zoobank.org:act:F258D047-BDE1-4BF3-B66C-4ED58B55F2AF
Figs 12B, 14, 15A

Proposed common name

Apache triepeolus.

Diagnosis

The following morphological features in combination tell *T. apache* sp. nov. apart from all other *Triepeolus* in the *simplex* species group except *T. shoshone* sp. nov.: the T1 basal band forms an inflexed arch and is thus gradually narrowed but not completely interrupted medially, such that the discal patch has a short, narrowed (i.e., inverted V-shaped) anteromedial projection (Figs 14B, 15A), and the legs are entirely reddish orange from trochanters to tarsi (Fig. 14A–C). Whereas in *T. shoshone* T2 and usually also T1 have complete apical transverse bands (see Remarks below), in *T. apache* the T1 apical transverse band is interrupted or (less commonly) at least narrowed medially and the T2 apical transverse band is narrowed or interrupted medially (Figs 14B, 15A). Although it might not be possible to separate certain individuals morphologically, throughout most of its range *T. apache* can be separated from *T. shoshone* by geography; the former is a southern species known only from the Southwestern United States and adjacent Mexico whereas the latter is a northern species whose known range extends from northern Arizona and northern New Mexico to Western Canada. Additionally, *T. apache* may be confused with *T. hirsutus* sp. nov. due to their small size and as the ranges of both species overlap considerably, but in *T. hirsutus* the mesopleura have sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to the usual appressed, branched setae (as opposed to only appressed, branched setae or sparse, short (< ¼ MOD), erect/suberect, simple setae in addition to

the usual appressed, branched setae) and the T1 discal patch has an inverted U- or horseshoe-shaped anteromedial projection, with the basal band so deeply invaginated that it appears to be completely interrupted medially in dorsal view.

Etymology

This species is named for the Apache peoples, whose traditional territories span much of its known range.

Material examined

Primary type material

USA • ♀, holotype; New Mexico, 28 mi S of Animas, Hidalgo County; 31.5628° N, 108.8752° W; 24 Aug. 2016; L. Packer leg.; BOLD sample ID: CCDB-24584 D03; PCYU.

Secondary type material

MEXICO – **Chihuahua** • 1 ♀, paratype; 10 mi W of Jiménez; 11 Sep. 1950; R.F. Smith leg.; AMNH. – **Coahuila** • 2 ♀♀, paratypes; C.A. Purpus leg.; ZMB • 1 ♀, paratype; Guadaloupe; 23 Aug. 1947; D. Rockefeller exped.; Spieth leg.; AMNH. – **Sonora** • 1 ♀, paratype; 30 km E of Agua Prieta; 31.3197° N, 109.2692° W; 19 Aug. 2003; A. Nelson leg.; RLM SBV036172.

USA – **Arizona** • 1 ♀, paratype; 1 mi E of Douglas, Cochise County; 20 Aug. 1968; Rozens and Favreau leg.; AMNH • 1 ♀, paratype; 1 mi E of Douglas, Cochise County; 31.3431° N, 109.4980° W; 25 Aug. 2006; S. Cardinal leg.; SCPC • 1 ♀, paratype; 1 mi N of Douglas, Cochise County; 16 Aug. 1962; E.G. Linsley leg.; UCBME • 2 ♀♀, paratypes; same data as for preceding; 29 Aug. 1967; J.G. Rozen and G. Krueger leg.; AMNH • 1 ♀, paratype; 10 mi W of Tucson; 29 Jun. 1961; P.H. Johnson leg.; UAIC • 1 ♀, paratype; 15 mi SW of Apache, Cochise County; 1 Sep. 1986; J.G. and B.L. Rozen leg.; AMNH • 1 ♀, paratype; 15 mi W of Chandler; 9 Jun. 1961; G.D. Butler leg.; UAIC • 1 ♀, paratype; 18 mi SW of Apache, Cochise County; 20 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀, paratype; same data as for preceding; 22–23 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀, paratype; 2 mi E of Apache, Cochise County; 23 Aug. 1988; Rozen, Quinter, and Brewster leg.; AMNH • 1 ♀, paratype; 2 mi NE of Portal, Cochise County; 22 Sep. 1963; J.G. Rozen leg.; AMNH • 1 ♀, paratype; 3 mi S of Portal, Cochise County (Chiricahua Mountains); 13 Aug. 1965; C.A. Saario leg.; UCR UCRC ENT 57289 • 2 ♀♀, paratypes; 4 mi E of Willcox, Cochise County; 22 Aug. 1985; J.G. and B.L. Rozen leg.; AMNH • 1 ♀, paratype; same data as for preceding; 30 Aug. 2004; J.G. Rozen and J.S. Ascher leg.; AMNH • 2 ♀♀, paratype; 4 mi N of Tombstone, Cochise County; 18 Aug. 1973; J.G. Rozen leg.; AMNH • 1 ♀, paratype; 5 mi S of Tombstone, Cochise County; 18 Aug. 1973; J.G. and K.C. Rozen leg.; AMNH • 1 ♀, paratype; 9 mi N of Elfrida, Cochise County; 5 Aug. 1961; J.G. Rozen leg.; AMNH • 1 ♀, paratype; Apache, Cochise County; 24 Aug. 1969; J.G. and K.C. Rozen leg.; AMNH • 1 ♀, paratype; same data as for preceding; 20 Aug. 1972; Rozen and Favreau leg.; AMNH • 1 ♀, paratype; Big Sandy Wash, Mohave County; 18 Sep. 1994; T. Griswold leg.; BBSL BBSL582181 • 1 ♀, paratype; Boyce Thompson Arboretum (Superior); 4 Jun. 1962; Bequaert and Werner leg.; UAIC • 1 ♀, paratype; Casa Grande; 12 Jun. 1962; G.D. Butler leg.; UAIC • 2 ♀♀, paratypes; Kingman, Mohave County; 11 Sep. 1976; R.C. Miller leg.; UCBME • 1 ♀, paratype; same data as for preceding; 20 Sep. 1976; R.C. Miller leg.; UCBME • 1 ♀, paratype; same data as for preceding; 27 Sep. 1976; R.C. Miller leg.; UCBME • 1 ♀, paratype; Kirkland Junction, Yavapai County; 15 Sep. 1961; P.D. Hurd leg.; UCBME • 1 ♀, paratype; Maricopa; 20 Jun. 1956; G.D. Butler leg.; UAIC • 1 ♀, paratype; N Rucker Canyon Rd, Elfrida, Cochise County; 31.7586° N, 109.6862° W; 3 Sep. 2003; S. Cardinal and A. Barnett leg.; SCPC • 1 ♂, paratype; San Bernardino National Wildlife Refuge, Cochise County; 31.3386° N, 109.2719° W; 8 Aug. 2003; A. Romero leg.; RLM SBV033824 • 1 ♂, allotype; Sierra Vista, Cochise County; 31.5104° N, 110.2592° W; 8 Sep. 2009; C.S. Sheffield leg.; BOLD sample ID: CCDB-38770 C03; RSKM PCYU:AZ09:40/RSKM_ENT_E-125505 • 1 ♀, paratype; Skeleton Canyon (6 mi SE of

Apache), Cochise County; 4 Sep. 1958; P.D. Hurd leg.; UCBME • 1 ♀, paratype; Southwestern Research Station (5 mi W of Portal), Cochise County; 24 Aug. 1958; P.D. Hurd leg.; UCBME • 2 ♀♀, paratypes; same data as for preceding; 26 Aug. 1962; J.G. Rozen, M. Statham, and S.J. Hessel leg.; AMNH • 1 ♀, paratype; same data as for preceding; 26 Aug. 1962; J.G. Rozen, M. Statham, and S.J. Hessel leg.; AMNH M.G.R. Database No. 1211 • 1 ♀, paratype; same data as for preceding; 22 Aug. 1973; M. Favreau leg.; AMNH • 1 ♀, paratype; Texas Canyon, Cochise County; 13 Aug. 1962; J.G. Rozen, M. Statham, and S.J. Hessel leg.; AMNH • 1 ♀, paratype; Theba; 9 Jun. 1955; G.D. Butler leg.; UAIC • 1 ♀, paratype; Tucson, Pima County; 10 May 1954; G.D. Butler leg.; UAIC. – **Nevada** • 1 ♀, paratype; Pahrump, Nye County; 25 Jul. 1958; R.C. Bechtel leg.; FSCA. – **New Mexico** • 1 ♀, paratype; 1 mi N of Rodeo, Hidalgo County; 28 Aug. 1970; J.G. Rozen leg.; AMNH • 2 ♀♀, paratypes; same data as for preceding; 28–29 Aug. 1987; J.G. and B.L. Rozen leg.; AMNH • 1 ♀, paratype; 1 mi NE of Rodeo, Hidalgo County; 16 Aug. 1967; J.H. and J.M. Davidson and M.A. Cazier leg.; ASU • 1 ♀, paratype; 11 km NW of Bayard, Grant County; 32.7920° N, 108.2430° W; 2 Sep. 2009; C.S. Sheffield and S. Dumesh leg.; PCYU PCYU-SD09:586 • 1 ♀, paratype; 16 mi S of Animas, Hidalgo County; 23 Aug. 1973; Rozen and Favreau leg.; AMNH • 1 ♀, paratype; 2 mi N of Rodeo, Hidalgo County; 22 Aug. 1996; J.G. and B.L. Rozen and A. Pence leg.; AMNH • 1 ♀, paratype; 20 mi S of Animas, Hidalgo County; 30 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀, paratype; 22 mi S of Animas, Hidalgo County; 25 Aug. 1973; J.G. and K.C. Rozen, M. Favreau, and R. McGinley leg.; AMNH • 1 ♀, paratype; 25 mi S of Animas, Hidalgo County; 26 Aug. 1979; J.v.d. Vecht leg.; BBSL BBSL522616 • 1 ♀, paratype; same data as for preceding; 21 Aug. 1996; J.G. and B.L. Rozen and A. Pence leg.; AMNH • 1 ♀, paratype; 26 mi S of Animas, Hidalgo County; 20 Aug. 1986; R.J. McGinley and B.M. Norden leg.; USNM • 2 ♀♀, paratypes; 27–32 mi S of Animas, Hidalgo County; 24 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀, paratype; 4 mi SW of Rodeo, Hidalgo County; 3 Sep. 1977; J.G. Rozen leg.; AMNH • 1 ♀, paratype; Rodeo, Hidalgo County; 6 Sep. 1973; M. Favreau leg.; AMNH • 1 ♀, paratype; same data as for preceding; 27 Aug. 1974; M. and T.M. Favreau leg.; AMNH. – **Utah** • 1 ♀, paratype; 9 mi E of Kanab, Kane County; 23 Sep. ??64; USNM.

DNA barcoded material

Available. BIN: BOLD:ADF0295. See type material for specimens examined and sequenced (indicated by unique BOLD sample ID).

Description

Measurements of holotype. Body length 7.5 mm; ITW 1.6 mm; head length 1.9 mm; head width 2.9 mm; fore wing length 5.9 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with apical two-fifths golden yellow (entirely dark brown/black in some paratypes). Mandible with basal three-fifths; labrum along apical and lateral margins; scape, pedicel, and F1 extensively; succeeding flagellomeres to some extent; tegula; coxae to some extent; trochanters to tarsi (excluding metatibial spurs) entirely; metasomal terga laterally; pygidial plate to some extent; and metasomal sterna to some extent reddish orange. Fore wing membrane subhyaline, apically dusky. Hind wing membrane dusky subhyaline to hyaline.

Pubescence. Face with tomentum densest around antennal socket. Clypeus, upper paraocular and frontal areas, and vertexal area mostly exposed. Pronotal collar with tomentum uniformly pale yellow. Mesoscutum with well-defined paramedian band of pale-yellow tomentum; pale tomentum otherwise mostly restricted to lateral and posterior margins. Metanotum with tomentum rubbed off medially in holotype, but uninterrupted and uniformly off-white in paratypes. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. T1 with apical transverse band of pale-yellow tomentum interrupted medially (narrowed medially in some paratypes), transverse bands subparallel,

discal patch transversely oblong or trapezoidal with short, narrowed (i.e., inverted V-shaped) anteromedial projection. T2–T4 with complete apical transverse bands of pale-yellow tomentum (that of T2 narrowly interrupted medially in some paratypes), those of T2–T3 medially somewhat removed from apical margins of terga, that of T2 with pair of basomedially convergent anterolateral extensions. S2–S3 with apical transverse bands of white tomentum (medially interrupted and/or reduced to posterolateral patches in holotype and some paratypes).

Surface sculpture. Labrum coarsely and densely (most i < 1d) rugose-punctate. Clypeus densely punctate (most i ≤ 1d) but interspaces well defined, shining; with many small punctures among larger ones. Vertexal area somewhat sparsely punctate (some i > 2d), especially around ocelli. Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense (most i ≤ 1d); interspaces well defined, shining. Mesopleuron with punctures in upper half nearly contiguous but not much denser (i < 1d) than in ventrolateral half (most i ≤ 1d); interspaces shining where punctures not contiguous; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense (i ≈ 1d), and evenly distributed; interspaces shining somewhat.

Structure. Labrum with pair of small subapical denticles, each preceded by longitudinal carina. Pronotal collar rather short (medial length ~3/5 MOD). Mesoscutellum moderately bigibbous. Axilla extending

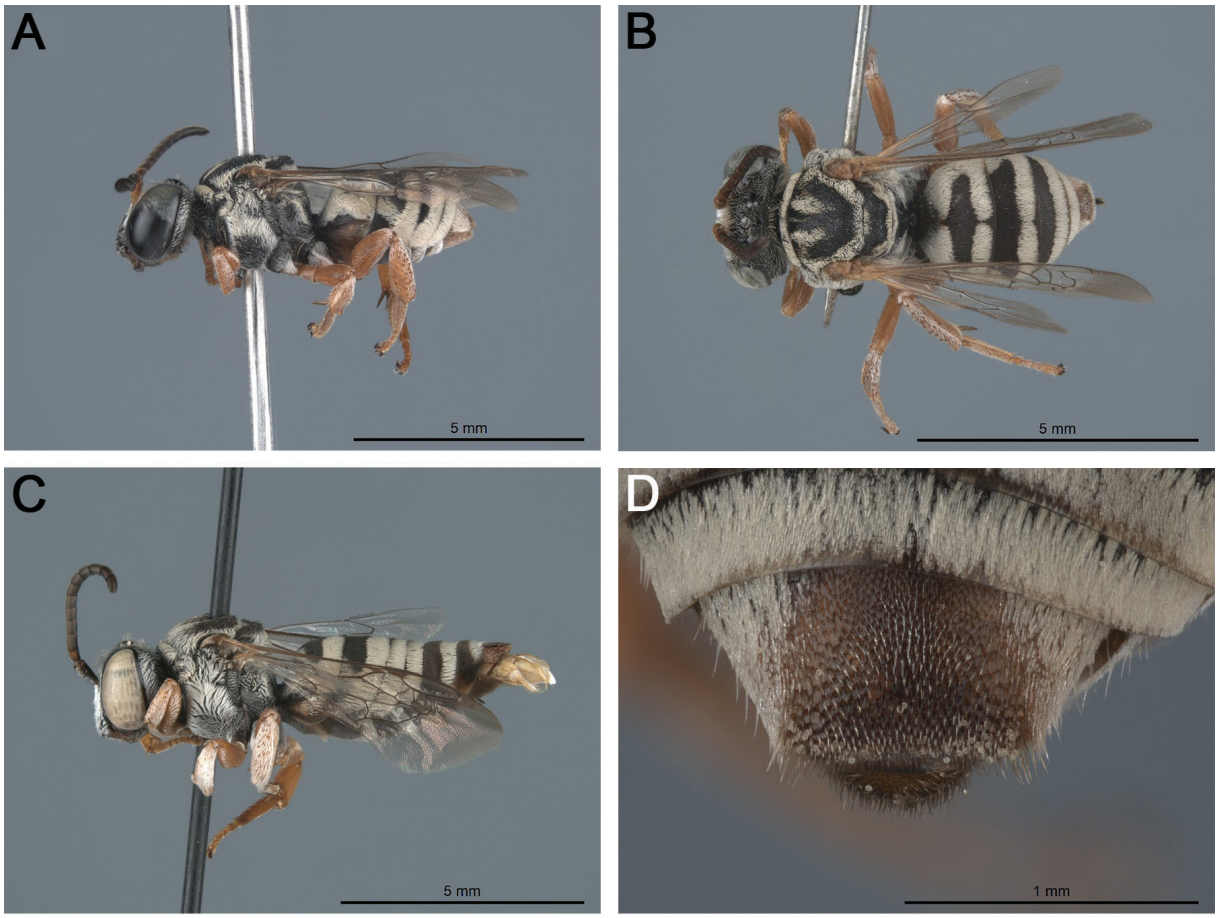

Fig. 14. *Triepeolus apache* sp. nov. **A**, **D**. Holotype, ♀ (BOLD sample ID: CCDB-24584 D03; PCYU). **A**. Habitus, lateral view. **B**. Paratype, ♀ (AMNH), habitus, dorsal view. **C**. Allotype, ♂ (BOLD sample ID: CCDB-38770 C03; RSKM PCYU:AZ09:40/RSKM_ENT_E-125505), habitus, lateral view. **D**. Pseudopygidial area, dorsal view.

little if at all beyond midlength of mesoscutellum; tip distinctly pointed, but mesally unattached to mesoscutellum for less than $^{2}/_{5}$ medial length of axilla; lateral margin relatively straight. Fore wing with three submarginal cells.

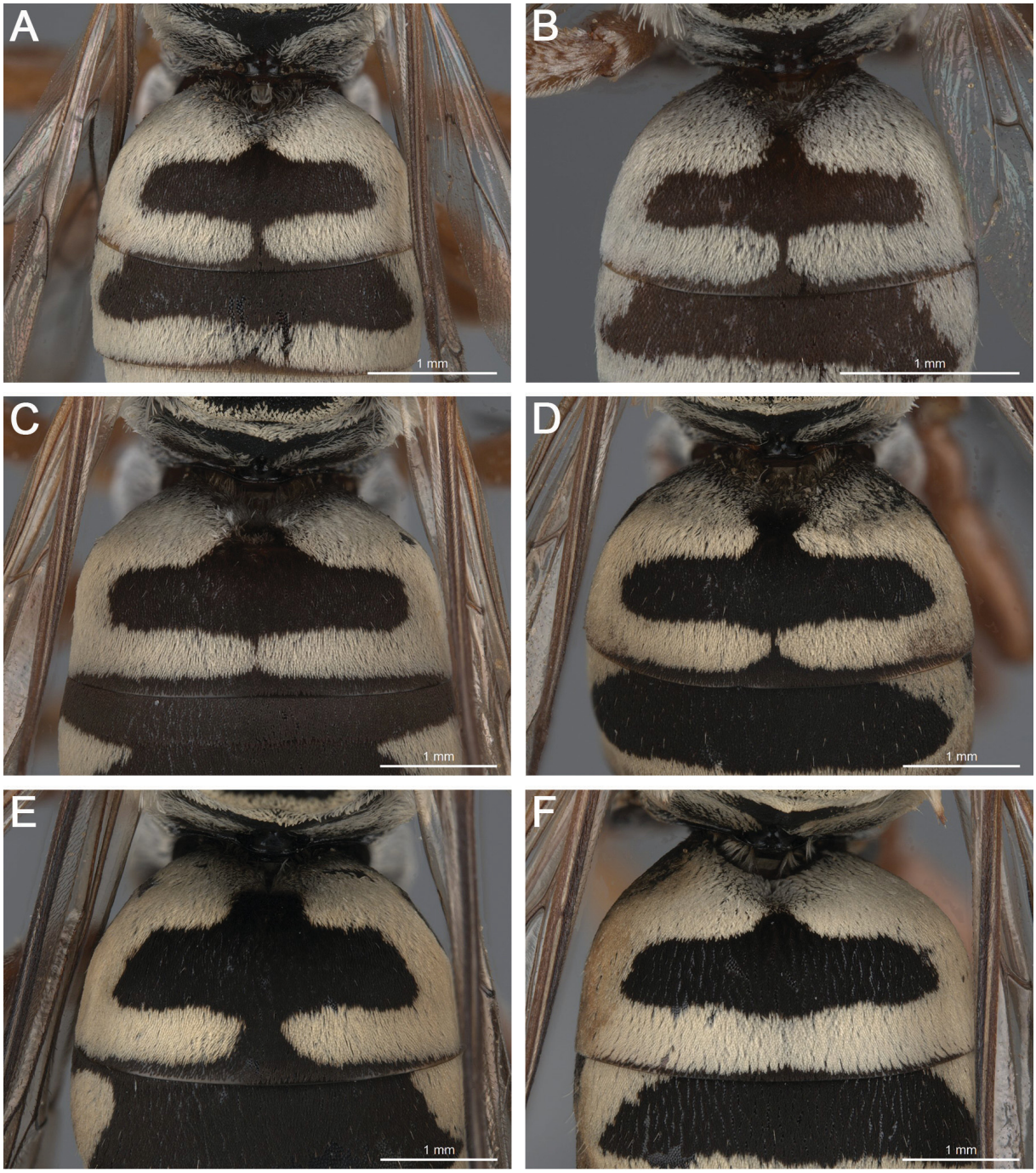

Fig. 15. T1 of female, dorsal view. **A**. *Triepeolus apache* sp. nov., paratype (AMNH). **B**. *T. hirsutus* sp. nov., paratype (AMNH). **C**. *T. oblongimacula* sp. nov., paratype (AMNH). **D**. *T. rhododontus* Cockerell, 1921 (AMNH). **E**. *T. segregatus* (Cockerell, 1900) (PCYU). **F**. *T. shoshone* sp. nov., paratype (PCYU PCYU-GS-07:2171).

Female

Paramedian band tapering slightly toward but not attaining anterior margin of mesoscutum. Mesopleuron with off-white, appressed, branched setae; densely setose except for two sparsely setose circular patches (one beneath base of fore wing (hypoepimeral area) and larger one occupying much of ventrolateral half of mesopleuron). T5 with concave apical margin and large patch of pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with underlying integument to some extent reddish orange, with triangular region of posteriorly directed setae with three subregions (basal patch of dense, golden setae; darker subapical band of sparser, coppery brown setae; and apical row of dense, suberect, silvery setae) within larger trapezoidal space of posteromedially directed coppery brown setae. Pygidial plate apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, with apical fimbria of coppery bristle-like setae.

Male

Paramedian band anteriorly joined to lateral transverse band of equally dense pale-yellow tomentum along anterior margin of mesoscutum. Mesopleuron almost entirely obscured by white/off-white tomentum. T5 with complete apical transverse band of pale-yellow tomentum. T6 with complete apical transverse band of off-white tomentum. Pygidial plate relatively flat and apically rounded, with lateral margin somewhat sinuate. S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved, predominantly coppery brown setae, contrasting with apical transverse bands of white tomentum of preceding sterna, those of S4 coppery to silvery laterally.

Distribution

Southwestern United States and northern Mexico (Fig. 12B).

Ecology

Host records

Unknown.

Floral records

Labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Asteraceae Giseke, *Carthamus tinctorius* L., *Helianthus* sp., *H. annuus* L., and *Picradeniopsis absinthifolia* (Benth.) B.G.Baldwin; in Boraginaceae Juss., *Heliotropium* sp.; in Fabaceae Juss., *Acacia* sp.; and *Melilotus albus* Medik.; and in Tamaricaceae Link, *Tamarix* sp.

Remarks

Triepeolus apache sp. nov. is very similar to *T. shoshone* sp. nov., and the two cannot be consistently separated morphologically. The T1 apical transverse band is interrupted medially in about 90% of the known specimens of *T. apache* sp. nov. whereas it is complete in about 80% of the known specimens of *T. shoshone*. Additionally, the T2 apical transverse band is interrupted medially in upwards of 10% of the known specimens of *T. apache*, whereas it is complete in all the known specimens of *T. shoshone*. Excluded from comparisons were damaged specimens in which the pubescence forming the apical transverse bands appeared to be rubbed off medially. However, the two forms appear to have largely allopatric distributions. Additionally, their status as separate species is supported by their separate BINs and large barcode sequence divergence from one another (2.2%) (see Supp. file 4). Hence, despite the apparent lack of reliable diagnostic morphological features, we have opted to treat the two forms as heterospecific.

Triepeolus eumeniformis sp. nov.
urn:lsid:zoobank.org:act:639463C4-48D5-4B50-BBF9-1A2A9BF67ED4
Figs 6D, 10D, 11C–D, 12C, 16

Proposed common name

Potter-wasp triepeolus.

Diagnosis

The following morphological features in combination tell *T. eumeniformis* sp. nov. apart from all other *Triepeolus* in the *simplex* species group: the mesoscutum has well-defined paramedian bands (Fig. 16B), the T1 discal patch is semicircular (Fig. 11C) or trapezoidal (Figs 11D, 16B), the T1 basal band (if present) is more widely interrupted medially than the apical transverse band (Figs 11C–D, 16B), and T3–T4 and usually also T2 have complete apical transverse bands of yellow tomentum that are about as broad as the bands on T1 and do not have basomedially convergent anterolateral extensions (Figs 10D, 11C–D, 16A–C). *Triepeolus eumeniformis* most closely resembles specimens of *T. alvarengai* that have an apical transverse band on T1 and *T. paucipunctatus* sp. nov., but in *T. alvarengai* the T1 apical transverse band (if present) is not more narrowly interrupted medially than the basal band and in *T. paucipunctatus* the T2 apical transverse band has a pair of well-defined basomedially convergent anterolateral extensions and the mesopleura are more sparsely punctate (some i > 4d as opposed to ≤ 3d) and have sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to the usual appressed, branched setae. Additionally, *T. eumeniformis* can easily be separated from *T. alvarengai* by geography; the former is known only from Mexico and Central America whereas the latter is known only from Brazil. Males of *T. eumeniformis* also closely resemble those of *T. rufoclypeus* (Fox, 1891) (outside of the *simplex* species group), but in *T. rufoclypeus* S3 has an apical/subapical fringe of dense, long (> 1 MOD), curved, pale setae (as opposed to only short, straight setae; Fig. 10D). This species is also very similar in overall appearance to specimens of *Epeolus flavofasciatus* Smith, 1879 (Hymenoptera: Apidae: Nomadinae) in which the axillae and mesoscutellum are black, but both sexes of *T. eumeniformis* can easily be told apart from any similar-looking *Epeolus* Latreille, 1802 by their simple mandibles; in *E. flavofasciatus* and most other *Epeolus* spp., the mandibles each have a distinct preapical tooth.

Etymology

The specific epithet is derived from *Eumenes* Latreille, 1802, the type genus of the subfamily Eumeninae (Hymenoptera: Vespidae), and was inspired by this species' resemblance to various kinds of potter wasps. The Latin adjectival suffix '-formis' means 'having the form of'.

Material examined

Primary type material

HONDURAS • ♀, holotype; Cortés, Estación Experimental Café (near Peñas Blancas rainforest); 15 Aug. 1992; C. Porter and L. Stange leg.; FSCA.

Secondary type material

HONDURAS • 1 ♀, paratype; same data as for holotype; FSCA M.G.R. Database No. 1321.

MEXICO – **Chiapas** • 1 ♀, paratype; 18 km S of La Trinitaria (small road NW of Hwy 190); 5 Dec. 1976; D.E. and J.A. Breedlove leg.; CAS • 1 ♀, paratype; Ei. Las Golondrinas (Acacoyagua); 15.4340° N, 92.6522° W; 29 Nov. 2004; M. Rincón, R. Ayala, and M. Guzmán leg.; ECOSUR ECO-TA-E-41202 • 1 ♀, paratype; Ei. Rosario Zacatonales (Acacoyagua); 8 Dec. 2004; M. Guzmán, M. Rincón, J. Esponda, C. Balboa, and J. Mérida leg.; ECOSUR ECO-TA-E-41813 • 1 ♂, allotype;

same data as for preceding; 10 Nov. 2006; J. Mérida, M. Guzmán, M. Cigarroa, J. Toto, and C. Balboa leg.; ECOSUR ECO-TAE-50298 • 1 ♀, paratype; Ei. Rosario Zacatonales (Acacoyagua); 15.4455° N, 92.6455° W; 29 Nov. 2004; M. Rincón, R. Ayala, and M. Guzmán leg.; ECOSUR ECO-TA-E-41255 • 3 ♂♂, paratypes; same data as for preceding; 29 Nov. 2004; M. Rincón, R. Ayala, and M. Guzmán leg.; ECOSUR ECO-TA-E-41259, ECO-TA-E-41271, ECO-TA-E-41312 • 1 ♂, paratype; same data as for preceding; 8 Dec. 2004; M. Rincón, R. Ayala, and M. Guzmán leg.; ECOSUR ECO-TA-E-41944 • 1 ♀, paratype; Ei. Rosario Zacatonales (Acacoyagua); 15.4480° N, 92.6435° W; 30 Nov. 2004; M. Rincón, R. Ayala, and M. Guzmán leg.; ECOSUR ECO-TA-E-41611 • 1 ♂, paratype; same data as for preceding; 30 Nov. 2004; M. Rincón, R. Ayala, and M. Guzmán leg.; ECOSUR ECO-TA-E-41610 • 1 ♀, paratype; Ei. Unión los Olivos (Mapastepec); 8 Nov. 2006; J. Mérida, M. Guzmán, M. Cigarroa, J. Toto, and C. Balboa leg.; ECOSUR ECO-TAE-50103. – **Estado de México** • 1 ♀, paratype; Tepotzotlán; 12 Nov. 1983; O. Morales leg.; UNAM. – **Jalisco** • 1 ♀, paratype; Chamela; 24 Oct. 1986; "A. Rodriguez P." leg.; UNAM. – **Morelos** • 1 ♂, paratype; Campamento YMCA, Tepoztlán; 21 Aug. 1958; H.F. Howden leg.; CNC 1801914. – **Nayarit** • 1 ♀, paratype; 8 mi N of Tepic; 25.vii.1954; M. Cazier, W. Gertsch, and Bradts leg.; AMNH. – **Tamaulipas** • 1 ♀, paratype; Cañón de Peregrina; 20 Oct. 1974; J.E. Gillaspy leg.; USNM. – **Veracruz** • 1 ♀, paratype; 5 mi NE of Tinajas; 18 Aug. 1963; F.D. Parker and L.A. Stange leg.; UCBME • 1 ♀, paratype; Fortín de las Flores; 17 Sep. 1954; F.X. Williams leg.; CAS.

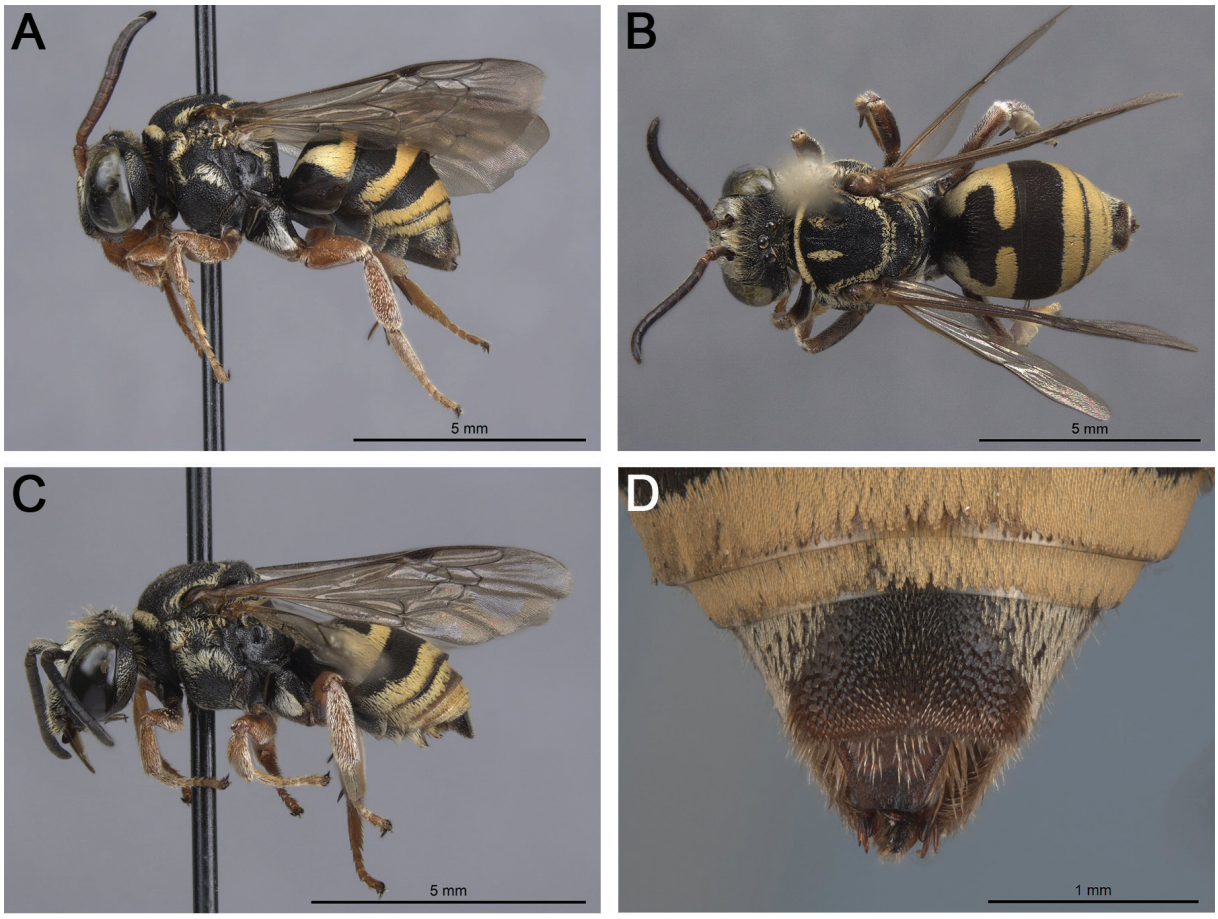

Fig. 16. *Triepeolus eumeniformis* sp. nov. **B**, **D**. Holotype, ♀ (FSCA). **A**. Paratype, ♀ (ECOSUR ECO-TA-E-41255), habitus, lateral view. **B**. Habitus, dorsal view. **C**. Allotype, ♂ (ECOSUR ECO-TAE-50298), habitus, lateral view. **D**. Pseudopygidial area, dorsal view.

DNA barcoded material

Unavailable.

Description

Measurements of holotype. Body length 9.5 mm; ITW 1.9 mm; head length 2.3 mm; head width 3.3 mm; fore wing length 7.7 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with basal half (except for extreme base) and labrum with lateral margin reddish orange. F1 to some extent, tegula, coxae to femora to some extent, and tibiae (excluding brown meso- and metatibial spurs) and tarsi predominantly to entirely orange. F2 with orange spot basally (entirely dark brown in some paratypes). Fore wing membrane dusky subhyaline throughout. Hind wing membrane dusky subhyaline to hyaline.

Pubescence. Face with tomentum densest around antennal socket. Tomentum slightly sparser on clypeus; upper paraocular and frontal areas and vertexal area mostly exposed. Pronotal collar with tomentum uniformly bright yellow. Mesoscutum with well-defined paramedian band of bright yellow tomentum, tapering slightly toward but not attaining anterior margin; pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with black, appressed, branched setae just anterior to hypoepimeral area and pale-yellow, appressed, branched setae elsewhere; densely setose only just below pronotal lobe and scrobal groove and along posterior margin above base of mesocoxa (upper half otherwise sparsely setose); ventrolateral half nearly bare, except along margins. Mesopleuron with sparse, pale-yellow, erect/suberect, simple setae (less than ½ MOD in length) in addition to usual appressed, branched setae. Metanotum with tomentum dark brown/gray submedially and pale yellow laterally and medially (pale yellow laterally and black medially in some paratypes). Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. T1 with basal transverse band of pale-yellow tomentum widely interrupted medially and arched but distinguishable from lateral longitudinal band (continuous with (and indistinguishable from) lateral longitudinal band in allotype and multiple paratypes), apical transverse band of bright yellow tomentum separated into pair of rounded lobes medially, discal patch trapezoidal (semicircular in allotype and multiple paratypes). T2–T4 with complete apical transverse bands of bright yellow tomentum without anterolateral extensions (T2 band with pair of very short and small anterolateral extensions in some paratypes). S2–S3 with apical transverse bands of white tomentum.

Surface sculpture. Labrum coarsely and densely (most $i < 1d$) rugose-punctate. Clypeus densely punctate (most $i \leq 1d$) but interspaces well defined, shining; with many small punctures among larger ones. Vertexal area densely punctate (most $i \leq 1d$). Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense (most $i \leq 1d$); interspaces well defined, dull due to tessellate surface microsculpture. Mesopleuron with punctures in upper half denser (most $i \leq 1d$) than in ventrolateral half ($i \leq 3d$); interspaces shining; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense ($i \approx 1d$), and evenly distributed; interspaces somewhat dull due to tessellate surface microsculpture.

Structure. Labral apex with pair of small denticles, each preceded by discrete longitudinal ridge. Pronotal collar rather short (medial length ~⅔ MOD). Mesoscutellum weakly bigibbous. Axilla not extending beyond midlength of mesoscutellum; tip visible but somewhat blunt, mesally unattached to mesoscutellum for less than ⅓ medial length of axilla; lateral margin relatively straight. Fore wing with three submarginal cells.

Female

Scape and pedicel extensively orange. T5 with reddish brown and concave apical margin and large patch of pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with

triangular region of posteriorly directed setae with three subregions (basal patch of dense, golden setae; darker subapical band of sparser, coppery setae; and apical row of dense, suberect, silvery setae) within larger trapezoidal space of posteromedially directed dark brown setae. Pygidial plate reddish brown in part and apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, with apical fimbria of coppery bristle-like setae.

Male

Pedicel orange in part in some paratypes. T5–T6 with complete apical transverse bands of bright yellow tomentum. Pygidial plate with small orange spot subapically, relatively flat and apically rounded. S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved setae, those of S4 coppery to silvery, those of S5 coppery and contrasting with apical transverse bands of white tomentum of preceding sterna.

Distribution

Western Mexico to the Northern Triangle of Central America (Fig. 12C).

Ecology

Host records

Unknown.

Floral records

The label of one examined voucher specimen indicates that this species has been collected from the following flowering plant species: in Lamiaceae Martinov, *Salvia* sp.

Remarks

This species exhibits continuous variation in the shape of the T1 discal patch, which ranges from strongly trapezoidal to almost perfectly semicircular. Additionally, the T1 basal band varies in the degree to which it is interrupted medially and in some specimens appears to be absent or indistinguishable from the lateral longitudinal bands. Based on known records, adults of *T. eumeniformis* sp. nov. are active from July to December.

Triepeolus hirsutus sp. nov.
urn:lsid:zoobank.org:act:C7F899F6-FA16-44CB-93E5-C6F2F9E27EB5
Figs 5C, 12D, 15B, 17, 18A

Proposed common name

Southwestern bristly triepeolus.

Diagnosis

The following morphological features in combination tell *T. hirsutus* sp. nov. apart from all other *Triepeolus* in the *simplex* species group except *T. parahirsutus* sp. nov.: the mesopleura have sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to the usual appressed, branched setae (Figs 17A, C, 18A); the legs are entirely reddish orange from trochanters to tarsi (Fig. 17A–C); and the T1 discal patch is rectangular or trapezoidal with an inverted U- or horseshoe-shaped anteromedial projection (Figs 15B, 17B). Females of *T. hirsutus* and *T. parahirsutus* are readily distinguished from each other by the pseudopygidial area, which in the former has three subregions of differentiated setae—a basal patch of dense, golden setae, a darker subapical band of sparser, coppery brown setae, and an apical row of dense, suberect, silvery setae (Fig. 17D)—and in the latter does not have distinct subregions of differentiated setae but rather setae that are golden to silvery and relatively uniform in density. Additionally, *T. hirsutus* is generally smaller (body length

5.5–9.0 mm; ITW 1.2–1.7 mm) (Fig. 17A–C) than *T. parahirsutus* (body length 8.0–12.0 mm; ITW 1.7–2.5 mm) and in the former the axillae almost never (as opposed to commonly) have reddish tips. Although it might not be possible to separate certain males morphologically, *T. hirsutus* can easily be separated from *T. parahirsutus* by geography; the former is known only from the Southwestern United States and adjacent Mexico whereas the latter is known only from Central and South Texas. Additionally, *T. hirsutus* may be confused with *T. apache* sp. nov. due to their small size and as the ranges of both species overlap considerably, but in *T. apache* the mesopleura laterally do not have erect/suberect, simple setae or have only sparse, short (< ¼ MOD), erect/suberect, simple setae in addition to the usual appressed, branched setae and the T1 basal band forms an inflexed arch and is thus gradually narrowed but not completely interrupted medially, such that the discal patch has a short, narrowed (i.e., inverted V-shaped) anteromedial projection.

Etymology

The specific epithet is a Latin adjective meaning 'bristly' and refers to the pale, erect/suberect, simple setae on the mesopleura.

Material examined

Primary type material

USA • ♀, holotype; Arizona, 8 mi NE of Portal, Cochise County; 17 Aug. 1990; J.G. Rozen and J. Krieger leg.; AMNH.

Secondary type material

MEXICO – **Chihuahua** • 1 ♀, paratype; 10 mi N of Jiménez; 10 Sep. 1950; R.F. Smith leg.; AMNH • 1 ♀, paratype; same data as for preceding; 21 Sep. 1970; R.M. Bohart leg.; UCBME • 1 ♀, paratype; 18 km NW of Jiménez; 26 Aug. 1991; J.G. Rozen leg.; AMNH SM0326380 • 1 ♀, paratype; 35 km NW of Janos; 31 Aug. 1991; R. Ayala leg.; INHS 8621/SM0326388 • 1 ♀, paratype; 5 mi N of Escalón; 20 Sep. 1970; G.E. and R.M. Bohart leg.; BBSL. – **Sonora** • 1 ♀, paratype; 30 km E of Agua Prieta; 31.3194° N, 109.2714° W; 29 Aug. 2003; A. Romero leg.; BOLD sample ID: CMNTO_308; RLM SBV036299.

