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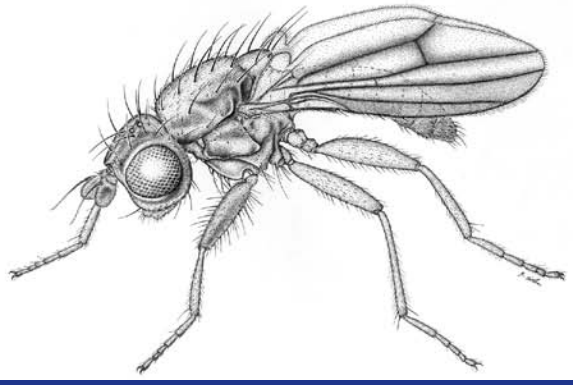

A Revision of the Nearctic Species of the Genus *Trixoscelis* Rondani (Diptera: Heleomyzidae: Trixoscelidinae)

George A. Foster and Wayne N. Mathis

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WASHINGTON D.C.
2011

ABSTRACT

Foster, George A., and Wayne N. Mathis. A Revision of the Nearctic Species of the Genus *Trixoscelis* Rondani (Diptera: Heleomyzidae: Trixoscelidinae). *Smithsonian Contributions to Zoology*, number 637, viii + 128 pages, 187 figures, 1 table, 2011.—The Nearctic species of the genus *Trixoscelis* Rondani are revised. Thirteen new species are described, seven new combinations and three new synonyms are proposed, and three species groups are characterized. Keys to the 38 known species are provided. Diagnoses, detailed distributional data for the species of the genus, notes on the biology, and illustrations (photographs and drawings) are included to assist species identification. A phylogenetic analysis was performed to test the monophyly of the genus *Trixoscelis* and the included species groups. The ingroup includes a total of 38 exemplar species. Outgroup sampling includes the following exemplar genera: *Neossos*, *Waterhousea*, *Fenwickia*, *Aneuria*, and *Xenura*. Analyses, including implied weighting, recovered a monophyletic *Trixoscelis* and species groups if the Mongolian genus *Paratrixoscelis* is included within *Trixoscelis*.

Cover image: *Trixoscelis fumipennis* Melander, Figure 1.

Published by Smithsonian Institution Scholarly Press
P.O. Box 37012, MRC 957
Washington, D.C. 20013-7012
www.scholarlypress.si.edu

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Library of Congress Cataloging-in-Publication Data
Foster, George A. (George Arnold), 1954–
A revision of the Nearctic species of the genus *Trixoscelis* Rondani (Diptera: Heleomyzidae: Trixoscelidinae) / George A. Foster and Wayne N. Mathis.
p. cm. — (Smithsonian contributions to zoology ; no. 637)
Includes bibliographical references.
1. Heleomyzidae—Classification. 2. Diptera—Classification. 3. Flies. I. Mathis, Wayne N. II. Title. III. Series: Smithsonian contributions to zoology ; no. 637.
QL537.H44F67 2011
595.77'3—dc23
2011027004

ISSN: 0081-0282 (print); 1943-6696 (online)

♾ The paper used in this publication meets the minimum requirements of the American National Standard for Permanence of Paper for Printed Library Materials Z39.48–1992.

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A Revision of the Nearctic Species of the Genus *Trixoscelis* Rondani (Diptera: Heleomyzidae: Trixoscelidinae)

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INTRODUCTION

Recent collecting in western North America has resulted in the discovery of many undescribed species of the genus *Trixoscelis* Rondani. These discoveries prompted this revision of all Nearctic species of the genus, especially since the last study of this fauna was published over 50 years ago (Melander, 1952) and is now woefully out of date and inadequate. For example, some of Melander's species are difficult to identify because many of the diagnostic characters have been found to be highly variable. Additionally, Melander focused very little on structures of the male terminalia, which we have found to be quite reliable for distinguishing species. In addition to describing the recently discovered Nearctic species, we are providing new data, synonymies, revised descriptions, comments, distributional data, and illustrations for all included species. A revised key to species is also provided. We have included a detailed treatment of *T. costalis* (Coquillett) from the Galápagos Islands in this study because this species had erroneously been reported from Arizona (Coquillett, 1902) and because we have had access to a series of 93 specimens from various Galápagos Islands.

Taxonomic History of the Nearctic Fauna

Hendel (1911) was the first to recognize the genus *Trixoscelis* in North America when he described *T. prima* from specimens collected in Claremont, California [cited incorrectly as Claremont, New Hampshire]. Two years later, Melander published two papers that treated *Trixoscelis*. In his first paper (Melander, 1913a), Melander described the second Nearctic species, *T. fumipennis,* and noted that (p. 169) "Hendel's *Trixoscelis prima* is the same as *Parodinia cinerea* Coquillett" and reported that Malloch had described specimens of

P. costalis Coquillett as *P. claripennis* (Malloch). Although Melander did not formally place these species in *Trixoscelis,* he clearly suggested such in his remarks about *T. fumipennis*. Significantly, Melander also misidentified Malloch's species as the European *T. frontalis* (Fallén), a precedent that was perpetuated by various authors until this study. In a later treatment of *T. frontalis,* Melander (1952:46) acknowledged that he "[did] not have European specimens for verification" but that it "seems to be identical with *T. frontalis.*" In this study, we document that *T. frontalis* is not known from North America.

In December of 1913, Melander (1913b) published his second paper, which included a key to the known Nearctic species of *Trixoscelis* (in the subfamily Geomyzinae). The following species were treated in his key: *T. costalis* Coquillett (*Parodinia: Rhicnoessa*), *T. cinerea* Coquillett (formerly in *Parodinia*), *T. frontalis* Fallén (misidentification), *T. prima* Hendel, and *Siligo litorea* Aldrich. Curiously, Melander either ignored or overlooked his previous synonymy of *T. prima* Hendel with *T. cinerea* (Coquillett) from his first paper of that year.

Aldrich (1929) formally placed both *T. cinerea* (Coquillett) and *T. nuda* (Coquillett) in *Trixoscelis* and also placed *T. prima* Hendel in synonymy with *T. nuda*. Malloch (1931) noted that *Diastata* Meigen and *Trixoscelis* are synonyms because both have the same type species, *Geomyza obscurella* Fallén (1823). Malloch treated *Spilochroa* Williston as a subgenus of *Diastata* in this study and in a second paper (Malloch, 1933).

Melander (1952) published the only major revision of the family for the North American fauna and included four genera: *Neossos* Malloch, *Zagonia* Coquillett, *Spilochroa* Williston, and *Trixoscelis*. He described 14 new species of *Trixoscelis,* and in the present study, we have found that all but two, *T. mohavea* and *T. sagulata,* are valid. Melander's new species are only known to occur in western North America, which we further document in this paper, to be the current center of species diversity in the New World.

Cogan (1977), in a review of the Afrotropical fauna of *Trixoscelis,* combined the genus *Spilochroa* with *Trixoscelis* because the characters used to differentiate these two genera, namely, the strongly patterned wing and weak oral vibrissae of *Spilochroa,* are quite variable. McAlpine (1985) accepted this synonymy and added *Zagonia* as another junior, generic synonym. We concur with McAlpine and herein combine both *Spilochroa* and *Zagonia* in *Trixoscelis*. McAlpine (1985) also provided evidence for recognizing the former family Trixoscelididae as the tribe Trixoscelidini in the family Heleomyzidae. Teskey (1987) conditionally maintained the generic status of *Spilochroa* and *Zagonia* in the Manual of Nearctic Diptera.

Methods and Materials

The descriptive terminology for external structures and many internal structures follows that published in the Manual of Nearctic Diptera (McAlpine, 1981). For structures of the male terminalia, however, we have adopted the terminology that Cumming et al. (1995) have suggested. Because specimens are small, usually less than 4 mm in length, study and illustration required use of dissecting and compound microscopes. The descriptions of new species are based primarily on their holotypes with variation being accounted for in the Remarks section. One head ratio, used in the descriptions, is defined below.

Ratios are averages of three specimens the largest, smallest, and one other. The gena-to-eye ratio is the genal height measured at the maximum eye height, viewed in direct profile, divided by the eye height.