USA – **Arizona** • 3 ♀♀, paratypes; 10 mi NE of Portal, Cochise County; 24 Aug. 1966; J.G. and B.L. Rozen leg.; AMNH • 1 ♀, paratype; 13 mi SW of Apache, Cochise County; 24 Aug. 1983; Rozen and Favreau leg.; AMNH • 1 ♀, paratype; 14 mi S of Apache, Cochise County; 28 Aug. 1980; R.J. McGinley leg.; USNM • 1 ♀, paratype; 16 mi NE of Douglas, Cochise County; 23 Aug. 1962; J.G. Rozen, M. Statham, and S.J. Hessel leg.; AMNH • 1 ♀, paratype; same data as for preceding; 31 Aug. 1962; J.G. Rozen, M. Statham, and S.J. Hessel leg.; AMNH • 1 ♀, paratype; 18 mi SW of Apache, Cochise County; 22–23 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀, paratype; same data as for preceding; 28 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀, paratype; 2 mi E of Apache, Cochise County; 16–17 Aug. 1988; J.G. Rozen and E. Quinter leg.; AMNH • 2 ♀♀, paratypes; same data as for preceding; 22 Aug. 1988; Rozen, Quinter, and Brewster leg.; AMNH • 1 ♀, paratype; same data as for preceding; 29 Aug. 1988; J.G. Rozen and E. Quinter leg.; AMNH • 1 ♀, paratype; 2 mi NE of Portal, Cochise County; 1 Sep. 1989; J.G. and B.L. Rozen and R. Foster leg.; AMNH • 1 ♀, paratype; 2 mi SW of Willcox, Cochise County; 4 Sep. 1983; J.G. Rozen and M. Favreau leg.; AMNH • 1 ♀, paratype; 2.5 mi N of Portal, Cochise County; 27 Jul. 1961; E.G. Linsley leg.; UCBME • 1 ♀, paratype; 4 mi E of Willcox, Cochise County; 19 Aug. 1992; J.G. Rozen leg.; AMNH • 1 ♀, paratype; 4 mi SW of Congress, Yavapai County; 15 Sep. 1961; P.D. Hurd leg.; UCBME • 1 ♀, paratype; 4 mi W of Quijotoa, Pima County; 1 Sep. 1970; J.G. and K.C. Rozen leg.; AMNH • 1 ♀, paratype; 5 mi S of San Simon, Cochise County; 27 Aug. 1996; J.G. and B.L. Rozen and A. Pence leg.; AMNH • 3 ♀♀, paratypes; 8 mi NE of Portal, Cochise County; 23–25 Aug. 1989; J.G. Rozen and R.L. Foster leg.; AMNH • 1 ♀, paratype; same data as for preceding; 14 Aug. 1990; J.G. Rozen and R.L. Foster leg.; AMNH • 3 ♀♀, paratypes;

same data as for preceding; 28 Aug. 1990; J.G. and B.L. Rozen and J. Krieger leg.; AMNH • 2 ♀♀, paratypes; 9 mi N of Elfrida, Cochise County; 5 Aug. 1961; J.G. Rozen leg.; AMNH • 1 ♀, paratype; 9 mi NE of Portal, Cochise County; 23 Aug. 2002; J.G. Rozen leg.; AMNH • 1 ♀, paratype; Apache, Cochise County; 17 Aug. 1961; M.A. Cazier leg.; AMNH • 1 ♀, paratype; Chiricahua Mountains, Cochise County; 9 Sep. 1951; Timberlake leg.; USNM • 1 ♂, allotype; Douglas, Cochise County; 31.3432° N, 109.4980° W; 23 Aug. 2007; PCYU • 1 ♀, paratype; Hereford, Cochise County; 20 Aug. 1989; R.M. Bohart leg.; UCBME • 1 ♀, paratype; Mohave Community College (Kingman), Mohave County; 13 Sep. 1976; R.C. Miller leg.; UCBME • 1 ♀, paratype; San Simon, Cochise County; 30 Aug. 1958; R.M. Bohart leg.; UCBME • 1 ♀, paratype; W side of Willcox Playa; 23 Aug. 1961; J.C. Bequaert and F. Werner leg.; UAIC • 1 ♀, paratype; Willcox, Cochise County; 21 Aug. 1972; J.G. Rozen and R. McGinley leg.; AMNH • 4 ♀♀, paratypes; same data as for preceding; 18 Aug. 1985; J.G. Rozen leg.; AMNH. – **California** • 1 ♀, paratype; 18 mi W of Blythe, Riverside County; 11 Oct. 1971; E.E. Grissell leg.; UCBME. – **New Mexico** • 1 ♀, paratype; 1 mi N of Rodeo, Hidalgo County; 25 Aug. 1967; AMNH • 1 ♀, paratype; same data as for preceding; 2 Sep. 1972; M. and T.M. Favreau leg.; AMNH • 1 ♀, paratype; same data as for preceding; 19 Aug. 1974; J.G. Rozen leg.; AMNH • 3 ♀♀, paratypes; same data as for preceding; 21 Aug. 1974; Rozen and Favreau leg.; AMNH • 2 ♀♀, paratypes; same data as for preceding; 28–29 Aug. 1987; J.G. and B.L. Rozen leg.; AMNH • 1 ♀, paratype; 2 mi N of Rodeo, Hidalgo County; 22 Aug. 1996; J.G. and B.L. Rozen and A. Pence leg.; AMNH • 1 ♀, paratype;

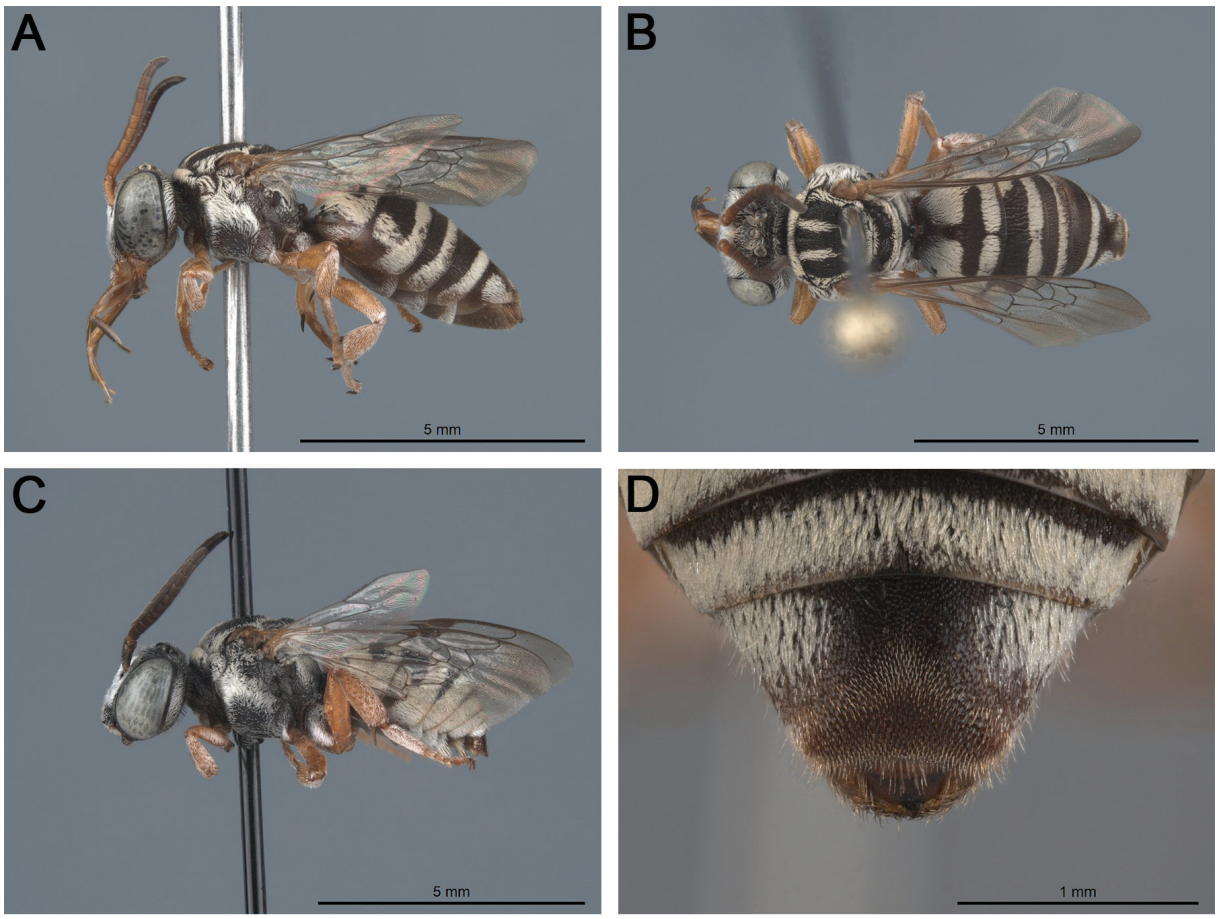

Fig. 17. *Triepeolus hirsutus* sp. nov. **A**–**B**. Holotype, ♀ (AMNH). **A**. Habitus, lateral view. **B**. Habitus, dorsal view. **C**. Allotype, ♂ (PCYU), habitus, lateral view. **D**. Paratype, ♀ (AMNH) pseudopygidial area, dorsal view.

2 mi S of Road Forks (Hwy 80), Hidalgo County; 21 Aug. 2013; E.S. Wyman leg.; BOLD sample ID: CCDB-22791 A03; AMNH AMNH_IZC 00292364 • 1 ♀, paratype; 2.3 mi NW of Rodeo, Hidalgo County; 16 Sep. 1960; M.A. Cazier leg.; AMNH M.G.R. Database No. 1206 • 1 ♀, paratype; 26 mi S of Animas, Hidalgo County; 20 Aug. 1986; J.G. Rozen leg.; AMNH • 2 ♀♀, paratypes; same data as for preceding; 20 Aug. 1986; R.J. McGinley and B.M. Norden leg.; USNM • 1 ♀, paratype; 5 mi N of Rodeo, Hidalgo County; 26 Aug. 1985; J.G. and B.L. Rozen leg.; AMNH • 5 ♀♀, paratypes; same data as for preceding; 1 Sep. 1989; J.G. and B.L. Rozen and R. Foster leg.; AMNH • 1 ♀, paratype; 7 mi SW of Rodeo, Hidalgo County; 22 Aug. 1964; J.G. and B.L. Rozen leg.; AMNH • 1 ♀, paratype; Animas, Hidalgo County; 1 Sep. 2009; S. Dumesh leg.; PCYU • 1 ♀, paratype; Lordsburg, Hidalgo County; 6 Sep. 1984; R.M. Bohart leg.; UCBME • 1 ♀, paratype; Middle Wells (21 mi S of Animas), Hidalgo County; 23 Aug. 1973; Rozen and Favreau leg.; AMNH • 2 ♀♀, paratypes; Rodeo, Hidalgo County; 22 Aug. 1958; C.G. Moore leg.; UCBME • 1 ♀, paratype; same data as for preceding; 3 Sep. 1973; M. Favreau leg.; AMNH • 1 ♀, paratype; same data as for preceding; 6 Sep. 1973; M. Favreau leg.; AMNH • 1 ♀, paratype; same data as for preceding; 9 Sep. 1973; M. Favreau leg.; AMNH • 1 ♀, paratype; S of Apache, Hidalgo County; 2003; L. Packer leg.; PCYU.

DNA barcoded material

Available. BIN: BOLD:ACP8071. See type material for specimens examined and sequenced (indicated by unique BOLD sample ID).

Non-barcoded material

USA • 2 ♀♀, *T. loomisorum* Rozen, 1989 paratypes; Arizona, 13 mi SW of Apache, Cochise County; 1 Sep. 1988; E. Quinter leg.; AMNH M.G.R. Database Nos 1754, 1756.

Description

Measurements of holotype. Body length 7.2 mm; ITW 1.4 mm; head length 1.8 mm; head width 2.5 mm; fore wing length 5.1 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with apical two-fifths golden yellow (entirely dark brown/black in some paratypes). Mandible with basal three-fifths, labrum, scape, pedicel, F1 entirely and succeeding flagellomeres to some extent, tegula, coxae to some extent, trochanters to tarsi (excluding brown meso- and metatibial spurs) entirely, metasomal terga laterally, and metasomal sterna to some extent orange. Fore wing membrane subhyaline, apically dusky. Hind wing membrane dusky subhyaline to hyaline. Pygidial plate to some extent reddish brown.

Pubescence. Face with tomentum densest around antennal socket. Tomentum slightly sparser on clypeus; upper paraocular and frontal areas and vertexal area mostly exposed. Pronotal collar with tomentum uniformly pale yellow. Mesoscutum with well-defined paramedian band of pale-yellow tomentum (attaining anterior margin in holotype and allotype; tapering slightly toward but not attaining anterior margin in some paratypes); pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with off-white to pale-yellow, appressed, branched setae; upper half densely setose, except behind pronotal lobe, with setae slightly sparser on hypoepimeral area; ventrolateral half sparsely setose. Mesopleuron with sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to usual appressed, branched setae. Metanotum with tomentum uninterrupted, uniformly pale yellow. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. T1 with basal transverse band of pale-yellow tomentum interrupted medially, apical transverse band of pale-yellow tomentum more narrowly interrupted medially (complete in some paratypes), transverse bands subparallel, discal patch widely trapezoidal. T2–T4 with complete apical transverse bands of pale-yellow tomentum, that of T2 with pair of basomedially convergent anterolateral extensions. S2–S3 with apical transverse bands of white tomentum.

Surface sculpture. Labrum with punctures nearly contiguous (most i < 1d). Clypeus densely punctate (most i ≤ 1d) but interspaces well defined, shining; with many small punctures among larger ones. Vertexal area somewhat sparsely punctate (some i > 2d), especially around ocelli. Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense (most i ≤ 1d); interspaces well defined, shining. Mesopleuron with punctures in upper half denser (i ≤ 1d) than in ventrolateral half (i ≤ 3d); interspaces shining; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense (i ≈ 1d), and evenly distributed; interspaces shining somewhat.

Structure. Labrum with pair of very small subapical denticles, each preceded by discrete longitudinal ridge. Pronotal collar short (medial length ~½ MOD). Mesoscutellum moderately bigibbous. Axilla not extending beyond midlength of mesoscutellum; tip distinctly pointed, but mesally unattached to mesoscutellum for less than ⅓ medial length of axilla; lateral margin relatively straight. Fore wing with three submarginal cells.

Female

T5 with concave apical margin and large patch of off-white to pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with triangular region of posteriorly directed setae with three subregions (basal patch of dense, golden setae; darker subapical band of sparser, coppery brown

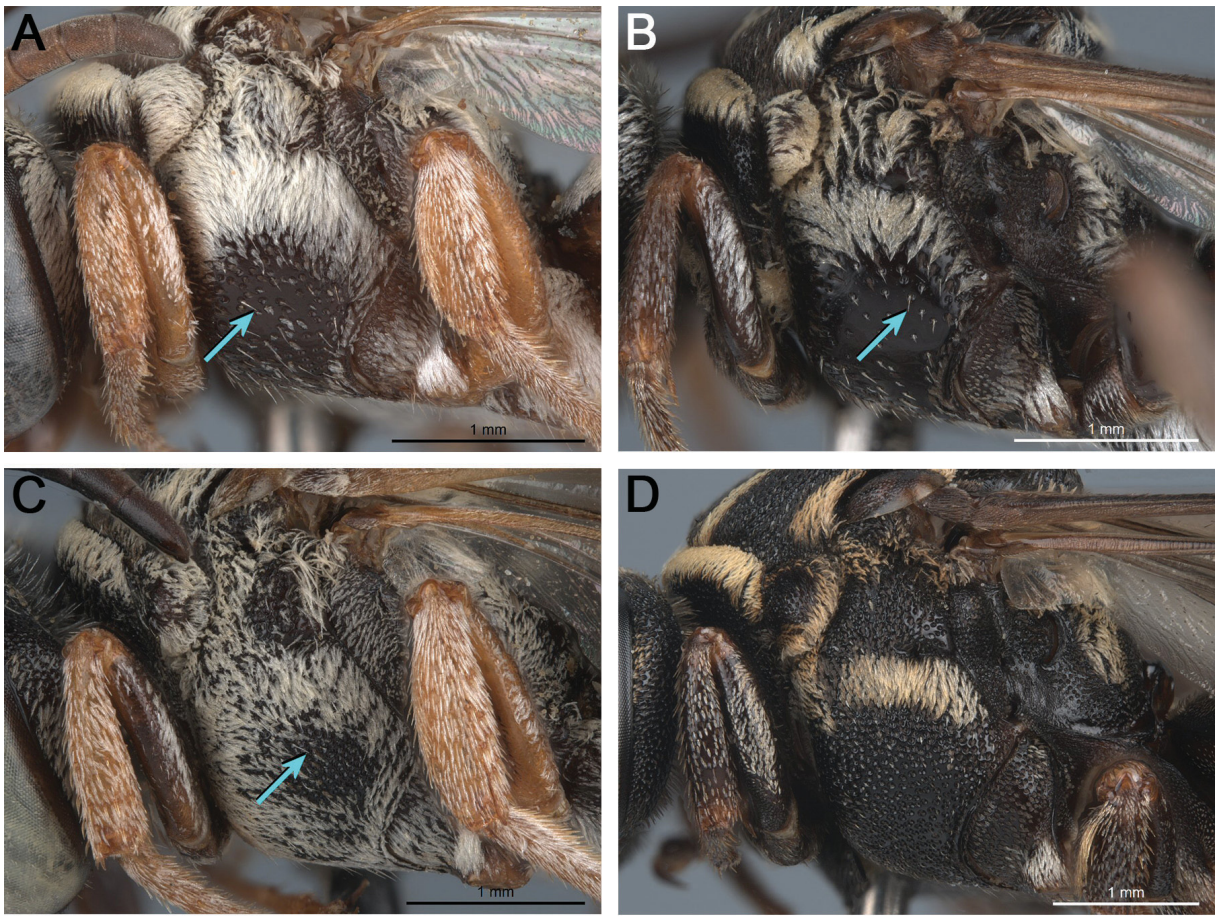

Fig. 18. Mesosoma of female, lateral view. **A**. *Triepeolus hirsutus* sp. nov., paratype (AMNH). **B**. *T. paucipunctatus* sp. nov., holotype (UCBME M.G.R. Database No. 1216). **C**. *T. saturninus* Cockerell & Sandhouse, 1924 (UCBME). **D**. *T. simplex* Robertson, 1903 (PCYU). Blue arrows indicate long (≥ ½ MOD), erect/suberect, simple setae.

setae; and apical row of dense, suberect, silvery setae) within larger trapezoidal space of posteromedially directed dark brown setae. Pygidial plate apically truncate. S4 with apical transverse band of white tomentum. S5 mostly straight in lateral view, with apical fimbria of coppery bristle-like setae.

Male

Paramedian band anteriorly joined to lateral transverse band of slightly sparser pale-yellow tomentum along anterior margin of mesoscutum. T5 with complete apical transverse band of pale-yellow tomentum. T6 with complete apical transverse band of off-white tomentum. Pygidial plate relatively flat and apically rounded, with lateral margin somewhat sinuate. S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved setae, those of S4 coppery to silvery, those of S5 coppery to silvery laterally, brown and contrasting with apical transverse bands of white tomentum of preceding sterna medially.

Distribution

Southwestern United States and northern Mexico (Fig. 12D).

Ecology

Host records

Two (female) paratypes of *T. hirsutus* sp. nov. at the AMNH were apparently taken from the same *Protoxaea* Cockerell & Porter, 1899 (Hymenoptera: Andrenidae: Oxaeinae) nest 8 mi NE of Portal in Cochise County, Arizona, USA.

Floral records

Labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Asteraceae, *Baccharis* sp., *B. salicina* Torr. & A.Gray, *Baileya pleniradiata* Harv. & A.Gray ex A.Gray, *Grindelia squarrosa* (Pursh) Dunal, *Gutierrezia sarothrae* (Pursh) Britton & Rusby, *Heterotheca* sp., and *Hymenothrix wislizeni* A.Gray; and in Euphorbiaceae Juss., *Euphorbia* sp.

Remarks

In addition to the diagnostic morphological features that separate *T. hirsutus* sp. nov. from similar species, its status as a separate species is supported by a separate BIN and large barcode sequence divergence (5.6%) from its nearest neighbor, *T. parahirsutus* sp. nov. (see Supp. file 4). Based on known records, adults of *T. hirsutus* are most active from August to September.

Triepeolus kathrynae Rozen, 1989
Figs 11E, 12E, 19, 20A

Triepeolus kathrynae Rozen, 1989: 10 (♀, ♂), figs 7–8, 18–21, 26–32.

Triepeolus species B – Rozen 1966: 14, figs 15–18 (description, illustrations of postdefecating larva).
Triepeolus kathrynae – Rozen 2001: figs 7–13 (illustrations of mature larva).

Proposed common name

Kathryn's triepeolus.

Diagnosis

The following morphological features in combination tell *T. kathrynae* apart from all other species of *Triepeolus*: the axillae have pale pubescence all along their margins and are large, each with the tip extending well beyond the midlength of the mesoscutellum and the free portion distinctly pointed, hooked (i.e., concave along the medial margin), and mesally unattached to the mesoscutellum for approximately half the medial length of the axilla (Figs 19B, 20A). In *T. bimorulus* Rightmyer, 2008 and *T. simulatus*

Rightmyer, 2008, which are not in the *simplex* species group, the axillae also have pale pubescence all along their margins but extend little if at all beyond the midlength of the mesoscutellum. Males of *T. kathrynae* are very similar in overall appearance to those of *T. grandis* (Friese, 1917) (outside of the *simplex* species group), but in both sexes of *T. grandis* the axillae do not have pale pubescence all along their margins.

Etymology

The specific epithet (declined in the genitive case) honors Kathryn Gail Rozen-Gagnon, granddaughter of the taxonomic authority.

Material examined

Primary type material

USA • ♀, holotype; New Mexico, 11 mi N of Rodeo, Hidalgo County; 19 Aug. 1968; J.G. Rozen and M. Favreau leg.; AMNH AMNH_IZC 00324363.

Secondary type material

MEXICO – **Chihuahua** • 1 ♀, paratype; 18 mi W of Jiménez; 10 Aug. 1951; H.E. Evans leg.; KUNHM M.G.R. Database No. 3838. – **Durango** • 1 ♂, paratype; 8 mi S of Canutillo; 9 Aug. 1951; H.E. Evans leg.; KUNHM SEMC26/M.G.R. Database No. 5579 • 1 ♀, paratype; San Juan del Río; 7 Aug. 1951; H.E. Evans leg.; KUNHM M.G.R. Database No. 3836 • 1 ♂, paratype; same data as for preceding; 7 Aug. 1951; H.E. Evans leg.; KUNHM M.G.R. Database No. 3839. – **Guerrero** • 1 ♀, paratype; Mezcala; 29 Jun. 1951; H.E. Evans leg.; KUNHM M.G.R. Database No. 3837. – **Morelos** • 1 ♀, paratype; 4.3 mi W of Yautepec; 17 Aug. 1962; Ordway and Marston leg.; KUNHM SEMC25/M.G.R. Database No. 5578.

USA – **Arizona** • 1 ♀, paratype; 1 mi E of Douglas, Cochise County; 16 Aug. 1974; Rozens and Favreau leg.; AMNH M.G.R. Database No. 1711 • 1 ♀, paratype; same data as for preceding; 20 Aug. 1975; J.G. Rozen leg.; AMNH M.G.R. Database No. 1710 • 1 ♂, paratype; same data as for preceding; 20 Aug. 1975; J.G. Rozen leg.; AMNH M.G.R. Database No. 1727 • 1 ♂, paratype; 2 mi NE of Portal, Cochise County; 1 Aug. 1959; M. Statham leg.; AMNH M.G.R. Database No. 1726 • 1 ♂, paratype; 7 mi E of Elfrida, Cochise County; 3 Aug. 1961; E.G. Linsley leg.; AMNH M.G.R. Database No. 1725 • 3 ♂♂, paratypes; Madera Canyon (Santa Rita Mountains), Pima County; 13 Aug. 1952; M. Cazier, R. Schrammel, and C. and P. Vaurie leg.; AMNH M.G.R. Database Nos 1480, 1728, 1729 • 1 ♂, paratype; Southwestern Research Station (5 mi W of Portal), Cochise County; 24 Jul. 1956; C. and M. Cazier leg.; AMNH M.G.R. Database No. 1717 • 1 ♂, paratype; same data as for preceding; 24 Jul. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 1722 • 1 ♂, paratype; same data as for preceding; 25 Jul. 1956; C. and M. Cazier leg.; AMNH M.G.R. Database No. 1720 • 1 ♂, paratype; same data as for preceding; 3 Aug. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 1715 • 1 ♂, paratype; same data as for preceding; 5 Aug. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 1713 • 1 ♂, paratype; same data as for preceding; 6 Aug. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 1723 • 2 ♂♂, paratypes; same data as for preceding; 10 Aug. 1956; C. and M. Cazier leg.; AMNH M.G.R. Database Nos 1718, 1721 • 1 ♂, paratype; same data as for preceding; 10 Aug. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 1716 • 1 ♂, allotype; same data as for preceding; 15 Aug. 1956; E. Ordway leg.; AMNH AMNH_IZC 00324364 • 1 ♂, paratype; same data as for preceding; 18 Aug. 1956; C. and M. Cazier leg.; AMNH M.G.R. Database No. 1714 • 1 ♀, paratype; same data as for preceding; 21 Aug. 1956; C. and M. Cazier leg.; AMNH M.G.R. Database No. 1712 • 1 ♂, paratype; same data as for preceding; 24 Aug. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 1719 • 1 ♀, paratype; Tumacacori, Santa Cruz County; 25 Aug. 1981; E.G. and J.M. Linsley leg.; USNM 0930-0959/M.G.R. Database No. 5715 • 1 ♀, paratype; same data as for preceding; 29 Aug. 1981; E.G. and J.M. Linsley leg.; USNM 0900-0929/M.G.R. Database No. 5714. – **New Mexico** • 1 ♀, paratype; 1 mi N of Rodeo, Hidalgo County; 23 Aug. 1963; M.A. Cazier and M. Mortenson leg.; USNM 0930-0959/M.G.R. Database No.

5716 • 1 ♀, paratype; 5 mi N of Carlsbad, Eddy County; 21 Sep. 1956; J.W. MacSwain leg.; USNM M.G.R. Database No. 5713. – **Texas** • 1 ♂, paratype; 17 mi S of Kent, Culberson County; 3 Jul. 1963; J.G. and B.L. Rozen leg.; AMNH M.G.R. Database No. 1724 • 1 ♀, paratype; Carrizo Springs, Dimmit County; 10 Jun. 1948; M. Cazier leg.; AMNH M.G.R. Database No. 1709.

DNA barcoded material

Available. BIN: BOLD:AAW8068. Specimens examined and sequenced:

MEXICO • 1 ♀; Sonora, 30 km E of Agua Prieta; 31.3267° N, 109.2520° W; 26 Jul. 2000; K. Toal leg.; BOLD sample ID: CCDB-34570 D05; RLM.

USA – **Arizona** • 1 ♀; 9 km W of Bisbee on Hwy 92, Cochise County; 31.3788° N, 109.9635° W; 30 Aug. 2013; L. Graham leg.; BOLD sample ID: CMNTO_005; PCYU • 1 ♀; Bisbee (Hwy 92), Cochise County; 31 Aug. 2013; BOLD sample ID: CMNTO_007; PCYU • 1 ♀; Portal Road (7 mi marker), Cochise County; 28 Aug. 2004; BOLD sample ID: 04-AZ-0942; PCYU.

Non-barcoded material

MEXICO – **Baja California Sur** • 2 ♂♂; 3.7 mi N of La Burrera; 7–8 Oct. 1975; R.R. Snelling leg.; LACM M.G.R. Database Nos 5426, 5428 • 1 ♀; 4 km N of Los Barriles; 4 Sep. 1977; R.R. Snelling

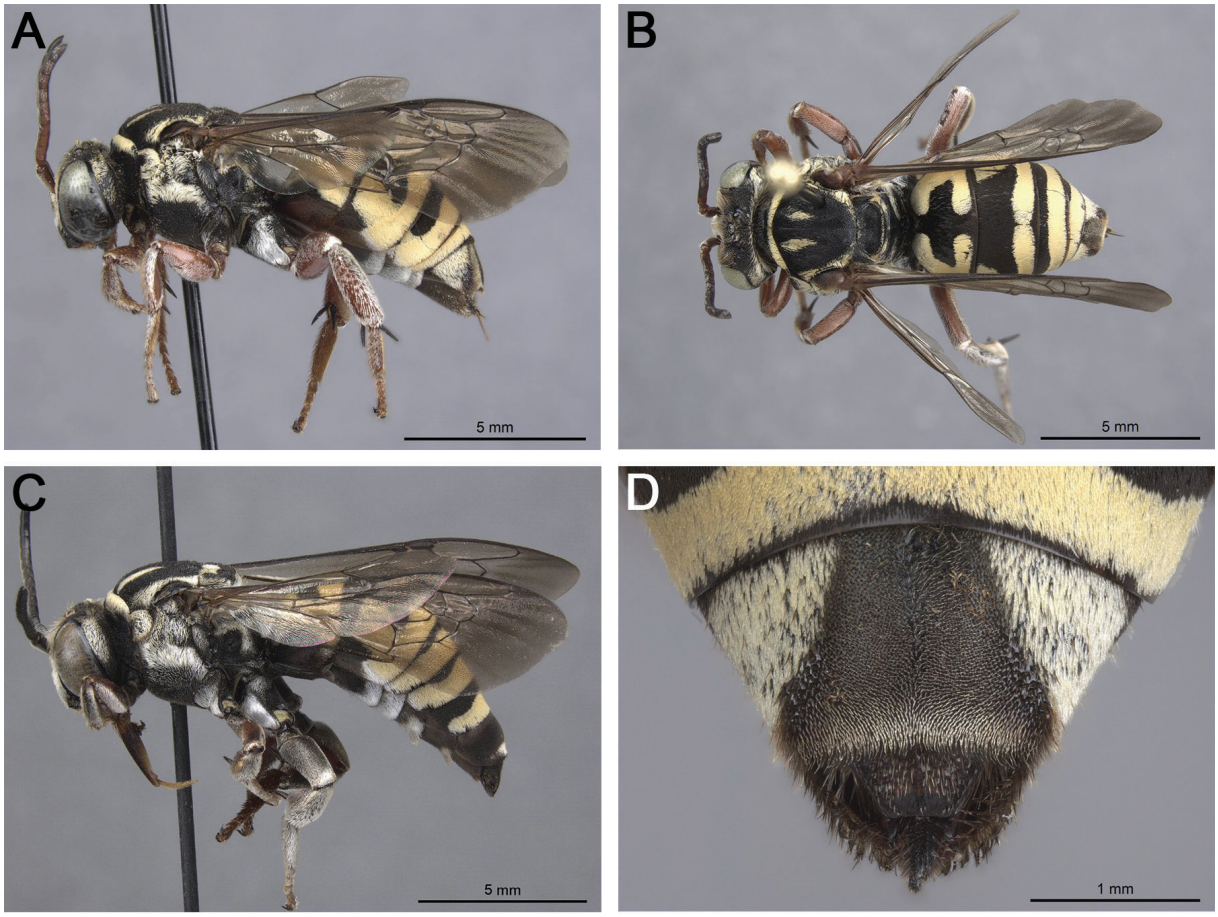

Fig. 19. *Triepeolus kathrynae* Rozen, 1989. **A**–**B**. Female (PCYU). **A**. Habitus, lateral view. **B**. Habitus, dorsal view. **C**. Male (RAM pmae00141635), habitus, lateral view. **D**. Female (BOLD sample ID: CMNTO_007; PCYU) pseudopygidial area, dorsal view.

leg.; LACM M.G.R. Database No. 3381 • 1 ♀; Estación de Microondas Ligüí vicinity (48 km S of Loreto); 7 Sep. 1977; R.R. Snelling leg.; LACM M.G.R. Database No. 3382. – **Chihuahua** • 1 ♂; 17 km S of Samalayuca; 31 Aug. 1992; B.N. Danforth leg.; USNM M.G.R. Database No. 6038 • 1 ♂; 18 mi W of Jiménez; 10 Aug. 1951; H.E. Evans leg.; KUNHM M.G.R. Database No. 4578. – **Jalisco** • 2 ♂♂; 3 mi SE of Plan de Barrancas; 8 Jul. 1963; F.D. Parker and L.A. Stange leg.; UCBME M.G.R. Database Nos 5429, 5431. – **Nuevo León** • 1 ♂; Vallecillo; 2–5 Jun. 1951; H.E. Evans leg.; KUNHM M.G.R. Database No. 4577. – **Sonora** • 1 ♀; 106 km E of Hermosillo; 16 Aug. 1991; J.G. Rozen and N. Pember leg.; KUNHM SM0326509/M.G.R. Database No. 7129 • 1 ♀; 50 km NE of Hermosillo; 14 Aug. 1991; R. Ayala leg.; KUNHM SM0326511/M.G.R. Database No. 7131 • 1 ♀; 55 km NE of Hermosillo; 13 Aug. 1991; J.L. Neff leg.; KUNHM SM0326512/M.G.R. Database No. 7132 • 1 ♀; Mazocahui; 13 Aug. 1991; L. Godinez leg.; KUNHM SM0326513/M.G.R. Database No. 7130.

USA – **Arizona** • 1 ♀; 1 mi E of Douglas, Cochise County; 13 Aug. 1969; M.A. Cazier leg.; UCBME 1645-1700/M.G.R. Database No. 11617 • 1 ♀; same data as for preceding; 15 Aug. 1994; J.G. Rozen, S.A. Budick, and G. LeBuhn leg.; AMNH M.G.R. Database No. 1739 • 1 ♂; 1 mi N of Douglas, Cochise County; 16 Aug. 1967; E.G. Linsley leg.; UCBME M.G.R. Database No. 5427 • 1 ♀; same data as for preceding; 16 Aug. 1969; E.G. Linsley leg.; UCBME M.G.R. Database No. 11619 • 2 ♀♀; 12 mi NW of Douglas, Cochise County; 30 Aug. 1989; J.G. and B.L. Rozen and R.L. Foster leg.; AMNH M.G.R. Database Nos 1736, 1737 • 1 ♀; 13 mi S of San Simon, Cochise County; 32.0719° N, 109.1797° W; 1 Sep. 2004; PCYU • 1 ♂; 14 km NNE of Portal, Cochise County; 31 Aug. 1989; KUNHM M.G.R. Database No. 5423 • 1 ♂; 15 mi SW of Apache, Cochise County; 18 Aug. 1997; J.G. Rozen and B. Adams leg.; AMNH M.G.R. Database No. 3290 • 1 ♂; 16 mi NE of Douglas, Cochise County; 18 Aug. 1964; C.D. Michener leg.; KUNHM M.G.R. Database No. 5417 • 1 ♀; 18 mi SW of Apache, Cochise County; 18 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH M.G.R. Database No. 3711 • 5 ♀♀; 18 mi SW of Apache, Cochise County; 18 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH M.G.R. Database Nos 1730 to 1734 • 6 ♀♀; 18 mi SW of Apache, Cochise County; 15 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH M.G.R. Database Nos 1738, 1740 to 1744 • 1 ♂; 4 mi E of Willcox, Cochise County; 32.2386° N, 109.7708° W; 18–25 Aug. 2002; RSKM RSKM_ENT_E-168251 • 1 ♀; 4 mi S of Apache, Cochise County; 18 Aug. 1982; R.M. Bohart leg.; UCBME M.G.R. Database No. 11615 • 1 ♂; 4 mi SW of Apache, Cochise County; 12 Aug. 2003; J.G. and B.L. Rozen leg.; AMNH M.G.R. Database No. 3289 • 1 ♀; 5 mi E of Sahuarita, Pima County; 15–16 Aug. 1989; J.G. Rozen and R.L. Foster leg.; AMNH M.G.R. Database No. 1735 • 1 ♂; 5 mi N of Douglas, Cochise County; 17 Aug. 1982; R.M. Bohart leg.; UCBME M.G.R. Database No. 5425 • 1 ♀; 8 mi NE of Portal, Cochise County; 23–25 Aug. 1989; J.G. Rozen and R.L. Foster leg.; AMNH M.G.R. Database No. 3712 • 1 ♂; Cochise County; 8 Aug. 1980; J.H. Cane leg.; KUNHM M.G.R. Database No. 5418 • 2 ♀♀; Continental; 2–4 Aug. 1959; K.V. Krombein leg.; USNM M.G.R. Database Nos 6035, 6036 • 1 ♀; Hereford, Cochise County; W.M. Mann leg.; USNM M.G.R. Database No. 6037 • 1 ♂; Hwy 80 & State Line Rd, Cochise County; 31.8005° N, 109.0527° W; 18–25 Aug. 2002; RSKM RSKM_ENT_E-168244 • 1 ♂; Madera Canyon (Santa Rita Mountains); 9 Aug. 1947; L. Martin leg.; LACM M.G.R. Database No. 3385 • 1 ♂; Paradise, Cochise County; 31.9333° N, 109.2167° W; 11–16 Aug. 2008; W. Steiner and J.M. Swearingen leg.; BIML USGS-DRO 147147 • 1 ♂; Portal (Road site 2), Cochise County; 26 Aug. 2007; J. Gibbs leg.; WRME JBWM0380539 • 11 ♀♀; Silver Bell Bajada (International Biological Program Desert Scrub Site), Pima County; J.L. Neff leg.; LACM 97646/M.G.R. Database No. 3370, 97638/M.G.R. Database No. 3371, 96503/M.G.R. Database No. 3372, 96507/M.G.R. Database No. 3373, 96506/M.G.R. Database No. 3374, 97644/M.G.R. Database No. 3375, 96505/M.G.R. Database No. 3376, 97645/M.G.R. Database No. 3377, 96491/M.G.R. Database No. 3378, 97639/M.G.R. Database No. 3379, 96504/M.G.R. Database No. 3380 • 1 ♀; Silver Bell Bajada (International Biological Program Desert Scrub Site), Pima County; 31 Jul. 1974; J.L. Neff leg.; LACM 69441/M.G.R. Database No. 3369 • 1 ♀; Southwestern Research Station (5 mi W of Portal), Cochise County; 4 Aug. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 2451 • 1 ♀; same data as for preceding; 8 Aug. 1956; C. and M. Cazier

leg.; AMNH M.G.R. Database No. 2537 • 1 ♂; same data as for preceding; 3 Aug. 1966; D.R. Miller leg.; UCBME M.G.R. Database No. 5430 • 1 ♂; same data as for preceding; 22 Aug. 2007; H.T. Ngo and J. Gibbs leg.; PCYU • 1 ♀; Southwestern Research Station (5 mi W of Portal), Cochise County; 31.8830° N, 109.2070° W; 23 Aug. 2019; J. Gibbs leg.; WRME WRME0500912 • 1 ♂; Tucson, Pima County; 28 Aug. 1951; C.D. MacNeill leg.; UCBME M.G.R. Database No. 5424 • 2 ♂♂; W Tucson-Ajo Hwy (22 mi W of Three Points), Pima County; 6 Aug. 1992; L. Packer leg.; PCYU. – **New Mexico** • 1 ♂; 1 mi N of Rodeo, Hidalgo County; 13 Aug. 1974; J.G. and K.C. Rozen leg.; AMNH M.G.R. Database No. 3291 • 1 ♀; 3 mi NE of Lordsburg, Hidalgo County; 21 Aug. 1971; E.E. Grissell and R.F. Denno leg.; UCBME M.G.R. Database No. 11616 • 1 ♀; 6 mi N of Rodeo, Hidalgo County; 26 Aug. 2011; WRME JBWM0380529 • 2 ♂♂; 7.5 mi W of Hachita, Grant County; 17 Aug. 1967; R.R. Snelling leg.; LACM M.G.R. Database Nos 3384, 3386 • 1 ♂; 20 mi SW of Alamogordo, Otero County; 14 Aug. 1971; M. and T.M. Favreau leg.; AMNH M.G.R. Database No. 3727 • 1 ♀; Animas, Hidalgo County; 26 Aug. 1975; R.J. McGinley leg.; USNM M.G.R. Database No. 6039 • 1 ♀; ca 4 mi N of Rodeo, Hidalgo County; 31.8803° N, 109.0356° W; 15 Aug. 2000; R. Brooks leg.; KUNHM SM0196592/ ARIZ 1B00001/M.G.R. Database No. 1323 • 1 ♀; Community Road (NE of Portal), Hidalgo County; 23 Aug. 2006; A.I. Gravel leg.; PCYU • 1 ♀; Granite Pass, Hidalgo County; 25 Aug. 1958; P.D. Hurd leg.; UCBME M.G.R. Database No. 11618 • 1 ♂; Hwy 80, Hidalgo County; 32.0935° N, 108.9684° W; 15 Aug. 2007; J. Gibbs and C.S. Sheffield leg.; PCYU PYU-3537 • 1 ♀; S of Animas, Hidalgo County; 2003; L. Packer leg.; PCYU. – **Texas** • 1 ♂; La Puerta Tract, Lower Rio Grande Valley National Wildlife Refuge, Starr County; 26.3450° N, 98.7317° W; 4 May 2017; M. Buck leg.; RAM pmae00141635.

Non-preserved material

MEXICO • 1 ♀; Nuevo León, Lampazos de Naranjo; 4 Oct. 2021; R. Castillo obs.; iNaturalist record #97206163.

USA – **Arizona** • 1 ♀; Cochise County; Aug. 2023; "samwilhelm" obs.; iNaturalist record #181775336 • 1 ♂; same data as for preceding; 20 Aug. 2023; K. Parys obs.; iNaturalist record #179819569 • 1 ♂; Southwestern Research Station (5 mi W of Portal), Cochise County; 31.8836° N, 109.2068° W; 27 Aug. 2019; J. Gibbs obs.; iNaturalist record #31641363. – **New Mexico** • 1 ♀; S end of Sonoma Ranch Boulevard, Las Cruces, Doña Ana County; 17 Aug. 2020; P. De Ley obs.; BugGuide record #1885693/ 1885695/1885697/1885698.

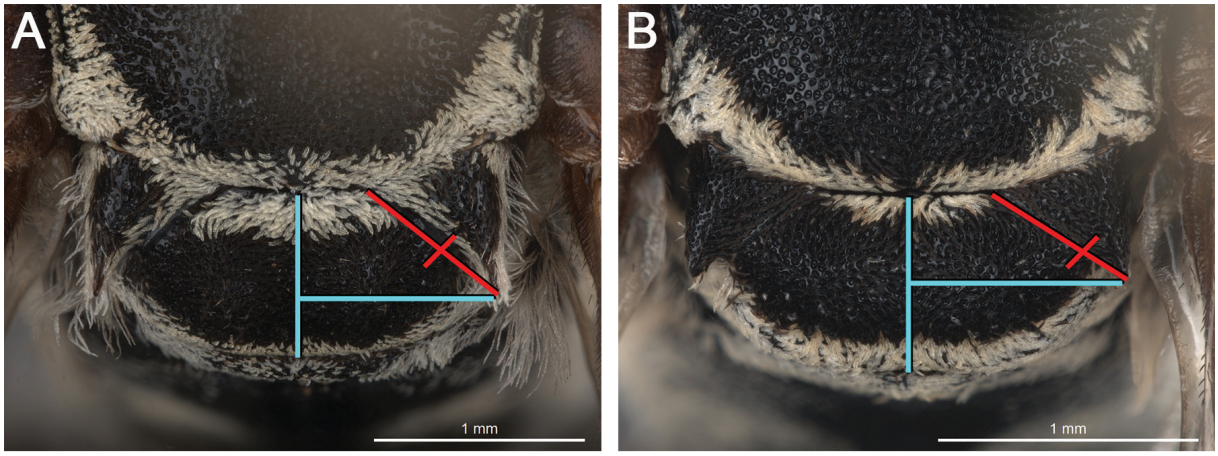

Fig. 20. Axillae and mesoscutellum of female, dorsal view. **A**. *Triepeolus kathrynae* Rozen, 1989 (AMNH M.G.R. Database No. 3711). **B**. *T. segregatus* (Cockerell, 1900) (SDNHM SDC.11202). Blue lines indicate the posterior extent of the axilla relative to the length of the mesoscutellum; red lines indicate the extent of the free portion of the axilla relative to its entire medial length.

Redescription

Measurements of holotype. Body length 12.2 mm; ITW 2.4 mm; head length 3.0 mm; head width 4.0 mm; fore wing length 10.1 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with apical half golden yellow and middle quarter in basal half reddish orange. F1 extensively, coxae to some extent, trochanters to tarsi (excluding brown meso- and metatibial spurs) partially to entirely, metasomal terga laterally, pygidial plate to some extent, and metasomal sterna to some extent orange. F2 with orange spot basally. Tegula reddish brown (dark brown in some specimens). Fore wing membrane dusky subhyaline throughout. Hind wing membrane dusky subhyaline to hyaline.

Pubescence. Face with tomentum densest around antennal socket. Tomentum slightly sparser on clypeus; upper paraocular and frontal areas and vertexal area mostly exposed. Pronotal collar with tomentum uniformly pale yellow. Mesoscutum with well-defined paramedian band of pale-yellow tomentum (tapering slightly toward but not attaining anterior margin in holotype; attaining anterior margin in allotype); pale tomentum otherwise mostly restricted to lateral and posterior margins. Axilla with off-white to pale-yellow, appressed, branched setae all along its margins. Mesopleuron with off-white to pale-yellow, appressed, branched setae in upper half and patches of off-white and brown, appressed, branched setae ventrally; upper half densely setose, except behind pronotal lobe, with setae slightly sparser on hypoepimeral area; ventrolateral half nearly bare, except along margins. Metanotum with tomentum rubbed off medially in holotype, but uninterrupted and uniformly off-white in allotype and other specimens. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. T1 with basal and apical transverse bands of pale-yellow tomentum interrupted medially and subparallel, discal patch trapezoidal (crescent-shaped in some specimens). T2–T4 with complete apical transverse bands of pale-yellow tomentum, those of T2–T3 medially somewhat removed from apical margins of terga, that of T2 with pair of basomedially convergent anterolateral extensions. S2–S3 with apical transverse bands of white tomentum.

Surface sculpture. Labrum coarsely and densely (most $i < 1d$) rugose-punctate. Clypeus densely punctate (most $i < 1d$) but interspaces well defined, shining. Vertexal area somewhat sparsely punctate (some $i > 2d$), especially around ocelli. Mesoscutum and axilla with punctures more or less equally dense (most $i \leq 1d$); interspaces well defined, shining. Mesoscutellum with punctures nearly contiguous (most $i < 1d$). Mesopleuron with punctures in upper half nearly contiguous and denser ($i < 1d$) than in ventrolateral half ($i \leq 2d$); interspaces shining where punctures not contiguous; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense ($i \approx 1d$), and evenly distributed; interspaces somewhat dull due to tessellate surface microsculpture.

Structure. Labrum with pair of small subapical denticles, each preceded by discrete longitudinal ridge. Pronotal collar somewhat elongate (medial length ~¾ MOD). Mesoscutellum moderately bigibbous. Axilla extending well beyond midlength of mesoscutellum but not as far back as its posterior margin; tip distinctly pointed and hooked (i.e., concave along medial margin), mesally unattached to mesoscutellum for approximately half medial length of axilla; lateral margin somewhat arcuate. Fore wing with three submarginal cells.

Female

Scape and pedicel extensively orange. T5 with concave apical margin and large patch of off-white to pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area trapezoidal, with posteromedially directed coppery brown setae on each side of glabrous midline and apical row

of posteriorly directed, dense, suberect golden to silvery setae. Pygidial plate apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, covered in mostly brown tomentum and with apical fimbria of coppery bristle-like setae.

Male

Scape and pedicel to some extent orange. T5 with complete apical transverse band of pale-yellow tomentum. T6 with complete apical transverse band or small posteromedial patch of off-white to pale-yellow tomentum. Pygidial plate apically rounded and slightly downturned, with lateral margin somewhat sinuate. S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved, coppery to silvery setae, not contrasting strongly with bands of preceding sterna.

Distribution

Arizona to Texas in the United States to south-central Mexico (Fig. 12E).

Ecology

Host records

Rozen (1966) described an unknown *Triepeolus* postdefecating larva taken from the nest of *Protoxaea gloriosa* (Fox, 1893). In the original description of *T. kathrynae*, Rozen (1989) identified the larva as this species based on the collection of an adult female (paratype, USNM 0930-0959/M.G.R. Database No. 5716) from the same locality and year investigating the entrance of a *Protoxaea* burrow.

Floral records

Rozen (1989) and labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Apocynaceae Juss., *Asclepias subverticillata* (A.Gray) Vail; in Asteraceae, *Baccharis* sp., *Engelmannia peristenia* (Raf.) Goodman & C.A.Lawson, *Gaillardia pulchella* Foug., *Picradeniopsis absinthifolia*, and *Verbesina encelioides* (Cav.) A.Gray; in Fabaceae, *Eysenhardtia* sp., *Melilotus albus*, and *Psorothamnus scoparius* Rydb.; in Malvaceae Juss., *Sphaeralcea* sp. or spp.; in Polygonaceae Juss., *Eriogonum* sp. and *Eriogonum deflexum* Torr.; and in Zygophyllaceae R.Br., *Kallstroemia* sp. or spp., *K. grandiflora* Torr. ex A.Gray, and *Larrea* sp.

Remarks

Based on known records, adults of *T. kathrynae* are active from May to October.

Triepeolus mexicanus (Cresson, 1878)
Figs 12F, 21

Epeolus mexicanus Cresson, 1878: 90 (♀, ♂).
Epeolus rugulosus Cockerell, 1917: 299 (♂), syn. nov.
Epeolus metatarsalis Friese, 1921: 91 (♂), syn. nov.
Triepeolus bilunatus Cockerell, 1949: 461 (♀), syn. nov.

Epeolus mexicanus – Cresson 1916: 124 (♀) (lectotype designation).
Epeolus metatarsalis – Friese 1925: 31 (description of female).
Triepeolus mexicanus – Cockerell 1949: 461.
Triepeolus rugulosus – Michener 1954: 128, figs 86–88.
Triepeolus metatarsalis – Moure *et al*. 2007: 591.

Proposed common name

Mexican triepeolus.

Diagnosis

The following morphological features in combination tell *T. mexicanus* apart from all other species of *Triepeolus*: pale tomentum on the mesoscutum is restricted to the lateral and posterior margins (Fig. 21B); the T1 basal band is arched, continuous with (and indistinguishable from) the lateral longitudinal bands, and mesally concave on each side, such that the discal patch is semicircular (Fig. 21B); and T2–T4 have complete apical transverse bands of yellow tomentum (Fig. 21B, D). *Triepeolus mexicanus* most closely resembles specimens of *T. alvarengai* without an apical transverse band on T1 and *T. nemoralis*, both of which are known only from South America, but in *T. alvarengai* the mesoscutum has well-defined paramedian bands and in *T. nemoralis* the mesoscutum has a large anteromedial ovate patch of yellow tomentum, which may be sparser medially such that the patch is suggestive of ill-defined paramedian bands. Males of *T. mexicanus* also closely resemble those of *T. flavipennis* (Friese, 1916) without an apical transverse band on T1 and *T. cameroni* (Meade-Waldo, 1913), but in the latter two species, which are not in the *simplex* species group, the mesoscutum has well-defined paramedian bands, in *T. flavipennis* the pair of anterolateral patches of pale tomentum on T1 are mesally convex, such that the discal patch forms a trapezoid or triangle with concave anterolateral sides, and in *T. cameroni* S3 has an apical/subapical fringe of dense, long (> 1 MOD), curved, pale setae (as opposed to only short, straight setae; Fig. 21C). This species is also very similar in overall appearance to *Epeolus luteipennis* Friese, 1916 and specimens of *E. obscuripes* Cockerell, 1917 in which the axillae and mesoscutellum are black, but both sexes of *T. mexicanus* can easily be told apart from any similar-looking *Epeolus* by their simple mandibles; in *E. luteipennis*, *E. obscuripes*, and most other *Epeolus* spp., the mandibles each have a distinct preapical tooth.

Etymology

The specific epithet refers to the type locality—Mexico. The Latin adjectival suffix '-anus' means 'of' or 'pertaining to'.

Material examined

Primary type material

HONDURAS • ♀, *T. bilunatus* holotype; Francisco Morazán, Zamorano; 17 Jan. 1947; W.P. Cockerell leg.; USNM 534619.

MEXICO • ♀, *E. mexicanus* lectotype; F. Sumichrast leg.; ANSP 2229.

PANAMA • ♂, *E. rugulosus* holotype; Comacho, Canal Zone; 27 Mar.; A.H. Jennings leg.; USNM 534866.

Secondary type material

MEXICO • 1 ♂, *E. mexicanus* lectoallotype; F. Sumichrast leg.; ANSP 2229-2 • 2 ♀♀, *E. mexicanus* paralectotypes; F. Sumichrast leg.; ANSP 2229-6, 2229-9 • 1 ♀, *E. mexicanus* paralectotype; USNM 2229.5/M.G.R. Database No. 5851.

DNA barcoded material

Available. BIN: BOLD:AAV3172. Specimens examined and sequenced:

MEXICO • 1 ♀; Jalisco, Chamela Eje Central trail; 19.5001° N, 105.0427° W; 1 Oct. 2010; S. Dumesh leg.; BOLD sample ID: CCDB-09669 A11; PCYU PCYU-MEX10-0013.

USA – **Arizona** • 1 ♂; Community Road, Cochise County; 32.0137° N, 109.0873° W; 26 Aug. 2011; N. de Silva leg.; BOLD sample ID: 14511H03-NM; PCYU 0003812. – **New Mexico** • 1 ♂; NW of Lordsburg, Hidalgo County; 32.5507° N, 108.9226° W; 3 Sep. 2015; L. Packer leg.; BOLD sample ID: CCDB-30344 C11; PCYU.

Non-barcoded material

COSTA RICA – **Alajuela** • 1 ♀ (supposedly an *E. metatarsalis* syntype, but the designation is suspect as Friese 1921 only described the male); San Mateo; May 1921; AMNH AMNH_IZC 00324050. – **Guanacaste** • 1 ♀; 5 mi NW of Las Cañas; 26 Jun. 1963; Wille and Michener *et al*. leg.; KUNHM M.G.R. Database No. 5068 • 1 ♀; Guanacaste National Park (Maritza Biological Station); "I/12/1995"; L.S. Kimsey leg.; UCBME • 1 ♀; Hacienda Comelco (24 km NW of Canas on Inter-American Hwy); 5 Aug. 1971; E.R. Heithaus leg.; LACM 5339, coll. #282/M.G.R. Database No. 3422 • 1 ♂; Palo Verde Biological Station; 10.3475° N, 85.3497° W; 17 Nov. 2001; R.W. Brooks leg.; KUNHM CR1B01 31/M.G.R. Database No. 5071 • 1 ♂; Palo Verde Biological Station; 10.3968° N, 85.3236° W; 18 Nov. 2001; R.W. Brooks leg.; KUNHM CR1B01 42/M.G.R. Database No. 5070.

GUATEMALA • 1 ♀; El Progreso, Puente El Hato (49.9 mi NE of Guatemala City); 5 Aug. 1966; Univ. Kans. Mex. Expedition leg.; KUNHM M.G.R. Database No. 5067.

HONDURAS – **Francisco Morazán** • 1 ♀; Zamorano; 20 Jan.; USNM M.G.R. Database No. 6221 • 1 ♀; same data as for preceding; 24 Jan.; USNM M.G.R. Database No. 6217 • 2 ♀♀; same data as for preceding; 26 Jan.; USNM M.G.R. Database Nos 6220, 6222 • 1 ♀; same data as for preceding; 26 Jan.; F. Wiley leg.; USNM M.G.R. Database No. 6219 • 3 ♀♀; same data as for preceding; 30 Jan.; USNM M.G.R. Database Nos 6215, 6216, 6218.

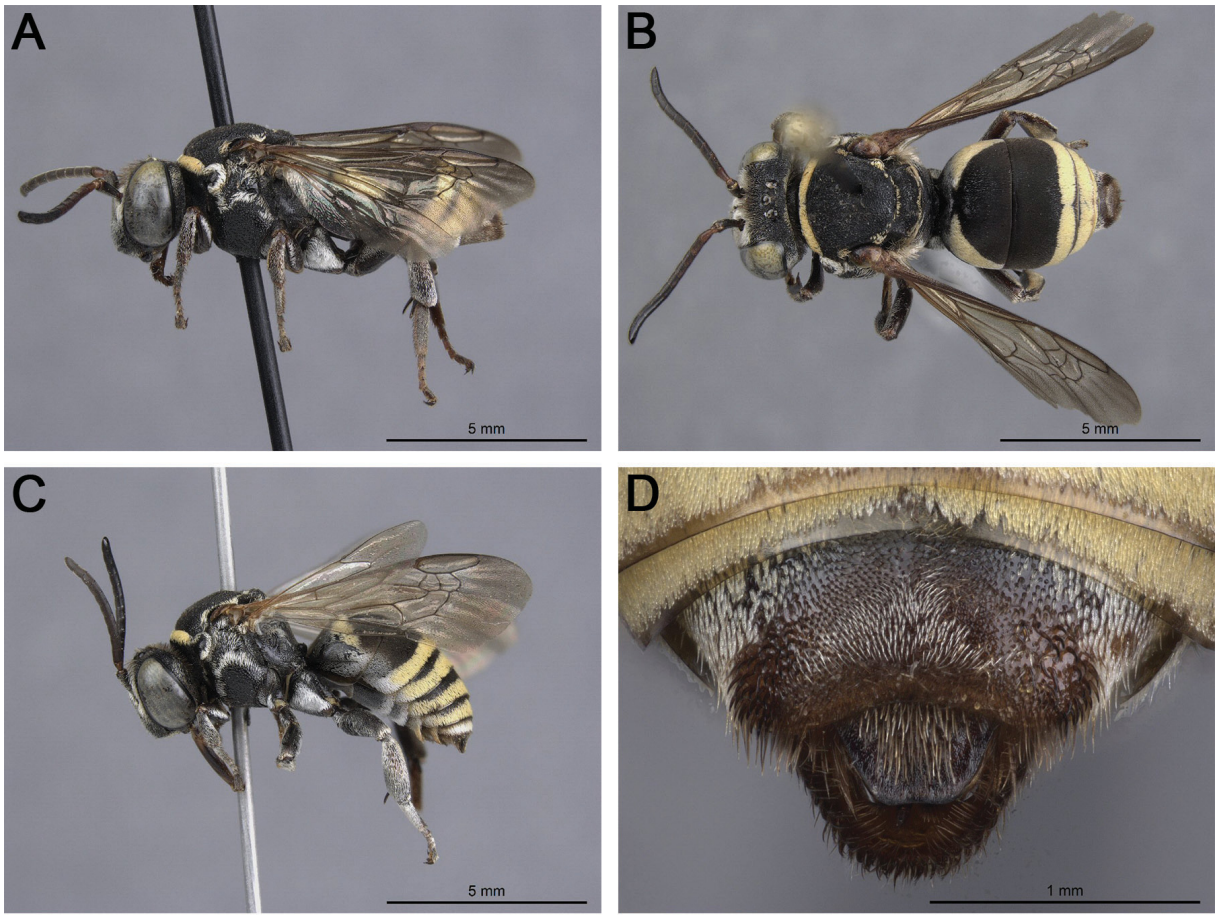

Fig. 21. *Triepeolus mexicanus* (Cresson, 1878). **A**–**B**, **D**. Female (BOLD sample ID: CCDB-09669 A11; PCYU PCYU-MEX10-0013). **A**. Habitus, lateral view. **B**. Habitus, dorsal view. **C**. Male (BOLD sample ID: CCDB-30344 C11; PCYU), habitus, lateral view. **D**. Pseudopygidial area, dorsal view.

MEXICO – **Chiapas** • 1 ♀; Nututun (3 km S of Palenque); 25 Apr. 1993; J.L. Neff leg.; KUNHM SM0326531/M.G.R. Database No. 7134 • 1 ♀; same data as for preceding; 25 Apr. 1993; R. Brooks leg.; KUNHM SM0326533/M.G.R. Database No. 7139 • 1 ♀; same data as for preceding; 25 Apr. 1993; R. Brooks leg.; KUNHM SM0326534/M.G.R. Database No. 7137. – **Jalisco** • 1 ♂; Chamela; 26 Sep. 1985; R.J. McGinley leg.; USNM M.G.R. Database No. 6226 • 2 ♂♂; same data as for preceding; 27 Sep. 1985; R.J. McGinley leg.; KUNHM M.G.R. Database Nos 5058, 5059 • 1 ♀; same data as for preceding; 1–8 Oct. 1985; F.D. Parker and T.L. Griswold leg.; KUNHM M.G.R. Database No. 5056 • 1 ♀; same data as for preceding; 10 Dec. 1989; "Rodriguez G." leg.; UNAM M.G.R. Database No. 1553 • 1 ♀; Estación de Biología, Chamela; 11 Jul. 1989; R. Brooks, C. Michener, and A. Roig-Alsina leg.; KUNHM #015/M.G.R. Database No. 5057. – **Morelos** • 1 ♀; 11 mi S of Tlaltizapán; 16 Aug. 1962; Roberts and Marston leg.; KUNHM M.G.R. Database No. 5062. – **Nayarit** • 1 ♀; San Blas; 7 Apr. 1994; R. Ayala leg.; KUNHM PCAM5-9 010/M.G.R. Database No. 5054 • 1 ♀; same data as for preceding; 7 Apr. 1994; R. Ayala leg.; KUNHM PCAM5-9 010/M.G.R. Database No. 5055. – **Oaxaca** • 1 ♀; 12 mi W of Tehuantepec; 16 Sep. 1974; G. Bohart and W. Hanson leg.; AMNH M.G.R. Database No. 2353 • 1 ♂; same data as for preceding; 16 Sep. 1974; G. Bohart and W. Hanson leg.; AMNH M.G.R. Database No. 2355 • 1 ♀; same data as for preceding; 16 Sep. 1974; G. Bohart and W. Hanson leg.; KUNHM M.G.R. Database No. 3893 • 1 ♂; same data as for preceding; 16 Sep. 1974; G. Bohart and W. Hanson leg.; KUNHM M.G.R. Database No. 3894 • 1 ♀; same data as for preceding; 16 Sep. 1974; G. Bohart and W. Hanson leg.; LACM M.G.R. Database No. 3421 • 1 ♂; same data as for preceding; 16 Sep. 1974; G. Bohart and W. Hanson leg.; LACM M.G.R. Database No. 3425 • 1 ♀; 4 mi E of Tapanatepec; 9 Jul. 1953; Univ. Kans. Mex. Expedition leg.; KUNHM M.G.R. Database No. 5063 • 1 ♀; 6 mi S of Tehuantepec; 8 Jul. 1953; Univ. Kans. Mex. Expedition leg.; KUNHM M.G.R. Database No. 1324 • 1 ♂; 8 km W of Tehuantepec; 9–10 Aug. 1974; E.M. and J.L. Fisher leg.; LACM M.G.R. Database No. 3428 • 1 ♀; Salina Cruz; 8 Jul. 1953; Univ. Kans. Mex. Expedition leg.; KUNHM M.G.R. Database No. 5064 • 1 ♂; Tequisistlán; 7 Jan. 1948; T. MacDougal leg.; AMNH M.G.R. Database No. 1491 • 1 ♀; San Luis Potosí, 15 mi S of Pujal; 21 Jun. 1953; Univ. Kans. Mex. Expedition leg.; UCBME • 1 ♂; same data as for preceding; 21 Jun. 1953; Univ. Kans. Mex. Expedition leg.; KUNHM M.G.R. Database No. 5053. – **San Luis Potosí** • 1 ♀; 3 mi E of Cascada el Salto; 21 Jul. 1962; Ordway and Roberts leg.; KUNHM M.G.R. Database No. 5051 • 7 ♀♀; Cascada el Salto; 3–5 Jul. 1990; R.L. Minckley leg.; KUNHM M.G.R. Database Nos 5042 to 5048 • 1 ♀; same data as for preceding; 4 Jul. 1990; I. Yarom leg.; KUNHM M.G.R. Database No. 5049 • 1 ♀; Cascada el Salto (12 km NW of El Naranjo); 3 Jul. 1990; D. Yanega leg.; UCR UCRC ENT 57102/M.G.R. Database No. 1554 • 1 ♂; El Salto; 8 Jun. 1961; Univ. Kans. Mex. Expedition leg.; KUNHM M.G.R. Database No. 5050 • 1 ♀; same data as for preceding; 4 Sep. 1962; Ordway and Marston leg.; KUNHM M.G.R. Database No. 5052 • 1 ♂; Tamazunchale; 1 May 1976; E. Barrera leg.; LACM M.G.R. Database No. 3427. – **Sinaloa** • 1 ♂; 20 mi N of Los Mochis; 9 Oct. 1968; G.E. Bohart leg.; CAS M.G.R. Database No. 11712 • 7 ♂♂; 5 mi N of Mazatlán; 5–7 Aug. 1964; J.E.H. Martin leg.; CNC 754101 to 754103, 754115 to 754117 • 1 ♀; 7 mi S of Culiacán; 23 Aug. 1960; R.L. Westcott leg.; LACM M.G.R. Database No. 3424 • 1 ♂; same data as for preceding; 23 Aug. 1960; R.L. Westcott leg.; LACM M.G.R. Database No. 3429 • 9 ♂♂; Mazatlán; 6 Aug. 1964; W.R.M. Mason leg.; CNC 754104 to 754108, 754112 to 754114, 754087 • 3 ♂♂; same data as for preceding; 16 Aug. 1964; J.F. McAlpine leg.; CNC 754109 to 754111. – **Sonora** • 2 ♀♀; 108 km W of Hermosillo; 16 Aug. 1991; R.L. Minckley leg.; KUNHM M.G.R. Database Nos 5040, 5041 • 1 ♀; 13 km W of Álamos; 1 Sep. 1975; B. Villegas leg.; UCBME • 1 ♂; Álamos; 3 Sep. 1991; J.G. Rozen leg.; KUNHM SM0326519/M.G.R. Database No. 7136 • 1 ♂; same data as for preceding; 3 Sep. 1991; J.G. Rozen leg.; KUNHM SM0326523/M.G.R. Database No. 7138 • 1 ♀; same data as for preceding; 4 Sep. 1991; J.L. Neff leg.; KUNHM SM0326524/M.G.R. Database No. 7135 • 1 ♂; Microondas Road (19 km N of Hwy 15 and Hwy 24 junction); 20 Mar. 1990; R.L. Minckley leg.; KUNHM M.G.R. Database No. 5069 • 1 ♀; San Bernardo; 16 Aug. 1935; H.S. Gentry leg.; LACM acc. 1031/M.G.R. Database No. 3423 • 1 ♂; same data as for preceding; 16 Aug. 1935; H.S. Gentry leg.; LACM acc. 1031/M.G.R. Database No. 3426. – **Tamaulipas** • 1 ♂; 14 mi S of Antiguo Morelos; 21 Jul. 1954; Univ. Kans. Mex. Expedition leg.; KUNHM M.G.R. Database No. 5060 • 1 ♀; 22 mi S of

Jiménez; 15 Jun. 1953; Univ. Kans. Mex. Expedition leg.; KUNHM M.G.R. Database No. 5065 • 1 ♀; 6.6 mi W of Antiguo Morelos; 3 Sep. 1962; Ordway and Naumann leg.; KUNHM M.G.R. Database No. 5061 • 1 ♀; El Limón; 17 Jun. 1953; Univ. Kans. Mex. Expedition leg.; KUNHM M.G.R. Database No. 5066. – **Veracruz** • 1 ♀; Rancho El Bejuco, Ozuluama; 3–4 Oct. 1985; G. Ekls leg.; UCBME.

NICARAGUA • 1 ♀; Chinandega, Chinandega; Baker leg.; USNM 2400/M.G.R. Database No. 6223.

PANAMA – **Coclé** • 1 ♂; El Valle de Antón; 1 Apr. 1945; C.D. Michener leg.; KUNHM M.G.R. Database No. 1515. – **Panamá** • 1 ♂; Ancon Hill (Panama City); 20 Dec. 1944; C.D. Michener leg.; KUNHM M.G.R. Database No. 3897 • 1 ♂; Balboa; T. Hallinan leg.; AMNH M.G.R. Database No. 2354 • 1 ♂; Culebra; 22 Nov. 1914; T. Hallinan leg.; AMNH M.G.R. Database No. 3273.

USA – **Arizona** • 2 ♂♂; 2.5 mi NW of Salome, La Paz County; 17 Aug. 1969; P.D. Hurd leg.; USNM M.G.R. Database Nos 6224, 6225 • 1 ♀; 9 mi NE of Portal, Cochise County; 18 Aug. 1992; J.G. Rozen leg.; AMNH M.G.R. Database No. 2323 • 4 ♂♂; Cibola area (8 mi S of Ehrenberg), La Paz County; 9 Aug. 2000; N.J. Smith and A.J. Gilbert leg.; UCBME • 1 ♀; Sabino Canyon, Pima County; 25 Jun. 1963; F.D. Parker leg.; UCBME • 1 ♀; San Simon, Cochise County; 4 Sep. 1989; J.G. and B.L. Rozen and R. Foster leg.; AMNH M.G.R. Database No. 2324 • 1 ♂; Southwestern Research Station (5 mi W of Portal), Cochise County; 4 Jul. 1959; M. Statham leg.; AMNH M.G.R. Database No. 2325.

Non-preserved material

BELIZE • 1 ♀; Orange Walk District; 6 May 2023; S. Werle obs.; iNaturalist record #162023522.

MEXICO – **Chihuahua** • 1 ♀; Julimes; 28.3916° N, 105.4578° W; 11 Jul. 2021; "juanloredo" obs.; iNaturalist record #86701761 • 1 ♀; Meoqui; 28.2597° N, 105.4956° W; 23 Sep. 2023; L. Hernández Escudero obs.; iNaturalist record #184679437 • 1 ♀; Meoqui; 28.2609° N, 105.4924° W; 28 Jul. 2023; L. Hernández Escudero obs.; iNaturalist record #175704384 • 1 ♀; Meoqui; 28.2622° N, 105.4955° W; 24 Jun. 2022; L. Hernández Escudero obs.; iNaturalist record #123403283 • 1 ♀; Meoqui; 28.2623° N, 105.4953° W; 24 Jun. 2022; L. Hernández Escudero obs.; iNaturalist record #123403281 • 1 ♀; Meoqui; 28.2624° N, 105.4929° W; 27 Jul. 2022; L. Hernández Escudero obs.; iNaturalist record #128379212 • 1 ♂; Meoqui; 28.2638° N, 105.4715° W; 9 Aug. 2021; "juanloredo" obs.; iNaturalist record #90605169 • 1 ♂; Meoqui; 28.2924° N, 105.4475° W; 6 Jul. 2023; L. Hernández Escudero obs.; iNaturalist record #171658341 • 1 ♂; Meoqui; 28.2630° N, 105.4938° W; 6 Oct. 2023; L. Hernández Escudero obs.; iNaturalist record #186525973. – **Oaxaca** • 1 ♂; 4ta, 70110 Ixtepec; 16.5696° N, 95.0983° W; 17 Nov. 2022; "MarCheläs" obs.; iNaturalist record #142539748 • 1 ♀; Ixtepec; 16.5697° N, 95.0980° W; 5 May 2023; "MarCheläs" obs.; iNaturalist record #159965832 • 1 ♂; Ixtepec; 16.5697° N, 95.0983° W; 14 Nov. 2023; "MarCheläs" obs.; iNaturalist record #191026657 • 1 ♂; same data as for preceding; 21 Nov. 2023; "MarCheläs" obs.; iNaturalist record #191722826. – **Sonora** • 1 ♀; San José de Bácum; 27.5179° N, 110.1369° W; 24 Sep. 2022; K. Reynaga obs.; iNaturalist record #144652014.

NICARAGUA • 1 ♀; Masaya, Las Flores; 15 Jun. 1994; J.M. Maes obs.; iNaturalist record #177727568.

USA – **Arizona** • 1 ♀; Arizona-Sonora Desert Museum (Tucson), Pima County; 25 Jul. 2018; P. Murray obs.; BugGuide record #1570812 • 1 ♂; Arizona-Sonora Desert Museum (Tucson), Pima County; 32.2427° N, 111.1673° W; 3 Oct. 2021; T. Palmer obs.; iNaturalist record #97093457 • 1 ♀; Dankworth Pond (S of Safford), Graham County; 27 Aug. 2008; D. Danforth leg.; BugGuide record #466015/466016 • 1 ♀; Las Vistas, Avondale, Maricopa County; 33.4819° N, 112.3034° W; 28 Sep. 2021; Kneubauer obs.; iNaturalist record #96546894 • 1 ♀; Saguaro National Park East, Pima County; 20 Aug. 2022; D. Sandri obs.; iNaturalist record #135607905.

Redescription

Measurements of lectotype. Body length 10.8 mm; ITW 2.1 mm; head length 2.5 mm; head width 3.5 mm; fore wing length 7.8 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with middle quarter in basal half reddish brown. Scape to some extent (entirely dark brown/black in some non-type specimens), pedicel and F1 extensively, and tegula orange. F2 with orange spot basally. Fore wing membrane dusky subhyaline throughout. Hind wing membrane dusky subhyaline to hyaline. Legs to some extent orange in *E. mexicanus* lectotype, possibly due to discoloration/fading, *T. bilunatus* holotype, and some non-type specimens. Pygidial plate reddish brown.

Pubescence. Face with tomentum densest around antennal socket. Tomentum slightly sparser on clypeus; upper paraocular and frontal areas and vertexal area mostly exposed. Pronotal collar with tomentum uniformly bright yellow. Mesoscutum with pale (yellow) tomentum restricted to lateral and posterior margins. Mesopleuron with off-white, appressed, branched setae; densely setose only just below scrobal groove and along posterior margin above base of mesocoxa (upper half otherwise sparsely setose); ventrolateral half nearly bare. Metanotum with tomentum uninterrupted, pale yellow laterally and black medially. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. T1 with basal transverse band of bright yellow tomentum separated medially into pair of anterolateral patches (complete in some non-type specimens), continuous with (and indistinguishable from) lateral longitudinal band, forming arch around semicircular discal patch. T2–T4 with complete apical transverse bands of bright yellow tomentum without well-defined anterolateral extensions, although T2–T3 with faint lateral longitudinal bands of diffuse off-white setae. S2–S3 with apical transverse bands of white tomentum.

Surface sculpture. Labrum, clypeus, mesoscutum, mesoscutellum, and axilla with punctures equally dense and nearly contiguous (most $i < 1d$). Vertexal area somewhat sparsely punctate (some $i > 2d$) anteriorly and around ocelli, otherwise densely (most $i < 1d$) rugose-punctate. Mesopleuron with punctures in upper half denser (most $i \leq 1d$) than in ventrolateral half ($i \leq 3d$); interspaces shining; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense ($i \approx 1d$), and evenly distributed; interspaces somewhat dull due to tessellate surface microsculpture.

Structure. Labrum with pair of small subapical denticles, each preceded by discrete longitudinal ridge. Pronotal collar somewhat elongate (medial length ~$^3/_5$ MOD). Mesoscutellum moderately bigibbous. Axilla extending little if at all beyond midlength of mesoscutellum; tip distinctly pointed, but mesally unattached to mesoscutellum for less than $^2/_5$ medial length of axilla; lateral margin somewhat sinuate. Fore wing with three submarginal cells.

Female

T5 with concave apical margin and large patch of pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area forming rounded triangle with concave sides. Pygidial plate apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, with apical fimbria of coppery bristle-like setae.

Male

T5–T6 with complete apical transverse bands of bright yellow tomentum. Pygidial plate relatively flat and apically rounded. S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved, coppery setae, contrasting with apical transverse bands of white tomentum of preceding sterna.

Distribution

Southwestern United States to Panama (Fig. 12F).

Ecology

Host records

Unknown.

Floral records

Rightmyer (2006), images on iNaturalist, and labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Asteraceae, *Baltimora* sp., *Bidens pilosa* L., *Gaillardia pulchella*, *Helenium* sp., *Melanthera nivea* (L.) Small, *Tridax procumbens* L., and *Verbesina* sp.; in Boraginaceae, *Heliotropium* sp. and *H. curassavicum* L.; in Convolvulaceae Juss., *Ipomoea* sp.; in Euphorbiaceae, *Euphorbia* sp.; in Fabaceae, *Medicago* sp., *Mimosa* sp., and *Prosopis juliflora* (Sw.) DC.; in Lamiaceae, *Hyptis suaveolens* (L.) Poit.; in Malvaceae, *Anoda cristata* (L.) Schltdl., *Gossypium* sp., and *Sphaeralcea angustifolia* G.Don; in Salicaceae Mirb., *Salix* sp.; in Tamaricaceae, *Tamarix chinensis* Lour.; in Verbenaceae J.St.-Hil., *Lippia* sp. or spp.; and in Zygophyllaceae, *Kallstroemia grandiflora*.

Remarks

In the original description of *E. rugulosus*, Cockerell (1917) did not mention *E. mexicanus* and described the holotype of the former as being "somewhat related to *E. xanthurus*" Cockerell, 1917, a name that has since been synonymized under *E. luteipennis* (Onuferko 2019). The (male) holotype of *E. rugulosus* was examined and agrees with the diagnosis for *T. mexicanus* provided herein.

Friese (1921) described *E. metatarsalis* from an unspecified number of male specimens. The whereabouts of any syntypes are unknown, despite searches by the second author through the ZMB where most of Heinrich Friese's type material has been deposited. Although the AMNH has a specimen labeled as *E. metatarsalis* that bears an orange label that says "Typus", it is female, and the collection date (May 1921) does not match that given in the original description (July), so the specimen does not belong to the original type series. In the original description, Friese (1921) did not mention *E. mexicanus* and compared *E. metatarsalis* only to *E. flavocinctus* Friese, 1916, a name that has since been synonymized under *T. aztecus* (Cresson, 1878) (Rightmyer 2008). However, the male was described as having yellow pubescence along the margins of the mesoscutum (with no mention of any paramedian bands or pale pubescence medially), a pair of patches of yellow tomentum basally on T1, and bands of yellow tomentum on the succeeding terga, features that in combination are diagnostic for *T. mexicanus*.

Cockerell (1949) described *T. bilunatus* from a single (female) specimen and described it as closely resembling *T. mexicanus*, to which he "was almost ready to refer this [specimen]" but did not on the basis that in *T. mexicanus* the sides of the metathorax are covered with dense yellowish pubescence. Both the holotype of *T. bilunatus* and lectotype of *E. mexicanus* were examined in the present study, and the posterior part of the mesosoma is not more noticeably densely or yellow pubescent in the latter than in the former.

As there are no discernable morphological differences among the primary types of *E. mexicanus*, *E. rugulosus*, and *T. bilunatus* and the description of *E. metatarsalis* closely describes the lectotype of *E. mexicanus*, apart from sex-specific differences, *E. rugulosus*, *E. metatarsalis*, and *T. bilunatus* are herein synonymized under *T. mexicanus*.

A female paralectotype of *E. mexicanus* (ANSP 2229-8), which has been incorrectly designated and labeled as a "Para-Type", is not the same species as the lectotype but rather *T. flavipennis*, a similar-looking species in the *T. verbesinae* group.

Triepeolus nemoralis (Holmberg, 1886)
Fig. 13B

Doeringiella nemoralis Holmberg, 1886: 280 (♀).
Epeolus merus Brèthes, 1909: 250 (♂).

Epeolus merus – Schrottky 1913: 265 (in regional checklist).
Triepeolus nemoralis – Roig-Alsina 1989: 578. — Onuferko *et al*. 2024: 27, figs 1f, 3b, 11, 13b (redescription).

Proposed common name

Nemoral triepeolus.

Diagnosis

The following morphological features in combination tell *T. nemoralis* apart from all other species of *Triepeolus*: the mesoscutum has a large anteromedial ovate patch of yellow tomentum, which may be sparser medially such that the patch is suggestive of ill-defined paramedian bands (Fig. 13B); the T1 basal band is arched, continuous with (and indistinguishable from) the lateral longitudinal bands, and mesally concave on each side, such that the discal patch is semicircular (Fig. 13B); T1 does not have an apical transverse band (Fig. 13B), but the apical impressed area may have ill-defined patches of pale tomentum; and T2–T4 have complete apical transverse bands of yellow tomentum (Fig. 13B). *Triepeolus nemoralis* most closely resembles specimens of *T. alvarengai* without an apical transverse band on T1 and *T. mexicanus*, the latter of which is known only from North and Central America, but in *T. alvarengai* the mesoscutum has well-defined paramedian bands and in *T. mexicanus* pale tomentum on the mesoscutum is restricted to the lateral and posterior margins. Males of *T. nemoralis* also closely resemble those of *T. flavipennis* without an apical transverse band on T1 and *T. cameroni*, which is known only from Mexico and Central America, but in the latter two species, which are not in the *simplex* species group, the mesoscutum has well-defined paramedian bands, in *T. flavipennis* the pair of anterolateral patches of pale tomentum on T1 are mesally convex, such that the discal patch forms a trapezoid or triangle with concave anterolateral sides, and in *T. cameroni* S3 has an apical/subapical fringe of dense, long (> 1 MOD), curved, pale setae (as opposed to only short, straight setae). This species is also very similar in overall appearance to *Epeolus luteipennis*, and in both species the mesoscutum has a large anteromedial patch of yellow tomentum (as opposed to well-defined paramedian bands), but both sexes of *T. nemoralis* can easily be told apart from any similar-looking *Epeolus* by their simple mandibles; in *E. luteipennis* and most other *Epeolus* spp., the mandibles each have a distinct preapical tooth.

Etymology

See Onuferko *et al*. (2024).

Material examined

See Onuferko *et al*. (2024).

DNA barcoded material

Unavailable.

Redescription

This species was recently redescribed (Onuferko *et al*. 2024).

Distribution

Northern and eastern South America (Onuferko *et al*. 2024: fig. 1F).

Ecology

Host records

Unknown.

Floral records

See Onuferko *et al*. (2024).

Remarks

Detailed morphological and taxonomic remarks about this species are given in Onuferko *et al*. (2024).

Triepeolus obliteratus Graenicher, 1911
Figs 3B, 7B, 9B, 12G, 22

Triepeolus obliteratus Graenicher, 1911: 242 (♀, ♂), lectotype presently designated.

Triepeolus obliteratus – Mitchell 1962: 477 (redescription). — Veit *et al*. 2021: 139 (new state record, new host association).

Proposed common name

Obliterated triepeolus.

Diagnosis

The following morphological features in combination tell *T. obliteratus* apart from all other *Triepeolus* in the *simplex* species group: the mesopleura laterally do not have erect/suberect, simple setae or have only sparse, short (<¼ MOD), erect/suberect, simple setae in addition to the usual appressed, branched setae (Figs 9B, 22A, C); the legs, at least from coxae to femora, are partially to predominantly dark brown/black (Figs 3B, 9B, 22A–C); the trochanters are normal (i.e., not tuberculate) (Fig. 9B); the dorsum of the mesosoma and metasoma have bands of pale-gray to white/off-white tomentum (Fig. 22); and the T1 discal patch is transversely oblong or elliptic (Fig. 22B). *Triepeolus obliteratus* most closely resembles *T. oblongimacula* sp. nov. and *T. rhododontus*, but in the latter two species the dorsum of the mesosoma and metasoma have bands of pale-yellow tomentum, the legs may be entirely reddish orange from trochanters to tarsi, and the pseudopygidial area of the female may be partially to predominantly reddish orange (as opposed to entirely dark brown/black; Fig. 22D), and in *T. rhododontus* the axillae commonly (as opposed to never) have reddish tips. Males of *T. obliteratus* also closely resemble those of *T. eliseae* Rightmyer, 2017 and *T. michiganensis* Mitchell, 1962, but in the latter two species, which are not in the *simplex* species group, the pygidial plate may have a well-defined basal transverse ridge, in *T. eliseae* the propodeal triangle is mostly covered in dense, appressed pale setae (as opposed to glabrous; Fig. 7B), and in *T. michiganensis* the clypeus has a well-defined glabrous midline (absent in *T. obliteratus*; Fig. 3B).

Etymology

The specific epithet was inspired by the fore wings each having the second submarginal crossvein incomplete in the lectotype and lectoallotype of this species, as indicated by Graenicher's (1911) remark

that "[b]oth of the specimens have the second transverse cubital nervure more or less obliterated in both wings".

Material examined

Primary type material

USA • ♀, lectotype; Wisconsin, Yellow River, Burnett County; 28–31 Jul. 1909; MPM ENT6434.

Secondary type material

USA • 1 ♂, lectoallotype; Wisconsin, Prescott, Pierce County; 13–19 Jul. 1910; MPM ENT6435.

DNA barcoded material

Available. BIN: BOLD:AEE4216. Specimens examined and sequenced:

CANADA – **Manitoba** • 1 ♀; Spruce Woods Provincial Park; 49.6649° N, 99.2774° W; 30 Jul. 2019; T.M. Onuferko leg.; BOLD sample ID: CMNTO_003; TOPC. – **Saskatchewan** • 1 ♀; Avonlea Badlands; 50.0246° N, 104.9831° W; 11 Jul.–1 Aug. 2019; RSM Bee Team leg.; BOLD sample ID: CCDB-38770 E10; RSKM RSKM_ENT_E-225802 • 1 ♀; Douglas Provincial Park (Elbow); 51.0467° N, 106.4423° W; 22 Jul. 2019; T.M. Onuferko leg.; BOLD sample ID: CMNTO_001; CMNC • 1 ♀; Herbert;

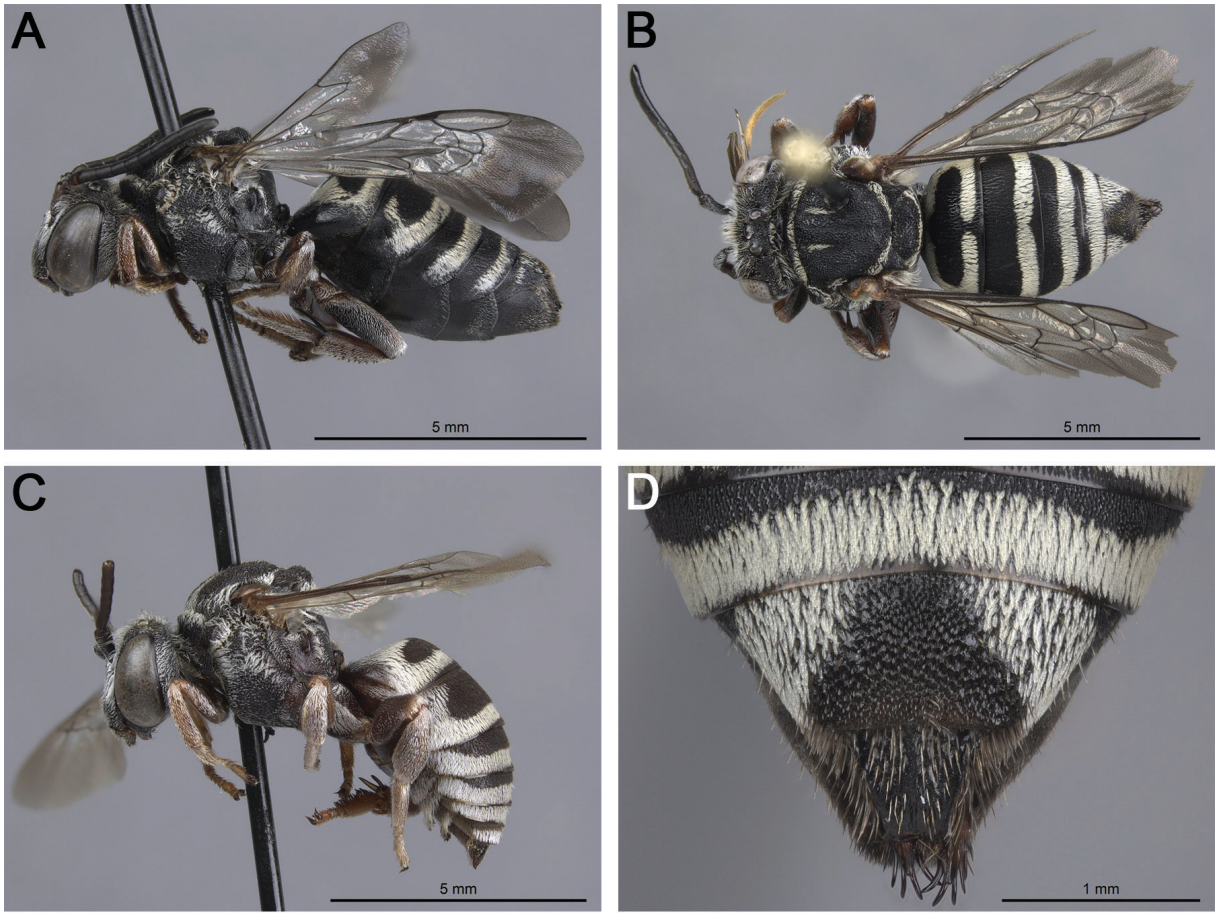

Fig. 22. *Triepeolus obliteratus* Graenicher, 1911. **B**, **D**. Female (BOLD sample ID: CMNTO_003; TOPC). **A**. Female (BOLD sample ID: CMNTO_001; CMNC), habitus, lateral view. **B**. Habitus, dorsal view. **C**. Male (CNC 427182), habitus, lateral view. **D**. Pseudopygidial area, dorsal view.

50.4195° N, 107.2189° W; 15 Aug. 2013; C.S. Sheffield *et al*. leg.; BOLD sample ID: CCDB-32640 H07; RSKM RSKM_ENT_E-110579 • 1 ♀; near Avonlea; 50.0241° N, 104.9831° W; 30 Jun.–7 Jul. 2017; C.S. Sheffield and R. Oram leg.; BOLD sample ID: CCDB-38770 F01; RSKM RSKM_ENT_E-185267 • 1 ♂; same data as for preceding; 30 Jun.–7 Jul. 2017; C.S. Sheffield, R. Oram, J. Kalyniuk, and G. Wihlidal leg.; BOLD sample ID: CCDB-38770 E11; RSKM RSKM_ENT_E-185259 • 1 ♂; same data as for preceding; 30 Jun.–7 Jul. 2017; C.S. Sheffield, R. Oram, J. Kalyniuk, and G. Wihlidal leg.; BOLD sample ID: CCDB-38770 E12; RSKM RSKM_ENT_E-185261.

USA – **Iowa** • 1 ♀; Butler County; 42.6260° N, 92.6896° W; 19 Jul. 2019; M. Vandever leg.; BOLD sample ID: CMNTO_057; CSUC. – **Massachusetts** • 1 ♀; Ashburnham, Worcester County; 42.7050° N, 71.9270° W; 6 Aug. 2015; M.F. Veit leg.; BOLD sample ID: CMNTO_249; TOPC. – **New Hampshire** • 1 ♂; Crotched Mountain Trail (Greenfield), Hillsborough County; 22 Jul. 2016; M.F. Veit leg.; BOLD sample ID: CMNTO_250; TOPC.

Non-barcoded material

CANADA – **Alberta** • 2 ♀♀; 8.5 km E of Clyde, Westlock County; 54.1661° N, 113.5003° W; 21 Jul. 2010; M. Buck leg.; RAM pmae00116017, pmae00116018 • 1 ♀; same data as for preceding; 21 Jul. 2010; M. Buck and Widen leg.; RAM pmae00116618 • 1 ♀; 15 km SW of Edson; 53.4917° N, 116.6044° W; 21 Jul. 2021; M. Buck leg.; RAM pmae00160149 • 1 ♀; Bridge Lake Natural Area, Westlock County; 54.1772° N, 113.4886° W; 27 Jul. 2011; M. Buck leg.; RAM pmae00120258 • 1 ♂; Opal Dunes, Thorhild County; 54.0075° N, 113.2681° W; 24 Jul. 2009; M. Buck and Palumbo leg.; RAM pmae00111591 • 1 ♀; Ukalta Dunes, Lamont County; 53.9747° N, 112.5072° W; 6 Aug. 2010; S. Widen leg.; RAM pmae00117232 • 1 ♀; Wainwright Municipal District, Ribstone Creek Heritage Rangeland Natural Area; 52.7269° N, 110.3667° W; 8 Jul. 2009; M. Buck leg.; RAM pmae00111947. – **Manitoba** • 2 ♀♀; 19.6 km WSW of Virden; 49.8014° N, 101.1961° W; 23 Jul. 2021; O. Abel leg.; CMNC • 1 ♂; 2.5 km E of Portage Sand Hills Wildlife Management Area on Road 54 N, Rural Municipality of Portage la Prairie; 49.7990° N, 98.2170° W; 5 Jul. 2019; E. Hanuschuk leg.; WRME WRME_EJH02370 • 1 ♀; 4.5 km SE of Portage La Prairie, Rural Municipality of Portage la Prairie; 49.9300° N, 98.2620° W; 16 Jul. 2018; E. Hanuschuk leg.; WRME JBWM0391741 • 1 ♀; 5 mi W of Carberry; 9 Aug. 1958; N.B. Chillcott leg.; CNC • 1 ♂; 6.5 km E of Portage Sand Hills Wildlife Management Area on Road 54 N, Rural Municipality of Portage la Prairie; 49.7980° N, 98.1650° W; 16 Aug. 2019; E. Hanuschuk leg.; WRME WRME_EJH02720 • 1 ♂; 7 km E of Marchand, Rural Municipality of Reynolds; 49.4440° N, 96.2700° W; 22 Jul. 2020; J. Gibbs leg.; WRME WRME0507584 • 1 ♀; Bald Head Hills (13 mi N of Glenboro); 9 Aug. 1958; R.B. Madge leg.; CNC • 1 ♂; Birds Hill Provincial Park; 50.0100° N, 96.9090° W; 2 Jul. 2020; J. Gibbs leg.; WRME WRME0507876 • 1 ♀; Birds Hill Provincial Park; 50.0115° N, 96.9065° W; 12 Aug. 2017; J. Gibbs and G.Y. Nozoe leg.; WRME JBWM0362976 • 1 ♀; Linden, Rural Municipality of Taché; 49.6790° N, 96.8890° W; 9 Aug. 2019; S. Shukla-Bergen leg.; WRME WRME0501597 • 3 ♀♀; Oak Hammock Marsh, Rural Municipality of Rockwood; 50.1750° N, 97.1550° W; 26 Aug. 2020; J. Gibbs leg.; WRME WRME0508600, WRME0508602, WRME0508637 • 1 ♀; Rd 13E (Oak Hammock Marsh Wildlife Management Area), Rural Municipality of Rockwood; 50.1820° N, 97.1610° W; 7 Aug. 2019; E. Hanuschuk leg.; WRME WRME_EJH01940 • 1 ♂; Shilo; 49.8124° N, 99.5131° W; 12 Jul. 2011; K. Wareham and S. Patterson leg.; WRME JBWM0385547 • 1 ♀; Spirit Hills; 49.6600° N, 99.2900° W; 25 Aug. 1978; T.D. Galloway leg.; WRME JBWM0296424 • 1 ♀; Spirit Sands (Spruce Woods Provincial Park); 49.6600° N, 99.2800° W; 2 Jul. 2018; J. Gibbs leg.; WRME JBWM0379545 • 2 ♂♂; same data as for preceding; 6 Jul. 2019; J. Gibbs leg.; WRME JBWM0422817, JBWM0422819 • 1 ♂; St. Adolphe, Rural Municipality of Ritchot; 49.6550° N, 97.1140° W; 12 Jul. 2019; S. Shukla-Bergen leg.; WRME JBWM0425506 • 1 ♀; Ste. Agathe; 29 Aug. 1969; Boyle leg.; LEM • 1 ♂; Transcona; 8 Aug. ??24; G.S. Brooks leg.; CNC 427182 • 1 ♂; Vita, Rural Municipality of Stuartburn; 49.1490° N, 96.6460° W; 11 Jul. 2019; S. Shukla-Bergen leg.; WRME JBWM0425564 • 1 ♀; Winnipeg; 21 Aug. 1935; R.R. Lejeune leg.; WRME JBWM0296432. – **Saskatchewan** • 1 ♀; 21 mi W of Moose Jaw; 28 Jul. 1972; C.D. Michener leg.; KUNHM M.G.R.