Label data from each specimen were recorded and listed alphabetically according to country, state or province, county, and specific locality, such as city. As available, date of collection, collector, sex, and specimen depository were listed. If a field of data is not on the label, such as the date when the specimen was collected or the collector's name, these data are not provided in the Specimens Examined section. Label data from holotype specimens were recorded exactly, and clarifying information, such as script style and label color, is enclosed within brackets.

Distribution maps were made using ESRI ArcView GIS 3.2. Longitude and latitude coordinates were obtained for the locality where each specimen was collected and entered into a Microsoft Excel spreadsheet. If unavailable directly from specimen labels, longitude and latitude were estimated using gazetteers and maps to determine the geographical coordinates. Our use of "Nearctic Region" and "Neotropical Region" in distribution sections under each species follows the delimitations used in the most recent catalogs of Diptera for those regions (Vockeroth, 1965; Gill, 1968); that is, the border between Mexico and United States is the boundary between these regions.

The phylogenetic analysis was performed with the assistance of TNT, a computerized algorithm that produces cladograms by parsimony. Character data were polarized primarily using outgroup procedures.

Dissections of male and female terminalia and descriptions were performed using the method of Clausen and Cook (1971) and Grimaldi (1987). Microforceps were used to remove abdomens, which were macerated

in a potassium or sodium hydroxide solution. Cleared structures were rinsed in distilled water and then transferred to glycerin for observation. If necessary for proper orientation, the specimen was transferred from glycerin to glycerin jelly. The glycerin jelly was heated, and the specimen appropriately oriented. After cooling, the embedded specimen in glycerin jelly became immobilized. Abdomens were placed in a plastic microvial filled with glycerin and attached to the pin supporting the remainder of the insect from which it was removed. For freshly caught specimens, we recommend that the epandrium and associated structures of the male terminalia be teased open, thus allowing examination of these structures and identification of the species without need of dissection.

In the species' descriptions, paired structures are described in the singular except where the context makes this inappropriate.

Acknowledgments

Although many specimens examined for this study are in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), we also borrowed and studied or cited numerous specimens that are deposited in the following museums:

ANSP	Academy of Natural Sciences of Philadelphia, Pennsylvania
CAS	California Academy of Sciences, San Francisco
CSCA	California State Collection of Arthropods, Sacramento
CNC	Canadian National Collection, Ottawa, Ontario
DEBU	University of Guelph Insect Collection, University of Guelph, Guelph, Ontario, Canada
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts
WSU	Maurice T. James Collection, Washington State University, Pullman

H. B. Williams (deceased) prepared the distribution maps, and Young Sohn produced the habitus illustration (Figure 1) and inked all other line drawings. The plates were assembled by Karolyn Darrow, who also expertly photographed and assembled the plates of heads and