Database No. 584 • 1 ♀; NCC's Buffalo Pound property; 50.7293° N, 105.5985° W; 3 Aug. 2021; C.S. Sheffield and K. Palmier leg.; RSKM RSKM_ENT_E-125601 • 1 ♀; Nipawin; 18 Jul. 1952; W.P. Stephen leg.; WRME JBWM0295628.

USA – **Illinois** • 1 ♀; Richardson Wildlife Foundation, Lee County; 9 Jul. 1996; J.K. Bouseman leg.; INHS 441217/362391 • 1 ♂; Sand Ridge State Forest (4 mi SW of Forest City), Mason County; 15 Jul. 1982; E. Miliczky leg.; INHS 7784. – **Massachusetts** • 1 ♂; 1.1 mi SE of Pepperell (Groton), Middlesex County; 28 Jul. 2008; M.F. Veit leg.; TOPC WHD00000335 • 1 ♂; 1.8 mi NE of Townsend, Middlesex County; 28 Jul. 2008; M.F. Veit leg.; TOPC WHD00000334 • 1 ♀; Ashburnham, Worcester County; 42.7050° N, 71.9270° W; 9 Aug. 2014; M.F. Veit leg.; TOPC • 1 ♀; Groton, Middlesex County; 42.6410° N, 71.5275° W; 15 Aug. 2009; M.F. Veit leg.; TOPC WHD00000332 • 1 ♂; same data as for preceding; 15 Aug. 2009; M.F. Veit leg.; TOPC WHD00000337. – **Minnesota** • 1 ♂; 6 mi SW of Detroit Lakes, Becker County; 30 Jul. 1981; J.R. Powers leg.; EMEC M.G.R. Database No. 495. – **New Hampshire** • 1 ♀; Albany, Carroll County; 43.9944° N, 71.3694° W; 25 Jul. 2010; M.F. Veit leg.; TOPC WHD00000333 • 1 ♀; Ashuelot (power line row), Cheshire County; 42.7930° N, 72.4210° W; 9 Aug. 2017; M.F. Veit leg.; BIML • 1 ♀; Pelham, Hillsborough County; 42.7027° N, 71.3047° W; 30 Jul. 2009; M.F. Veit leg.; TOPC WHD00000331 • 1 ♂; same data as for preceding; 30 Jul. 2009; M.F. Veit leg.; TOPC WHD00000336. – **New Jersey** • 1 ♂; USNM M.G.R. Database No. 497 • 1 ♂; USNM M.G.R. Database No. 497. – **North Carolina** • 1 ♀; Black Mountains; AMNH Ac. 33827/M.G.R. Database No. 598 • 1 ♀, *T. junctus* paratype; Fayetteville; 2 Oct. 1941; H.E. Evans leg.; CUIC Cornell U No. 3927/M.G.R. Database No. 527 • 2 ♀♀; Moore County; 8 Oct. 1964; B.S. Heming leg.; DEBU debu01089133, debu01089136 • 1 ♀; same data as for preceding; 8 Oct. 1964; J.F. Cornell leg.; DEBU debu01089130 • 1 ♀; Swannanoa; 3 Sep. 1924; J.C. Crawford leg.; USNM M.G.R. Database No. 528. – **North Dakota** • 1 ♀; 13 mi NW of Inkster, Grand Forks County; 17 Jul. 1955; W.E. LaBerge leg.; KUNHM M.G.R. Database No. 585 • 1 ♀; 13 mi NW of Inkster, Grand Forks County; 17 Jul. 1956; W.E. LaBerge leg.; KUNHM M.G.R. Database No. 599 • 1 ♀; Grands Forks; 3 Aug. 1912; O.A. Stevens leg.; USNM 3404/M.G.R. Database No. 586 • 1 ♀; Perth; 20 Aug. 1910; O.A. Stevens leg.; AMNH 6480/M.G.R. Database No. 587. – **Oklahoma** • 1 ♀; Fort Cobb Wildlife Management Area, Caddo County; 35.2220° N, 98.5180° W; 6 Oct. 2023; S. O'Dell and I. Gonzales leg.; OKBS OKBS.POL.13827.

Non-preserved material

CANADA – **Manitoba** • 1 ♀; Spruce Woods Provincial Park; 49.6635° N, 99.2894° W; 21 Aug. 2018; P. Tavares obs.; iNaturalist record #15971912. – **Saskatchewan** • 1 ♂; Division No. 6; 18 Jul. 2020; L. Pyle obs.; iNaturalist record #53926803.

USA – **Iowa** • 1 ♂; State Center; 10 Aug. 2021; T. Grant obs.; iNaturalist record #90756016. – **Massachusetts** • 1 ♀; Weir Hill Reservation, North Andover; 42.6926° N, 71.1065° W; 21 Aug. 2019; M. McCarthy obs.; iNaturalist record #40378120. – **Minnesota** • 1 ♀; Park Point, Duluth; 46.7267° N, 92.0463° W; 30 Aug. 2022; "dexternienhaus" obs.; iNaturalist record #133398524. – **New Hampshire** • 1–3 ♀♀; Rockingham County; Jul. 2021; C. Prieto obs.; iNaturalist record #87793484, #189067399, #189067405 • 1 ♀; same data as for preceding; Jul. 2021; C. Prieto obs.; iNaturalist record #189368519.

Redescription

Measurements of lectotype. Body length 8.7 mm; ITW 1.8 mm; head length 2.0 mm; head width 2.8 mm; fore wing length 6.2 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with middle third; labrum along apical and lateral margins; scape, pedicel, and F1 to some extent (entirely dark brown/black in some non-type specimens); pronotal lobe (entirely dark brown/black in some non-type specimens); tegula;

coxae to femora to some extent; tibiae (excluding brown meso- and metatibial spurs) predominantly; tarsi entirely; metasomal terga laterally; and metasomal sterna to some extent orange. F2 with orange spot basally. Fore wing membrane subhyaline, apically dusky. Hind wing membrane dusky subhyaline to hyaline. Pygidial plate to some extent reddish brown.

Pubescence. Face with tomentum densest around antennal socket. Tomentum slightly sparser on clypeus; upper paraocular and frontal areas and vertexal area mostly exposed. Pronotal collar with tomentum uniformly off-white/pale gray. Mesoscutum with well-defined paramedian band of off-white to pale-gray tomentum; pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with pale-gray to white/off-white, appressed, branched setae; upper half densely setose, except behind pronotal lobe, with setae slightly sparser on hypoepimeral area; ventrolateral half sparsely setose. Metanotum with tomentum uninterrupted, uniformly off-white. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. Metasomal terga with bands of off-white/pale-gray tomentum. T1 with basal transverse band interrupted medially, apical transverse band narrowly interrupted medially, transverse bands subparallel, discal patch transversely oblong or elliptic. T2–T4 with apical transverse bands complete and medially somewhat removed from apical margins of terga, that of T2 with pair of basomedially convergent anterolateral extensions. S2–S3 with medially interrupted apical transverse bands of white tomentum (reduced to posterolateral patches in lectotype and multiple non-type specimens).

Surface sculpture. Labrum coarsely and densely (most $i < 1d$) rugose-punctate. Clypeus densely punctate (most $i < 1d$) but interspaces well defined, shining; with many small punctures among larger ones. Vertexal area somewhat sparsely punctate (some $i > 2d$), especially around ocelli. Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense and nearly contiguous (most $i < 1d$). Mesopleuron with punctures in upper half nearly contiguous and denser ($i < 1d$) than in ventrolateral half ($i \leq 2d$); interspaces shining where punctures not contiguous; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense ($i \approx 1d$), and evenly distributed; interspaces shining somewhat.

Structure. Labrum with pair of small subapical denticles, each preceded by discrete longitudinal ridge. Pronotal collar rather short (medial length ~⅔ MOD). Mesoscutellum moderately bigibbous. Axilla extending little if at all beyond midlength of mesoscutellum; tip distinctly pointed, but mesally unattached to mesoscutellum for less than ²/₅ medial length of axilla; lateral margin somewhat arcuate. Fore wing with second submarginal crossvein incomplete and thus two submarginal cells in lectotype and lectoallotype; three submarginal cells in non-type specimens.

Female

Paramedian band tapering slightly toward but not attaining anterior margin of mesoscutum. T5 with concave apical margin and large patch of white/off-white tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with triangular region of posteriorly directed coppery to silvery setae within larger trapezoidal space of posteriorly directed dark brown setae. Pygidial plate apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, with apical fimbria of coppery bristle-like setae.

Male

Paramedian band anteriorly joined to lateral transverse band of equally dense off-white to pale-gray tomentum along anterior margin of mesoscutum. T5 with complete apical transverse band of off-white to pale-gray tomentum. T6 with complete apical transverse band of white/off-white tomentum. Pygidial plate relatively flat and apically rounded, with lateral margin somewhat sinuate. S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved, predominantly coppery brown setae, contrasting with apical transverse bands of white tomentum of preceding sterna, those of S4 coppery to silvery laterally.

Distribution

Eastern United States to Canada's Prairie Provinces (Fig. 12G).

Ecology

Host records

Triepeolus obliteratus has been observed and photographed (in 2014 and 2015) at a nest aggregation of *Melissodes apicatus* Lovell & Cockerell, 1906 (Hymenoptera: Apidae: Eucerinae) in Ashburnham, Massachusetts (Veit *et al*. 2021). That *M. apicatus* is not known to occur west of Ontario in Canada (Ascher & Pickering 2023) suggests that *T. obliteratus* takes as hosts multiple species. *Triepeolus obliteratus* has been collected with *T. pectoralis* (Robertson, 1897) at a nest aggregation of *M. druriellus* (Kirby, 1802) in Birds Hill Provincial Park in Manitoba (J. Gibbs, pers. com. 2020).

Floral records

Images on iNaturalist and labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Asteraceae, *Crepis tectorum* L., *Erigeron* sp. or spp., *Euthamia graminifolia* (L.) Nutt., *Gaillardia* sp., *Grindelia squarrosa*, *Heterotheca villosa* (Pursh) Shinners, *Rudbeckia* sp., *R. hirta* L., *Solidago* sp. or spp., *S. mollis* Bartlett, and *Verbesina encelioides*; in Brassicaceae Burnett, canola (*Brassica* sp.); and in Fabaceae, *Dalea purpurea* Vent., *Melilotus albus*, and *Trifolium repens* L.

Remarks

Graenicher (1911) described *T. obliteratus* from both sexes, represented by two syntypes at the MPM. Since Graenicher (1911) provided a more complete description of the female and since females are more easily recognized as members of the *simplex* species group, the female syntype is herein designated as the lectotype of *T. obliteratus* whereas the male is recognized as the lectoallotype.

In both the lectotype and lectoallotype, the second submarginal crossvein is incomplete in both fore wings. Although Mitchell (1962) considered this feature to be diagnostic in his key to species of *Triepeolus* of the Eastern United States, this feature does not reliably distinguish *T. obliteratus* from any similar-looking *Triepeolus*, and in most exemplars the fore wings each have three submarginal cells with complete submarginal crossveins. Cases of intraspecific variation in the number of submarginal cells and reduction of submarginal crossveins are known in many other bees, including cleptoparasitic apids (reviewed by Scarpulla 2018).

Triepeolus obliteratus is the most commonly collected species in the *T. simplex* group in Canada.

Triepeolus oblongimacula sp. nov.
urn:lsid:zoobank.org:act:A939584A-99F2-4D1C-B4A5-23D778D8B027
Figs 4B, 8B, 9C, 12H, 15C, 23

Proposed common name

Oblong-spot triepeolus.

Diagnosis

The following morphological features in combination tell *T. oblongimacula* sp. nov. apart from all other *Triepeolus* in the *simplex* species group: the axillae are entirely black and large, each with the tip extending beyond the midlength of the mesoscutellum (but not as far back as its posterior margin) and the free portion distinctly pointed, hooked (i.e., concave along the medial margin), and mesally unattached to the mesoscutellum for more than a third the medial length of the axilla (Fig. 23B); the mesopleura laterally do not have erect/suberect, simple setae or have only sparse, short (<¼ MOD),

erect/suberect, simple setae in addition to the usual appressed, branched setae (Fig. 9C); the trochanters are normal (i.e., not tuberculate) (Fig. 9C); the dorsum of the mesosoma and metasoma have bands of pale-yellow tomentum (Figs 8B, 15C, 23); and the T1 discal patch is broadly rounded laterally and rod-shaped with an inverted U- or horseshoe-shaped anteromedial projection (Figs 15C, 23B). *Triepeolus oblongimacula* most closely resembles *T. obliteratus* and *T. rhododontus*, but in *T. obliteratus* the dorsum of the mesosoma and metasoma have bands of pale-gray to white/off-white tomentum, the legs are never (as opposed to commonly; Fig. 23A–C) entirely reddish orange from trochanters to tarsi, and the pseudopygidial area of the female is never (as opposed to uncommonly) reddish orange, and in *T. rhododontus* the T1 discal patch is somewhat narrowed and/or curved posterolaterally and thus allantoid and the axillae commonly have reddish tips, especially in the West where the species' range overlaps with that of *T. oblongimacula*.

Etymology

The specific epithet is a Latin noun in apposition meaning 'oblong-spot' and refers to the shape of the T1 discal patch.

Material examined

Primary type material

USA • ♀, holotype; New Mexico, Rodeo, Hidalgo County; 7 Sep. 1973; M. Favreau leg.; AMNH.

Secondary type material

MEXICO – **Chihuahua** • 1 ♀, paratype; 10 mi N of Jiménez; 10 Sep. 1950; R.F. Smith leg.; AMNH • 1 ♀, paratype; Samalayuca; 6 Oct. 1966; G.E. and A.S. Bohart leg.; BBSL BBSL581796.

USA – **Arizona** • 1 ♀, paratype; 10 mi NW of Douglas, Cochise County; 7 Sep. 1975; E.S. Ross leg.; CAS • 1 ♀, paratype; 2 mi NE of Portal, Cochise County; 11 Sep. 1960; Cazier and Feight leg.; AMNH • 1 ♀, paratype; same data as for preceding; 22 Aug. 1967; AMNH • 1 ♀, paratype; 28.3 mi S of Portal, Cochise County; 31.8420° N, 109.2520° W; 22 Aug. 2000; J.L. Neff leg.; CTMI 11991/M.G.R. Database No. 1387 • 1 ♀, paratype; 3 mi E of Portal, Cochise County; 13 Sep. 1955; C. and M. Cazier leg.; AMNH • 1 ♀, paratype; 7 mi W of Tombstone, Cochise County; 29 Sep. 1963; V.L. Vesterby leg.; UCBME • 1 ♀, paratype; Apache, Cochise County; 28 Sep. 1980; J.G. Rozen leg.; AMNH • 1 ♀, paratype; same data as for preceding; 30 Aug.–1 Sep. 1986; K.V. Krombein leg.; USNM • 1 ♀, paratype; Box Canyon, Pima County; 31.7998° N, 110.7572° W; 15 Sep. 1994; T.L. Griswold leg.; BBSL BBSL582189 • 1 ♀, paratype; Double Adobe, Cochise County; 7 Sep. 1975; E.G. and J.M. Linsley leg.; EMEC M.G.R. Database No. 1389 • 1 ♀, paratype; Mount Graham Road (Pinaleño Mountains), Graham County; 27 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀, paratype; Pearce to Cochise Stronghold, Cochise County; 1 Sep. 1991; L. Stange and R. Miller leg.; FSCA • 1 ♀, paratype; Pinaleño Mountains, Graham County; 22 Aug. 1980; C.A. Olson leg.; UAIC • 1 ♀, paratype; Southwestern Research Station (5 mi W of Portal), Cochise County; 4 Sep. 1962; S.J. Hessel leg.; AMNH • 1 ♀, paratype; same data as for preceding; 9 Sep. 1966; P.H. Arnaud, Jr leg.; CAS • 1 ♀, paratype; Sunglow West Turkey Creek (Chiricahua Mountains), Cochise County; 12 Sep. 1991; J.G. and B.L. Rozen leg.; AMNH • 1 ♀, paratype; Tombstone, Cochise County; 12 Sep. 1940; R.H. Crandall leg.; UAIC • 1 ♀, paratype; West Turkey Creek (13 mi E of Sunizona), Cochise County; 5 Sep. 1983; J.G. Rozen and M. Favreau leg.; AMNH. – **Colorado** • 1 ♀, paratype; 8.3 mi N of Roggen (along route 386), Weld County; 15 Sep. 1992; L.R. Davis, Jr. leg.; FSCA • 2 ♀♀, paratypes; Boulder County; 18 Sep. 1925; C.P. Custer leg.; UCMC • 1 ♀, paratype; Roggen; 15 Sep. ??31; UCMC • 1 ♂, paratype; Colorado, Sandhills 3 mi N of Roggen, Weld County; 7 Sep. 1991; M.J. Weissmann leg.; CSUC. – **New Mexico** • 1 ♀, paratype; 11 km NW of Bayard, Grant County; 32.7920° N, 108.2430° W; 2 Sep. 2009; C.S. Sheffield and S. Dumesh leg.; BOLD sample ID: CMNTO_013; PCYU PCYU-SD09:573 • 1 ♀, paratype; 11.2 km NE of Bayard, Grant County; 32.8110° N, 108.0260° W; 2 Sep. 2009; C.S. Sheffield and S. Dumesh

leg.; BOLD sample ID: CMNTO_031; PCYU PCYU-SD09:112 • 2 ♀♀, paratypes; 17 mi S of Animas, Hidalgo County; 30 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀, paratype; 20 mi E of Animas, Hidalgo County; 20 Sep. 1999; M.G. Rightmyer leg.; AMNH • 1 ♀, paratype; 27–32 mi S of Animas, Hidalgo County; 24 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH M.G.R. Database No. 1207 • 1 ♀, paratype; 5 mi E of Lordsburg, Hidalgo County; 14 Oct. 1970; J.C. and F.M. Hall leg.; UCR UCRC ENT 57233 • 1 ♀, paratype; 6 mi NW of Silver City, Grant County; 11–12 Sep. 1974; E.G. and J.M. Linsley leg.; EMEC • 1 ♀, paratype; Animas, Hidalgo County; 4–5 Aug. 1974; E.G. and J.M. Linsley leg.; EMEC M.G.R. Database No. 1385 • 1 ♀, paratype; same data as for preceding; 26 Aug. 2015; L. Packer leg.; PCYU • 1 ♀, paratype; Granite Gap (18 mi N of Rodeo); 7 Sep. 1976; R.M. Bohart leg.; UCBME • 1 ♀, paratype; Hwy 80, 6 km S of Hwy 10; 32.1831° N, 108.9481° W; 30 Aug. 2009; C.S. Sheffield, S. Dumesh, and L. Packer leg.; BOLD sample ID: CMNTO_023; PCYU • 1 ♀, paratype; Mescalero Sands (45 mi E of Roswell), Chaves County; 12–13 Sep. 1959; E.R. Tinkham leg.; CAS • 1 ♀, paratype; same data as for preceding; 12–13 Sep. 1959; E.R. Tinkham leg.; USNM • 1 ♂, allotype; Near Hwy 10, Doña Ana County; 32.2420° N, 107.1930° W; 30 Aug. 2009; C.S. Sheffield and S. Dumesh leg.; BOLD sample ID: CMNTO_298; PCYU PCYU-SD09:28 • 1 ♀, paratype; Silver City; 32.7130° N, 108.2970° W; 31 Aug. 2009; C.S. Sheffield leg.; BOLD sample ID: CMNTO_035; PCYU PCYU-CSNM-09-184. – **Oklahoma** • 1 ♀, paratype; Norman (Canadian River), Cleveland

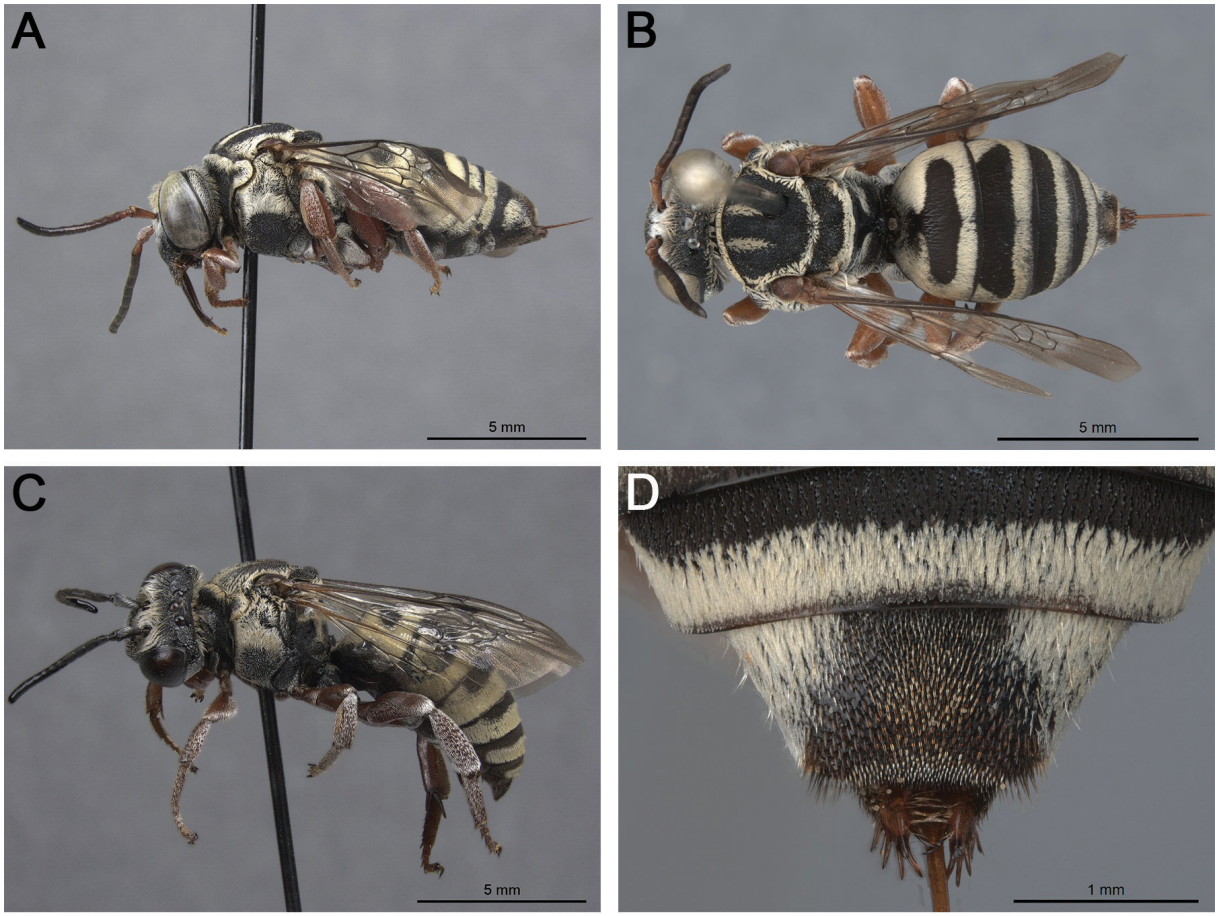

Fig. 23. *Triepeolus oblongimacula* sp. nov. **B**, **D**. Holotype, ♀ (AMNH). **A**. Paratype, ♀ (BOLD sample ID: CMNTO_035; PCYU PCYU-CSNM-09-184), habitus, lateral view. **B**. Habitus, dorsal view. **C**. Allotype, ♂ (BOLD sample ID: CMNTO_298; PCYU PCYU-SD09:28), habitus, lateral view. **D**. Pseudopygidial area, dorsal view.

County; 35.2007° N, 97.4964° W; 21 Oct. 2021; K.L.J. Hung leg.; BOLD sample ID: CMNTO_421; OKBS OKBS.POL.810. – **South Dakota** • 3 ♀♀, paratypes; Forestburg; 8 Sep. 1928; H.C. Severin leg.; USNM M.G.R. Database Nos 1375 to 1377. – **Texas** • 1 ♀, paratype; 8 mi NW of Girvin, Pecos County; 9 Sep. 1989; J.L. Neff leg.; CTMI K07230 • 1 ♀, paratype; Dallas; 5 Oct. 1905; F.C. Bishopp leg.; USNM • 1 ♀, paratype; Pedernales Falls State Park, Blanco County; 11 Oct. 1995; J.L. Neff leg.; CTMI 07724 • 1 ♀, paratype; Red River, Hwy 81, Montague County; 12 Oct. 2002; B. Kondratieff, J. Owens, and J. Schmidt leg.; CSUC • 1 ♀, paratype; Redford, Presidio County; 16 Oct. 1998; J.L. Neff leg.; CTMI 09280/M.G.R. Database No. 1388.

DNA barcoded material

Available. BIN: BOLD:AEE4216. See type material for specimens examined and sequenced (indicated by unique BOLD sample ID).

Description

Measurements of holotype. Body length 11.7 mm; ITW 2.4 mm; head length 2.7 mm; head width 3.9 mm; fore wing length 8.6 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with apical third golden yellow. Mandible with basal two-thirds (except for extreme base), labrum along apical and lateral margins, F1 to some extent, coxae to some extent, trochanters to tibiae (excluding brown meso- and metatibial spurs) partially to entirely, and tarsi entirely orange. F2 with orange spot basally. Tegula reddish brown. Fore wing membrane subhyaline, apically dusky. Hind wing membrane dusky subhyaline to hyaline. Pygidial plate to some extent reddish brown (difficult to see in holotype because T6 mostly retracted; described from paratypes).

Pubescence. Face with tomentum densest around antennal socket. Clypeus, upper paraocular and frontal areas, and vertexal area mostly exposed. Pronotal collar with tomentum uniformly pale yellow. Mesoscutum with well-defined paramedian band of pale-yellow tomentum; pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with off-white to pale-yellow, appressed, branched setae; upper half densely setose, except behind pronotal lobe, with setae slightly sparser on hypoepimeral area; ventrolateral half nearly bare, except along margins. Mesopleuron with sparse, pale-yellow, erect/suberect, simple setae (less than ½ MOD in length) in addition to usual appressed, branched setae. Metanotum with tomentum uninterrupted, uniformly pale yellow. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. Metasomal terga with bands of pale-yellow tomentum. T1 with basal transverse band interrupted medially, apical transverse band complete (narrowly interrupted medially in some paratypes), transverse bands subparallel, discal patch transversely oblong or elliptic. T2–T4 with apical transverse bands complete and medially somewhat removed from apical margins of terga, that of T2 with pair of basomedially convergent anterolateral extensions. S2–S3 with medially interrupted apical transverse bands of white tomentum (reduced to posterolateral patches in holotype and some paratypes).

Surface sculpture. Labrum coarsely and densely (most $i < 1d$) rugose-punctate. Clypeus densely punctate (most $i < 1d$) but interspaces well defined, shining; with many small punctures among larger ones. Vertexal area somewhat sparsely punctate (some $i > 2d$), especially around ocelli. Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense and nearly contiguous (most $i < 1d$). Mesopleuron with punctures in upper half nearly contiguous and denser ($i < 1d$) than in ventrolateral half ($i \leq 2d$); interspaces somewhat dull due to tessellate surface microsculpture where punctures not contiguous; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense ($i \approx 1d$), and evenly distributed; interspaces shining somewhat.

Structure. Labrum with pair of small subapical denticles, each preceded by discrete longitudinal ridge. Pronotal collar somewhat elongate (medial length ~4/5 MOD). Mesoscutellum moderately bigibbous. Axilla extending beyond midlength of mesoscutellum but not as far back as its posterior margin; tip distinctly pointed and hooked (i.e., concave along medial margin), mesally unattached to mesoscutellum for ~2/5 medial length of axilla; lateral margin somewhat arcuate. Fore wing with three submarginal cells.

Female

Scape and pedicel extensively reddish orange. T5 with concave apical margin and large patch of pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with underlying integument to some extent reddish orange in some paratypes, with triangular region of posteriorly directed setae with three subregions (basal patch of dense, golden setae; darker subapical band of sparser, coppery brown setae; and apical row of dense, suberect, silvery setae) within larger trapezoidal space of posteromedially directed dark brown setae. Pygidial plate apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, with apical fimbria of brown bristle-like setae and brown tomentum laterally; S5 otherwise covered in off-white tomentum.

Male

Paramedian band anteriorly joined to lateral transverse band of equally dense pale-yellow tomentum along anterior margin of mesoscutum. T5–T6 with complete apical transverse bands. Pygidial plate apically rounded and slightly downturned, with lateral margin somewhat sinuate. S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved, predominantly coppery brown setae, contrasting with apical transverse bands of white tomentum of preceding sterna, those of S4 coppery to silvery laterally.

Distribution

Great Plains to the Southwestern United States and northern Mexico (Fig. 12H).

Ecology

Host records

Unknown.

Floral records

Labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Asteraceae, *Gutierrezia* sp., *Helianthus annuus*, *Isocoma pluriflora* Greene, and *Verbesina encelioides*; in Fabaceae, *Acacia angustissima* (Mill.) Kuntze; and in Zygophyllaceae, *Kallstroemia grandiflora*.

Remarks

DNA barcode sequences of specimens identified as *T. oblongimacula* sp. nov. and *T. obliteratus* were assigned the same BIN, although only partial sequences (≤428 bp) are presently available for the former. However, sequences of *T. obliteratus* cluster separately from those of *T. oblongimacula* (see Supp. file 4) and exhibit a minimum distance of 0.0% and maximum distance of 0.6% whereas a maximum distance of 3.0% separates sequences of specimens identified as *T. oblongimacula* and *T. obliteratus*. A comparison of all available barcode sequences revealed two nucleotide characters that are diagnostic or partial (391 – A in *T. oblongimacula*, G or R in *T. obliteratus*; 577 – G in *T. oblongimacula*, A or R in *T. obliteratus*). It remains to be seen whether sequencing of additional specimens will result in better defined MOTUs. Despite their sequences sharing a BIN, the pronounced and consistent morphological differences between *T. oblongimacula* and *T. obliteratus* as well as their largely non-overlapping ranges (see Fig. 12G–H) support their treatment as separate species, and therefore the two forms are herein considered to be heterospecific.

Triepeolus parahirsutus sp. nov.
urn:lsid:zoobank.org:act:A06B47B8-CDD7-4E83-9B51-D3C829AA9347
Figs 6B, 12I, 24

Proposed common name

Texas bristly triepeolus.

Diagnosis

The following morphological features in combination tell *T. parahirsutus* sp. nov. apart from all other *Triepeolus* in the *simplex* species group except *T. hirsutus* sp. nov.: the mesopleura have sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to the usual appressed, branched setae (Figs 6B, 24A, C); the legs are entirely reddish orange from trochanters to tarsi (Fig. 24A–C); and the T1 discal patch is trapezoidal with an inverted U- or horseshoe-shaped anteromedial projection (Fig. 24B). Females of *T. parahirsutus* and *T. hirsutus* are readily distinguished from each other by the pseudopygidial area, which in the former does not have distinct subregions of differentiated setae but rather setae that are golden to silvery and relatively uniform in density (Fig. 24D) and in the latter has three subregions of differentiated setae—a basal patch of dense, golden setae, a darker subapical band of sparser, coppery brown setae, and an apical row of dense, suberect, silvery setae. Additionally, *T. parahirsutus* is generally larger (body length 8.0–12.0 mm; ITW 1.7–2.5 mm) (Fig. 24A–C) than *T. hirsutus* (body length 5.5–9.0 mm; ITW 1.2–1.7 mm) and in the former the axillae commonly (as opposed to almost never) have reddish tips (Fig. 24B). Although it might not be possible to separate certain males morphologically, *T. parahirsutus* can easily be separated from *T. hirsutus* by geography; the former is known only from Central and South Texas whereas the latter is known only from the Southwestern United States and adjacent Mexico. Additionally, *T. parahirsutus* may be confused with *T. segregatus* due to their similar size and trapezoidal discal patch with an inverted U- or horseshoe-shaped anteromedial projection and as the ranges of both species overlap to some extent, but in *T. segregatus* the mesopleura laterally do not have erect/suberect, simple setae or have only sparse, short (< ¼ MOD), erect/suberect, simple setae in addition to the usual appressed, branched setae.

Etymology

The specific epithet refers to this species' similarity to *T. hirsutus* sp. nov. The Greek prefix 'para-' means 'near'.

Material examined

Primary type material

USA • ♀, holotype; Texas, McAllen Botanical Gardens (McAllen), Hidalgo County; 28 Jul. 1984; C. Porter leg.; FSCA.

Secondary type material

USA – **Texas** • 1 ♀, paratype; Texas; Belfrage leg.; USNM • 1 ♀, paratype; 2 mi S of El Sauz, Starr County; 28 May 1980; Webb and Lisowski leg.; INHS 7838 • 1 ♀, paratype; Dallas; ZMB 21261 • 1 ♂, allotype; same data as for preceding; ZMB 21261 • 1 ♀, paratype; Fedor, Lee County; 18 Sep. 1897; Birkmann leg.; USNM • 1 ♀, paratype; same data as for preceding; 24 Sep. 1897; Birkmann leg.; ZMB • 1 ♀, paratype; Laguna Atascosa National Wildlife Refuge (Island Fields Loop), Cameron County; 26.2231° N, 97.3525° W; 20 Apr. 2017; M. Buck leg.; BOLD sample ID: CMNTO_313; RAM pmae00140925 • 1 ♀, paratype; Laguna Madre; 10 Apr. 1945; D.E. Hardy and V.L. Wooley leg.; USNM • 1 ♀, paratype; McAllen Botanical Gardens (McAllen), Hidalgo County; 16–30 May 1974; C. Porter leg.; FSCA • 1 ♀, paratype; same data as for preceding; 1 Jul. 1983; C. Porter leg.; FSCA.

DNA barcoded material

Available. BIN: BOLD:AEM8829. See type material for specimens examined and sequenced (indicated by unique BOLD sample ID).

Description

Measurements of holotype. Body length 11.6 mm; ITW 2.5 mm; head length 2.7 mm; head width 3.9 mm; fore wing length 8.6 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with apical half golden yellow (entirely dark brown/black in some paratypes). Labrum entirely (partially to entirely dark brown/black in some paratypes), clypeus along lower and lateral margins (entirely dark brown/black in some paratypes), scape, pedicel, F1 entirely and succeeding flagellomeres to some extent, pronotal lobe (entirely dark brown/black in some paratypes), tegula, axilla with tip (entirely dark brown/black in some paratypes), coxae to some extent, trochanters to tarsi (excluding brown meso- and metatibial spurs) entirely, metasomal terga laterally, pygidial plate to some extent (difficult to see in holotype because T6 mostly retracted; described from paratypes), and metasomal sterna to some extent reddish orange. Fore wing membrane subhyaline, apically dusky. Hind wing membrane dusky subhyaline to hyaline.

Pubescence. Face with tomentum densest around antennal socket. Clypeus, upper paraocular and frontal areas, and vertexal area mostly exposed. Pronotal collar with tomentum uniformly pale yellow. Mesoscutum with well-defined paramedian band of pale-yellow tomentum; pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with off-white to pale-yellow, appressed, branched setae; upper half densely setose, except behind pronotal lobe, with setae slightly sparser on hypoepimeral area; ventrolateral half sparsely setose. Mesopleuron with sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to usual appressed, branched setae. Metanotum with tomentum uninterrupted, uniformly pale yellow. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. Metasomal terga with bands of pale-yellow tomentum. T1 with basal and apical transverse bands interrupted medially (former more widely than latter) and subparallel, discal patch trapezoidal. T2–T4 with complete apical transverse bands, those of T2–T3 medially somewhat narrowed and removed from apical margins of terga, that of T2 with pair of basomedially convergent anterolateral extensions. S2–S3 with apical transverse bands of white tomentum.

Surface sculpture. Labrum with punctures nearly contiguous (most $i < 1d$). Clypeus densely punctate (most $i \leq 1d$) but interspaces well defined, shining; with many small punctures among larger ones. Vertexal area somewhat sparsely punctate (some $i > 2d$), especially around ocelli. Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense (most $i \leq 1d$); interspaces well defined, shining. Mesopleuron with punctures in upper half denser ($i \leq 1d$) than in ventrolateral half ($i \leq 3d$); interspaces somewhat dull due to tessellate surface microsculpture; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense ($i \approx 1d$), and evenly distributed; interspaces shining somewhat.

Structure. Labrum with pair of small subapical denticles, each preceded by discrete longitudinal ridge. Pronotal collar somewhat elongate (medial length ~¾ MOD). Mesoscutellum moderately bigibbous. Axilla extending little if at all beyond midlength of mesoscutellum; tip distinctly pointed, but mesally unattached to mesoscutellum for less than ²/₅ medial length of axilla; lateral margin relatively straight. Fore wing with three submarginal cells.

Female

Paramedian band tapering slightly toward but not attaining anterior margin of mesoscutum. T5 with concave apical margin and large patch of pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with underlying integument to some extent reddish orange, with triangular region of posteriorly directed golden to silvery setae (relatively uniform in density) within larger trapezoidal space of posteromedially directed dark brown setae. Pygidial plate apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, with apical fimbria of coppery bristle-like setae.

Male

Paramedian band anteriorly joined to lateral transverse band of equally dense pale-yellow tomentum along anterior margin of mesoscutum. T5–T6 with complete apical transverse bands. Pygidial plate relatively flat and apically rounded, with lateral margin somewhat sinuate. S4–S5 each with apical/subapical fringe of dense, long (>1 MOD), curved setae, those of S4 coppery to silvery, those of S5 coppery and contrasting with apical transverse bands of white tomentum of preceding sterna.

Distribution

Central and South Texas (Fig. 12I).

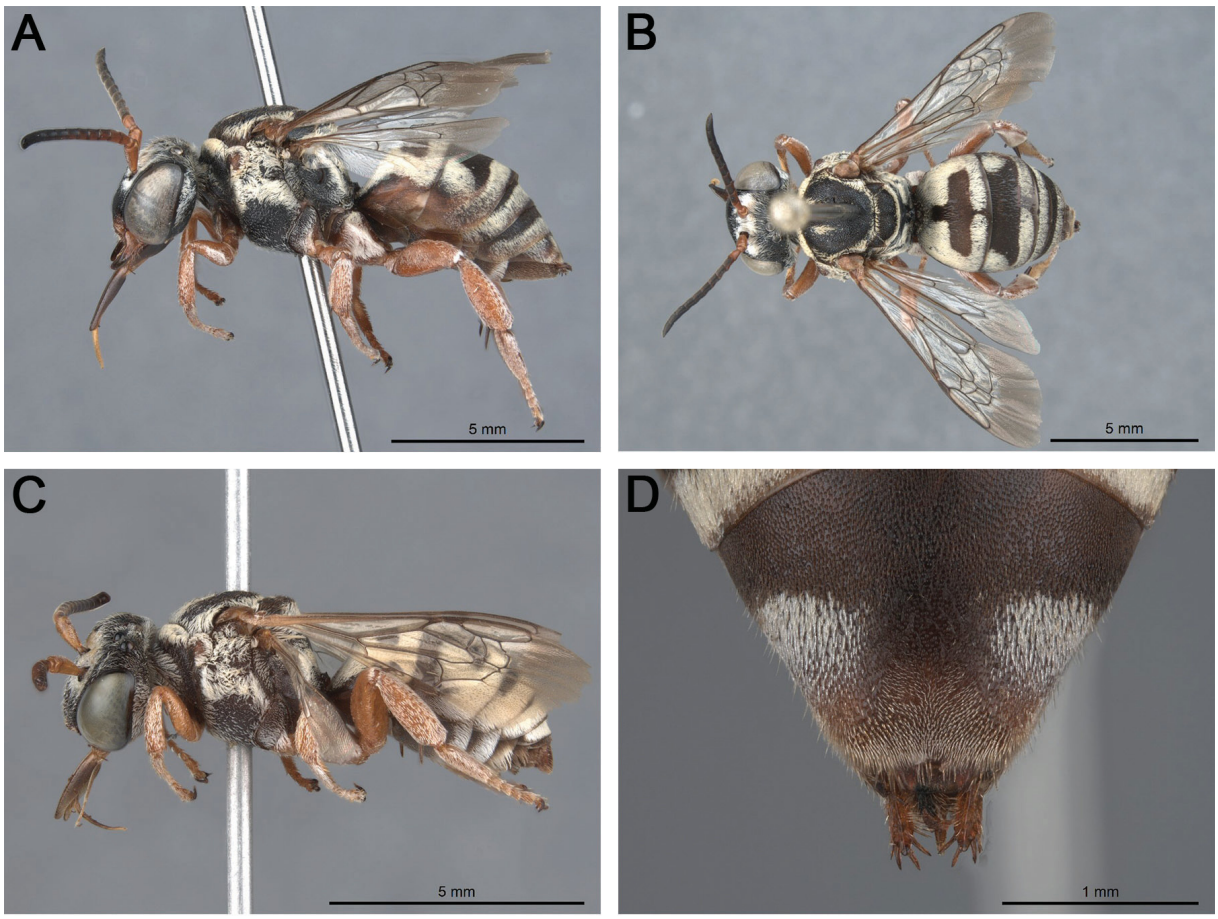

Fig. 24. *Triepeolus parahirsutus* sp. nov. **A**–**B**. Holotype, ♀ (FSCA). **A**. Habitus, lateral view. **B**. Habitus, dorsal view. **C**. Allotype, ♂ (ZMB 21261), habitus, lateral view. **D**. Paratype, ♀ (USNM) pseudopygidial area, dorsal view.

Ecology

Host records

Unknown.

Floral records

Unknown.

Remarks

In addition to the diagnostic morphological features that separate *T. parahirsutus* sp. nov. from similar species, its status as a separate species is supported by a separate BIN and large barcode sequence divergence (5.6%) from its nearest neighbor, *T. hirsutus* sp. nov. (see Supp. file 4).

Triepeolus paucipunctatus sp. nov.
urn:lsid:zoobank.org:act:9B1A5AAE-DA84-497C-8467-623DD1F80D2F
Figs 12J, 18B, 25

Proposed common name

Oaxaca triepeolus.

Diagnosis

The following morphological features in combination tell *T. paucipunctatus* sp. nov. apart from all other *Triepeolus* in the *simplex* species group: the T1 discal patch is crescent-shaped (Fig. 25B) and the ventrolateral halves of the mesopleura are sparsely punctate (some i > 4d) and have sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to the usual appressed, branched setae (Figs 18B, 25A). *Triepeolus paucipunctatus* most closely resembles specimens of *T. alvarengai* that have an apical transverse band on T1, *T. eumeniformis* sp. nov., and *T. segregatus*, but in the latter three species the mesopleura are more densely punctate (i ≤ 3d) and laterally do not have erect/suberect, simple setae or have only sparse, short (< ¼ MOD), erect/suberect, simple setae in addition to the usual appressed, branched setae, and in *T. alvarengai* and *T. eumeniformis* the T2 apical transverse band does not have well-defined basomedially convergent anterolateral extensions.

Etymology

The specific epithet is a compound adjective that combines the Latin ‘pauci’ (meaning ‘few’) and ‘punctatus’ (meaning ‘punctate’) and refers to the sparsely punctate mesopleura.

Material examined

Primary type material

MEXICO • ♀, holotype; Oaxaca, 3 mi W of El Camarón; 5 Aug. 1963; L.A. Stange leg.; UCBME M.G.R. Database No. 1216.