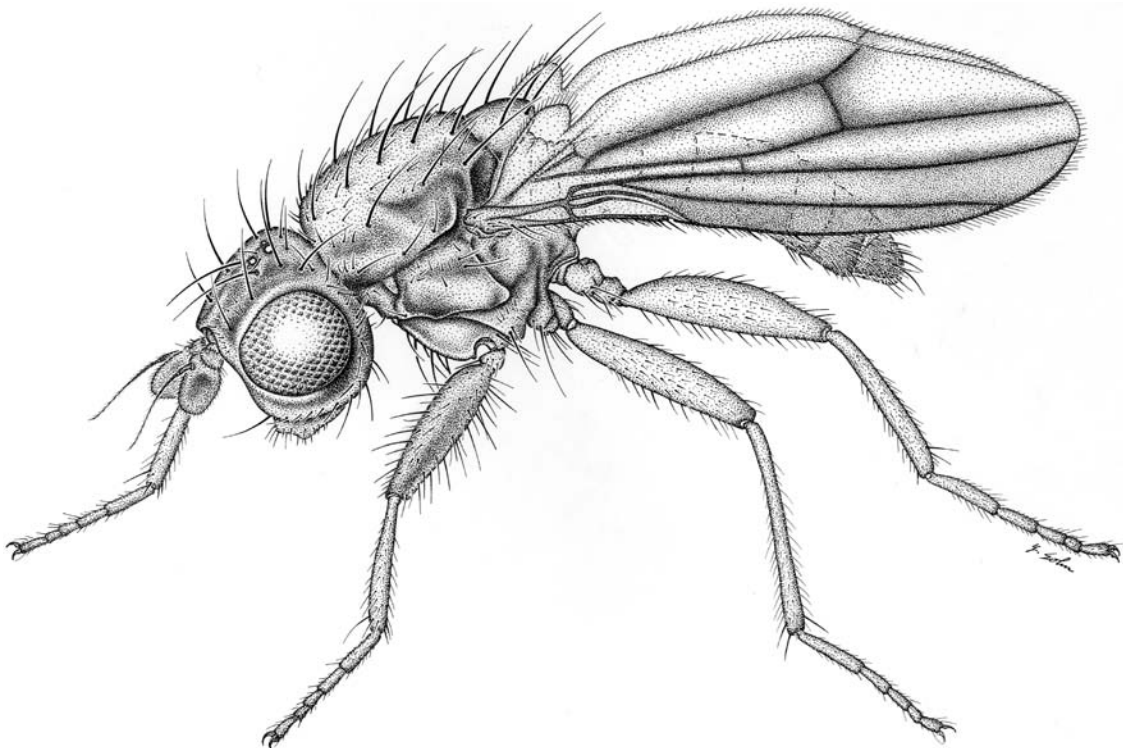


FIGURE 1. *Trixoscelis fumipennis* Melander.

wings. For reviewing a draft of this paper, we thank Joel Kits, Kevin N. Barber, and Allen L. Norrbom. We are also grateful to David Challinor (deceased), former Assistant Secretary for Research, Smithsonian Institution, and Stanwyn G. Shetler, former Deputy Director of the National Museum of Natural History, for financial support to conduct fieldwork and study primary types through grants from the Research Opportunity Fund.

We also acknowledge and express thanks for the valuable contribution of Kevin N. Barber, who provided information on the Nearctic fauna and collecting insights for trixoscelidines, and of Andrej Woznica for insights on the Palearctic fauna, particularly the identity of *T. frontalis*. We acknowledge and thank Robert K. Robbins for patiently introducing us to the use of TNT.

Funding for this research project, especially fieldwork in southern California (2003), Texas (2004), Idaho, Oregon, and Washington (2006), and Alaska (2006) was provided largely by grants from the Biodiversity Program (Biological Surveys and Inventories, BSI), National Museum of Natural History, Smithsonian Institution (Lynne R. Parenti and George Zug, chairs). Fieldwork in Alaska in 2002 was supported by the Bateman Fund. Fieldwork in the George Washington Memorial Parkway (2006–2008) was supported by a grant from the National Park Service, and we especially thank Brent W. Steury for his assistance, facilitation, and support.

SYSTEMATICS

GENUS *TRIXOSCELIS* RONDANI

Trixoscelis Rondani, 1856:13 [type species: *Geomyza obscurella* Fallén, by original designation]. —Melander, 1913a:169 [comments on *Parodinia costalis* and *P. claripennis* in *Trixoscelis*]; 1913b:296 [key]. —Curran, 1934:372 [in key to genera of Chyromyidae]. —Melander, 1952:40 [revision]. —Vockeroth, 1965:817–818 [Nearctic catalog]. —Steyskal, 1971:10 [nomenclature]. —Sabrosky, 1999:315 [nomenclature].

Parodinia Coquillett, 1902:186 [type species: *Parodinia cinerea* Coquillett, by original designation]. —Malloch, 1913:274–276 [synonymy; discussion, key, relationship to *Zagonia*].

Zagonia Coquillett in Baker, 1904:27 [type species: *Zagonia flava* Coquillett, by original designation]. —Melander, 1913b:297 [diagnosis, distribution]. —Curran, 1934: 372 [in key to genera of Chyromyidae]. —Melander, 1952:39 [diagnosis, key]. —McAlpine, 1985:234 [synonymical notes, classification].

Spilochroa Williston, 1907:2 [type species: *Heterochroa ornata* Johnson, monotypy]. —Curran, 1934:372 [in key to genera of Chyromyidae]. —Melander, 1952:40 [diagnosis, key, distribution]. —Wheeler, 1955:111 [discussion, key to species]. —Vockeroth, 1965:817 [Nearctic catalog]. —Cogan, 1977:3 [synonymy]. —McAlpine, 1985:234 [synonymical notes, classification].

Siligo Aldrich, in Aldrich and Darlington, 1908:99 [type species: *Siligo oregona* Aldrich, by original designation]. —Melander, 1913b:297 [diagnosis, distribution, synonymy with *Zagonia*].

Diastata [in part] Meigen, 1830:94. Malloch, 1931:28 [synonymy; discussion, key to *Spilochroa* as subgenus]. —Malloch, 1933:214 [synonymy; discussion].

DIAGNOSIS. Body generally light brown to dark gray microtomentose, pleural sclerites sometimes darker brown, somewhat shiny, brown spots present or absent at bases of setae, including scutellar setae, two to four rows of acrostichal setae varying in regularity; wing hyaline to heavily infuscated, costa with a break at end of subcosta; costal margin with a row of strong setae varying in number; antenna with scape and pedicel yellowish to brown, center of basal flagellomere yellow to mostly brown or black; gena moderately short to conspicuously high, gena-to-eye ratio 0.15 to 0.55.

DESCRIPTION. Body length 1.64–3.71 mm.

Head: Eye round to oval, often higher than wide; ocellar triangle light brown to gray microtomentose; frons bare, generally yellowish orange becoming darker dorsally, parafrons usually whitish-silver microtomentose; two strong, reclinate parafrontal setae; ocellar setae one strong pair, positioned at level of or anterior to anterior ocellus, one additional posterior pair of shorter, weaker ocellar setae; one short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput very narrow, gray dorsally, often becoming paler ventrally, microtomentose with one row of short dorsoclinate setulae; antenna with scape and pedicel yellowish to brown, center of basal flagellomere yellow to mostly brown or black; arista brown, with sparse hairs. Gena-to-eye ratio from 0.15 to 0.55, usually yellow or white, sometimes with a diffuse brown spot at base of oral vibrissa, microtomentose, bearing one row of short ventroclinate setae along ventral edge in addition to one stronger convergent oral vibrissa; face usually white; palpus usually yellow, clypeus small indistinct, gray to brown.

Thorax: Mesonotum gray, yellowish or brown microtomentose, sometimes with brownish vittae along dorsocentral and acrostichal rows of varying intensity. Dorsocentral setae 5(2+3); acrostichal setae in two or four rows of varying regularity; apical scutellar setae often twice or more length of scutellum. Pleural sclerites sometimes distinctly darker than mesonotum, anepisternum mostly bare

except for one strong seta on posterodorsal corner along with three to four much smaller setulae in cluster; katepisternum with two longer setae and several very short setulae along posterodorsal edge. Wing hyaline to heavily infuscated. Halter usually white. Leg color varying from all dark to all yellow, male often with swollen hind basitarsus, sometimes with other basitarsi swollen in addition; fore femur with row of longer setae along posterodorsal and posteroventral surfaces

Abdomen: Tergites generally brown to gray microtomentose, lightly and evenly setulose. Male terminalia: Tergite 6 reduced to thin strip; sternites 6, 7, and 8 fused and asymmetrical; epandrium generally rounded, capsulate; hypandrium Y-shaped with stem directed anteriorly; surstyli varying from reduced/absent to large, robust, curved; cerci usually reduced or absent; pre- and postgonites fused or separate, pregonite often with a row of setae along the ventral margin; aedeagus simple, strap-like to highly complex, trilobed, heavily sclerotized. Female terminalia: Spermathecae 3; tergite and sternite 7 often strongly fused to form a ring but point of fusion weak in some species; sternite 8 may bear lateral setaceous lobe; epiproct and hypoproct often with two strong setae on one or both.

Biology. Information on the biology of *Trixoscelis* is virtually negligible, being limited, with the exception of one species, to general observations on the climate and biotopes where specimens have been collected (Cogan, 1971; Campobasso et al., 1999). The immature stages are completely unknown, and the only clue as to where these may be found are Collin's (1943) and Skidmore's (1962) reports of *T. frontalis* (Fallén) being bred from a thrush blackbird's nest (*Turdus merula* L.) in England. More specimens have been collected in dry or arid zones throughout the world, and certainly in this study of the Nearctic fauna we have discovered far greater species diversity in the comparatively arid West. This seeming preference for aridity is a pattern elsewhere in the worldwide distribution of *Trixoscelis* (Cogan, 1971). Kevin Barber (pers. comm.) has often observed large numbers of *T. fumipennis* in eastern Canada in areas with short grassy vegetation and sandy soils.