DNA barcoded material

Unavailable.

Description

Measurements of holotype. Body length 8.0 mm; ITW 1.6 mm; head length 2.0 mm; head width 2.9 mm; fore wing length 6.4 mm.

Female

Integument coloration. Dark brown to black except as follows. Mandible with middle quarter in basal half reddish brown. Scape to some extent, pedicel and F1 extensively, tegula, coxae to femora to some

extent, and tibiae (excluding metatibial spurs) and tarsi extensively orange. F2 with orange spot basally. Fore wing membrane dusky subhyaline throughout. Hind wing membrane dusky subhyaline to hyaline. Pseudopygidial area with apical margin and pygidial plate reddish brown.

Pubescence. Face with tomentum densest around antennal socket. Tomentum slightly sparser on clypeus; upper paraocular and frontal areas and vertexal area mostly exposed. Pronotal collar with tomentum uniformly pale yellow. Mesoscutum with well-defined paramedian band of pale-yellow tomentum, tapering slightly toward but not attaining anterior margin; pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with pale-yellow, appressed, branched setae; upper half densely setose, with setae slightly sparser on hypoepimeral area; ventrolateral half nearly bare, except along margins. Mesopleuron with sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to usual appressed, branched setae. Metanotum with tomentum sparser medially, uniformly off-white. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. Metasomal terga with bands of pale-yellow tomentum. T1 with basal transverse band narrowly interrupted medially, arched, and continuous with (and indistinguishable from) lateral longitudinal band; apical transverse band broadened submedially and separated into pair of rounded lobes medially; discal patch crescent-shaped. T2–T4 with complete apical transverse bands, those of T2–T3 medially somewhat narrowed and removed from apical margins of terga, that of T2 with pair of basomedially convergent anterolateral extensions. T5 with large patch of pale-yellow tomentum on each

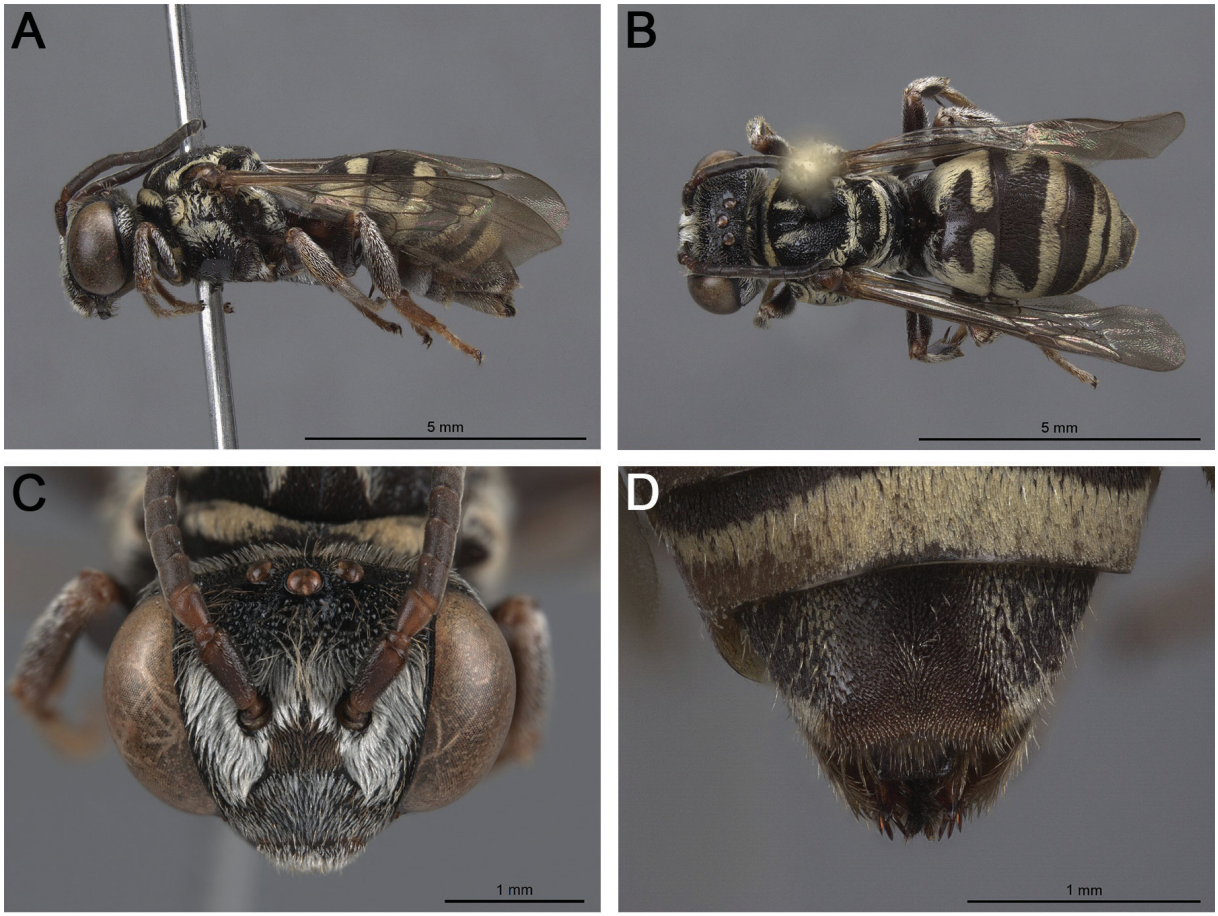

Fig. 25. *Triepeolus paucipunctatus* sp. nov., holotype, ♀ (UCBME M.G.R. Database No. 1216). **A**. Habitus, lateral view. **B**. Habitus, dorsal view. **C**. Head, frontal view. **D**. Pseudopygidial area, dorsal view.

side lateral to pseudopygidial area. Pseudopygidial area with triangular region of posteriorly directed coppery setae within larger trapezoidal space of posteromedially directed silvery setae; apical margin with row of dense, suberect, silvery setae. S2–S4 with apical transverse bands of white tomentum. S5 with apical fimbria of coppery bristle-like setae.

Surface sculpture. Labrum with punctures nearly contiguous (most i < 1d). Clypeus densely punctate (most i ≤ 1d) but interspaces well defined, shining; with many small punctures among larger ones. Vertexal area somewhat sparsely punctate (some i > 2d), especially around ocelli. Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense (most i ≤ 1d); interspaces well defined, shining. Mesopleuron with punctures in upper half much denser (most i ≤ 2d) than in ventrolateral half (some i > 4d); interspaces shining; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense (i = 1–2d), and evenly distributed; interspaces shining.

Structure. Labral apex with pair of very small denticles, each preceded by discrete longitudinal ridge. Pronotal collar somewhat elongate (medial length ~¾ MOD). Mesoscutellum weakly bigibbous. Axilla extending little if at all beyond midlength of mesoscutellum; tip distinctly pointed and hooked (i.e., concave along medial margin), mesally unattached to mesoscutellum for approximately half medial length of axilla; lateral margin somewhat arcuate. Left fore wing with second submarginal crossvein incomplete and thus two submarginal cells, right fore wing with three submarginal cells. T5 with concave apical margin. Pygidial plate apically truncate. S5 straight in lateral view.

Male

Unknown.

Distribution

Presently known only from the type locality in Oaxaca, Mexico (Fig. 12J).

Ecology

Host records

Unknown.

Floral records

Unknown.

Remarks

This species is known and described only from the holotype, despite extensive search efforts for additional exemplars in existing entomological collections. Although it is undesirable to describe new species from limited material, the multiple unusual morphological features exhibited by the specimen clearly set it apart from other members of the *T. simplex* group and thus support its treatment as a separate species.

Triepeolus rhododontus Cockerell, 1921
Figs 9D, 12K, 15D, 26

Triepeolus rhododontus Cockerell, 1921: 5 (♂).
Epeolus lectiformis Cockerell, 1925a: 623 (♀), syn. nov.
Triepeolus lusor Cockerell, 1925a: 625 (♂), syn. nov.
Triepeolus junctus Mitchell, 1962: 471 (♀, ♂), syn. nov.

Triepeolus lectiformis – Brumley 1965: 73.

Proposed common name

Red-spined triepeolus.

Diagnosis

The following morphological features in combination tell *T. rhododontus* apart from all other *Triepeolus* in the *simplex* species group: the mesopleura laterally do not have erect/suberect, simple setae or have only sparse, short (< ¼ MOD), erect/suberect, simple setae in addition to the usual appressed, branched setae (Figs 9D, 26A, C); the trochanters are normal (i.e., not tuberculate) (Fig. 9D); the dorsum of the mesosoma and metasoma have bands of pale-yellow tomentum (Figs 15D, 26); and the T1 discal patch is somewhat narrowed and/or curved posterolaterally and thus allantoid with an inverted U- or horseshoe-shaped anteromedial projection (Figs 15D, 26A–C). *Triepeolus rhododontus* most closely resembles *T. obliteratus* and *T. oblongimacula* sp. nov., but in the latter two species the axillae never (as opposed to commonly; Fig. 26C) have reddish tips, in *T. obliteratus* the dorsum of the mesosoma and metasoma have bands of pale-gray to white/off-white tomentum, the legs are never (as opposed to commonly) entirely reddish orange from trochanters to tarsi, and the pseudopygidial area of the female is never (as opposed to commonly; Fig. 26D) reddish orange, and in *T. oblongimacula* the T1 discal patch is broadly rounded laterally and rod-shaped.

Etymology

The specific epithet was inspired by the holotype's (partially) red axillae, which in the original description were described as "dentiform, curved, [and] acute" (Cockerell 1921). Rhodo- comes from the Greek 'rhódon' (meaning 'rose'), and dontus comes from the Greek 'odṓn' (meaning 'tooth').

Material examined

Primary type material

USA – **Colorado** • ♂, *T. lusor* holotype; Crook; 24 Aug. 1920; G. Sandhouse leg.; USNM 534850 • ♀, *E. lectiformis* holotype; Logan County; 23 Aug. 1923; G. Sandhouse leg.; USNM 534641 • ♂, *T. rhododontus* holotype; Wray (at the head of Dry Willow Creek), Yuma County; 17–19 Aug. 1919; F.E. Lutz leg.; AMNH AMNH_IZC 00323955. – **North Carolina** • ♀, *T. junctus* holotype; Lakeview, Moore County; 23 Sep. 1933; T.B. Mitchell leg.; USNM 534640.

Secondary type material

USA – **Colorado** • 1 ♀, *E. lectiformis* paratype; Logan County; 23 Aug. 1923; G. Sandhouse leg.; CAS M.G.R. Database No. 1438. – **North Carolina** • 1 ♀, *T. junctus* paratype; Burgaw Savannah; 13 Oct. 1954; T.B. Mitchell leg.; NCSU M.G.R. Database No. 595 • 1 ♂, *T. junctus* allotype; Raleigh; Sep. 1921; T.B. Mitchell leg.; USNM U.S.N.M. 45898/M.G.R. Database No. 590.

DNA barcoded material

Available. BIN: BOLD:AAJ8523. Specimens examined and sequenced:

USA – **Colorado** • 1 ♀; Logan County; 40.4894° N, 102.7412° W; 27 Sep. 2013; M. Vandever *et al*. leg.; BOLD sample ID: CMNTO_127; CSUC • 1 ♀; W of Colorado Springs (Hwy 24), El Paso County; 38.8540° N, 104.8820° W; 3 Aug. 2007; J. Gibbs and C.S. Sheffield leg.; BOLD sample ID: CMNTO_021; PCYU PCYU-GS-07:1540. – **Maryland** • 1 ♂; Cove Point, Calvert County; 38.3868° N, 76.3857° W; 7–8 Oct. 2007; L. Shapiro leg.; BOLD sample ID: CCDB-03761 E08; BIML USGS_DRO116873. – **New Mexico** • 1 ♂; 16 km NW of Tucumcari on Hwy 104; 35.2663° N, 103.8480° W; 29 Aug. 2009; C.S. Sheffield, S. Dumesh, and L. Packer leg.; BOLD sample ID: CMNTO_139; PCYU. – **South Carolina** • 1 ♀; Savannah River Site, Aiken County; 33.3758° N, 81.5278° W; 1 Oct. 2018; S. Helmreich leg.; BOLD sample ID: CMNTO_164; WRME SCFS005768.

Non-barcoded material

MEXICO • 2 ♀♀; Chihuahua, 9 mi S of Hidalgo del Parral; 8 Aug. 1967; R.C. Gardner, C.R. Kovacic, and K. Lorenzen leg.; UCBME.

USA – **Arizona** • 1 ♀; 18 mi SW of Apache, Cochise County; 22–23 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀; 8 mi NE of Portal, Cochise County; 23–25 Aug. 1989; J.G. Rozen and R.L. Foster leg.; AMNH • 2 ♀♀; 8 mi S of Moons Park, Coconino County; 12 Sep. 1995; Griswold and Tepedino leg.; BBSL BBSL582183, BBSL582214 • 1 ♀; Avra Valley; 6 Jul. 1955; G. Butler and F. Werner leg.; UAIC. – **Arkansas** • 1 ♀; Eureka Springs (Ouachita Mountains); 6 Sep. 1939; E.C. Van Dyke leg.; CAS • 2 ♀♀; Hot Springs; 1 Oct. 1939; E.C. Van Dyke leg.; CAS • 1 ♀; Knob Hill Rst (Ouachita Mountains); 1 Sep. 1939; E.C. Van Dyke leg.; CAS. – **Colorado** • 1 ♀; Boulder County; 6 Sep. 1926; C.H. Hicks leg.; UCMC • 1 ♀; same data as for preceding; 6 Sep. 1926; C.P. Custer leg.; UCMC • 1 ♀; Boulder, Boulder County; 21 Sep. 1932; H.W. Campbell leg.; UCMC • 1 ♀; same data as for preceding; 5 Sep. 1976; P. Robinson leg.; UCMC • 2 ♀♀; Owens Lake (Boulder); 8 Sep. 1932; C.H. Hicks leg.; UCMC • 1 ♀; Upper Queen Reservoir, Kiowa County; 13 Sep. 1997; D. Leatherman leg.; CSUC. – **Florida** • 1 ♂; St. Andrews State Park, Panama City, Bay County; 14 Oct. 2000; C. Porter and L. Stange leg.; FSCA. – **Georgia** • 1 ♀; Tifton; ANSP. – **Illinois** • 1 ♂; 3.5 mi N of Oquawka, Henderson County; 24 Aug. 1983; E. Miliczky leg.; INHS 7843. – **Minnesota** • 1 ♂ (studied from images); Altona State Wildlife Management Area, Pipestone County; 44.1928° N, 96.3214° W; "8/6/2019"; D. Drons leg.; MNDNR MNDNR180590 • 2 ♀♀; Rochester; 30 Aug. 1956; G.E. Bohart leg.; BBSL BBSL522481, BBSL522624 • 1 ♀ (studied from images); Zumbra Heights, Carver County; 31 Aug. 1929; E.C. Alfonsus leg.; UMSP UMSP146916. – **Mississippi** • 1 ♀; West Point; 16 Sep. 1904; F.C. Bishopp leg.; USNM M.G.R. Database No. 1373 • 2 ♂♂; same data as for preceding; 16 Sep. 1904; F.C. Bishopp leg.; USNM M.G.R. Database Nos 1371, 1372. – **Missouri** • 4 ♀♀; Branson; 15 Sep. 1939; E.C. Van Dyke leg.; CAS • 2 ♀♀; same data as for preceding; 16 Sep. 1939; E.C. Van Dyke leg.; CAS • 1 ♀; Columbia, Boone County; 1 Sep. 1966; F.D. Parker leg.; UCBME M.G.R. Database No. 1390 • 1 ♀; same data as for preceding; 25 Sep. 1966; F.D. Parker leg.; UCBME M.G.R. Database No. 1378. – **New Mexico** • 2 ♂♂; 16 km NW of Tucumcari on Hwy 104; 35.2663° N, 103.8480° W; 29 Aug. 2009; C.S. Sheffield, S. Dumesh, and L. Packer leg.; PCYU• 1 ♀; 26 mi S of Animas, Hidalgo County; 20 Aug. 1986; R.J. McGinley and B.M. Norden leg.; USNM • 1 ♀; Las Cruces; 30 Aug.; Townsend leg.; USNM • 1 ♀; same data as for preceding; Aug. ??27; Townsend leg.; USNM • 1 ♀; Las Vegas, San Miguel County; 35.6176° N, 105.2074° W; 30 Aug. 2007; J. Gibbs and C.S. Sheffield leg.; PCYU PYU-3394 • 1 ♀; St. Vrain, Curry County; 3 Oct. 1965; BBSL. – **New York** • 1 ♀; Long Island; "09"; G. Salt leg.; NHMUK B.M.1931-343 • 1 ♂; Napeague (Long Island); 2 Jul. 1954; R. Latham leg.; USNM M.G.R. Database No. 1370. – **North Carolina** • 3 ♂♂; Black Mountains; AMNH Ac. 33827/M.G.R. Database Nos 1379 to 1381 • 1 ♀; Moore County; 8 Oct. 1964; B.S. Heming leg.; DEBU debu01089134. – **Oklahoma** • 1 ♂; Songbird Park (Norman), Cleveland County; 35.1700° N, 97.4200° W; 5 Sep. 2022; K.L.J. Hung leg.; OKBS OKBS.POL.5883. – **South Carolina** • 1 ♀; Columbia; 18 Sep. 1951; L. and G. Townes leg.; CAS M.G.R. Database No. 597. – **Tennessee** • 1 ♀; Memphis; 9 Sep. 1920; "Ex Coll. M.A. Cazier"; AMNH M.G.R. Database No. 1382. – **Texas** • 1 ♂; El Paso, El Paso County; 11 Jul. 1917; G. Salt leg.; NHMUK • 1 ♀; Lajitas, Brewster County; 2 Oct. 1960; J.E. Gillaspy leg.; CAS.

Redescription

Measurements of holotype. Body length 8.7 mm; ITW 1.9 mm; head length 2.3 mm; head width 3.3 mm; fore wing length 7.1 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with apical two-fifths golden yellow. Mandible with basal three-fifths (except for extreme base); labrum to some extent (except basomedially); scape, pedicel, and F1 to some extent (entirely dark brown/black in some non-type specimens); pronotal lobe (entirely black in *T. junctus* holotype and paratype and multiple non-type

specimens); tegula; axilla with tip (entirely black in *E. lectiformis* holotype, *T. junctus* holotype and paratype, and multiple non-type specimens); coxae to some extent; trochanters to tibiae (excluding brown meso- and metatibial spurs) partially to entirely; tarsi entirely; metasomal terga laterally (entirely dark brown/black in *T. junctus* holotype and paratype and multiple non-type specimens); pygidial plate to some extent; and metasomal sterna to some extent (entirely dark brown/black in some non-type specimens) orange. F2 with orange spot basally (entirely dark brown in some non-type specimens). Fore wing membrane dusky subhyaline throughout. Hind wing membrane dusky subhyaline to hyaline.

Pubescence. Face with tomentum densest around antennal socket. Clypeus, upper paraocular and frontal areas, and vertexal area mostly exposed. Pronotal collar with tomentum uniformly pale yellow. Mesoscutum with well-defined paramedian band of pale-yellow tomentum; pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with off-white to pale-yellow, appressed, branched setae; upper half densely setose, except behind pronotal lobe, with setae slightly sparser on hypoepimeral area; ventrolateral half nearly bare, except along margins. Metanotum with tomentum uninterrupted, uniformly pale yellow. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. Metasomal terga with bands of pale-yellow tomentum. T1 with basal and apical transverse bands interrupted medially (former more widely than latter) (T1 with apical transverse band narrowed medially in *T. junctus* holotype and allotype and multiple non-type specimens) and subparallel,

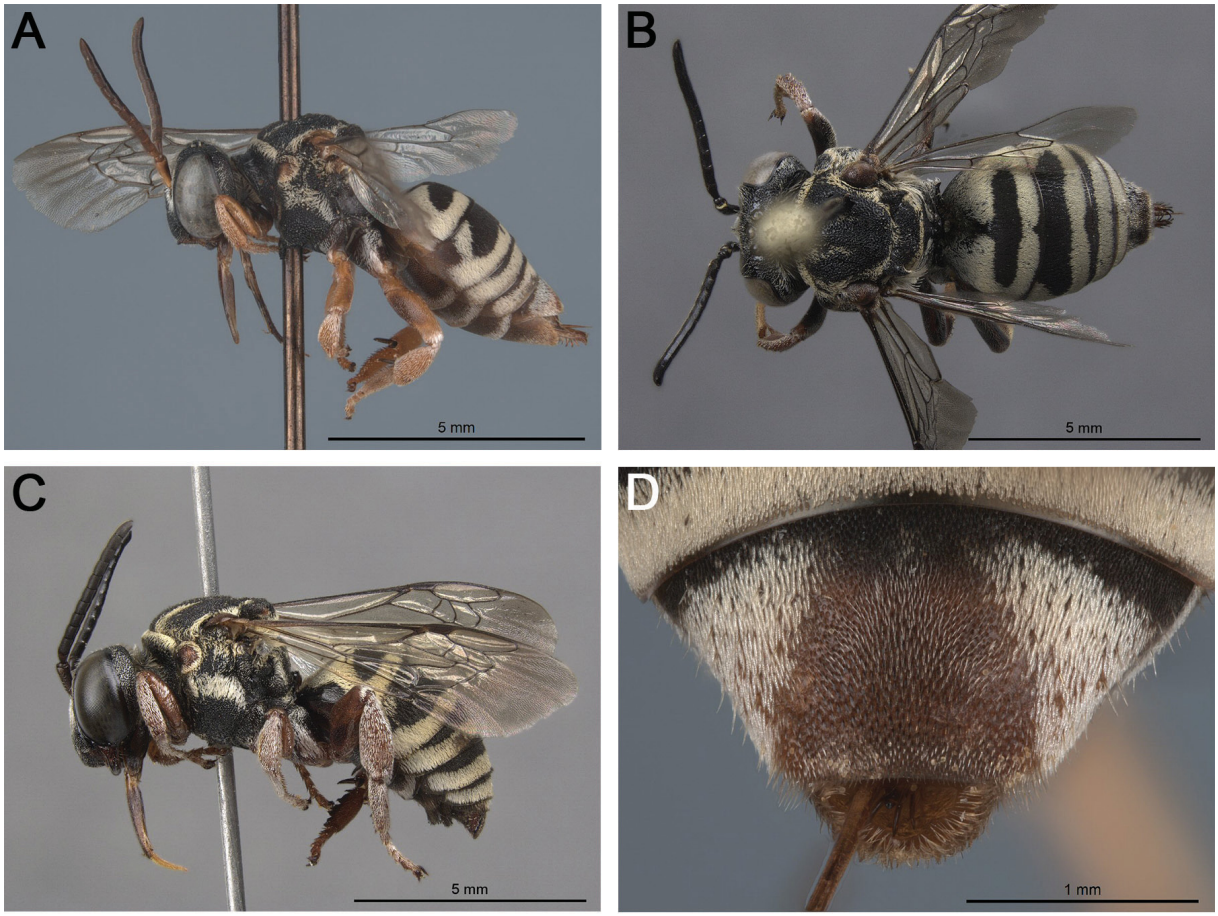

Fig. 26. *Triepeolus rhododontus* Cockerell, 1921. **A**. *Epeolus lectiformis* Cockerell, 1925 paratype, ♀ (CAS M.G.R. Database No. 1438) (herein synonymized under *T. rhododontus*), habitus, lateral view. **B**. Female (BOLD sample ID: CMNTO_164; WRME SCFS005768), habitus, dorsal view. **C**. Male (PCYU), habitus, lateral view. **D**. Female (AMNH) pseudopygidial area, dorsal view.

discal patch transversely oblong (verging on widely trapezoidal in *T. rhododontus* holotype). T2–T4 with apical transverse bands complete and medially somewhat removed from apical margins of terga, that of T2 with pair of basomedially convergent anterolateral extensions. S2–S3 with medially interrupted apical transverse bands of white tomentum.

Surface sculpture. Labrum coarsely and densely (most i < 1d) rugose-punctate. Clypeus densely punctate (most i < 1d) but interspaces well defined, shining. Vertexal area somewhat sparsely punctate (some i > 2d), especially around ocelli. Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense and nearly contiguous (most i < 1d) (interspaces well defined, shining in *E. lectiformis* holotype, *T. lusor* holotype, *T. junctus* holotype and paratype, and multiple non-type specimens). Mesopleuron with punctures in upper half nearly contiguous and denser (i < 1d) than in ventrolateral half (i ≤ 2d); interspaces somewhat dull due to tessellate surface microsculpture where punctures not contiguous; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense (i ≈ 1d), and evenly distributed; interspaces somewhat dull due to tessellate surface microsculpture.

Structure. Labrum with pair of small subapical denticles, each preceded by longitudinal carina. Pronotal collar somewhat elongate (medial length ~4/5 MOD). Mesoscutellum moderately bigibbous. Axilla extending well beyond midlength of mesoscutellum but not as far back as its posterior margin; tip distinctly pointed and hooked (i.e., concave along medial margin), mesally unattached to mesoscutellum for approximately half medial length of axilla; lateral margin somewhat arcuate. Fore wing with three submarginal cells.

Female

T5 with concave apical margin and large patch of pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with underlying integument extensively orange in *E. lectiformis* holotype and multiple non-type specimens, with triangular region of posteriorly directed setae with three subregions (basal patch of dense, golden setae; darker subapical band of sparser, coppery brown setae; and apical row of dense, suberect, silvery setae) within larger trapezoidal space of posteromedially directed dark brown setae. Pygidial plate apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, with apical fimbria of coppery bristle-like setae.

Male

Paramedian band anteriorly joined to lateral transverse band of equally dense pale-yellow tomentum along anterior margin of mesoscutum in *T. rhododontus* holotype, *T. lusor* holotype, *T. junctus* allotype, and multiple non-type specimens. T5–T6 with complete apical transverse bands. Pygidial plate relatively flat and apically rounded, with lateral margin somewhat sinuate. S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved, coppery brown setae, contrasting with apical transverse bands of white tomentum of preceding sterna.

Distribution

Eastern United States to northern Mexico (Fig. 12K).

Ecology

Host records

Unknown.

Floral records

Labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Asteraceae, *Grindelia* sp. or spp., *Haplopappus* sp., *Helenium* sp., *Pityopsis graminifolia* (Michx.) Nutt., *Solidago canadensis* L., and *S. velutina* DC.; and in Convolvulaceae, *Cuscuta cuspidata* Engelm. and *C. indecora* Choisy.

Remarks

In the original description of *Epeolus lectiformis*, Cockerell (1925a) did not mention *T. rhododontus*, having misidentified the two female representatives as an *Epeolus*, and stated that "[f]rom Cresson's description [he] should hesitate to separate this [species] from *E. lectus* [Cresson, 1878]"; however, he opted to describe it as a separate species because in *E. lectus* the spurs are not black and the metasoma exhibits features that are quite distinctive. In the same publication, Cockerell (1925a) also described *T. lusor*, comparing the (male) holotype with *T. schwarzi* Cockerell, 1921, *T. cressonii* (Robertson, 1897), and *T. pectoralis*, all of which are visibly different bees and none of which belong to the *simplex* species group. Curiously, he did not compare the specimen to the holotype of *T. rhododontus*, to which it is most similar.

Based on specimens from the Eastern United States, Mitchell (1962) described this species under the name *T. junctus*. Neither *T. rhododontus*, *E. lectiformis*, nor *T. lusor*, whose type localities are all in Colorado, were mentioned in the original description of *T. junctus*. Except for its slightly larger size, the (female) holotype of *T. junctus* looks very much like that of *E. lectiformis*, and in both specimens the axillae are entirely black whereas in the (male) holotypes of *T. rhododontus* and *T. lusor* the axillae are to some extent reddish orange (more so in that of *T. rhododontus*). Barcode sequences of specimens with entirely black axillae (from Maryland and South Carolina) and axillae with reddish tips (from Colorado and New Mexico) were assigned the same BIN, exhibiting 99.2–100.0% similarity.

As there are no discernable morphological differences among the holotypes of *T. rhododontus*, *E. lectiformis*, *T. lusor*, and *T. junctus* that fall outside the range of variation observed among both barcoded and non-barcoded specimens, *E. lectiformis*, *T. lusor*, and *T. junctus* are herein synonymized under *T. rhododontus*.

Romankova (2004) reported *T. junctus* from Ontario and Canada based on a single male specimen deposited in the CNC, which was examined by the first author of the present study and determined to have been misidentified. The specimen (CNC 428319) is undoubtedly *E. pusillus* Cresson, 1864, and no actual representatives of *T. rhododontus* from Canada are known at this time.

Triepeolus roni Genaro, 1999
Figs 5B, 11A, 12L, 27

Triepeolus roni Genaro, 1999: 219 (♀, ♂), figs 1c, 2b, 3c.

Proposed common name

Ron's triepeolus.

Diagnosis

Unique to *T. roni* within the genus are the basal arched ridge overhanging the impressed apicomedial region of the pseudopygidial area of the female, which (as in all species in the *T. simplex* group) is triangular, with the apical margin of T5 concave, and glabrous midline extending from it to the apical margin of the tergum, which is suggestive of the cleft pseudopygidial area of *Rhogepeolus* Moure, 1955 (Hymenoptera: Apidae: Nomadinae) (Fig. 27D). Otherwise, the following morphological features in combination tell both sexes of *T. roni* apart from all other species of *Triepeolus*: the clypeus does not have a glabrous midline (Supp. file 2: Fig. S19C); the axillae are large, each with the tip extending well beyond the midlength of the mesoscutellum and the free portion distinctly pointed, hooked (i.e., concave along the medial margin), and mesally unattached to the mesoscutellum for approximately half the medial length of the axilla (Fig. 5B); the T1 discal patch is trapezoidal with a semicircular anteromedial projection (Figs 11A, 27B); and the T1 apical transverse band is conspicuously narrowed sublaterally,

at the posterior corners of the discal patch (Figs 11A, 27B). Males of *T. roni* are very similar in overall appearance to those of *T. nisibonensis* Genaro, 2001, a Hispaniolan (as opposed to Bahamian and Cuban) species (outside of the *simplex* species group), but both sexes of *T. roni* can easily be separated from *T. nisibonensis* on the basis of the vertexal area, which in the latter is uniquely notched posteromedially, as well as by geography.

Etymology

The specific epithet (declined in the genitive case) honors the late Dr Ronald (Ron) J. McGinley, a friend and colleague of the taxonomic authority, in recognition of his contributions to the knowledge of bee biodiversity, conservation, and collections management (Genaro 1999).

Material examined

Primary type material

CUBA • ♀, holotype (studied from images); Mayabeque, La Fosforita, Loma de Candela, Güines; 28 Dec. 1992; J.A. Genaro leg.; MNHNCU.

Secondary type material

CUBA – **Mayabeque** • 1 ♀, paratype; same data as for holotype; KUNHM M.G.R. Database No. 3713 • 1 ♀, paratype (studied from image); same data as for holotype; MNHNCU. – **Sancti Spíritus** • 1 ♀, paratype (studied from image); Punta Caguanes, Yaguajay; 16 Jul. 1996; J.A. Genaro leg.; MNHNCU. – **Santiago de Cuba** • 1 ♂, allotype (studied from image), 1 ♀, paratype (studied from image); Cuabitas; Oct. 1949; P. Alayo leg.; MNHNCU.

DNA barcoded material

Available. BIN: BOLD:AFI6376. Specimens examined and sequenced:

CUBA • 1 ♂ (studied from image); Pinar del Río, San Diego de los Baños, Los Palacios; 16 Sep. 2022; D. Breto leg.; BOLD sample ID: CCDB-14520-D12; MHNTSN.

Non-barcoded material

BAHAMAS – **Central Abaco** • 1 ♀; Marsh Harbour (Great Abaco Island); 30 Apr. 1993; T.W. Schoener leg.; UCBME. – **Mangrove Cay** • 1 ♀; Mangrove Cay (Andros Island); 26 Apr. 1953; E.B. Hayden leg.; AMNH M.G.R. Database No. 1307. – **San Salvador** • 1 ♂; San Salvador Island; 6 Jun. 1978; P. Salbert leg.; USNM M.G.R. Database No. 5922.

Redescription

Measurements of holotype. Body length 8.8 mm; ITW 2.1 mm; head length 2.2 mm; head width 3.1 mm; fore wing length 6.9 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with apical third golden yellow. Mandible with basal two-thirds; labrum along apical and lateral margins; scape, pedicel, and F1 predominantly and succeeding flagellomeres to some extent; tegula; coxae to some extent; trochanters entirely; femora predominantly to entirely; and tibiae (excluding brown meso- and metatibial spurs) and tarsi entirely orange. Fore wing membrane dusky subhyaline throughout, slightly darker beyond venation. Hind wing membrane dusky subhyaline to hyaline. Metasomal terga laterally, pygidial plate to some extent, and metasomal sterna to some extent reddish brown.

Pubescence. Face with tomentum densest around antennal socket. Clypeus, upper paraocular and frontal areas, and vertexal area mostly exposed. Pronotal collar with tomentum uniformly bright yellow (off-white in some non-type specimens). Mesoscutum with well-defined paramedian band of off-white

to yellow tomentum (attaining anterior margin in holotype, allotype, and paratypes; tapering slightly toward but not attaining anterior margin in some non-type specimens); pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with dark brown/gray, appressed, branched setae ventromedially and off-white to pale-yellow, appressed, branched setae elsewhere; densely setose except for two sparsely setose circular patches (one beneath base of fore wing (hypoepimeral area) and larger one occupying much of ventrolateral half of mesopleuron). Metanotum with tomentum uninterrupted, uniformly pale yellow (off-white in some non-type specimens). Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. Metasomal terga with bands of white/off-white to yellow tomentum. T1 with basal and apical transverse bands subparallel and discal patch trapezoidal with semicircular anteromedial projection. T1–T4 with apical transverse bands medially somewhat removed from apical margins of terga, those of T1–T2 separated into pairs of rounded lobes medially, that of T1 narrowed sublaterally mesad lateral longitudinal band (at posterior corner of discal patch), that of T2 with pair of basomedially convergent anterolateral extensions, those of T3–T4 complete or tapering until separated medially. S2–S3 with apical transverse bands of white tomentum.

Surface sculpture. Labrum coarsely and densely (most i < 1d) rugose-punctate. Clypeus densely punctate (most i ≤ 1d) but interspaces well defined, shining; with many small punctures among larger ones. Vertexal area somewhat sparsely punctate (some i > 2d) anteriorly and around ocelli, otherwise densely (most i < 1d) rugose-punctate. Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense and nearly contiguous (most i < 1d). Mesopleuron with punctures in upper half nearly

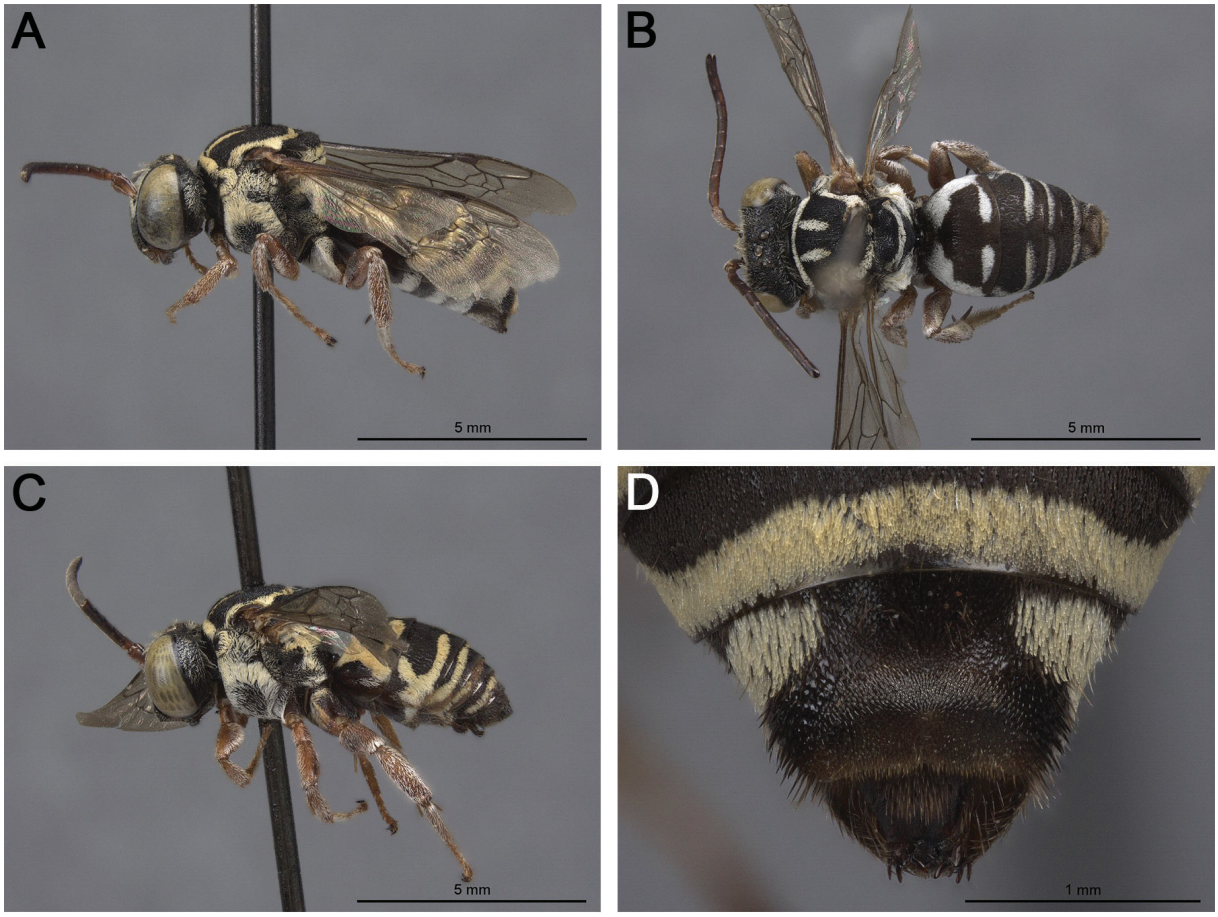

Fig. 27. *Triepeolus roni* Genaro, 1999. **A**, **D**. Paratype, ♀ (KUNHM M.G.R. Database No. 3713). **A**. Habitus, lateral view. **B**. Female (AMNH M.G.R. Database No. 1307), habitus, dorsal view. **C**. Male (USNM M.G.R. Database No. 5922), habitus, lateral view. **D**. Pseudopygidial area, dorsal view.

contiguous but not much denser (i < 1d) than in ventrolateral half (most i ≤ 1d); interspaces shining where punctures not contiguous; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense (i ≈ 1d), and evenly distributed; interspaces shining somewhat.

Structure. Labrum with pair of small subapical denticles, each preceded by discrete longitudinal ridge. Pronotal collar short (medial length ~ ½ MOD). Mesoscutellum strongly bigibbous. Axilla extending well beyond midlength of mesoscutellum but not as far back as its posterior margin; tip distinctly pointed and hooked (i.e., concave along medial margin), mesally unattached to mesoscutellum for approximately half medial length of axilla; lateral margin somewhat arcuate. Fore wing with three submarginal cells.

Female

T5 with concave apical margin and large patch of pale-yellow to white/off-white tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with underlying integument reddish brown in part, forming rounded triangle with concave sides, with brown erect/suberect setae basally and brown spinelike setae laterally, with basal arched ridge overhanging impressed apicomedial region with ill-defined glabrous midline. Pygidial plate apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, with apical fimbria of brown bristle-like setae and dark brown tomentum laterally and apicomedially; S5 otherwise covered in off-white tomentum (S5 uniformly covered in brown tomentum in some non-type specimens).

Male

T5 with complete apical transverse band of bright to pale-yellow tomentum. T6 with small posteromedial patch of pale-yellow tomentum. Pygidial plate apically rounded and slightly downturned, with lateral margin somewhat sinuate. S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved, predominantly coppery brown setae, contrasting with apical transverse bands of white tomentum of preceding sterna, those of S4 coppery to silvery laterally.

Distribution

The Bahamas and Cuba (Fig. 12L). This is the only species in the *T. simplex* group known to occur in the West Indies.

Ecology

Host records

Unknown.

Floral records

Unknown.

Remarks

In some specimens from the Bahamas, the dorsum of the mesosoma and metasoma have bands of white/off-white (as opposed to yellow) tomentum.

Triepeolus saturninus Cockerell & Sandhouse, 1924
Figs 12M, 18C, 28

Triepeolus saturninus Cockerell & Sandhouse, 1924: 312 (♂).

Proposed common name

Saturnine triepeolus.

Diagnosis

The following morphological features in combination tell *T. saturninus* apart from all other *Triepeolus* in the *simplex* species group: the mesopleura have sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to the usual appressed, branched setae (Figs 18C, 28A, C); the legs are extensively dark brown/black from coxae to femora (Figs 18C, 28A–C); and the T1 discal patch is trapezoidal (Fig. 28B). *Triepeolus saturninus* most closely resembles *T. hirsutus* sp. nov. and *T. parahirsutus* sp. nov., and in all three species the mesopleura have sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to the usual appressed, branched setae; the T1 basal band is rather abruptly interrupted medially; and the T1 discal patch is quadrangular, but in *T. hirsutus* and *T. parahirsutus* the legs are entirely reddish orange from trochanters to tarsi and the underlying integument of the pseudopygidial area of the female ranges from entirely dark brown/black to predominantly reddish orange whereas in *T. saturninus* it is entirely dark brown/black (Fig. 28D). Additionally, *T. saturninus* may be confused with *T. segregatus* or *T. shoshone* sp. nov. as the ranges of the three species overlap to some extent, but in the latter two species the legs are predominantly to entirely reddish orange from trochanters to tarsi, in *T. segregatus* the mesopleura laterally do not have erect/suberect, simple setae or have only sparse, short (< ¼ MOD), erect/suberect, simple setae in addition to the usual appressed, branched setae, and in *T. shoshone* the T1 basal band forms an inflexed arch and is thus gradually narrowed but not completely interrupted medially, such that the discal patch has a short, narrowed (i.e., inverted V-shaped) anteromedial projection.

Etymology

The specific epithet was inspired by the shape of the area of black tomentum on T1 (discal patch), which in the original description was said to suggest "the planet Saturn with its rings, only the rings much broader" (Cockerell & Sandhouse 1924).

Material examined

Primary type material

USA • ♂, holotype; California, Millbrae, San Mateo County; 1 Sep. 1912; E.C. Van Dyke leg.; CAS 1605.

DNA barcoded material

Unavailable.

Non-barcoded material

USA – **California** • 1 ♀; Etna, Siskiyou County; 6 Aug. 1978; B. Villegas leg.; UCBME • 1 ♀; Lower Klamath Lake, Siskiyou County; 14 Aug. 1963; J. Schuh leg.; FSCA • 1 ♀; same data as for preceding; 17 Aug. 1963; J. Schuh leg.; FSCA • 1 ♀; Santa Cruz Island (wash N of research station), Santa Barbara County; 22 Oct. 1990; R.W. Thorp leg.; UCBME • 1 ♀; Sunol Regional Wilderness (15 mi E of Fremont), Alameda County; 24 May 1987; S. Geohegan leg.; USNM. – **Idaho** • 1 ♀; 3 mi NW of Carey, Blaine County; 8 Aug. 1967; D.S. Horning, Jr. leg.; UCBME. – **Oregon** • 1 ♀; 6 mi W of Bly, Klamath County; 18 Aug. 1955; W.P. Stephen leg.; OSAC • 1 ♀; ca 5 mi SE of Culver, Jefferson County; 19 Aug. 1984; Schauff and Grissell leg.; USNM • 1 ♀; Dairy, Klamath County; 4 Sep. 1962; J. Schuh leg.; FSCA • 1 ♀; Modoc Point, Klamath County; 14 Aug. 1963; J. Schuh leg.; FSCA • 1 ♀; S of Chiloquin, Klamath County; 13 Aug. 1973; H.V. Weems, Jr. leg.; FSCA. – **Utah** • 1 ♀; High Creek, Cache County; 15 Aug. 1974; Knowlton and Cazier leg.; BBSL BBSL Faunal Survey No. 000 077 713. – **Washington** • 1 ♀; Yakima River Canyon (Hwy 281); 14 Sep. 1990; E. Miliczky leg.; ERM.

Non-preserved material

USA • 1 ♀; Washington, Richland, Benton County; 46.3097° N, 119.2622° W; 1 Sep. 2023; "janeabel" obs.; iNaturalist record #185099704.

Redescription

Measurements of holotype. Body length 9.3 mm; ITW 1.9 mm; head length 2.3 mm; head width 3.1 mm; fore wing length 7.5 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with apical half golden yellow and middle quarter in basal half reddish orange. Antenna (except for orange spot basally on F2) dark brown in holotype; scape, pedicel, and F1 extensively orange in some non-type specimens. Tegula, coxae to femora to some extent, and tibiae (excluding metatibial spurs) and tarsi entirely orange. Fore wing membrane dusky subhyaline throughout. Hind wing membrane dusky subhyaline to hyaline.