Phylogenetic Considerations. A detailed, species-level phylogeny is beyond the scope of this paper, especially as *Trixoscelis* is essentially found worldwide and herein we focus on the Nearctic fauna. Our intent here is to present evidence and an analysis of that evidence in an attempt to determine intermediate clusters of taxa such as species groups within *Trixoscelis*.

Recent classifications of Heleomyzidae (McAlpine, 1985, 2007) place *Trixoscelis* in the subfamily Trixoscelidinae, tribe Trixoscelidini. We accept this classification and used it as a guide for selecting outgroups. Determining the outgroup(s) turned out to be as challenging as discovery of evidence used in the species group analysis. As noted previously, we initially studied the so-called genera *Spilochroa* and *Zagonia* as potential outgroups for a cladistic analysis of species groups within *Trixoscelis* but soon discovered that both putative genera represented taxa within the overall generic continuum of *Trixoscelis*. This continuum was especially evident in structures of the male terminalia, which for all three previously recognized genera are very similar, essentially representing variations on the same theme. Thus we confirm here Cogan and McAlpine's synonymy of *Spilochroa* and *Zagonia* with *Trixoscelis* and the Nearctic species of these taxa are treated herein.

We then searched more broadly within the higher classification for outgroups, starting with *Paratrixoscelis* Papp (we examined *P. oedipus* Becker), and soon discovered that this genus too is clearly within *Trixoscelis,* appearing in the majority of trees as the sister group to the *fumipennis* species group. Not only is its generic status problematic but its suitability as an outgroup is clearly questionable. Although we are confident that *Paratrixoscelis* is a junior synonym of *Trixoscelis,* we will not formally revise its status until we have examined specimens of all three described species of *Paratrixoscelis* from Mongolia, which is beyond the scope of this revision. Finally, we examined genera in related tribes as outgroups, such as *Fenwickia* Malloch (we examined *F. claripennis* Malloch), *Aneuria* Malloch (*A. bipunctata* Malloch), and *Xeneura* Malloch (*X. picata* Hutton) in Fenwickiini and *Waterhousea* Malloch (*W. cyclops* Malloch) in Waterhouseiini. To root these genera, including *Trixoscelis,* we used *Neossos* Malloch as the overall outgroup. *Neossos* (family Heleomyzidae; Cogan, 1977) was chosen based on its apparent close relationship to *Trixoscelis* (Melander, 1952). The tribes Waterhouseiini and Fenwickiini are in the subfamily Trixoscelidinae (McAlpine, 2007). With these genera as outgroups, we proceeded with the cladistic analysis. McAlpine (1985) has placed the genus *Stuckenbergiella* in Trixoscelidini, but the male is unknown so we did not include it in this analysis.

Trixoscelis, including *Paratrixoscelis,* is apparently a monophyletic genus based on the following synapomorphies: gonites well developed and separate from the hypandrium (nos. 14 and 15 below), cerci in male reduced or absent (no. 13), female seventh tergite and sternite fused or nearly fused in many taxa (no. 21), ocellar setae inserted anterior to the level of the anterior ocellus (no. 4) and dorsocentral setae 5(2+3) (no. 5).

With the phylogenetic background for further study of *Trixoscelis* within the tribe Trixoscelidini, subfamily Trixoscelidinae, established and the monophyly of the genus documented, we now proceed with the cladistic analysis and resultant relationships among the included species, but with a few explanatory remarks first. In the presentation on species group relationships that follows, the characters used in the analysis are listed first. The cladogram (Figure 2) is the primary mode to convey these relationships. In the discussion of character data, a "0" indicates the plesiomorphic state, while a "1" or "2" indicates the progressively more derived states. Question marks in the matrix indicate unclear or unavailable data. Multistate characters 6, 8, 13, 15, and 21 were treated as nonadditive (dash). The numbers used for characters in the presentation are the same as those on the cladogram, and the sequence is the same as noted in the character matrix (Table 1).