Pubescence. Face with tomentum densest around antennal socket. Tomentum slightly sparser on clypeus; upper paraocular and frontal areas and vertexal area mostly exposed. Pronotal collar with tomentum uniformly pale yellow. Mesoscutum with well-defined paramedian band of pale-yellow tomentum; pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with off-white to pale-yellow, appressed, branched setae; densely setose except for two sparsely setose circular patches (one beneath base of fore wing (hypoepimeral area) and slightly larger one in ventrolateral half of mesopleuron). Mesopleuron with sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to usual appressed, branched setae. Metanotum with tomentum uninterrupted, uniformly pale yellow. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. Metasomal terga with bands of pale-yellow tomentum. T1 with basal and apical transverse bands interrupted medially (former more widely than latter) and subparallel, discal patch trapezoidal. T2–T4 with complete apical transverse bands, that of T2 somewhat narrowed medially and with pair of basomedially convergent anterolateral extensions. S2–S3 with apical transverse bands of white tomentum.

Surface sculpture. Labrum coarsely rugose-punctate, with larger punctures than clypeus, but punctures of both equally dense (most $i < 1d$). Clypeus with glabrous midline incomplete and very short, extending from upper margin down to $<⅓$ length of clypeus. Vertexal area densely punctate (most $i \leq 1d$). Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense (most $i \leq 1d$); interspaces well defined, shining. Mesopleuron with punctures in upper half nearly contiguous but not much denser ($i < 1d$) than in ventrolateral half (most $i \leq 1d$); interspaces shining where punctures not contiguous; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense ($i \approx 1d$), and evenly distributed; interspaces shining somewhat.

Structure. Labrum with pair of small subapical denticles, each preceded by discrete longitudinal ridge. Pronotal collar somewhat elongate (medial length ~⅘ MOD). Mesoscutellum weakly bigibbous. Axilla extending little if at all beyond midlength of mesoscutellum; tip distinctly pointed, but mesally unattached to mesoscutellum for less than ⅖ medial length of axilla; lateral margin relatively straight. Fore wing with three submarginal cells.

Female

Paramedian band tapering slightly toward but not attaining anterior margin of mesoscutum. Mesopleuron with black, appressed, branched setae in sparsely setose circular patch in ventrolateral half of mesopleuron. T5 with concave apical margin and large patch of pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with triangular region of posteriorly directed coppery to silvery setae within larger trapezoidal space of posteriorly directed dark brown setae; apical margin with row of dense, suberect, silvery setae. Pygidial plate reddish brown in part and apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, with apical fimbria of coppery bristle-like setae.

Male

Paramedian band anteriorly joined to lateral transverse band of equally dense pale-yellow tomentum along anterior margin of mesoscutum. T5–T6 with complete apical transverse bands. Pygidial plate with small orange spot subapically, relatively flat and apically rounded. S4–S5 each with apical/subapical fringe of dense, long (> 1 MOD), curved setae, those of S4 coppery to silvery, those of S5 coppery and contrasting with apical transverse bands of white tomentum of preceding sterna.

Distribution

United States west of the Rocky Mountains (Fig. 12M).

Ecology

Host records

Unknown.

Floral records

Labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Asteraceae, *Chrysothamnus* sp. or spp., *Grindelia* sp., *Machaeranthera canescens* (Pursh) A.Gray, and *Senecio flaccidus* var. *douglasii* (DC.) B.L.Turner & T.M.Barkley; and in Fabaceae, *Melilotus* sp.

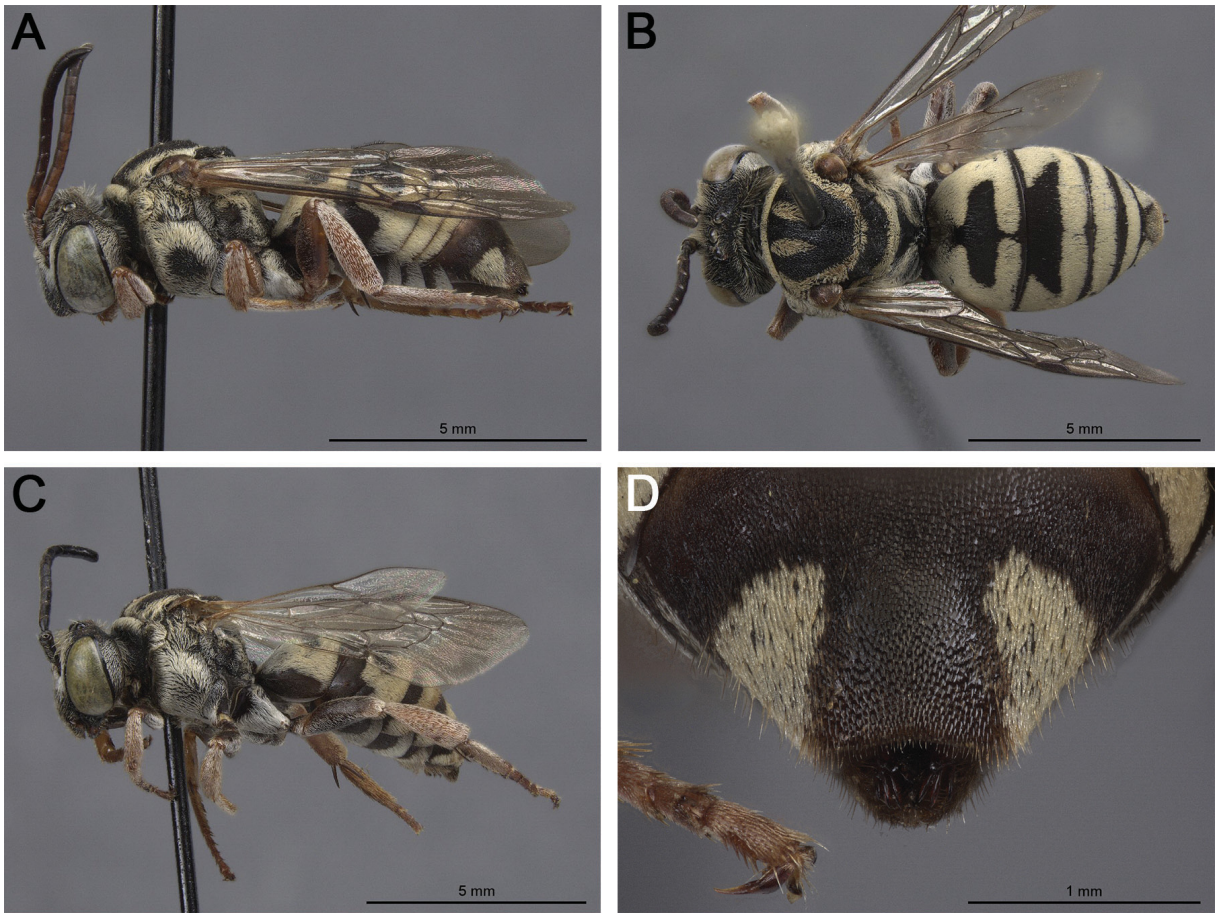

Fig. 28. *Triepeolus saturninus* Cockerell & Sandhouse, 1924. **A**, **D**. Female (USNM). **A**. Habitus, lateral view. **B**. Female (USNM), habitus, dorsal view. **C**. Holotype, ♂ (CAS 1605), habitus, lateral view. **D**. Pseudopygidial area, dorsal view.

Remarks

In the holotype of this species, the discal patch has a Saturn-like shape and thus resembles that of *T. joliae* Rightmyer, 2008 and, to a lesser extent, some specimens of *T. californicus* (Cresson, 1878). The description of the female of *T. saturninus* is published here for the first time. Based on known records, adults of *T. saturninus* are most active from August to September.

Triepeolus segregatus (Cockerell, 1900)
Figs 12N, 15E, 20B, 29

Epeolus occidentalis var. *segregatus* Cockerell, 1900: 361 (♀, ♂).
Epeolus permixtus Cockerell, 1923: 94 (♀, ♂), syn. nov.
Triepeolus brunnescens Cockerell & Sandhouse, 1924: 313 (♂), syn. nov.
Triepeolus pacis Cockerell, 1925b: 201 (♂), syn. nov.
Epeolus sarothrinus Cockerell, 1929: 103 (♀, ♂), syn. nov.
Epeolus sarothrinus var. *confluens* Cockerell, 1929: 103 (♂), syn. nov.

Triepeolus segregatus – Cockerell 1904: 38; 1907: 63 (redescription).
Doeringiella (*Triepeolus*) *sarothrinus* – Vergara & Ayala 2002: 24 (in regional checklist).

Proposed common name

Segregated triepeolus.

Diagnosis

The following morphological features in combination tell *T. segregatus* apart from all other *Triepeolus* in the *simplex* species group: the axillae do not have pale pubescence all along their margins and are small to intermediate in size, each with the tip extending little if at all beyond the midlength of the mesoscutellum and the free portion distinctly pointed but mesally unattached to the mesoscutellum for less than 2/5 the medial length of the axilla (Figs 20B, 29B); the mesopleura laterally do not have erect/suberect, simple setae or have only sparse, short (<¼ MOD), erect/suberect, simple setae in addition to the usual appressed, branched setae (Fig. 29A, C); the T1 discal patch is trapezoidal with an inverted U- or horseshoe-shaped anteromedial projection, with the basal band so deeply invaginated that it appears to be completely interrupted medially in dorsal view (Figs 15E, 29B); and the T2 apical transverse band has a pair of well-defined basomedially convergent anterolateral extensions (Figs 15E, 29A–C). Specimens from Texas and adjacent Mexico may be confused with *T. parahirsutus* sp. nov. and specimens from California with *T. saturninus* due to their similar size and trapezoidal discal patch with an inverted U- or horseshoe-shaped anteromedial projection, but in the two similar-looking species the mesopleura have sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to the usual appressed, branched setae.

Etymology

The specific epithet is a Latin adjective meaning ‘set apart’, presumably in reference to Cockerell’s (1900) recognition of the holotype as a separate variety that “[d]iffers from typical [*E.*] *occidentalis* from Colorado”, with which it was mistakenly considered to be conspecific.

Material examined

Primary type material

MEXICO – **Baja California** • ♂, *E. permixtus* holotype; Isla Pond bay, Isla Ángel de la Guarda, Gulf of California; 1 Jul. 1921; E.P. Van Duzee leg.; CAS 954. – **Baja California Sur** • ♂, *T. pacis* holotype; La Paz; 29 Jun. 1919; G.F. Ferris leg.; CAS 1661.

USA – **California** • ♂, *T. brunnescens* holotype; Poway, San Diego County; 10 Sep. 1884; F.E. Blaisdell leg.; CAS 1606 • ♀, *E. sarothrinus* holotype; Riverside, Riverside County; 26 May 1928; P.H. Timberlake leg.; AMNH AMNH_IZC 00323550 • ♂, *E. sarothrinus* var. *confluens* holotype; same data as for preceding; 26 May 1928; P.H. Timberlake leg.; USNM 534623. – **New Mexico** • ♂, *E. occidentalis* var. *segregatus* holotype; Las Vegas Hot Springs; 11 Jul.; USNM 534868.

Secondary type material

USA • 1 ♀, *E. sarothrinus* paratype; California, Riverside, Riverside County; 6 Jul. 1928; P.H. Timberlake leg.; AMNH M.G.R. Database No. 1516.

DNA barcoded material

Available. Three BINs in two clusters:

Cluster: BOLD:AAG7909+BOLD:AFP1028. BIN: BOLD:AAG7909. Specimen examined and sequenced:

USA • 1 ♀; California, Chollas Creek Park (San Diego), San Diego County; 32.7201° N, 117.0780° W; 15 Jul. 2011; K.L.J. Hung leg.; BOLD sample ID: KJH.4621; UCR.

Cluster: BOLD:AAG7909+BOLD:AFP1028. BIN: BOLD:AFP1028. Specimens examined and sequenced:

USA – **Arizona** • 1 ♀ (previously assigned to the BIN BOLD:AAG7909); Sierra Vista, Cochise County; 31.5100° N, 110.2590° W; 4 Sep. 2009; C.S. Sheffield and S. Dumesh leg.; BOLD sample ID: CMNTO_025; PCYU PCYU-SD09:631 • 1 ♂, *T.* cf. *segregatus* (previously assigned to the BIN BOLD:AAG7909); Southwestern Research Station (5 mi W of Portal), Cochise County; 22 Aug. 2007; H.T. Ngo and J. Gibbs leg.; BOLD sample ID: CMNTO_485; PCYU • 2 ♂♂, *T.* cf. *segregatus* (BIN previously unassigned); same data as for preceding; 22 Aug. 2007; H.T. Ngo and J. Gibbs leg.; BOLD sample IDs: CMNTO_487, CMNTO_488; PCYU.

Cluster: BOLD:AAG7909+BOLD:AFP1028. BIN unassigned:

USA – **Arizona** • 1 ♂, *T.* cf. *segregatus*; Southwestern Research Station (5 mi W of Portal), Cochise County; 22 Aug. 2007; H.T. Ngo and J. Gibbs leg.; BOLD sample ID: CMNTO_489; PCYU • 1 ♂; Southwestern Research Station (5 mi W of Portal), Cochise County; 31.8830° N, 109.2070° W; 21 Aug. 2019; J. Gibbs leg.; BOLD sample ID: WRME0501356; WRME WRME0501356.

Cluster and BIN: BOLD:AEI6013. Specimens examined and sequenced:

USA – **Arizona** • 1 ♂; 19 mi SE of Willcox, Cochise County; 18–25 Aug. 2002; BOLD sample ID: CCDB-38770 F09; RSKM RSKM_ENT_E-168248 • 1 ♂; Catalina Hwy (Santa Catalina Mountains), Coronado National Forest; 32.3631° N, 110.7137° W; 16 Aug. 2015; T.M. Onuferko leg.; BOLD sample ID: CMNTO_047; TOPC • 1 ♂; Catalina Hwy (Santa Catalina Mountains), Coronado National Forest; 32.3728° N, 110.7068° W; 16–26 Aug. 2015; T.M. Onuferko leg.; BOLD sample ID: CMNTO_109; PCYU • 1 ♀; Southwestern Research Station (5 mi W of Portal), Cochise County; 1 Sep. 2013; BOLD sample ID: CMNTO_017; PCYU • 1 ♀; Southwestern Research Station (5 mi W of Portal), Cochise County; 31.8840° N, 109.2060° W; 25 Aug. 2011; N. de Silva leg.; BOLD sample ID: 14511G09-AZ; PCYU 0003776 • 1 ♀; Southwestern Research Station (5 mi W of Portal), Cochise County; 31.8852° N, 109.2051° W; 24 Aug. 2017; R. Oram leg.; BOLD sample ID: CCDB-38770 F11; RSKM RSKM_ENT_E-167432. – **Colorado** • 1 ♀; Escalante State Wildlife Area, Sawmill Mesa Road, Delta County; 38.7361° N, 108.1556° W; 31 Aug. 2013; M. Buck leg.; BOLD sample ID: CMNTO_314;

RAM pmae00122773. – **New Mexico** • 1 ♀; 7 km NE of Silver City, Grant County; 32.8270° N, 108.2410° W; 2 Sep. 2009; C.S. Sheffield and S. Dumesh leg.; BOLD sample ID: CMNTO_019; PCYU PCYU-SD09:289 • 1 ♀; 28 mi S of Animas, Hidalgo County; 31.5550° N, 108.8760° W; 27 Aug. 2019; J. Gibbs leg.; BOLD sample ID: CMNTO_162; WRME WRME0500765 • 1 ♀; NM-152 (along Iron Creek), Gila National Forest, Grant County; 32.9078° N, 107.8160° W; 18 Aug. 2015; T.M. Onuferko leg.; BOLD sample ID: CMNTO_050; TOPC.

Non-barcoded material

MEXICO – **Baja California** • 1 ♀; 1 mi E of Santa Inés; 6 Apr. 1985; Bloomfield and Faulkner leg.; INHS 387489 • 1 ♂; 3.3 mi S of El Cóndor; 1 Sep. 1981; D.K. Faulkner leg.; SDNHM • 1 ♀; 4 mi S of El Cóndor; 28 May 1981; Faulkner and Brown leg.; SDNHM • 1 ♀; 8 mi E of Tecate on Hwy 2; 30 Jun. 1980; Faulkner and Brown leg.; SDNHM • 1 ♀; 19 mi E of Ojos Negros; 21 Jul. 1980; Faulkner and Brown leg.; SDNHM • 9 ♀♀; Agua Caliente (San Carlos), 18.5 km E of Maneadero; 6 Jul. 1973; P.H. Arnaud, Jr. leg.; CAS • 2 ♀♀; El Pabellón; 2 Jul. 1968; J. Davidson, J. Bigelow, M. Bentzien, W. Fox, S. Williams, and M. Cazier leg.; ASU • 1 ♀; Los Mártires; 24 Jun. 1968; N. Leppla, J. Davidson, J. Bigelow, M. Bentzien, W. Fox, S. Williams, and M. Cazier leg.; ASU • 1 ♀; Río San Salvador at Hwy 3; 31.8733° N, 116.0908° W; 7–12 Jun. 1997; M.E. Irwin and E.I. Schlinger leg.; INHS 387491 • 19 ♀♀; San Ángel; 28 Jun. 1968; N. Leppla, J. Davidson, J. Bigelow, M. Bentzien, W. Fox, S. Williams, and M. Cazier leg.; ASU • 1 ♀; same data as for preceding; 28 Jun. 1968; N. Leppla, J. Davidson, J. Bigelow, M. Bentzien, W. Fox, S. Williams, and M. Cazier leg.; ASU M.G.R. Database No. 1215 • 1 ♀; Santa Ana; 21 Jun. 1968; N. Leppla, J. Davidson, J. Bigelow, M. Bentzien, W. Fox, S. Williams, and M. Cazier leg.; ASU • 1 ♀; Sierra de Juárez (6 mi N of Laguna Hanson); 21 Jul. 1980; Faulkner and Brown leg.; SDNHM. – **Baja California Sur** • 1 ♀; 2 mi S of La Paz; 2 Aug. 1966; J.A. Chemsak leg.; EMEC • 1 ♀; 11 mi N of San Isidro (La Purísima); 3 Apr. 1985; Bloomfield and Faulkner leg.; SDNHM • 1 ♀; 36 km NE of San José del Cabo; 8 Mar. 1988; W.J. Pulawski leg.; CAS • 1 ♂; Arroyo San Bartolo; 28 Aug. 1982; D.K.F. leg.; SDNHM • 1 ♀; Loreto 21 Jun. 1983; R. Miller and L. Stange leg.; FSCA • 1 ♀; Playa Los Cerritos (11.2 mi S of Todos Santos); 28 Sep. 1981; F. Andrews and D. Faulkner leg.; SDNHM • 3 ♀♀; Puerto Escondido; 15 Jun. 1992; R. Shaver leg.; UCBME • 1 ♀; S of El Rosario on Hwy 1 at km 115 marker; 24–25 Aug. 1992; D.E. Russell leg.; UCBME • 1 ♀; San Ignacio; 26 Jun. 1938; Michelbacher and Ross leg.; CAS • 2 ♀♀; San José Viejo; 17 Jul. 1968; J. Davidson, J. Bigelow, M. Bentzien, W. Fox, S. Williams, and M. Cazier leg.; ASU. – **Chihuahua** • 1 ♀; 10–15 km S of Maycoba; 29 Aug. 1984; W.J. Pulawski leg.; CAS. – **Coahuila** • 2 ♀♀; 61 mi N of Saltillo; 11 Aug. 1959; A.S. Menke and L.A. Stange leg.; UCBME • 1 ♀; Guadalupe; 24 May 1952; M. Cazier, W. Gertsch, and R. Schrammel leg.; AMNH • 1 ♀; Rancho Las Lilas (Reserva de la Biosfera Mapimí); 26.7372° N, 103.7542° W; 12 Jun. 1995; L. Godínez leg.; UNAM LG-1095 7400. – **Durango** • 1 ♂; Navajos (20 mi E of El Salto); 23 Jul. 1964; L.A. Kelton leg.; CNC 808392. – **Guanajuato** • 2 ♀♀; León; 16 Aug. 1953; C. and P. Vaurie leg.; AMNH. – **Jalisco** • 1 ♀; Guadalajara; Crawford leg.; USNM. – **Michoacán** • 1 ♀; Cotija; 6 Sep. 1970; B.L. Villegas leg.; UCBME. – **Nuevo León** • 2 ♀♀; 50 mi SE of Monterrey; 13 Oct. 1957; H.A. Scullen leg.; OSAC. – **Sonora** • 1 ♀; Bahia San Pedro, Gulf of California; 7 Jul. 1921; E.P. Van Duzee leg.; CAS.

USA – **Arizona** • 1 ♀; 0.5 mi W of Hwy 92 on Ash Canyon Road (Huachuca Mountains), Cochise County; 13–22 Sep. 1993; N. McFarland leg.; CNC 1801913 • 1 ♀; 1 mi S of Portal (Chiricahua Mountains), Cochise County; 26 Aug. 1966; M.A. Cazier leg.; ASU • 1 ♀; 11 mi SW of Eloy, Pinal County; 19 Jun. 1953; T.R. Haig leg.; UCBME • 1 ♀; 12 km NE of Tombstone, Cochise County; 31.8460° N, 110.0030° W; 7 Sep. 2009; C.S. Sheffield and S. Dumesh leg.; PCYU PCYU-SD09:1064 • 1 ♀; 12 mi N of Yuma; 8 Oct. 1958; T.R. Haig leg.; UCBME • 2 ♀♀; 15 mi E of Nogales; 22 Sep. 1963; V.L. Vesterby leg.; UCBME • 7 ♀♀; 15 mi W of Chandler; 9 Jun. 1961; G.D. Butler leg.; UAIC • 1 ♀; 15 mi W of Flagstaff on Hwy 66; 8 Sep. 1964; F.M. and M.C. Hull leg.; CNC 753870 • 1 ♀; 2 mi E of Apache, Cochise County; 3 Sep. 2003; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀; 2 mi N of

Paradise, Cochise County; 9 Aug. 1967; F.G. Andrews leg.; UCR UCRC ENT 57283 • 1 ♀; 2.5 mi NE of Portal, Cochise County; 9 Aug. 1959; M. Statham leg.; AMNH • 1 ♀; 21 mi W of Portal, Cochise County; 15 Aug. 1970; R.F. Denno leg.; UCBME • 1 ♀; 2–10 mi S of Williams, Coconino County; 11 Aug. 1994; J.G. and B.L. Rozen leg.; AMNH • 1 ♂; 23 mi SE of Sonoita, Santa Cruz County; 27 Aug. 1968; R.W. Thorp leg.; UCBME • 1 ♀; 3 mi N of Portal, Cochise County; Aug. 2005; L. Packer leg.; PCYU PCYU-NA: 823 • 1 ♀; 3 mi S of Portal, Cochise County (Chiricahua Mountains); 13 Aug. 1965; C.A. Saario leg.; UCR UCRC ENT 57290 • 4 ♀♀; 3 mi W of Salome, La Paz County; 21 Jun. 1971; G. Bohart and P. Torchio leg.; BBSL BBSL522493 to BBSL522496 • 1 ♀; 4 mi N of Grand Canyon Junction; 12 Jul. 1956; F.G. Werner leg.; UAIC • 1 ♀; 4 mi SW of Portal (Chiricahua Mountains), Cochise County; 16 Aug. 1973; Cazier family leg.; ASU • 1 ♀; 4 mi W of Paradise (Chiricahua Mountains), Cochise County; 9 Sep. 1950; W. Gertsch and M. Cazier leg.; AMNH • 1 ♀; 5 mi E of Fort Apache; 28 Aug. 1964; E.I. Schlinger leg.; UCR UCRC ENT 57378 • 4 ♀♀; same data as for preceding; 28 Aug. 1964; M.E. Irwin leg.; UCR UCRC ENT 57397 to UCRC ENT 57400 • 1 ♀; 5.5 mi W of Peña Blanca, Santa Cruz County; 17 Aug. 1961; Werner and Bequaert leg.; UAIC • 1 ♀; 5803 North US Hwy 89, Flagstaff, Coconino County; 25 Jul. 1988; P.H. Arnaud, Jr. leg.; CAS • 1 ♀; 6 mi N of Pearce; 6 Aug. 1955; G.D. Butler and Z. Noon leg.; UAIC • 1 ♀; 6 mi SW of Apache, Cochise County; 1 Sep. 2003; J.G. Rozen and J.S. Ascher leg.; AMNH • 1 ♀; 8 mi N of Flagstaff; 15 Sep. 1955; G.D. Butler leg.;

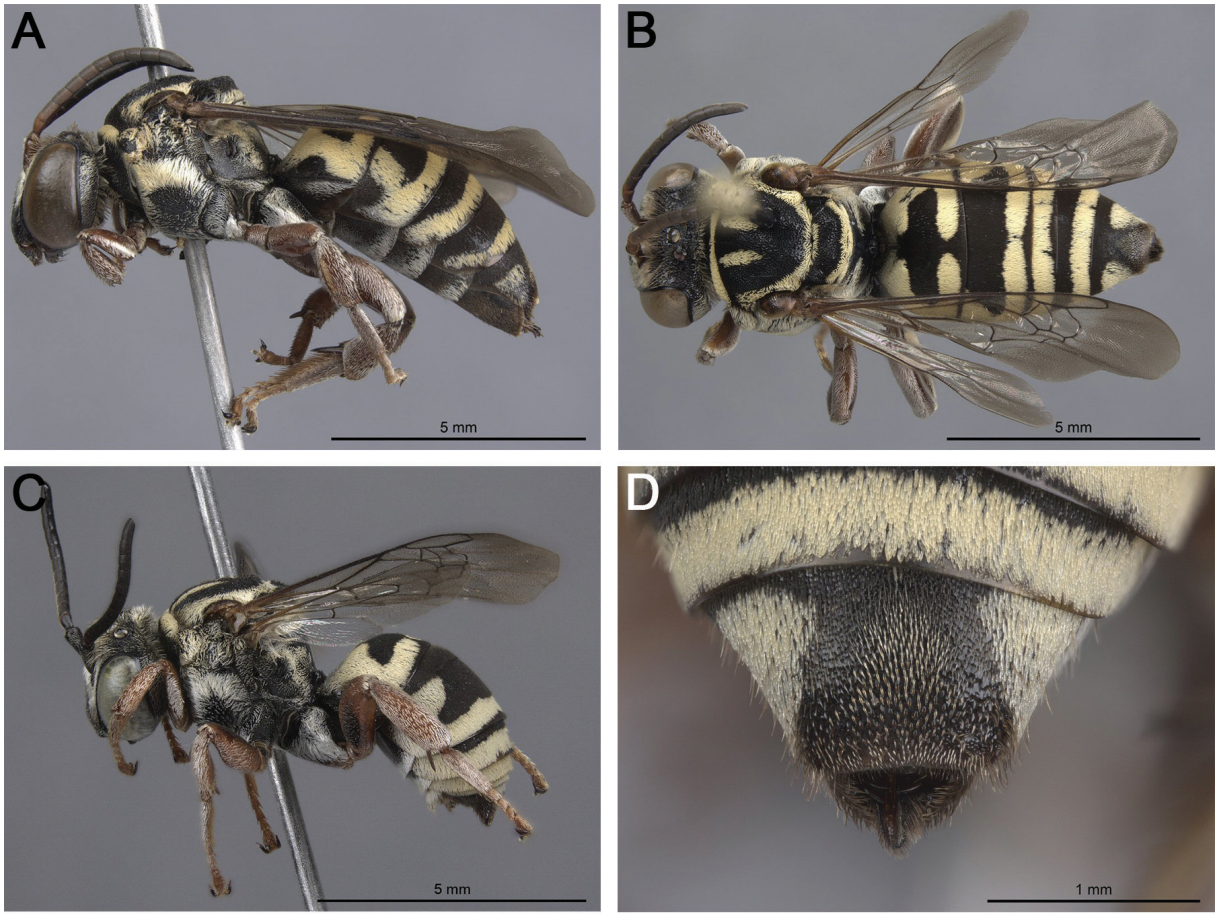

Fig. 29. *Triepeolus segregatus* (Cockerell, 1900). **A**. Female (CNC PCYU:CNC-Bee: 509), habitus, lateral view. **B**. Female (CNC PCYU:CNC-Bee: 449), habitus, dorsal view. **C**. Male (PCYU 0005890), habitus, lateral view. **D**. Female (BOLD sample ID: CMNTO_017; PCYU) pseudopygidial area, dorsal view.

UAIC • 1 ♀; 8 mi N of Onion Saddle (Chiricahua Mountains), Cochise County; 22 Aug. 1986; McGinley and Norden leg.; USNM • 1 ♀; 8 mi S of Toltec, Pinal County; 24 Jun. 1953; T.R. Haig leg.; UCBME • 1 ♀; 9 mi N of Elfrida, Cochise County; 5 Aug. 1961; J.G. Rozen leg.; AMNH M.G.R. Database No. 1210 • 1 ♀; Benson; 4 Jul. 1961; P.H. Johnson leg.; UAIC • 1 ♀; Boyce Thompson Arboretum (Superior); 15 May 1954; G.D. Butler leg.; UAIC • 2 ♀♀; Buckeye; 11 Jun. 1954; G.D. Butler leg.; UAIC • 1 ♀; same data as for preceding; 12 Aug. 1954; G.D. Butler leg.; UAIC • 1 ♀; same data as for preceding; 27 May 1955; G.D. Butler leg.; UAIC • 1 ♀; Carr Canyon summit campground, Cochise County; 1–8 Aug. 1993; M. Sharkey leg.; CNC PCYU:CNC-Bee: 509 • 4 ♀♀; Carrizo, Gila County; 1 Sep. 1986; A.S. Menke leg.; USNM • 1 ♀; Casa Grande; 20 Jun. 1956; C. Williams leg.; UAIC • 1 ♀; Arizona, Cave Creek Canyon; 14 Aug. 1981; A.J. Gilbert and N.J. Smith leg.; UCBME • 1 ♀; Chiricahua Mountains, Cochise County; 31 Jul. 1946; H.A. Scullen leg.; OSAC • 1 ♂; Cienega Spring (near Portal), Cochise County; 21 Aug. 1993; L. Packer, T. Pare, and M. Sharkey leg.; PCYU • 1 ♀; Cochise County; Nov. 1969; D. Schuh leg.; FSCA • 1 ♀; Double Adobe, Cochise County; 20 Aug. 1989; R.M. Bohart leg.; UCBME • 1 ♀; E of Box Canyon, Pima County; 31.7913° N, 110.7457° W; 15 Sep. 1994; T. Griswold leg.; BBSL BBSL582211 • 1 ♀; Eloy; 14 Jun. 1955; G.D. Butler leg.; UAIC • 1 ♀; Flagstaff; 22 Jul. 1934; F.E. Lutz leg.; AMNH • 1 ♀; Garden Canyon, Cochise County; 17 Aug. 2014; R. Parks leg.; CSUC • 1 ♀; Grand Canyon; 18 Aug. 1939; E.C. Van Dyke leg.; CAS • 1 ♀; Grand Canyon (South Rim); 31 Jul. 1934; E.L. Bell leg.; AMNH • 1 ♀; Jhus Canyon, Cochise County; 11 Aug. 1967; F.G. Andrews leg.; UCR UCRC ENT 57406 • 2 ♀♀; Kansas Settlement; 23 Jun. 1954; G.D. Butler leg.; UAIC • 1 ♀; Madera Canyon (Santa Rita Mountains); "9-11-11"; J. Cowles leg.; SDNHM • 1 ♀; Madera Canyon (Santa Rita Mountains), Pima County; 13 Aug. 1952; M. Cazier, R. Schrammel, and C. and P. Vaurie leg.; AMNH • 1 ♀; Madera Canyon (Santa Rita Mountains), Santa Cruz County; 10 Aug. 1965; M.R. Irwin leg.; UCR UCRC ENT 57285 • 1 ♀; Marana; 28 Sep. 1955; G.D. Butler leg.; UAIC • 2 ♀♀; same data as for preceding; 7 Jun. 1962; M. Wargo leg.; UAIC • 3 ♀♀; Maricopa; 20 Jun. 1956; G.D. Butler leg.; UAIC • 1 ♀; same data as for preceding; 12 Jun. 1962; G.D. Butler leg.; UAIC • 3 ♀♀; Mesa; 9 Jun. 1955; G.D. Butler leg.; UAIC • 1 ♂; Mount Wrightson (Santa Rita Mountains), Santa Cruz County; 28 Aug. 1962; H.E. Milliron leg.; CNC 808389 • 1 ♀; Oak Creek Canyon, Coconino County; 2 Sep. 1968; D.R. Miller and J.E. Lauck leg.; UCBME • 1 ♀; Onion Saddle (Chiricahua Mountains), Cochise County; 15 Aug. 1986; McGinley and Norden leg.; USNM • 2 ♀♀; Onion Saddle, Cochise County; 31.9334° N, 109.2631° W; 26 Aug. 2016; L. Packer leg.; PCYU • 1 ♂; Paradise, Cochise County; 31.9333° N, 109.2167° W; 11–16 Aug. 2008; W. Steiner and J.M. Swearingen leg.; BIML USGS-DRO 147147 • 1 ♀; Pinery Canyon (10 mi NW of Onion Saddle) (Chiricahua Mountains), Cochise County; 16 Aug. 1965; K. Brown leg.; UCR UCRC ENT 57272 • 1 ♀; Ramsey (Huachuca Mountains); 30 Aug. 1953; G.D. Butler leg.; UAIC • 1 ♀; Ramsey Canyon (15 mi S of Sierra Vista), Huachuca Mountains; 15 Oct. 1969; R.F. Sternitzky leg.; CNC 753862 • 1 ♀; Roll; 2 Jun. 1955; G.D. Butler leg.; UAIC • 1 ♀; Salt River Canyon at Hwy 60; 11 Jul. 1965; S.A. Gorodenski leg.; ASU • 1 ♀; Sierra Vista, Cochise County; 31.5100° N, 110.2590° W; 4 Sep. 2009; C.S. Sheffield and S. Dumesh leg.; PCYU PCYU-SD09:614 • 2 ♀♀; Skeleton Canyon (Peloncillo Mountains), Cochise County; 24 Aug. 1962; H.V. Weems, Jr. leg.; FSCA • 1 ♀; same data as for preceding; 8 Sep. 1958; H.V. Weems, Jr. leg.; FSCA • 1 ♀; Sonoita, Santa Cruz County; 19 Aug. 1986; R.M. Bohart leg.; UCBME • 3 ♀♀; Southwestern Research Station (5 mi W of Portal), Cochise County; 1 Aug. 1956; C. and M. Cazier leg.; AMNH M.G.R. Database Nos 3763, 3765, 3771 • 1 ♀; same data as for preceding; 1 Aug. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 3772 • 1 ♀; same data as for preceding; 2 Aug. 1956; C. and M. Cazier leg.; AMNH M.G.R. Database No. 3770 • 1 ♀; same data as for preceding; 2 Aug. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 3767 • 1 ♀; same data as for preceding; 4 Aug. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 3762 • 1 ♀; same data as for preceding; 10 Aug. 1956; C. and M. Cazier leg.; AMNH M.G.R. Database No. 3768 • 1 ♀; same data as for preceding; 21 Aug. 1956; C. and M. Cazier leg.; AMNH M.G.R. Database No. 3774 • 1 ♀; same data as for preceding; 17 Sep. 1956; E. Ordway leg.; AMNH M.G.R. Database No. 3766 • 2 ♀♀; same data as for preceding; 26 Sep. 1956; E. Ordway leg.; AMNH M.G.R. Database Nos 3764, 3769 • 1 ♀; same data as

for preceding; 13 Aug. 1958; P.D. Hurd leg.; UCBME • 1 ♀; same data as for preceding; 17 Aug. 1958; E.G. Linsley leg.; UCBME • 1 ♀; same data as for preceding; 19 Aug. 1958; E.G. Linsley leg.; UCBME • 2 ♀♀; same data as for preceding; 19 Aug. 1958; P.D. Hurd leg.; UCBME • 1 ♀; same data as for preceding; 26 Aug. 1958; E.G. Linsley leg.; UCBME • 1 ♀; same data as for preceding; 27 Aug. 1958; H.V. Weems, Jr. leg.; FSCA • 1 ♀; same data as for preceding; 25 Aug. 1960; P.H. Arnaud, Jr. and D.C. Rentz leg.; CAS • 1 ♀; same data as for preceding; 3 Sep. 1962; J.G. Rozen and S.J. Hessel leg.; AMNH • 1 ♀; same data as for preceding; 26 Aug. 1964; J.G. and B.L. Rozen leg.; AMNH M.G.R. Database No. 3773 • 1 ♀; same data as for preceding; 18 Sep. 1966; P.H. Arnaud, Jr. leg.; CAS • 1 ♀; same data as for preceding; 20 Sep. 1966; P.H. Arnaud, Jr. leg.; CAS • 2 ♀♀; same data as for preceding; 21 Aug. 1973; M. Favreau leg.; AMNH • 4 ♀♀; same data as for preceding; 22 Aug. 1973; M. Favreau leg.; AMNH • 2 ♀♀; same data as for preceding; 24 Aug. 1973; M. Favreau leg.; AMNH • 2 ♀♀; same data as for preceding; 26 Aug. 1973; Rozen and Favreau leg.; AMNH • 1 ♀; same data as for preceding; 27 Aug. 1973; J.G. Rozen leg.; AMNH • 1 ♀; same data as for preceding; 1 Sep. 1973; M. Favreau and R. McGinley leg.; AMNH • 1 ♀; same data as for preceding; 21 Aug. 1985; J.G. Rozen leg.; AMNH • 1 ♀; same data as for preceding; 18 Aug. 1995; J.G. Rozen and S.A. Budick leg.; AMNH • 1 ♂; same data as for preceding; 2003; L. Packer leg.; PCYU • 1 ♀; same data as for preceding; 17 Aug. 2004; J.S. Ascher leg.; AMNH • 1 ♂; same data as for preceding; 27 Aug. 2004; PCYU • 1 ♀, 1 ♂; same data as for preceding; 24 Aug. 2007; PCYU • 1 ♂; same data as for preceding; 25 Aug. 2007; PCYU • 2 ♀♀; same data as for preceding; 23 Aug. 2011; K.L.J. Hung leg.; SDNHM • 4 ♀♀; same data as for preceding; 25 Aug. 2011; K.L.J. Hung leg.; SDNHM • 1 ♀; same data as for preceding; 26 Aug. 2013; PCYU • 1 ♀; same data as for preceding; 27 Aug. 2013; PCYU • 3 ♀♀; same data as for preceding; 1 Sep. 2013; PCYU • 4 ♂♂; Southwestern Research Station (5 mi W of Portal), Cochise County; 31.8830° N, 109.2070° W; 26 Aug. 2019; J. Gibbs leg.; WRME WRME0500630, WRME0500632 to WRME0500634 • 3 ♂♂; Southwestern Research Station (5 mi W of Portal), Cochise County; 31.8840° N, 109.2060° W; 22 Aug. 2011; N. de Silva leg.; PCYU 0005889 to 0005891 • 1 ♂; same data as for preceding; 25 Aug. 2011; N. de Silva leg.; PCYU 0003777 • 4 ♂♂; Southwestern Research Station (5 mi W of Portal), Cochise County; 31.8852° N, 109.2051° W; 22 Aug. 2017; L. Graham leg.; PCYU • 2 ♂♂; same data as for preceding; 23 Aug. 2017; R. Oram leg.; RSKM RSKM_ENT_E-167429, RSKM_ENT_E-167430 • 2 ♂♂; same data as for preceding; 24 Aug. 2017; R. Oram leg.; RSKM RSKM_ENT_E-167427, RSKM_ENT_E-167431 • 3 ♂♂; same data as for preceding; 25 Aug. 2017; L. Graham leg.; PCYU • 1 ♀; Sunnyslope; 26 May 1954; G.D. Butler leg.; UAIC • 1 ♀; Arizona, Sycamore Canyon (near Ruby); 16–17 Aug. 1961; Werner and Bequaert leg.; UAIC • 2 ♀♀; Tucson, Pima County; 19 May 1954; G.D. Butler leg.; UAIC • 1 ♀; same data as for preceding; 17 Jun. 1955; G.D. Butler leg.; UAIC • 1 ♀; same data as for preceding; 31 May 1962; G.D. Butler leg.; UAIC • 1 ♀; vicinity of Portal, Cochise County; 25 Aug. 1960; P.H. Arnaud, Jr. and D.C. Rentz leg.; CAS • 1 ♀; West Turkey Creek, Cochise County; 2 Sep. 2003; J.G. Rozen, J.S. Ascher, R.L. Staff, and R.E. Edwards leg.; AMNH • 1 ♂; Whiteriver, Navajo County; 9 Jul. 1977; R.C. Miller leg.; UCBME • 1 ♀; Willcox, Cochise County; 28 Aug. 1974; R.M. Bohart leg.; UCBME. – **California** • 1 ♀; 1 mi N of Hodge, San Bernardino County; 13 Jun. 1979; J.C. Hall leg.; UCR UCRC ENT 57190 • 1 ♀; 1.7 mi S of Hwy 223 along Hwy 99, Kern County; 8 Oct. 1999; G.R. Ballmer leg.; UCR UCRC ENT 00037952 • 2 ♀♀; 10 mi NE of Artois, Glenn County; 25 Jul. 1967; R.W. Thorp leg.; UCBME • 1 ♀; 6 mi N of Borrego Springs Rd and Di Giorgio Rd junction (Coyote Creek), Anza Borrego State Park, San Diego County; 5 Apr. 1968; S. and S. Frommer leg.; UCR UCRC ENT 57191 • 1 ♀; 7 mi N of Scissors Crossing, San Diego County; 15 May 1968; F.G. Andrews leg.; UCR UCRC ENT 57165 • 2 ♂♂; Alpine Ranch, San Diego County; 19 Aug. 1998; D.K. Faulkner leg.; SDNHM • 1 ♂; Anza Borrego State Park, San Diego County; 6 Jul. 1993; R.B. Parks leg.; SDNHM • 1 ♀; Anza Borrego State Park, San Diego County; 32.9695° N, 116.3088° W; 17 Aug. 2013; K.L.J. Hung leg.; SDNHM SDC.1995 • 3 ♀♀; Anza Borrego State Park, San Diego County; 33.1356° N, 116.3163° W; 30 Aug. 2014; K.L.J. Hung leg.; SDNHM SDC.11195, SDC.11196, SDC.11202 • 1 ♀; Davis; 14 Sep. 1961; M.E. Irwin leg.; UCBME • 2 ♀♀, 1 ♂; E of Barrett Honor Camp, Cleveland National Forest, San Diego County; 25 Jun. 2003; D.K. Faulkner leg.; SDNHM • 1 ♂; Grapevine

Canyon, Anza Borrego State Park, San Diego County; 12 Jul. 1985; R.B. Parks leg.; SDNHM • 1 ♀, 1 ♂; same data as for preceding; 20 Jul. 1985; R.B. Parks leg.; SDNHM • 1 ♀; same data as for preceding; 1 Sep. 1985; R.B. Parks leg.; SDNHM • 1 ♀; Imperial Valley; 10 Jul. 1981; G.D. Butler leg.; UAIC • 1 ♀; Independence, Inyo County; 19 Jul. 1965; J. Birchim leg.; CAS • 2 ♂♂; Jamacha, San Diego County; 12 Aug. ??20; SDNHM • 1 ♀; Keeler, Inyo County; 12 Jul. 1982; R.M. Bohart leg.; UCBME • 1 ♀; Keosegan Ranch (Indio), Riverside County; 14–16 Jul. 1970; M.E. Irwin leg.; UCR UCRC ENT 57178/Cotton Insect Survey M.E. Irwin Project Specimen Number 730 • 1 ♀; Lone Pine, Inyo County; 7 Jun. 1937; E.C. Van Dyke leg.; CAS • 1 ♀; Merced County; 27 Sep. 1959; W. Cothran leg.; UCBME P 0219947 • 1 ♀; Mercey Hot Springs, Fresno County; 21 Sep. 1963; R.L. Westcott leg.; UCBME • 2 ♂♂; Mission Gorge, San Diego County; 5 Sep. 1983; R.B. Parks leg.; SDNHM • 1 ♀; near La Mesa, San Diego County; 5 Sep. 1953; F.X. Williams leg.; CAS • 1 ♀; near Wendel, Lassen County; Jul. 1934; R.D. Murphy leg.; CAS • 1 ♀; Northridge, Los Angeles County; 2 Jul. 1940; SDNHM • 2 ♀♀; NW corner of UC Riverside Botanic Gardens (Riverside), Riverside County; 29 Apr. 1992; D.C. Hawks leg.; UCR UCRC ENT 57114, UCRC ENT 57115 • 1 ♀; Pope Valley (⅓ km S of Aetna Springs), Napa County; 3–14 Oct. 1993; L.S. Kimsey leg.; UCBME • 1 ♀; Potrero, San Diego County; 27 Jun. 1958; F.X. Williams leg.; SDNHM • 1 ♂; Ramona, San Diego County; 19 May 1992; R.B. Parks leg.; SDNHM • 1 ♀; Riverside, Riverside County; P.H. Timberlake leg.; USNM • 1 ♀; same data as for preceding; 18 Jul. 1928; P.H. Timberlake leg.; UCMC • 1 ♀; same data as for preceding; 21 Jul. 1933; P.H. Timberlake leg.; UCBME P 0219953 • 1 ♀; same data as for preceding; 10 Aug. 1957; E.I. Schlinger leg.; UCBME P 0218818 • 1 ♀; Saline Valley Salt Lake, Inyo County; 36.6967° N, 117.8328° W; 19 May 1995; T.L. Griswold leg.; BBSL BBSL Faunal Survey No. 000 102 989 • 2 ♀♀; San Diego, San Diego County; 20 Jul. 1920; W.S. Wright leg.; SDNHM • 1 ♀; same data as for preceding; 5 Jul. 1921; W.S. Wright leg.; SDNHM • 1 ♀; San Diego Country Estates, Ramona; 15 Jun. 1992; R.B. Parks leg.; SDNHM • 2 ♀♀; Scissors Crossing, Valle de San Felipe, San Diego County; 4 May 1969; E.I. Schlinger leg.; UCR UCRC ENT 57163, UCRC ENT 57164 • 1 ♀; SWS3 Zircon Street, San Diego County; 32.7202° N, 117.0779° W; 28 Jun. 2022; J.L. Mullins leg.; UCR UCSD.JLM.4140 • 1 ♀; Tracy, San Joaquin County; 13 Jun. 1949; J.W. MacSwain leg.; USNM • 1 ♀; California, White Slough, San Joaquin County; 22 Aug. 1984; L.G. Bezark leg.; UCBME P 0219928. – **Colorado** • 2 ♀♀; "El Paso County Solar Trails County Park T14S R67W Sec 15 SW¼"; F.M. Brown leg.; UCMC • 1 ♀; 2 mi W of Walsenburg; 1 Jul. 1975; B. Vogel leg.; UCMC • 1 ♀; 3 mi W of Arriola, Montezuma County; 4–24 Aug. 1975; T. Marquardt leg.; CSUC • 1 ♀; same data as for preceding; Sep. 1975; T. Marquardt leg.; CSUC • 2 ♀♀; 4 mi E of Steamboat Springs; 28 Aug. 1979; U.N. Lanham leg.; UCMC • 1 ♀; Boulder, Boulder County; 13 Jul. 1925; C.H. Hicks leg.; UCMC • 2 ♀♀; same data as for preceding; 2 Aug. 1925; C.P. Custer leg.; UCMC • 1 ♀; Clear Creek; 3 Aug. ??98; USNM • 2 ♀♀; County Road 42 (3 mi E of County Road 41.7), Las Animas County; 17 Jul. 2012; W. Cranshaw, B. Kondratieff, and D. Leatherman leg.; CSUC • 1 ♀; Evergreen; 16 Jul. 1952; R.S. Beal leg.; ASU • 1 ♀; Glacier view Meadows, Larimer County; 27 Jul. 1996; H.E. Evans leg.; CSUC • 1 ♀; Jim Creek (near Boulder); 24 Jul. 1922; AMNH • 1 ♀; Phantom Canyon, Larimer County; 30 Jul. 1992; S. Fitzgerald leg.; CSUC. – **Nevada** • 1 ♀; 7 mi N of Dyer, Esmeralda County; 2 Jul. 1958; R.C. Bechtel leg.; FSCA • 2 ♀♀; Alamo, Lincoln County; 13 Jul. 1958; F.D. Parker leg.; FSCA. – **New Mexico** • 1 ♀; 1 mi N of Rodeo, Hidalgo County; 22 Aug. 1996; J.G. and B.L. Rozen and A. Pence leg.; AMNH • 1 ♀; 3 km S of Seven Rivers, Eddy County; 3 Sep. 1990; T. Griswold leg.; BBSL BBSL522617 • 5 ♀♀; 5 mi NE of San Lorenzo, Grant County; 32.8197° N, 107.8967° W; 28 Aug. 2000; J.L. Neff leg.; CTMI 20245 to 20247, 20259, 20347 • 1 ♀; 8.3 km SW of Silver City, Grant County; 25 Aug. 1992; B.N. Danforth leg.; USNM • 1 ♂; 10 mi N of Mimbres, Grant County; 32.9778° N, 108.0528° W; 6 Aug. 2007; J.H. Kits leg.; DEBU debu00293461 • 1 ♀; 15 mi E of Santa Fe; 27 Jun. 1931; H.A. Scullen leg.; OSAC • 1 ♀; 20 mi W of Jal, Lea County; 3 May 1961; J.C. Bequaert and K. Roever leg.; UAIC • 1 ♀; 25–28 mi S of Animas, Hidalgo County; 16 Aug. 1994; J.G. Rozen and J.S. Ascher leg.; AMNH • 2 ♂♂; Animas, Hidalgo County; 31.9500° N, 108.8070° W; 26 Aug. 2015; L. Packer leg.; PCYU • 1 ♀; Iron Creek Campground, Gila National Forest, Grant County; 32.9089° N, 107.8058° W; 16 Aug. 2007; M. Buck leg.; DEBU debu00292521 • 1 ♀; Las Vegas; 20 Jul.

??02; Oslar leg.; USNM • 1 ♀; Loving; 8 May 1945; J.W. MacSwain leg.; CAS • 1 ♀; same data as for preceding; 26 May 1945; J.W. MacSwain leg.; CAS • 2 ♀♀; same data as for preceding; 29 May 1945; J.W. MacSwain leg.; CAS • 1 ♀; Mesilla; 28 Jun.; A.P. Morse leg.; USNM • 1 ♀; New Canyon Campground (8 mi W of Manzano), Manzano Mountains; CNC PCYU:CNC-Bee: 449 • 1 ♀; Santa Fe; M. Boyle leg.; USNM • 1 ♀; Wrights Cabin Campground, Gila National Forest, Grant County; 32.9131° N, 107.7806° W; 16 Aug. 2007; J.H. Kits leg.; DEBU debu00293007. – **Oklahoma** • 1 ♀; Sutton Wilderness Trail Park (Norman), Cleveland County; 35.2454° N, 97.4286° W; 21 Oct. 2023; K.L.J. Hung leg.; OKBS OKBS.POL.14137. – **Texas** • 2 ♀♀; Belfrage leg.; USNM • 1 ♀; same data as for preceding; Morrison leg.; USNM • 1 ♀; 1 mi E of Eagle Pass, Maverick County; 9 Apr. 1999; J.L. Neff leg.; CTMI 09853 • 1 ♀; 1 mi E of Rio Grande City, Starr County; 15 Mar. 1999; J.L. Neff, A. Hook, and C.R. Riley leg.; CTMI 09421 • 1 ♀; 10 mi SE of Dryden, Terrell County; 22 Sep. 1972; W. Hanson and J. Poff leg.; BBSL • 1 ♀; 100 mi E of El Paso; 13 Jul. 1942; E.C. Van Dyke leg.; CAS • 5 ♀♀; 13 mi E of Snyder, Scurry County; 4 Jun. 1965; R.M. Bohart leg.; UCBME • 1 ♀; 14 mi W of Grandfalls, Ward County; 9 Sep. 1989; J.L. Neff leg.; CTMI K07334 • 2 ♀♀; 2 mi S of El Sauz, Starr County; 29 May 1980; D.W. Webb leg.; INHS 7835, 7836 • 3 ♀♀; 20 mi N of Van Horn; 28 Sep. 1957; W. Nutting and F. Werner leg.; UAIC • 4 ♀♀; 8 mi NW of Girvin, Pecos County; 9 Sep. 1989; J.L. Neff leg.; CTMI K07226, K07227, K07231, K07233 • 1 ♀; Alpine; 10 Jun. 1930; G. Linsley leg.; CAS • 1 ♀; same data as for preceding; 1 Jul. 1942; E.C. Van Dyke leg.; CAS • 7 ♀♀; same data as for preceding; 1 Jul. 1942; H.A. Scullen leg.; OSAC • 1 ♀; same data as for preceding; 2 Jul. 1942; E.C. Van Dyke leg.; CAS • 2 ♀♀; same data as for preceding; 8 Jul. 1942; E.C. Van Dyke leg.; CAS • 3 ♀♀; same data as for preceding; 8 Jul. 1942; H.A. Scullen leg.; OSAC • 1 ♀; Big Bend National Park, Nine Point Draw; 15 May 1959; W.R.M. Mason leg.; CNC 808404 • 2 ♀♀; Brackenridge Field Laboratory (Austin), Travis County; 22 Oct. 1985; J.L. Neff leg.; CTMI K02556, K02557 • 1 ♀; same data as for preceding; 11.xi.1989; A. Hook leg.; CTMI • 1 ♀; Cotulla; 18 Apr. 1906; F.C. Pratt leg.; USNM • 1 ♀; Cuevas Amarillas Springs (24 km ENE of Presidio), Big Bend Ranch State Natural Area, Presidio County; 30–31 May 1992; C.R. Nelson, J. Gelhaus, and D. Koenig leg.; CTMI • 3 ♀♀; Davis Mountains; 28 Jun. 1942; E.C. Van Dyke leg.; CAS • 1 ♀; Davis Mountains, Jeff Davis County; 26 Jun. 1942; H.A. Scullen leg.; OSAC • 2 ♀♀; same data as for preceding; 27 Jun. 1942; H.A. Scullen leg.; OSAC • 5 ♀♀; same data as for preceding; 28 Jun. 1942; H.A. Scullen leg.; OSAC • 1 ♀; Del Rio; 8 May 1907; F.C. Bishopp leg.; USNM • 2 ♀♀; Devils River; 3 May 1907; F.C. Bishopp leg.; USNM • 1 ♀; same data as for preceding; 6 May 1907; F.C. Bishopp leg.; USNM • 2 ♀♀; same data as for preceding; 7 May 1907; F.C. Bishopp leg.; USNM • 1 ♀; Dolan Creek above Devils River, Val Verde County; 18 Sep. 1993; C.R. Nelson, S.M. Stringer, and S. Thomas leg.; CTMI • 3 ♀♀; Dolan Falls (Devils River), Val Verde County; 26–29 May 1994; A. Hook and O. Hernandez leg.; CTMI • 1 ♀; same data as for preceding; 24 Jun. 1994; Kondratieff and Kippenhan leg.; CSUC • 1 ♀; same data as for preceding; 5–7 Aug. 1994; A. Hook and O. Hernandez leg.; CTMI • 1 ♀; same data as for preceding; 4–6 Nov. 1994; A. Hook and O. Hernandez leg.; CTMI • 1 ♀; Dripping Springs; 10 Aug.; USNM • 1 ♀; Eagle Pass, Maverick County; 25 May 1952; M. Cazier, W. Gertsch, and R. Schrammel leg.; AMNH • 1 ♀; El Paso; 23 Jun. 1942; E.C. Van Dyke leg.; CAS • 1 ♀; Fedor, Lee County; 23 Sep. 1897; Birkmann leg.; ZMB • 1 ♀; same data as for preceding; 15 Jun. 1898; Birkmann leg.; ZMB • 1 ♀; same data as for preceding; 3 May 1909; AMNH • 4 ♀♀; Texas, Fort Davis; 27 Jun. 1942; E.C. Van Dyke leg.; CAS • 1 ♀; Gail, Borden County; 4 Jun. 1965; R.M. Bohart leg.; UCBME • 1 ♀; Green Gulch, Big Bend National Park; 2 May 1959; W.R.M. Mason leg.; CNC 753901 • 1 ♀; Horsehead Crossing, Pecos County; 31.2333° N, 102.5167° W; 10 Sep. 1996; J.L. Neff leg.; CTMI 08075 • 1 ♀; same data as for preceding; 10 Sep. 1996; J.L. Neff leg.; CTMI 08076/M.G.R. Database No. 1213 • 1 ♀; Hwy 163 (near Sterling City), Sterling County; 23 Apr. 1998; S. Fitzgerald, B. Kondratieff, and D. Leatherman leg.; CSUC • 1 ♀; Hwy 84, Double Mountain Fork Brazos River, Justiceburg, Garza County; 1 Jul. 1993; A.W. Hook leg.; CTMI • 1 ♀; James River (20 mi NNW of Harper), Kimble County; 2 Jun. 1996; J.L. Neff leg.; CTMI 07972 • 1 ♀; Kermit Sand Hills, County Road 302, Winkler County; 31.9022° N, 103.0467° W; 12 May 2019; M. Buck leg.; RAM pmae00151961 • 4 ♀♀; Kerrville; Apr. ??07; P. Durham leg.; USNM • 2 ♀♀; same

data as for preceding; 11 Apr. ??07; F.C. Pratt leg.; USNM • 2 ♀♀; same data as for preceding; 12 Apr. ??07; F.C. Pratt leg.; USNM • 1 ♀; same data as for preceding; 14 Apr. ??07; P. Durham leg.; USNM • 1 ♀; same data as for preceding; 22 Jun. 1942; E.S. Ross leg.; CAS • 1 ♀; Lake Childress, Childress County; 24 Aug. 1948; P.-C. Vaurie leg.; AMNH • 1 ♀; McAllen, Hidalgo County; 13 May 1952; M. Cazier, W. Gertsch, and R. Schrammel leg.; AMNH • 1 ♀; Palo Duro Canyon (22 mi S of Claude), Armstrong County; 4 Apr. 1979; R.J. McGinley leg.; USNM M.G.R. Database No. 529 • 2 ♀♀; Pecos, Reeves County; 15 May 1927; J.O. Martin leg.; CAS • 1 ♀; same data as for preceding; 11 Jul. 1942; H.A. Scullen leg.; OSAC • 1 ♀; Pine Canyon, Big Bend National Park; 4 May 1959; J.F. McAlpine leg.; CNC 753874 • 2 ♀♀; Quemado, Maverick County; 25 May 1952; M. Cazier, W. Gertsch, and R. Schrammel leg.; AMNH • 1 ♀; same data as for preceding; 3 Sep. 1960; P.M. Marsh leg.; UCBME • 1 ♀; Reagan Wells; 25 May 1916; F.C. Bishopp leg.; USNM • 1 ♀; Rio Grande Village, Big Bend National Park, Brewster County; 23 Jun. 1970; M. Cazier, O. Francke, and L. Welch leg.; ASU • 1 ♀; Sanderson, Terrell County; 12 Jun. 1948; M. Cazier leg.; AMNH • 1 ♀; Sandy, Blanco County; 12 Jun. 1994; J.L. Neff and A. Hook leg.; CTMI • 1 ♀; Shumla, Val Verde County; 26 May 1952; M. Cazier, W. Gertsch, and R. Schrammel leg.; AMNH • 1 ♀; Texas Tech University, Junction, Kimble County; 22 May 1983; J.L. Neff leg.; CTMI K13693 • 1 ♀; The Basin (near base of Lost Mine Trail) (Chisos Mountains), Big Bend National Park; 14 Aug. 1962; H.V. Weems, Jr. leg.; FSCA • 1 ♀; The Rockpile (30 mi NW of Fort Davis); 28 May 1959; W.R.M. Mason leg.; CNC 753875 • 1 ♀; Uvalde; 3 Jun. 1916; F.C. Bishopp leg.; USNM • 1 ♀; Texas, Valentine; 27 Sep. 1957; W. Nutting and F. Werner leg.; UAIC • 1 ♀; Van Horn; 24 Jun. 1942; E.C. Van Dyke leg.; CAS • 1 ♀; same data as for preceding; 24 Jun. 1942; E.C. Van Dyke leg.; CAS M.G.R. Database No. 1212 • 1 ♀; Zapata, San Ygnacio 15 S; 13 May 1974; J.L. Neff leg.; CTMI K11139. – **Utah** • 1 ♀; Beaver Canyon; Jun.; USNM • 1 ♀; St. George, Washington County; 8 Jun. 1964; W.J. Hanson leg.; BBSL BBSL522488 • 1 ♀; Wildcat Valley, Beaver County; Aug.; USNM.

Non-preserved material

USA – **California** • 1 ♀; Charles St, San Diego, San Diego County; 32.7180° N, 117.2443° W; 13 Jul. 2020; B. Nickel obs.; iNaturalist record #52965246 • 1 ♀; Mission Trails Regional Park, San Diego; 32.8347° N, 117.0758° W; 22 Aug. 2023; M.K. James obs.; iNaturalist record #179755886 • 1 ♀; Santee, San Diego County; 14 Aug. 2020; B.J. Stacey obs.; iNaturalist record #69844452. – **Texas** • 1 ♀; Ector County; May 2021; S.M. McCoshum obs.; iNaturalist record #147628875 • 1 ♀; Mills County; 9 Apr. 2022; R. Pfau obs.; iNaturalist record #111471058 • 1 ♀; Road to Dry Creek Lake, Briscoe County; 3 Sep. 2020; C.C. Galley obs.; iNaturalist record #59724169.

Redescription

Measurements of holotype. Body length 8.6 mm; ITW 2.1 mm; head length 2.6 mm; head width 3.5 mm; fore wing length 8.2 mm.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with apical third golden yellow. Mandible with basal two-thirds, labrum along apical and lateral margins, scape and pedicel to some extent, F1 extensively, pronotal lobe in some non-type specimens, tegula, coxae to some extent, trochanters and femora predominantly to entirely, and tibiae and tarsi entirely orange. F2 with orange spot basally. Fore wing membrane subhyaline, apically dusky. Hind wing membrane dusky subhyaline to hyaline. Metasomal terga laterally, pygidial plate to some extent, and metasomal sterna to some extent reddish brown.

Pubescence. Face with tomentum densest around antennal socket. Tomentum slightly sparser on clypeus; upper paraocular and frontal areas and vertexal area mostly exposed. Pronotal collar with tomentum uniformly pale yellow (off-white in some non-type specimens). Mesoscutum with well-defined paramedian band of pale-yellow tomentum (off-white in some non-type specimens), tapering

slightly toward but not attaining anterior margin; pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with off-white to pale-yellow, appressed, branched setae; densely setose except for two sparsely setose circular patches (one beneath base of fore wing (hypoepimeral area) and slightly larger one in ventrolateral half of mesopleuron). Metanotum with tomentum uninterrupted, uniformly pale yellow (off-white in some non-type specimens). Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. T1 with basal and apical transverse bands of off-white to pale-yellow tomentum interrupted medially (former more widely than latter) and subparallel, discal patch trapezoidal. T2–T4 with complete apical transverse bands of off-white to pale-yellow tomentum, those of T2–T3 medially somewhat removed from apical margins of terga, that of T2 with pair of basomedially convergent anterolateral extensions. S2–S3 with apical transverse bands of white tomentum.

Surface sculpture. Labrum coarsely and densely (most $i < 1d$) rugose-punctate. Clypeus densely punctate (most $i < 1d$) but interspaces well defined, shining. Vertexal area somewhat sparsely punctate (some $i > 2d$), especially around ocelli. Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense and nearly contiguous (most $i < 1d$). Mesopleuron with punctures in upper half nearly contiguous and denser ($i < 1d$) than in ventrolateral half ($i \leq 2d$); interspaces shining where punctures not contiguous; punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense ($i \approx 1d$), and evenly distributed; interspaces shining somewhat.

Structure. Labrum with pair of small subapical denticles, each preceded by discrete longitudinal ridge. Pronotal collar rather short (medial length ~3/5 MOD). Mesoscutellum moderately bigibbous. Axilla extending little if at all beyond midlength of mesoscutellum; tip distinctly pointed, but mesally unattached to mesoscutellum for less than 2/5 medial length of axilla; lateral margin relatively straight. Fore wing with three submarginal cells.

Female

T5 with concave apical margin and large patch of off-white to pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with underlying integument to some extent reddish orange in some non-type specimens, with triangular region of posteriorly directed setae with three subregions (basal patch of dense, golden setae; darker subapical band of sparser, coppery brown setae; and apical row of dense, suberect, silvery setae; poorly differentiated in some non-type specimens) within larger trapezoidal space of posteromedially directed coppery brown setae. Pygidial plate apically truncate. S4 with apical transverse band of white tomentum. S5 straight in lateral view, with apical fimbria of coppery bristle-like setae and brown tomentum laterally if not throughout; S5 otherwise covered in off-white tomentum.

Male

T5 with complete apical transverse band of pale-yellow tomentum. T6 with small posteromedial patch of off-white tomentum. Pygidial plate relatively flat and apically rounded. S4–S5 each with apical/subapical fringe of dense, long (>1 MOD), curved setae, those of S4 coppery to silvery, those of S5 coppery and contrasting with apical transverse bands of white tomentum of preceding sterna.

Distribution

Southern Great Plains to California and western Mexico (Fig. 12N).

Ecology

Host records

Unknown.

Floral records

Cockerell (1900, 1929), images on iNaturalist, and labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Apocynaceae, *Asclepias* sp.; in Asteraceae, *Aster* sp., *Baccharis* sp., *B. salicina*, *Bidens* sp., *Carthamus tinctorius*, *Encelia palmeri* Vasey & Rose, *Gaillardia pulchella*, *Grindelia pulchella* Dunal, *Gutierrezia californica* (DC.) Torr. & A.Gray, *G. sarothrae*, *Haplopappus* sp. or spp., *Helenium amarum* (Raf.) H.Rock, *Heterotheca* sp., *H. subaxillaris* (Lam.) Britton & Rusby, *Isocoma menziesii* (Hook. & Arn.) G.L.Nesom, *I. pluriflora*, *Pectis papposa* Harv. & Gray, *Pluchea sericea* (Nutt.) Coville, *Ratibida columnifera* (Nutt.) Wooton & Standl., *Rudbeckia* sp., *Solidago* sp., *Symphyotrichum* sp., *Tetraneuris linearifolia* Greene, *Verbesina* sp. or spp., *Xanthisma gracile* (Nutt.) D.R.Morgan & R.L.Hartm., and *X. spinulosum* (Pursh) D.R.Morgan & R.L.Hartm.; in Boraginaceae, *Heliotropium* sp. or spp.; in Brassicaceae, *Lepidium* sp. or spp.; in Cleomaceae Bercht. & J.Presl, *Wislizenia* sp.; in Fabaceae, *Acacia* sp., *Dalea candida* Willd., *Medicago sativa* L., *Melilotus albus*, *Phaseolus* sp., *Pithecellobium* sp., and *Trifolium repens*; in Lamiaceae, *Marrubium vulgare* L., *Monarda* sp., and *M. citriodora* Cerv. ex Lag.; in Malvaceae, *Sphaeralcea* sp.; in Polygonaceae, *Eriogonum fasciculatum* Benth.; in Tamaricaceae, *Tamarix* sp.; in Verbenaceae, *Lippia* sp.; and in Zygophyllaceae, *Kallstroemia grandiflora*.

Remarks

In the original description of *E. permixtus*, Cockerell (1923) did not mention *T. segregatus*, having misidentified the two female and two male representatives as an *Epeolus* based on the presence of two (as opposed to three) maxillary palpomeres, which is not diagnostic for either genus (Rightmyer 2004), and instead compared them to *Triepeolus dacotensis* (as *E. dacotensis*), which is a visibly different bee, and *T. concinnus* Cockerell, 1917, a name that has since been synonymized under *T. townsendi* Cockerell, 1907 (Rightmyer 2008), which he described as superficially similar but with a much larger pseudopygidial area.

In the original description of *T. brunnescens*, Cockerell & Sandhouse (1924) did not mention *T. segregatus* and instead compared the (male) holotype to *T. brunneus* Cockerell, 1921, a name that has since been synonymized under *T. balteatus* Cockerell, 1921 (Rightmyer 2008), which the authors described as easily distinguishable "by the pleura and pattern of abdomen", *Triepeolus balteatus* is more easily separated from the holotype of *T. brunnescens* (and all other *Triepeolus*) by the presence of a pair of curved, clasper-like structures near the bases of the metacoxae.

In the original description of *T. pacis*, Cockerell (1925b) did not mention *T. segregatus* or *T. brunnescens* and instead compared the (male) holotype to *T. blaisdelli* Cockerell & Sandhouse, 1924, to which *T. pacis* was said to be related, *T. mensae* Cockerell, 1924, and *T. norae* Cockerell, 1907. The (male) holotypes of *T. blaisdelli* (CAS 1603) and *T. mensae* (CAS 1607) were examined and recognized as members of the *verbesinae* species group; as in most Nearctic species in the *T. verbesinae* group, in both specimens the propodeal triangle is mostly covered in dense, appressed pale setae (as opposed to mostly glabrous, with (pale) setae restricted to small lateral patches). The pseudopygidial area of the (female) holotype of *T. norae* is subtriangular (with the apical margin of T5 slightly convex), confirming the placement of this species outside the *T. simplex* group.

In the original description of *E. sarothrinus*, Cockerell (1929) compared the (female) holotype to *E. lectiformis*, which is herein established as a junior synonym of *T. rhododontus* (vide supra), and *E. permixtus*, with which *E. sarothrinus* was said to have evident affinity but differing "by [*E. permixtus*] being distinctly larger and more robust, [with] the eyes much larger and very much darker, the antennae stouter and the apical plate broader". However, Cockerell (1929) added that "it may later seem expedient to treat [*E. sarothrinus*] as a northern race of *E. permixtus*". Cockerell (1929) described a variety of *E. sarothrinus* under the name *confluens* based on a male (the holotype) in which the paramedian

bands are anteriorly joined to lateral transverse bands of pale tomentum along the anterior margin of the mesoscutum, the pro- and metafemora are partially brown, the T1–T2 apical transverse bands are complete, and the pygidial plate is less obtuse.

Barcoded specimens resembling the types of *E. occidentalis* var. *segregatus*, *E. permixtus*, *T. brunnescens*, *T. pacis*, *E. sarothrinus*, and *E. sarothrinus* var. *confluens* were assigned to three BINs—BOLD:AAG7909, BOLD:AEI6013, and BOLD:AFP1028—which appear in two widely separated clusters (with a minimum distance of 3.9%) in a neighbor-joining tree that includes all available sequences of species in the *T. simplex* group (Supp. file 4). The BIN BOLD:AFP1028 includes specimens that were previously assigned to the BIN BOLD:AAG7909 (its nearest neighbor), from which it was split in a subsequent iteration of the RESL clustering algorithm despite exhibiting a barcode sequence divergence of only 1.0%. The sequences in these two BINs cluster together closely (Supp. file 4). The BIN BOLD:AEI6013 exhibits a larger barcode sequence divergence (of 5.3% (p-dist)) from its nearest neighbor BIN (BOLD:AFP1028) in the aforementioned cluster. The sequences in both clusters lack in-frame stop codons, have a similar mean GC content (25.0%, SE ± 0.2 for BINs BOLD:AAG7909+BOLD:AFP1028; 23.3%, SE ± 0.2 for BIN BOLD:AEI6013), and strong AT-bias in the third codon position (95.3%, SE ± 0.2 for BINs BOLD:AAG7909+BOLD:AFP1028; 94.7%, SE ± 0.2 for BIN BOLD:AEI6013). However, there are four specimens for which barcoding attempts at the CBG failed (BOLD sample IDs: CCDB-24584 D10, CCDB-24584 D12, CCDB-30384 E02, and CCDB-30384 E10; see Supp. file 1 for specimen and vouchering information). Examination of the associated trace files and their reassembly into consensus sequences, which were aligned, revealed stop codons in every reading frame in all four sequences and indels in one. Although these are clearly non-target sequences, they were matched with 97.7–98.9% similarity to the same sequence (BOLD sample ID: CMNTO_025) in BIN BOLD:AFP1028 and cluster more closely to the sequences in this cluster than any other. The sequences of another four (male) specimens that closely resemble the allotype of *T. apache* (BOLD sample IDs: CMNTO_485, CMNTO_487, CMNTO_488, and CMNTO_489) unexpectedly appeared in this cluster and are thus listed here as *T.* cf. *segregatus*. If these specimens are heterospecific as suggested by their morphology, the observed low sequence divergence from *T. segregatus* in this cluster could be explained by the possible sequencing of conserved nuclear mitochondrial pseudogenes (numts) mistaken for COI sequences. Françoso *et al*. (2019) found very similar numts (1.2% divergence) that coincided with highly divergent COI sequences (16.5% divergence) in two species of *Tetragonula* Moure, 1961 (Hymenoptera: Apidae: Apinae) stingless bees. Thus, of the three BINs available for *T. segregatus*, it is possible if not probable that BINs BOLD:AAG7909 and BOLD:AFP1028 are comprised of COI paralogs (numts) despite those sequences having been designated as barcode compliant. In any event, the placement of any sequences in this cluster should be treated cautiously for identification purposes.

Further complicating the treatment of these MOTUs as separate species is that barcoded specimens from the two groups cannot reliably be told apart morphologically. For example, although there is pronounced variation among specimens in mesopleural puncture density, with punctures ranging from nearly contiguous throughout to separated by > 2d ventrolaterally, specimens whose sequences comprise separate MOTUs exhibit considerable overlap with respect to this feature. Specifically, those with sequences in the cluster to which the BINs BOLD:AAG7909 and BOLD:AFP1028 were assigned exhibit continuous variation in mesopleural puncture density, with punctures ranging from nearly contiguous throughout to separated by > 2d ventrolaterally, whereas in those with sequences corresponding to BIN BOLD:AEI6013 the mesopleura are sparsely punctate ventrolaterally (many i > 2d). In the holotypes of *E. permixtus*, *T. brunnescens*, *T. pacis*, *E. sarothrinus*, and *E. sarothrinus* var. *confluens*, the mesopleura are finely rugose-punctate, each with the punctures more or less equally dense throughout (most i < 1d), which is typical of (but not exclusive to) specimens from the Californias. Specimens from Arizona to Texas exhibit greater variation in mesopleural puncture density, even locally. For example, in the AMNH collection there are non-barcoded specimens taken from the same locality (the Southwestern Research

Station near Portal, Arizona) in which the mesopleura range from finely and densely to coarsely and sparsely punctate. In the holotype of *E. occidentalis* var. *segregatus*, the mesopleura are somewhat more coarsely and sparsely punctate (most i≤1d) than in the aforementioned types, but the specimen does not more obviously resemble barcoded specimens of one haplotype than the other in this or any other regard.

In specimens from Texas and adjacent Mexico, for which DNA barcode sequences are presently unavailable, the pronotal lobes are more commonly orange (as opposed to entirely black) and the metasomal tergal bands are typically (but not always) off-white (as opposed to yellow). Although these and the aforementioned examples of pronounced morphological variation as well as available DNA barcode data suggest the possibility of a cryptic species complex, it is not clear if or where species limits should be drawn. Thus, given the apparent lack of morphological or geographic support for each of the MOTUs, the unusual clustering of available barcode sequences (see Supp. file 4), and that it is possible for real species to have split (i.e., multiple) BINs (Ratnasingham & Hebert 2013), they are herein regarded as representing a single, highly variable species in which intraspecific barcode sequence divergence is greater than might normally be expected among conspecifics, assuming that none of the sequences are of nuclear paralogous copies of the COI gene as discussed above. Additionally, as there are no discernable morphological differences among the holotypes of *E. occidentalis* var. *segregatus*, *E. permixtus*, *T. brunnescens*, *T. pacis*, *E. sarothrinus*, and *E. sarothrinus* var. *confluens* that fall outside the range of variation observed among both barcoded and non-barcoded specimens, *E. permixtus*, *T. brunnescens*, *T. pacis*, *E. sarothrinus*, and *E. sarothrinus* var. *confluens* are herein synonymized under *T. segregatus*.

Triepeolus shoshone sp. nov.
urn:lsid:zoobank.org:act:E7F437ED-E934-4E01-9FCC-3151D1C3EF6F
Figs 12O, 15F, 30

Proposed common name

Shoshone triepeolus.

Diagnosis

The following morphological features in combination tell *T. shoshone* sp. nov. apart from all other *Triepeolus* in the *simplex* species group except *T. apache* sp. nov.: the T1 basal band forms an inflexed arch and is thus gradually narrowed but not completely interrupted medially, such that the discal patch has a short, narrowed (i.e., inverted V-shaped) anteromedial projection (Figs 15F, 30B), and the legs are entirely reddish orange from trochanters to tarsi (Fig. 30A–C). Whereas in *T. apache* the T1 apical transverse band is interrupted or (less commonly) at least narrowed medially and the T2 apical transverse band is narrowed or interrupted medially, in *T. shoshone* T2 and usually also T1 have complete apical transverse bands (Figs 15F, 30B). Although it might not be possible to separate certain individuals morphologically, throughout most of its range *T. shoshone* can be separated from *T. apache* by geography; the former is a northern species whose known range extends from northern Arizona and northern New Mexico to Western Canada whereas the latter is a southern species known only from the Southwestern United States and adjacent Mexico.

Etymology

This species is named for the Shoshone people, whose traditional territory spans much of its known range.

Material examined

Primary type material

USA • ♀, holotype; Utah, Hwy 491, San Juan County; 37.8350° N, 109.1110° W; 27 Jul. 2007; J. Gibbs and C.S. Sheffield leg.; BOLD sample ID: CMNTO_063; PCYU PCYU-GS-07:2170.

Secondary type material

CANADA – **Alberta** • 1 ♀, paratype; 6 km E of Writing-on-Stone Provincial Park (at bridge); 12 Aug. 1982; D.B. McCorquodale leg.; RAM • 1 ♀, paratype; Lethbridge; 9 Aug. 1921; H.L. Seamans leg.; CNC 753877 • 2 ♀♀, paratypes; Medicine Hat; 17 Jul. 1917; Sladen leg.; CNC 753824, 753826. – **British Columbia** • 1 ♀, paratype; Fernie; 3 Aug. 1963; G. Bohart and P. Torchio leg.; BBSL BBSL522497. – **Saskatchewan** • 1 ♀, paratype; Grasslands National Park; 49.1371° N, 107.6149° W; 25 Jul. 1996; A.T. Finnamore leg.; RAM PMAE 17947 • 1 ♀, paratype; Grasslands National Park; 49.1643° N, 107.4351° W; 23 Jul. 1996; A.T. Finnamore leg.; RAM PMAE 16026 • 1 ♀, paratype; Maple Creek Golf Course; 49.9021° N, 109.4654° W; 13 Jul.–9 Aug. 2018; RSM Bee Team leg.; BOLD sample ID: CCDB-38770 B12; RSKM RSKM_ENT_E-208865 • 1 ♀, paratype; Near Avonlea; 50.0240° N, 104.9650° W; 7 Jul. 2017; G. Wihlidal leg.; RSKM RSKM_ENT_E-172173 • 1 ♀, paratype; near Avonlea Badlands; 50.0229° N, 104.9842° W; 29 Jul. 2016; C.S. Sheffield leg.; BOLD sample ID: CCDB-25139 G11; RSKM RSKM_ENT_E-185221.

USA – **California** • 1 ♀, paratype; Turlock, Stanislaus County; 1 Sep. 1953; R.R. Snelling leg.; USNM • 1 ♀, paratype; same data as for preceding; 18 Apr. 1957; R.R. Snelling leg.; USNM. – **Colorado** • 2 ♀♀, paratypes; C.F. Baker leg.; USNM • 1 ♀, paratype; Costilla County; Jul. ??20; S. McCampbell leg.; CSUC • 1 ♀, paratype; Denver; 19 Jun. 1917; E.C. Jackson leg.; USNM. – **Idaho** • 2 ♀♀, paratypes; 4 mi W of Homedale, Owyhee County; 21 Jul. 1959; W.F. Barr leg.; BBSL BBSL Faunal Survey Nos 000 086 098, 000 086 099 • 1 ♀, paratype; Boise; 15 Jun. 1941; CAS • 1 ♀, paratype; Grand View; 27 Jul. 1926; R.W. Haegele leg.; USNM • 1 ♀, paratype; Hot Springs, Owyhee County; 5 Jul. 1956; W.F. Barr leg.; USNM • 1 ♀, paratype; Melba; 18 Jun. 1926; R.W. Haegele leg.; USNM • 1 ♀, paratype; Oreana; 25 Jun. 195?; A.R. Gittins leg.; BBSL BBSL Faunal Survey No. 000 086 097 • 5 ♀♀, paratypes; Parma, Canyon County; 12 Jul. 1966; G.E. Bohart leg.; BBSL BBSL Faunal Survey Nos 000 086 100 to 000 086 104 • 1 ♀, paratype; same data as for preceding; 12 Jul. 1966; G.E. Bohart leg.; BBSL BBSL582464. – **Montana** • 2 ♀♀, paratypes; ANSP. – **Nevada** • 1 ♀, paratype; 2 mi N of Nixon, Washoe County; 16 Jun. 1972; J.D. Pinto leg.; UCR UCRC ENT 57154 • 5 ♀♀, paratypes; 4 mi N of Nixon, Washoe County; 7 Jun. 1996; F.D. Parker leg.; BBSL BBSL581745, BBSL581746, BBSL581758, BBSL581762, BBSL581833 • 1 ♀, paratype; Beowawe, Eureka County; 30 Jul. 1969; R.M. Bohart leg.; UCBME • 1 ♀, paratype; Fallon; 18 Jun. 1930; E.L. Bell leg.; AMNH • 1 ♀, paratype; Nixon, Washoe County; 20 Jun. 1927; E.P. Van Duzee leg.; CAS • 1 ♀, paratype; same data as for preceding; 24 Jun. 1964; D.F. Veirs leg.; BBSL BBSL522486 • 1 ♀, paratype; same data as for preceding; 24 Jun. 1964; J.E. Slansky leg.; UCBME M.G.R. Database No. 1209 • 1 ♀, paratype; same data as for preceding; 24 Jun. 1964; R.M. Bohart leg.; UCBME • 1 ♀, paratype; Orovada, Humboldt County; 14 Jul. 1962; M.E. Irwin leg.; UCBME • 2 ♀♀, paratypes; Pyramid Lake, Washoe County; 25 Jun. 1970; B.L. Villegas leg.; UCBME • 1 ♀, paratype; same data as for preceding; 25 Jun. 1970; R.M. Bohart leg.; UCBME • 1 ♀, paratype; Sand Pass, Washoe County; 7 Aug. 1957; R.C. Bechtel leg.; FSCA • 1 ♀, paratype; Winnemucca, Humboldt County; 24 Jun. 1973; P.F. Torchio leg.; BBSL BBSL522487. – **New Mexico** • 2 ♀♀, paratypes; Koehler; 1 Aug. ??14; W.R. Walton leg.; USNM. – **Oregon** • 1 ♀, paratype; 5 mi NW of Adrian, Malheur County; 25 Jun. 1958; R.K. Eppley leg.; BBSL BBSL Faunal Survey No. 000 086 096 • 1 ♀, paratype; 6 mi S of Adrian, Malheur County; 28 Jul. 1957; R.K. Eppley leg.; BBSL BBSL Faunal Survey No. 000 086 095 • 1 ♀, paratype; Klamath Avenue (SW of Nyssa), Malheur County; 6 Sep. 1957; R.K. Eppley leg.; BBSL BBSL Faunal Survey No. 000 086 094 • 7 ♀♀, paratypes; Ontario; 2 Aug. 1929; H.A. Scullen leg.; BBSL BBSL Faunal Survey Nos 000 086 087 to 000 086 093. – **South Dakota** • 1 ♀, paratype; Cave Hills; 22 Jul. 1928; H.C. Severin leg.; USNM M.G.R. Database No. 1374. – **Utah** • 3 ♀♀, paratypes; 12 mi NW of Fillmore, Millard County; 20 Jun. 1972; F. Parker and D. Vincent leg.; BBSL BBSL522489 to BBSL522491 • 1 ♀, paratype; 3 mi W of Hatton; 3 Jun. 1959; BBSL BBSL522484 • 1 ♀, paratype; Gandy; Apr. 1949; G.E. Bohart leg.; BBSL BBSL522485 • 3 ♀♀, paratypes; Hwy 491, San Juan County; 37.8350° N, 109.1110° W; 27 Jul. 2007; J. Gibbs and C.S. Sheffield leg.; PCYU PCYU-GS-07:2171, PCYU-GS-07:2173, PCYU-GS-07:2181 • 1 ♀, paratype;

Sinbad Country (E of Block Mountain), Emery County; 24 Jul. 1981; Parker, Veirs, and Griswold leg.; BBSL BBSL224656. – **Wyoming** • 2 ♀♀, paratypes; Grand Teton National Park; Jul. ??37; BBSL BBSL Faunal Survey Nos 000 086 085, 000 086 086 • 1 ♀, paratype; Sheridan Local Training Area, Sheridan County; 10 Jul. 2000; B.C. Kondratieff, P.M. Pineda, and H. Al-Dhafer leg.; CSUC.

DNA barcoded material

Available. BIN: BOLD:ADH5866. See type material for specimens examined and sequenced (indicated by unique BOLD sample ID).

Description

Measurements of holotype. Body length 9.8 mm; ITW 2.3 mm; head length 2.6 mm; head width 3.6 mm; fore wing length 8.2 mm (margins of both worn).

Female

Integument coloration. Dark brown to black except as follows. Mandible with apical third golden yellow (entirely dark brown/black in some paratypes). Mandible with basal two-thirds; labrum along apical and lateral margins; scape, pedicel, and F1 extensively; succeeding flagellomeres to some extent; tegula; coxae to some extent; trochanters to tarsi (excluding brown meso- and metatibial spurs) entirely; metasomal terga laterally; and pseudopygidial area with underlying integument, pygidial plate, and metasomal sterna to some extent reddish orange. Fore wing membrane subhyaline, apically dusky. Hind wing membrane dusky subhyaline to hyaline.

Pubescence. Face with tomentum densest around antennal socket. Clypeus, upper paraocular and frontal areas, and vertexal area mostly exposed. Pronotal collar with tomentum uniformly pale yellow. Mesoscutum with well-defined paramedian band of pale-yellow tomentum, tapering slightly toward but not attaining anterior margin; pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with off-white to pale-yellow, appressed, branched setae; upper half densely setose, except behind pronotal lobe, with setae slightly sparser on hypoepimeral area; ventrolateral half sparsely setose. Mesopleuron with sparse, pale-yellow, erect/suberect, simple setae (less than ½ MOD in length) in addition to usual appressed, branched setae. Metanotum with tomentum uninterrupted, uniformly pale yellow. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. Metasomal terga with bands of pale-yellow tomentum. T1 with apical transverse band complete (narrowly interrupted medially in some paratypes), transverse bands subparallel, discal patch transversely oblong or trapezoidal with short, narrowed (i.e., inverted V-shaped) anteromedial projection. T2–T4 with complete apical transverse bands, those of T2–T3 medially somewhat removed from apical margins of terga, that of T2 with pair of basomedially convergent anterolateral extensions. T5 with large patch of pale-yellow tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with triangular region of posteriorly directed setae with three subregions (basal patch of dense, golden setae; darker subapical band of sparser, coppery brown setae; and apical row of dense, suberect, silvery setae) within larger trapezoidal space of posteromedially directed coppery brown setae. S2–S3 with apical transverse bands of white tomentum (ill-defined and/or reduced to posterolateral patches in holotype and some paratypes). S4 with apical transverse band of white tomentum. S5 with apical fimbria of coppery bristle-like setae.

Surface sculpture. Labrum coarsely and densely (most $i < 1d$) rugose-punctate. Clypeus densely punctate (most $i \leq 1d$) but interspaces well defined, shining; with many small punctures among larger ones. Vertexal area somewhat sparsely punctate (some $i > 2d$), especially around ocelli. Mesoscutum, mesoscutellum, and axilla with punctures more or less equally dense (most $i \leq 1d$); interspaces well defined, shining. Mesopleuron with punctures in upper half nearly contiguous and denser ($i < 1d$) than in ventrolateral half ($i \leq 2d$); interspaces shining where punctures not contiguous; punctures similar in

size throughout. Discs of metasomal terga with punctures very fine, dense (i≈1d), and evenly distributed; interspaces shining somewhat.

Structure. Labral apex with pair of small denticles, each preceded by longitudinal carina. Pronotal collar short (medial length ~½ MOD). Mesoscutellum weakly bigibbous. Axilla extending little if at all beyond midlength of mesoscutellum; tip distinctly pointed, but mesally unattached to mesoscutellum for less than $^{2}/_{5}$ medial length of axilla; lateral margin relatively straight. Fore wing with three submarginal cells. T5 with concave apical margin. Pygidial plate apically truncate. S5 straight in lateral view.

Male

Unknown.

Distribution

Western United States and adjacent Canada (Fig. 12O).

Ecology

Host records

Unknown.