Characters Used in the Analysis

Head

1. Number of frontal setae: 2 pairs (0); 3 pairs (1).
2. Genal height: short, less than 0.15–0.28 as high as eye (0); high, 0.33 to over 0.50 as high as eye (1).
3. Face shape in lateral view: normal, concave (0); somewhat convex (1).
4. Position of ocellar setae: Inserted behind level of anterior ocellus (0); inserted in front of or level with anterior ocellus (1).

Thorax

5. Number of pairs of dorsocentral setae: 4 (0); 5 (1) (a synapomorphy for *Trixoscelis*).
6. Male basitarsi: hind basitarsus not enlarged at all (0); hind basitarsus moderately but obviously swollen (1); hind basitarsus widely swollen (2).
7. Male mid and fore basitarsi: not enlarged at all (0); swollen, if only slightly (1).
8. Wing: hyaline (0); partially maculate (1); predominately dark with round hyaline spots (2).
9. Number of setae at costal break: 2 (0); 1 (1) (a synapomorphy for Waterhouseiini and Fenwickiini).
10. Preapical dorsal tibial seta: present (0); absent (1).

Abdomen (Male)

11. Epandrium: large, robust in relation to the rest of the abdomen (0); smaller, less obvious in undissected specimens (1).
12. Number of surstyli: 1 pair (0) (In *Neossos* the surstyli are bi-lobed but not truly separate (Gilbert and Wheeler, 2007)); 2 pairs (1) (an autapomorphy for Fenwickiini).
13. Surstylus: large, strong, may be curved, with strong setae (0); small in relation to epandrium, often subtriangular, setae finer (1); reduced or absent (2) (an autapomorphy for the *T. nuda* species group).
14. Condition of gonites: fused with hypandrium, appearing only as small lobes with one or two setae on each (0); distinctly separated from hypandrium, variously shaped, pre- and postgonites distinct (1).
15. Postgonite: apparently absent (0); a simple, variously shaped lobe, armed with only a few weak setulae (1); a robust, curving lobe on the dorsal margin of the pregonite, armed with one strong spicule (2) (an autapomorphy for the *T. fumipennis* species group).
16. Distiphallus: variously sclerotized, complex, with one to several flaps or lobes distally (0); a completely sclerotized strap-like structure, triangular or somewhat rectangular in form (1) (an autapomorphy for the *T. nuda* species group).
17. Distiphallus: without spicules on the distiphallus (0); armed with several strong spicules on the dorsal midshaft (1) (an autapomorphy for *T. plebs*, *T. nitidiventris*, and likely many more Palearctic species based on illustrations (Hackman, 1970)).
18. Cerci: well developed (0); reduced or absent (1) (an autapomorphy for *Trixoscelis*).

Abdomen (Female)

19. Appendages of eighth sternite: with lateral lobes (0); lateral lobes lacking (1).
20. Sclerotization of spermathecal ducts: not sclerotized (0); partially sclerotized (1).
21. Condition of seventh sternite and tergite: separate (0); fused with an evident suture (1); strongly fused (2) (derived states 1 and 2 are autapomorphies for *Trixoscelis*).
22. Shape of eighth sternite: lacking a notch (0); notched anteriorly (1).
23. Shape of spermathecae: spherical or conical (0); long, narrow (1).

Analysis and Results. Using the heuristic "traditional search" option in TNT (Goloboff et al., 2003, 2008), 196 cladograms were generated from the analysis of the 23 characters. The cladograms have a length of 51 steps. The matrix was then subjected to implied weighting with a *K* value of three, which further reduced the number of cladograms to 157. With our focus on species group