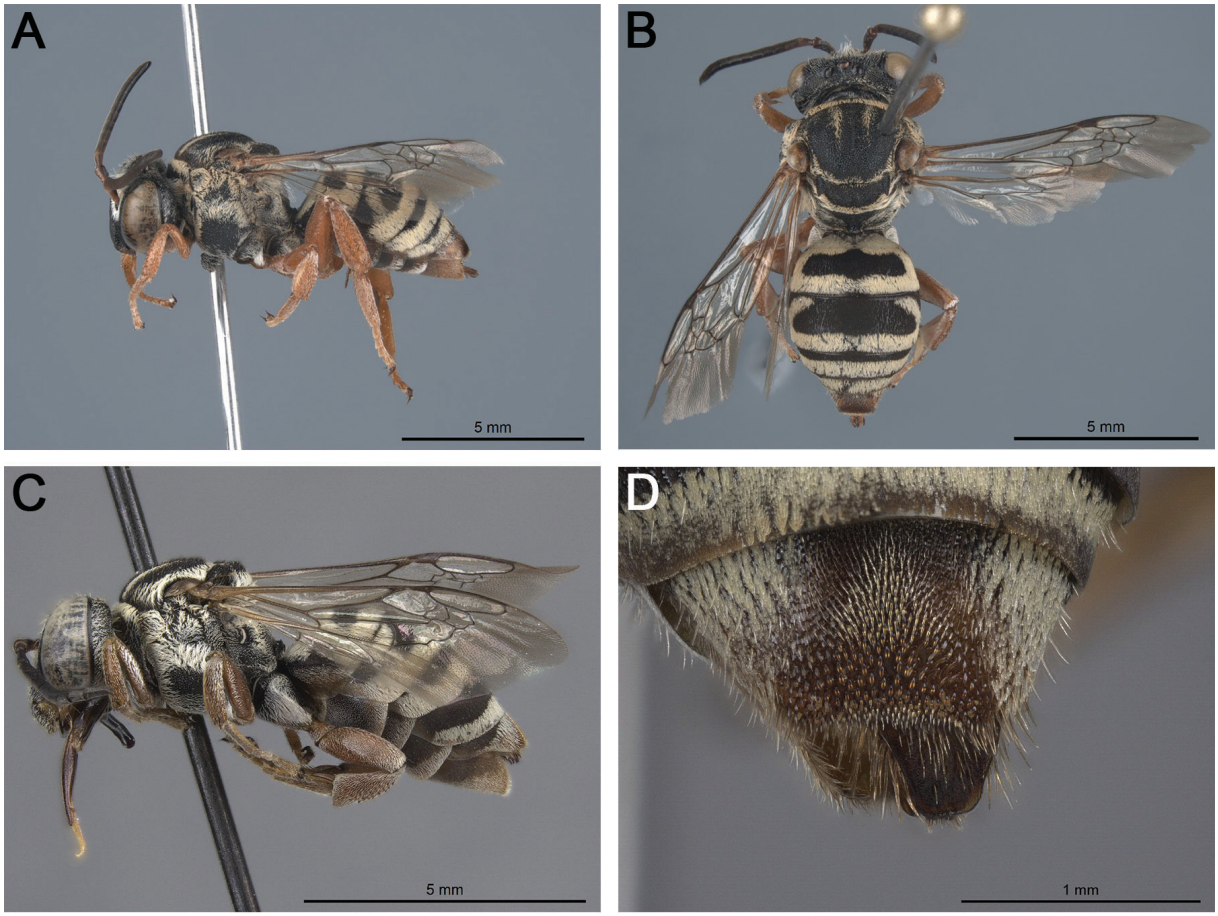

Fig. 30. *Triepeolus shoshone* sp. nov. **A**–**B**. Holotype, ♀ (BOLD sample ID: CMNTO_063; PCYU PCYU-GS-07:2170). **A**. Habitus, lateral view. **B**. Habitus, dorsal view. **C**. Paratype, ♀ (RAM PMAE 16026), habitus, lateral view. **D**. Paratype, ♀ (PCYU PCYU-GS-07:2173) pseudopygidial area, dorsal view.

Floral records

Labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Asteraceae, *Centromadia pungens* Greene and *Tetradymia canescens* DC.; in Cleomaceae, *Cleomella* sp.; in Fabaceae, *Melilotus albus*; in Grossulariaceae DC., *Ribes* sp.; and in Tamaricaceae, *Tamarix* sp. or spp. and *T. gallica* L.

Remarks

Triepeolus shoshone sp. nov. is very similar to *T. apache* sp. nov., and the two cannot be consistently separated morphologically (see Remarks under *T. apache* for information pertaining to their treatment as separate species).

Triepeolus simplex Robertson, 1903
Figs 10A, 12P, 18D, 31

Triepeolus simplex Robertson, 1903: 285 (♀, ♂).

Triepeolus simplex – Mitchell 1962: 483 (redescription). — Webb 1980: 110 (♀) (lectotype designation by W.E. LaBerge).

Proposed common name

Simple triepeolus.

Diagnosis

Unique to *T. simplex* within the *simplex* species group is the presence of only short, straight setae (as opposed to an apical/subapical fringe of dense, long (>1 MOD), curved setae) on the male S5 (Figs 10A, 31C). Otherwise, the following morphological features in combination tell both sexes of *T. simplex* apart from all other species of *Triepeolus*: the clypeus does not have a glabrous midline (Supp. file 2: Fig. S25C); the T1 discal patch is trapezoidal or almost semicircular (Fig. 31B); T2–T4 have apical transverse bands of pale tomentum that are clearly not as broad as the bands on T1 and do not have basomedially convergent anterolateral extensions (Fig. 31A–C); and the T2–T3 apical transverse bands are yellow and somewhat removed from the apical margins of the terga whereas the T4 apical transverse band is off-white and on or very little removed from the apical margin of the tergum (Figs 10A, 31A–C). Males of *T. simplex* are very similar in overall appearance to those of *T. lunatus* (Say, 1824) (outside of the *simplex* species group), but in males of *T. lunatus* both S4 and S5 each have an apical/subapical fringe of dense, long (>1 MOD), curved setae and in both sexes the clypeus has a well-defined glabrous midline that extends most if not all of its length.

Etymology

The specific epithet is a Latin adjective meaning ‘simple,’ but it is not clear from the original description why Robertson (1903) chose this name.

Material examined

Primary type material

USA • ♀, lectotype; Illinois, Carlinville, Macoupin County; 14 Aug. 1896; C.A. Robertson leg.; INHS 62277.

Secondary type material

USA • 1 ♂, lectoallotype; Illinois, Carlinville, Macoupin County; 7 Aug. 1897; C.A. Robertson leg.; INHS 62278.

DNA barcoded material

Available. BIN: BOLD:AAW8070. Specimens examined and sequenced:

CANADA • 1 ♂; Ontario, Queen's University Biological Station; 3 Aug. 2005; Forney and Gravel leg.; BOLD sample ID: QUBS0291G11; PCYU.

USA – **Michigan** • 1 ♀; Flynn Township Nature Center, Sanilac County; 43.2670° N, 82.9480° W; 4 Aug. 2018; T.J. Wood leg.; BOLD sample ID: CMNTO_158; WRME JBWM0398680. – **North Carolina** • 1 ♀; Nellie (near Cataloochee), Great Smoky Mountains National Park, Haywood County; 35.6249° N, 83.1139° W; 6 Aug. 2006; J. Gibbs and C.S. Sheffield leg.; BOLD sample ID: CMNTO_038; PCYU PYU-319. – **Oklahoma** • 1 ♀; Keystone Wildlife Management Area (Arkansas River), Osage County; 36.3066° N, 96.5221° W; 1 Jul. 2022; M.E. Powley leg.; BOLD sample ID: CMNTO_453; OKBS OKBS.POL.4927. – **Vermont** • 1 ♀; Intervale Community Farm, Burlington; 44.4955° N, 73.2072° W; 3 Sep. 2019; S. Hardy leg.; BOLD sample ID: CMNTO_097; VCE 4244.

Non-barcoded material

CANADA – **Ontario** • 1 ♀; near St-Albert; 45.2528° N, 75.2030° W; 25 Jul.–1 Aug. 2019; S. Cardinal leg.; CNC 1595850 • 1 ♀; Sixteen Mile Creek (near Hwy 407), Oakville; 19 Aug. 2004; M. Buck leg.; DEBU debu00240350 • 1 ♂; Centennial Park (Toronto); 43.6584° N, 79.5899° W; 28 Aug. 2019; S. MacKell leg.; PCYU.

USA – **Arkansas** • 2 ♀♀; Polk County; 21 Aug. 1928; A.M. James leg.; KUNHM M.G.R. Database Nos 4615, 4616. – **Georgia** • 1 ♂; Morrison; USNM M.G.R. Database No. 6638 • 1 ♀; SW of Watkinsville, Oconee County; 22 Aug. 1981; C.K. Starr leg.; USNM M.G.R. Database No. 1344. – **Illinois** • 1 ♀; Carlinville, Macoupin County; C.A. Robertson leg.; AMNH acc 38827/M.G.R. Database No. 3612. – **Indiana** • 1 ♂; Conrad, Newton County; 8 Jul. 2001; R.P. Jean leg.; RJC #3059/M.G.R. Database No. 6678. – **Iowa** • 1 ♀; Co. 3; 19 Aug. 1933; Barker leg.; USNM M.G.R. Database No. 5895. – **Kansas** • 1 ♀; 5 km E of Lawrence, Douglas County; 3 Sep. 1984; R. Brooks and C. Michener leg.; KUNHM M.G.R. Database No. 4608 • 1 ♀; 5 mi W of Lawrence, Douglas County; 10 Sep. 1950; J.R. White leg.; KUNHM M.G.R. Database No. 4601 • 1 ♀; 7 km E of Lawrence, Douglas County; 15 Aug. 1990; R.L. Minckley leg.; KUNHM M.G.R. Database No. 4605 • 1 ♀; Allen County; R.H. Beamer leg.; KUNHM M.G.R. Database No. 4612 • 1 ♀; Baldwin; USNM M.G.R. Database No. 6452 • 1 ♂; same data as for preceding; Jul.; Bridwell leg.; USNM M.G.R. Database No. 6639 • 1 ♂; same data as for preceding; Jul.; J.C. Bridwell leg.; USNM M.G.R. Database No. 6640 • 2 ♂♂; DeSoto; 13 Aug. 1952; W.E. LaBerge leg.; KUNHM M.G.R. Database Nos 4580, 4588 • 1 ♀; Douglas County; F.H. Snow leg.; KUNHM M.G.R. Database No. 3939 • 1 ♀; same data as for preceding; 30 Jul. 1949; C.D. Michener leg.; KUNHM M.G.R. Database No. 4600 • 2 ♂♂; same data as for preceding; 30 Jul. 1951; C.D. Michener leg.; KUNHM M.G.R. Database Nos 4579, 4582 • 1 ♂; same data as for preceding; 2 Aug. 1951; W.E. LaBerge leg.; KUNHM M.G.R. Database No. 4585 • 1 ♀; same data as for preceding; 16 Aug. 1951; W.E. LaBerge leg.; KUNHM M.G.R. Database No. 4604 • 1 ♀; same data as for preceding; 20 Aug. 1951; W.E. LaBerge leg.; KUNHM M.G.R. Database No. 4607 • 1 ♂; same data as for preceding; 18 Aug. 1955; C.W. Rettenmeyer leg.; KUNHM M.G.R. Database No. 4589 • 1 ♂; Lawrence, Douglas County; 23 Jul. 1949; Michener and Rozen leg.; AMNH M.G.R. Database No. 3611 • 1 ♀; same data as for preceding; 9 Aug. 1950; J.R. White leg.; KUNHM M.G.R. Database No. 4598 • 2 ♂♂; same data as for preceding; 9 Aug. 1950; J.R. White leg.; KUNHM M.G.R. Database Nos 4581, 4583 • 2 ♂♂; same data as for preceding; 16 Aug. 1950; J.R. White leg.; KUNHM M.G.R. Database Nos 4584, 4587 • 1 ♀; same data as for preceding; 18 Aug. 1950; J.R. White leg.; KUNHM M.G.R. Database No. 4603 • 1 ♂; same data as for preceding; 18 Aug. 1950; J.R. White leg.; KUNHM M.G.R. Database No. 4591 • 1 ♀; same data as for preceding; 18 Aug. 1951; C.D. Michener leg.; KUNHM M.G.R. Database No. 4599 • 3 ♂♂; same data as for preceding; 11 Jun. 1954; Daly leg.; USNM M.G.R. Database Nos 1345 to 1347

• 2 ♀♀; Lawrence vicinity; 30 Jul. 1977; S. Laroca leg.; KUNHM M.G.R. Database Nos 1322, 4606 • 1 ♂; Ottawa; 20 Aug. 1950; C.D. Michener leg.; KUNHM M.G.R. Database No. 4590 • 1 ♂; Topeka; 3 Aug. 1950; C.D. Michener and J.R. White leg.; KUNHM M.G.R. Database No. 4592 • 1 ♀; University of Kansas Natural History Reservation, Douglas County; 22 Jul. 1960; KUNHM M.G.R. Database No. 4602. – **Louisiana** • 1 ♂; Logansport; 13 Aug. 1905; La. Crop Pest Commission leg.; USNM M.G.R. Database No. 6643. – **Maryland** • 1 ♀; Easton, Talbot County; 38.7683° N, 76.0754° W; 18 Jul. 2016; S.W. Droege leg.; BIML USGS-DRO 446669 • 3 ♂♂; Oxford, Talbot County; 38.6833° N, 76.1650° W; 11 Jul. 2018; S.W. Droege leg.; BIML USGS-DRO 536852, USGS-DRO 536888, USGS-DRO 536897. – **Michigan** • 1 ♀; Al Sabo Land Preserve (Kalamazoo); 42.2140° N, 85.6740° W; 29 Jul. 2017; T.J. Wood leg.; WRME JBWM0398679. – **Minnesota** • 1 ♀; Dumfries, Wabasha County; 13 Aug. 1960; J.R. Powers leg.; LACM M.G.R. Database No. 3613. – **Mississippi** • 1 ♂; USNM M.G.R. Database No. 6642 • 1 ♀; same data as for preceding; W.H. Ashmead leg.; USNM M.G.R. Database No. 1343 • 1 ♀; 7.3 km NE of Starkville, Oktibbeha County; 33.5100° N, 88.7369° W; 19 Jun. 2001; R. Brooks and T. Peterson leg.; KUNHM MISS1B01 002/M.G.R. Database No. 4614 • 1 ♂; same data as for preceding; 19 Jun. 2001; R. Brooks and T. Peterson leg.; KUNHM MISS1B01 002/M.G.R. Database No. 4597. – **Missouri** • 1 ♂; 12 mi E of Lebanon; 5 Aug. 1951; C.D. Michener leg.; KUNHM M.G.R. Database No. 4586 • 1 ♂; Atherton; Jul. 1954; W.M. Mann leg.; USNM M.G.R. Database No. 1349 • 1 ♂; same data as for preceding; Aug. 1954; W.M. Mann leg.; USNM M.G.R. Database No. 1348 • 1 ♀; Columbia; 5 Sep. 1967; F.D. Parker leg.; USNM M.G.R. Database No. 1342 • 1 ♀; Saline County (31 mi W of Boonville); 2 Jul. 1999; L. Packer leg.; PCYU • 1 ♂; St. Louis; 12 Aug. 1938; USNM M.G.R. Database No. 6641. – **Nebraska** • 1 ♀; West Point; 28 Jul. 1903; J.C. Crawford leg.; USNM M.G.R. Database No. 5893 • 1 ♀; same data as for preceding; 16 Aug. 1903; J.C. Crawford leg.; USNM Crawford no. 2268/M.G.R. Database No. 5894. – **North Carolina** • 1 ♀; North Carolina; USNM M.G.R. Database No. 1339 • 2 ♀♀; Edgecombe County; 28 Aug. 1996; W.A. Mangum leg.; KUNHM M.G.R. Database Nos 1340, 1341 • 1 ♂; same data as for preceding; 29 Aug. 1996; W.A. Mangum leg.; KUNHM M.G.R. Database No. 4596 • 1 ♀; Tuckasegee; 31 Aug. 1957; L.A. Kelton leg.; CNC. – **Oklahoma** • 1 ♂; Ardmore; 1 Jun. 1909; F.C. Bishopp leg.; USNM M.G.R. Database No. 5590 • 1 ♀; Keystone Wildlife Management Area (Arkansas River), Osage County; 36.3066° N, 96.5221° W; 1 Jul. 2022; M.E. Powley leg.; OKBS OKBS.POL.4924 • 1 ♀; Lake Texoma (2 mi E of Willis); Jun. 1965; R.M. Bohart leg.; UCBME M.G.R. Database No. 11682 • 1 ♂; Sequoyah National Wildlife Refuge, Sequoyah County; 35.4448° N, 95.0120° W; 5 Jul. 2022; M.E. Powley leg.; OKBS OKBS.POL.4958 • 1 ♀; Sequoyah National Wildlife Refuge, Sequoyah County; 35.4500° N, 95.0110° W; 26 Jun. 2023; S. O'Dell leg.; OKBS OKBS.POL.9870. – **South Carolina** • 1 ♂; Swansea; 8 Aug. 1911; F.K. Knab leg.; USNM M.G.R. Database No. 1410. – **Texas** • 5 ♂♂; 1877; J. Tosquinet leg.; IRSNB M.G.R. Database Nos 762 to 766 • 2 ♀♀; 16 mi E of Goliad; 7 May 1953; R.H. Beamer leg.; KUNHM M.G.R. Database Nos 4609, 4611 • 1 ♂; same data as for preceding; 7 May 1953; R.H. Beamer leg.; KUNHM M.G.R. Database No. 4594 • 1 ♀; Athens; 6 Aug. 1906; F.C. Bishopp leg.; USNM M.G.R. Database No. 1336 • 1 ♂; Bastrop; 11 May 1954; R.H. Beamer leg.; KUNHM M.G.R. Database No. 4595 • 1 ♂; Colorado County; 12 May 1922; G.O. Wiley leg.; KUNHM M.G.R. Database No. 4593 • 2 ♀♀; Giddings; 9 May 1954; R.H. Beamer leg.; KUNHM M.G.R. Database Nos 1423, 4610 • 1 ♀; Lytle, Atascosa County; 1 Jun. 1951; H.E. Evans leg.; KUNHM M.G.R. Database No. 4613 • 1 ♀; New Boston; 5 Jun. 1909; F.C. Bishopp leg.; USNM M.G.R. Database No. 1338 • 1 ♀; Paris; 5 Aug. 1904; F.C. Bishopp leg.; USNM M.G.R. Database No. 1335 • 1 ♀; Willis; 19 Jun. 1903; Bridwell leg.; USNM M.G.R. Database No. 1337. – **Virginia** • 1 ♂; Blandy Station; 1 Jul. 2008; M. Vandyke leg.; BIML • 1 ♂; Rappahannock River Valley National Wildlife Refuge, Richmond County; 38.0129° N, 76.8874° W; 17–18 Aug. 2009; R. Coston leg.; BIML USGS-DRO 137886. – **West Virginia** • 4 ♀♀; Moncove Lake State Park, Monroe County; 37.6217° N, 80.3519° W; 30 Jul. 2008; S.M. Paiero leg.; DEBU debu01142283 to debu01142286 • 1 ♂; same data as for preceding; DEBU debu01142282.

Non-preserved material

CANADA – **Ontario** • 1 ♀; Lansdowne, Leeds and the Thousand Islands; 44.5110° N, 75.9933° W; 11 Aug. 2013; K. Hennige obs.; iNaturalist record #38798666 • 1 ♀; Tweed; 44.4810° N, 77.3179° W; 30 Jul. 2022; J. Bartok obs.; iNaturalist record #128803190.

USA – **Arkansas** • 1 ♂; Camp Robinson State Wildlife Management Area, Faulkner County; 5 Jun. 2023; "czlittle" obs.; iNaturalist record #165923253. – **Iowa** • 1 ♂; Polk City; 21 Aug. 2021; T. Grant obs.; iNaturalist record #92063440. – **New York** • 1 ♂; Gouverneur; 44.1185° N, 75.6767° W; 19 Jul. 2021; C. Wilson obs.; iNaturalist record #104480957 • 1 ♀; Tank Trail, Gouverneur; 44.0695° N, 75.6932° W; 13 Jul. 2021; C. Wilson obs.; iNaturalist record #104482815. – **South Dakota** • 1 ♀; North Alabama Bend Wildlife Area (Vermillion); 12 Jul. 2022; "stenthesnake" obs.; iNaturalist record #127900207. – **Wisconsin** • 1 ♀; Madison; 43.0886° N, 89.4304° W; 27 Jul. 2018; M. Nofsinger obs.; iNaturalist record #15114602 • 1 ♀; Sauk City; 19 Aug. 2021; "natureman98" obs.; iNaturalist record #100182955.

Redescription

Measurements of lectotype. Body length 10.9 mm; ITW 2.3 mm; head length 2.8 mm; head width 3.7 mm; fore wing length 8.5 mm (margins of both worn).

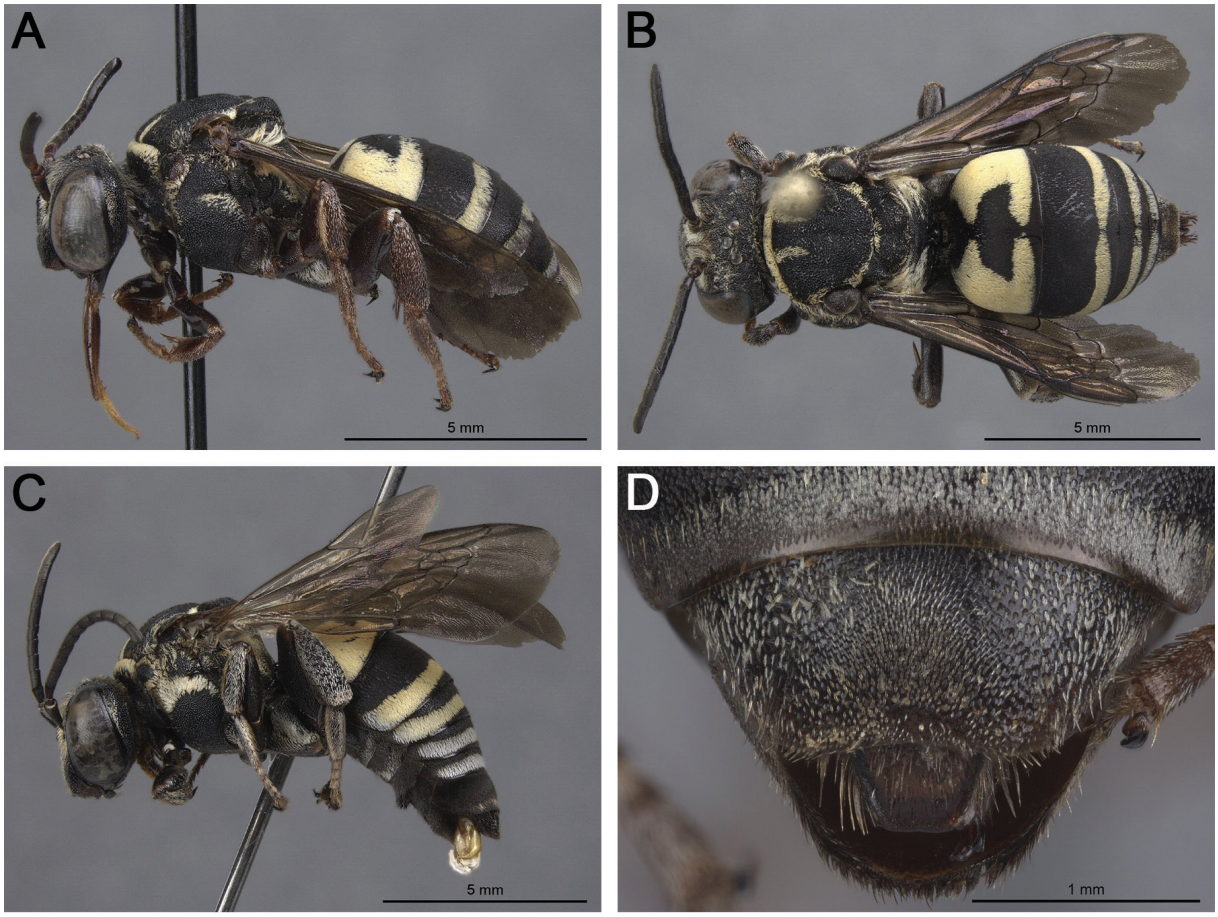

Fig. 31. *Triepeolus simplex* Robertson, 1903. **A**, **D**. Female (BOLD sample ID: CMNTO_038; PCYU PYU-319). **A**. Habitus, lateral view. **B**. Female (DEBU debu01142285), habitus, dorsal view. **C**. Male (BIML USGS-DRO 137886), habitus, lateral view. **D**. Pseudopygidial area, dorsal view.

Both sexes

Integument coloration. Dark brown to black except as follows. Mandible with apical half golden yellow and middle quarter in basal half reddish brown. Labrum partially, clypeus along lower margin, scape to some extent, and pedicel and F1 extensively orange. F2 with orange spot basally. Pronotal lobe to some extent in multiple non-type specimens, tegula, axilla with tip (entirely black in lectoallotype and multiple non-type specimens), coxae to tibiae to some extent, tarsi partially to entirely, metasomal terga laterally, pygidial plate, and metasomal sterna to some extent reddish brown. Fore wing membrane dusky subhyaline throughout, slightly darker beyond venation. Hind wing membrane dusky subhyaline to hyaline.

Pubescence. Face with tomentum densest around antennal socket. Clypeus, upper paraocular and frontal areas, and vertexal area mostly exposed. Pronotal collar with tomentum uniformly bright yellow. Mesoscutum with well-defined paramedian band of bright yellow tomentum attaining anterior margin; pale tomentum otherwise mostly restricted to lateral and posterior margins. Mesopleuron with pale-yellow, appressed, branched setae; densely setose only just below scrobal groove and along posterior margin above base of mesocoxa (upper half otherwise sparsely setose); ventrolateral half nearly bare. Metanotum with tomentum uninterrupted, pale yellow laterally and almost entirely black medially. Propodeal triangle mostly glabrous, with (pale) setae restricted to small lateral patches. T1 with basal and apical transverse bands of bright yellow tomentum interrupted medially and subparallel, lateral longitudinal band broader than apical transverse band, discal patch trapezoidal (semicircular in some non-type specimens). T1–T4 with apical transverse bands complete and medially somewhat narrowed and removed from apical margins of terga, that of T2 bright yellow and without anterolateral extensions (with pair of very short and small anterolateral extensions in some non-type specimens), that of T3 pale yellow, that of T4 off-white.

Surface sculpture. Labrum coarsely and densely (most $i < 1d$) rugose-punctate. Clypeus densely punctate (most $i < 1d$) but interspaces well defined, shining; with many small punctures among larger ones. Vertexal area densely punctate (most $i \leq 1d$). Mesoscutum, mesoscutellum, axilla, and mesopleuron with punctures more or less equally dense and nearly contiguous (most $i < 1d$). Mesopleuron with punctures similar in size throughout. Discs of metasomal terga with punctures very fine, dense ($i \approx 1d$), and evenly distributed; interspaces shining.

Structure. Labrum with pair of small subapical denticles, each preceded by discrete longitudinal ridge. Pronotal collar somewhat elongate (medial length ~¾ MOD). Mesoscutellum strongly bigibbous. Axilla extending beyond midlength of mesoscutellum but not as far back as its posterior margin; tip distinctly pointed, but mesally unattached to mesoscutellum for less than ⅓ medial length of axilla; lateral margin somewhat arcuate. Fore wing with three submarginal cells.

Female

T5 with concave apical margin and large patch of off-white tomentum on each side lateral to pseudopygidial area. Pseudopygidial area with triangular region of very short posteromedially directed golden setae. Pygidial plate apically truncate. S5 straight in lateral view, with apical fimbria of coppery bristle-like setae; metasomal sterna otherwise covered in brown tomentum.

Male

T5 with complete apical transverse band of off-white tomentum. T6 with small posteromedial patch of off-white tomentum in lectoallotype (absent in multiple non-type specimens). Pygidial plate apically rounded and slightly downturned, with basal transverse ridge rather ill-defined and lateral margin sinuate. S2–S3 with medially widely interrupted apical transverse bands of white tomentum. S4 with apical/subapical fringe of dense, long (> 1 MOD), curved, brown setae, contrasting with apical transverse bands of white tomentum of preceding sterna.

Distribution

Ontario and much of the Eastern United States to the Great Plains (Fig. 12P).

Ecology

Host records

Among the specimens examined as part of Rightmyer's (2006) dissertation was one *T. simplex* collected at the nest of a species of *Hesperapis* Cockerell, 1898 (Hymenoptera: Melittidae: Dasypodainae) and another collected at the nest of *Svastra petulca* (Cresson, 1879) (Hymenoptera: Apidae: Eucerinae) in Bastrop County, Texas.

Floral records

Robertson (1929), Mitchell (1962), Rightmyer (2006), images on iNaturalist, and labels of examined voucher specimens indicate that this species has been collected from the following flowering plant species: in Asteraceae, *Amphiachyris* sp., *Cirsium* sp., *Coreopsis* sp., *C. tinctoria* Nutt., *Gaillardia* sp. or spp., *G. pulchella*, *Helenium* sp. or spp., *Helianthus* sp., *H. annuus*, *H. divaricatus* L., *H. strumosus* L., *H. tuberosus* L., *Heterotheca camporum* (Greene) Shinners, *Liatris* sp., *Ratibida columnifera*, *R. pinnata* Barnhart, *Rudbeckia hirta*, *R. hirta* var. *pulcherrima* Farw., *Silphium integrifolium* Michx., *S. integrifolium* var. *laeve* Torr. & A.Gray, *Solidago* sp. or spp., *S. ohioensis* Riddell, *Vernonia* sp. or spp., *V. baldwinii* Torr., and *V. missurica* Raf.; in Fabaceae, *Dalea candida*, *D. purpurea*, *Eysenhardtia texana* Scheele, and *Lespedeza virginica* (L.) Britton; in Lamiaceae, *Origanum* sp., *Pycnanthemum flexuosum* Britton, Sterns & Poggenb., *P. verticillatum* var. *pilosum* (Nutt.) Cooperr., and *Teucrium canadense*; in Malvaceae, *Callirhoe involucrata* (Torr. & A.Gray) A.Gray; and in Verbenaceae, *Verbena* sp., *V. hastata* L. and *V. stricta* Vent.

Remarks

This species exhibits continuous variation in the shape of the T1 discal patch, which ranges from strongly trapezoidal to almost perfectly semicircular. *Triepeolus simplex* was not included in Romankova's (2004) review of the Epeolini of Ontario and is herein newly reported from Canada.

Triepeolus tuberculifer Onuferko, Rightmyer & Roig-Alsina, 2024
Figs 1, 9A

Triepeolus tuberculifer Onuferko, Rightmyer & Roig-Alsina in Onuferko *et al.*, 2024: 41 (♀, ♂), figs 1i, 13d, 15b, 16.

Triepeolus n. sp. 2 – Rightmyer 2008: 30 (in key).

Proposed common name

Tubercled triepeolus.

Diagnosis

Unique to *T. tuberculifer* within the genus are the distinctly tuberculate pro- and mesotrochanters (Fig. 9A). Additionally, *T. tuberculifer* is the only South American species in the *T. simplex* group in which T1 has subparallel basal and apical transverse bands, which are joined on each side by a distinct longitudinal band such that the discal patch is transversely oblong (Fig. 1), and T2–T4 have medially interrupted apical transverse bands (Fig. 1).

Etymology

See Onuferko *et al*. (2024).

Material examined

See Onuferko *et al*. (2024).

DNA barcoded material

Unavailable.

Redescription

This species was recently described (Onuferko *et al*. 2024), and a redescription is not warranted.

Distribution

Northern South America (Onuferko *et al*. 2024: fig. 1i).

Ecology

Host records

Unknown.

Floral records

Unknown.

Remarks

Detailed morphological and taxonomic remarks about this species are given in Onuferko *et al*. (2024).

Key to both sexes of the species of the *Triepeolus simplex* group

1. T1 with basal band of pale tomentum arched, on each side (or each if medially interrupted) continuous with (and indistinguishable from) lateral longitudinal band, such that discal patch triangular, semicircular, or crescent-shaped (as in Fig. 11C; for additional examples see also Figs 13, 21B, 25B) 2
– Not as above. T1 basal and apical transverse bands (if present and distinct) joined laterally with abrupt transition between basal band and lateral longitudinal band (Fig. 11D–E) (at least if transverse bands not effectively mirror images, as in Figs 1, 23B), such that discal patch quadrangular or transversely oblong or elliptic (as in Fig. 15; for additional examples see also Figs 1, 11A, D–E, 14B, 16B, 17B, 19B, 22B, 23B, 24B, 26B, 27B, 28B, 29B, 30B, 31B) 8

2. Mesoscutum without well-defined paramedian band of yellow tomentum (Figs 13B, 21B). T1 without apical transverse band (Figs 13B, 21B); if T1 extensively covered in pale tomentum, then tomentum on apical impressed area not forming distinct transverse band 3
– Mesoscutum with well-defined paramedian band of off-white to yellow tomentum (Figs 13A, 16B, 19B, 25B, 31B). T1 with (Figs 11C–E, 13A, 19B, 25B) or without apical transverse band 4

3. Mesoscutum with pale (yellow) tomentum restricted to lateral and posterior margins (Fig. 21B) [Southwestern United States to Central America] ..... ***T. mexicanus*** (Cresson, 1878)
– Mesoscutum with large anteromedial ovate patch of pale (yellow) tomentum, which may be sparser medially such that patch suggestive of ill-defined paramedian band (Fig. 13B) [South America] .... ***T. nemoralis*** (Holmberg, 1886)

4. Axilla with pale pubescence all along its margins (Figs 19B, 20A). Pseudopygidial area of female with glabrous midline or distinct midline of posteriorly directed setae (Fig. 19D) ....***T. kathrynae*** Rozen, 1989 (in part)

– Axilla without pale pubescence all along its margins (Figs 13A, 16B, 25B, 31B). Pseudopygidial area of female without glabrous midline (Figs 16D, 25D, 31D) 5

5. Mesopleuron with ventrolateral half sparsely punctate (some i > 4d), laterally with sparse, pale-yellow, erect/suberect, simple setae (reaching about ½ MOD in length) in addition to the usual appressed, branched setae (Figs 18B, 25A). T1 discal patch crescent-shaped (Fig. 25B). T2 apical transverse band with pair of basomedially strongly convergent anterolateral extensions (Fig. 25B) ..... ***T. paucipunctatus*** sp. nov.
– Mesopleuron more densely punctate (i ≤ 3d), laterally without erect/suberect, simple setae or with short (< ¼ MOD), erect/suberect, simple setae (Figs 6D, 16A, C, 18D, 31A, C). T1 discal patch semicircular or triangular (Figs 11C, 13A). T2 apical transverse band without anterolateral extensions (Figs 10D, 11C–D, 16A–C, 31B–C) or with pair of ill-defined, perpendicular anterolateral extensions (Fig. 13A) 6

6. Metasomal tergal bands progressively paler (Figs 10A, 31). T2–T4 apical transverse bands clearly not as broad as bands on T1, those of T2–T3 medially somewhat removed from apical margins of terga (Figs 10A, 31). S5 of male with short, straight subapical setae (only S4 with apical/subapical fringe of dense, long (> 1 MOD), curved setae) (Figs 10A, 31C) [Nearctic] ..... ***T. simplex*** Robertson, 1903 (in part)
– Metasomal tergal bands concolorous or T1 basal band paler than succeeding bands (Figs 10D, 11C–D, 13A, 16). T2–T4 apical transverse bands about as broad as (if not broader than) bands on T1 and usually very little removed from apical margins of terga (Figs 10D, 11C–D, 13A, 16). S4–S5 of male each with apical/subapical fringe of dense, long (> 1 MOD), curved setae (Figs 10D, 16C) [Neotropics] 7

7. T1 with (Fig. 13A) or without apical transverse band; if T1 with apical transverse band, then basal band not more widely interrupted medially than apical transverse band (Fig. 13A) [Brazil] ..... ***T. alvarengai*** Moure, 1955
– T1 with apical transverse band (Figs 10D, 11C–D, 16A–C). T1 basal band more widely interrupted medially than apical transverse band (Figs 11C–D, 16B) [Mexico and Central America] ..... ***T. eumeniformis*** sp. nov. (in part)

8. T1 basal band forming inflexed arch and thus gradually narrowed but not completely interrupted medially, such that discal patch with short, narrowed (i.e., inverted V-shaped) anteromedial projection (as in Fig. 15A, F; for additional examples see also Figs 14B, 30B). Legs entirely reddish orange from trochanters to tarsi (Figs 14A–C, 30A–C) 9
– T1 basal band rather abruptly if not completely interrupted medially, with region of dark, short, appressed setae expanded basally or such that discal patch with inverted U- or horseshoe-shaped anteromedial projection (as in Fig. 15D–E; for additional examples see also Figs 1, 11A, D–E, 16B, 17B, 19B, 22B, 23B, 24B, 26B, 27B, 28B, 29B, 31B); if projection at all narrowed basomedially, then basal band deeply invaginated, such that basal transverse band appears completely interrupted medially in dorsal view (Fig. 15B–C). Legs entirely reddish orange from trochanters to tarsi (Figs 17A–C, 18A, 19A–B, 23A–C, 24A–C, 27B, 29A–B) to extensively dark brown/black (Figs 11D, 18D, 19C, 22A–C, 26B, 31A–C) 10

9. T1 apical transverse band interrupted or (less commonly) at least narrowed medially (Figs 14B, 15A). T2 apical transverse band complete or interrupted medially (Figs 14B, 15A) [Southwestern United States and adjacent Mexico] ..... ***T. apache*** sp. nov.

– T1 apical transverse band complete (Figs 15F, 30B) or (less commonly) narrowly interrupted medially. T2 apical transverse band complete (Fig. 30B) [northern Arizona and northern New Mexico to Western Canada] ..... ***T. shoshone*** sp. nov.

10. Mesopleuron laterally with long (≥ ½ MOD), erect/suberect, simple setae (Figs 6B, 18A, C) 11
– Mesopleuron laterally without erect/suberect, simple setae or with short (< ¼ MOD), erect/suberect, simple setae (Figs 6D, 9, 18D) 13

11. Legs extensively dark brown/black from coxae to femora (Figs 18C, 28A–C). Pseudopygidial area of female with underlying integument dark brown/black (Fig. 28D) .... ***T. saturninus*** Cockerell & Sandhouse, 1924
– Legs entirely reddish orange from trochanters to tarsi (Figs 6B, 17A–C, 18A, 24A–C). Pseudopygidial area of female with underlying integument entirely dark brown/black (Fig. 17D) to predominantly reddish orange (Fig. 24D) 12

12. Pseudopygidial area of female with three subregions of differentiated setae: basal patch of dense, golden setae; darker subapical band of sparser, coppery brown setae; and apical row of dense, suberect, silvery setae (Fig. 17D). Axilla black (Figs 5C, 17B). Generally smaller (body length 5.5–9.0 mm; ITW 1.2–1.7 mm) (Fig. 17A–C) [Southwestern United States and adjacent Mexico] .. .. ***T. hirsutus*** sp. nov.
– Pseudopygidial area of female without distinct subregions of differentiated setae; setae golden to silvery and relatively uniform in density (Fig. 24D). Axilla commonly with reddish tip (Fig. 24B). Generally larger (body length 8.0–12.0 mm; ITW 1.7–2.5 mm) (Fig. 24A–C) [Central and South Texas] ..... ***T. parahirsutus*** sp. nov.

13. T1 discal patch narrowly oblong or elliptic (as in Fig. 15C–D; for additional examples see also Figs 1, 22B, 23B, 26B) 14
– T1 discal patch trapezoidal (as in Fig. 15E; for additional examples see also Figs 11A, D–E, 16B, 19B, 27B, 29B, 31B) 17

14. Pro- and mesotrochanters distinctly tuberculate (Fig. 9A) [northern South America] .... ***T. tuberculifer*** Onuferko, Rightmyer & Roig-Alsina, 2024
– Pro- and mesotrochanters not tuberculate (Fig. 9B–D) [North America] 15

15. Mesoscutum and metasomal terga with bands of pale-gray to white/off-white, short, appressed setae (Fig. 22). Legs, at least from coxae to femora, partially to predominantly dark brown/black (Figs 3B, 9B, 22A–C). Pseudopygidial area of female with underlying integument dark brown/black (Fig. 22D) ..... ***T. obliteratus*** Graenicher, 1911
– Mesoscutum and metasomal terga with bands of pale-yellow, short, appressed setae (Figs 8B, 15C–D, 23, 26). Legs predominantly dark brown/black from coxae to femora (Fig. 26B) to entirely reddish orange from trochanters to tarsi (Fig. 23A–C). Pseudopygidial area of female with underlying integument entirely dark brown/black (Fig. 23D) to predominantly reddish orange (Fig. 26D) ... 16

16. T1 discal patch broadly rounded laterally and rod-shaped (Figs 15C, 23B). Axilla black (Fig. 23B) ..... ***T. oblongimacula*** sp. nov.
– T1 discal patch somewhat narrowed and/or curved posterolaterally and thus allantoid (Figs 15D, 26A–C). Axilla black (Fig. 26B) or to some extent reddish orange, especially in western specimens (Fig. 26C) ..... ***T. rhododontus*** Cockerell, 1921

17. T2 apical transverse band without anterolateral extensions (Figs 10D, 11C–D, 16A–C, 31B–C) or with pair of ill-defined, perpendicular anterolateral extensions 18

– T2 apical transverse band with pair of basomedially strongly convergent anterolateral extensions (Figs 11A, E, 15E, 19A–C, 27B–C, 29A–C) 19

18. Metasomal tergal bands concolorous or T1 basal band paler than succeeding bands (Figs 10D, 11C–D, 16). T2–T4 apical transverse bands about as broad as (if not broader than) bands on T1 and usually very little removed from apical margins of terga (Figs 10D, 11C–D, 16). S4–S5 of male each with apical/subapical fringe of dense, long (> 1 MOD), curved setae (Figs 10D, 16C) [Neotropics] ..... ***T. eumeniformis*** sp. nov. (in part)
– Metasomal tergal bands progressively paler (Figs 10A, 31). T2–T4 apical transverse bands clearly not as broad as bands on T1, those of T2–T3 medially somewhat removed from apical margins of terga (Figs 10A, 31). S5 of male with short, straight subapical setae (only S4 with apical/subapical fringe of dense, long (> 1 MOD), curved setae) (Figs 10A, 31C) [Nearctic] .... ***T. simplex*** Robertson, 1903 (in part)

19. Axilla extending little if at all beyond midlength of mesoscutellum (Figs 20B, 29B); tip distinctly pointed, but mesally unattached to mesoscutellum for less than $^{2}/_{5}$ medial length of axilla (Figs 20B, 29B). Pseudopygidial area of female without glabrous midline (Fig. 29D) ....***T. segregatus*** (Cockerell, 1900)
– Axilla extending well beyond midlength of mesoscutellum (Figs 5B, 19B, 20A, 27B); tip distinctly pointed and hooked (i.e., concave along medial margin), mesally unattached to mesoscutellum for approximately half medial length of axilla (Figs 5B, 19B, 20A, 27B). Pseudopygidial area of female with glabrous midline or distinct midline of posteriorly directed setae (Figs 19D, 27D) 20

20. Axilla with pale pubescence all along its margins (Figs 19B, 20A). T1 discal patch without semicircular anteromedial projection, apical transverse band at most slightly narrowed sublaterally (Figs 11E, 19B) [Southwestern United States and Mexico] .....***T. kathrynae*** Rozen, 1989 (in part)
– Axilla without pale pubescence all along its margins (Figs 5B, 27B). T1 discal patch trapezoidal with semicircular anteromedial projection, apical transverse band usually greatly narrowed sublaterally at posterior corner of discal patch (Figs 11A, 27B) [The Bahamas and Cuba] .....***T. roni*** Genaro, 1999

Discussion

The *Triepeolus simplex* group is herein understood to be represented by 18 species, of which seven are newly described and one was only recently described (Onuferko *et al*. 2024). Of these, 14 are found in mainland North America, three are known only from South America, and one is known exclusively from the West Indies. DNA barcodes are presently available for 12 species in the *T. simplex* group—one from Cuba and the rest from mainland North America. Represented by nearly 500 specimen records, *T. segregatus* was the most commonly observed species in this group and accounted for more than a third of all studied specimens. Represented by only a single specimen, *T. paucipunctatus* sp. nov. was the rarest species encountered in this group. The other six newly described species were each represented by more than ten specimens (to a maximum of 82 in the case of *T. hirsutus* sp. nov.).

Although supported in part by DNA barcodes, many of the morphological features upon which taxon concepts were based are subtle. Additionally, some specimens within two species pairs—*T. apache* sp. nov. / *T. shoshone* sp. nov. and *T. hirsutus* sp. nov. / *T. parahirsutus* sp. nov.—cannot be reliably distinguished from their most similar congeners morphologically. Thus, even with the availability of up-to-date diagnoses for all species in the *T. simplex* group and a fully illustrated key to separate them, correct species-level identification may still require direct comparisons to reference material, consideration of the locality where a specimen was collected or observed, or DNA barcoding.

Based on their shared morphology of the pseudopygidial area of the female, the species treated herein are presumed to form a natural group, but a species-level phylogeny for *Triepeolus* with comprehensive taxon sampling is currently lacking. Although the taxonomy of the *T. simplex* group is now greatly improved, the males of two newly described species—*T. paucipunctatus* sp. nov. and *T. shoshone* sp. nov.—are unknown, and those of four others—*T. apache* sp. nov., *T. hirsutus* sp. nov., *T. oblongimacula* sp. nov., and *T. parahirsutus* sp. nov.—are represented by very few specimens. Additionally, there is little information on the ecology of most species in this group, with information on known or suspected hosts available for only four species.

With the taxonomic changes proposed here and in Onuferko *et al*. (2024), a total of 146 species of *Triepeolus* are presently recognized as valid. Still unresolved, however, is the taxonomy of the species in the *T. verbesinae* group in which the propodeal triangle is mostly covered in dense, appressed pale setae, which should be the subject of future taxonomic work on this genus. As well, taxon concepts are lacking/incomplete for males of various North American species, many of which remain unknown.

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Supplementary files

Supp. file 1. A database of collection and observation records. Records of South American species presented in Onuferko *et al*. (2024) are not duplicated here except for specimens of which new images are presented in the present paper. https://doi.org/10.5852/ejt.2024.950.2643.12187

Supp. file 2. Supplementary figures including images of the primary types and associated labels of all species in the *Triepeolus simplex* group and their junior synonyms except *Epeolus metatarsalis* Friese, 1921, whose whereabouts are unknown, and species occurring in South America, for which images have recently been made available (see Onuferko *et al*. 2024).
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Supp. file 3. Species of *Triepeolus* Robertson, 1901 known only from the female (members of the *simplex* and *verbesinae* species groups excluded). https://doi.org/10.5852/ejt.2024.950.2643.12191

Supp. file 4. A neighbor-joining tree of COI sequences available for the *Triepeolus simplex* group. Scale bar represents the percentage of similarity between sequences.
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