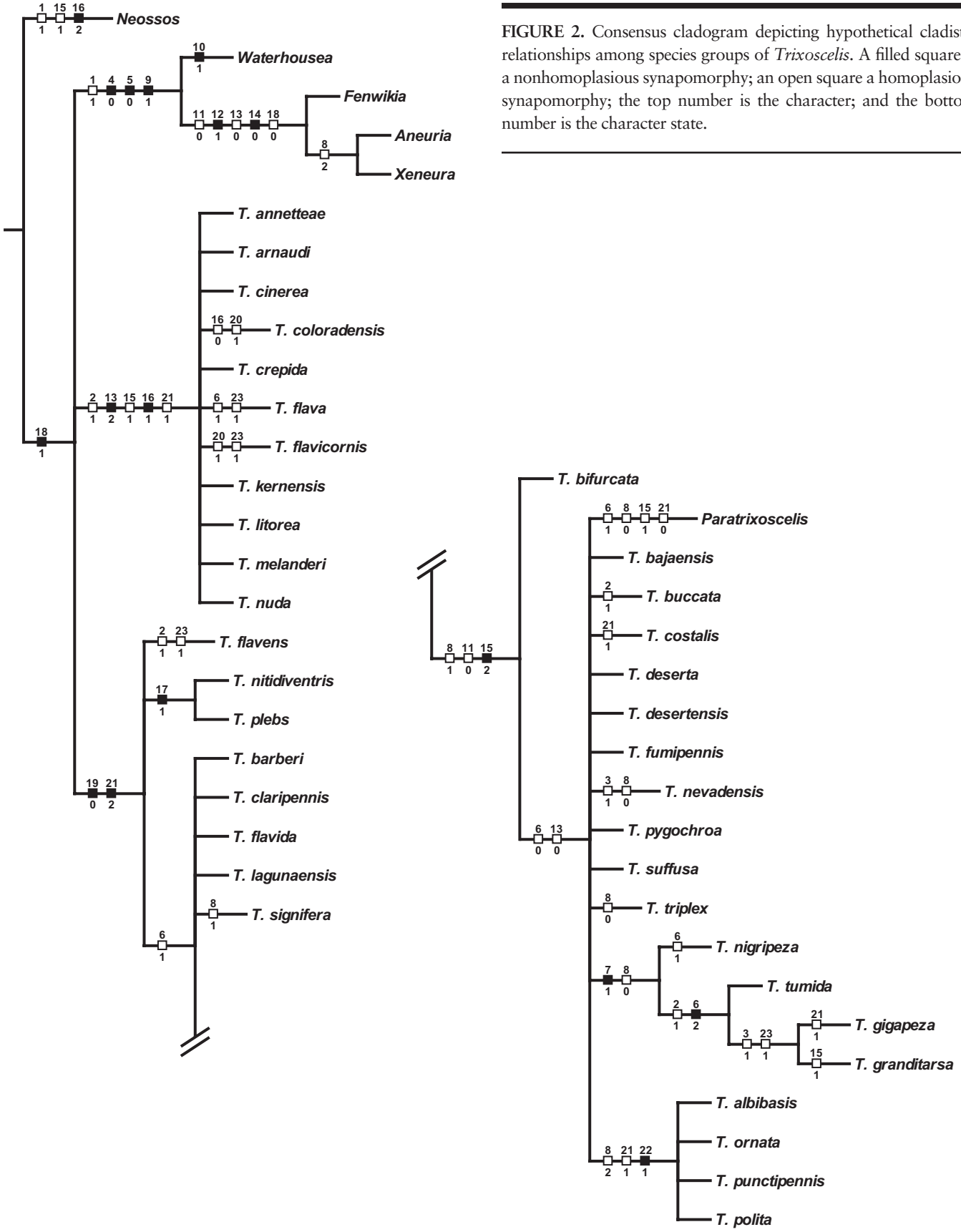


FIGURE 2. Consensus cladogram depicting hypothetical cladistic relationships among species groups of *Trixoscelis*. A filled square is a nonhomoplasious synapomorphy; an open square a homoplasious synapomorphy; the top number is the character; and the bottom number is the character state.

TABLE 1. Matrix of characters and taxa used in the cladistic analysis of *Trixoscelis*. Numbers for characters correspond with those used in the text. Question marks in the matrix indicate unclear or unavailable data.

Taxa	0000	000001	11111111	12222
Character Number	1234	567890	12345678	90123
Neossos	1001	100000	10111200	10000
Waterhousea	1000	000011	1011?001	?????
Fenwickia	1000	000010	01000000	10000
Aneuria	1000	000210	01000000	10000
Xeneura	1000	000210	01000000	?????
Paratrixoscelis	0001	110000	00011001	00000
T. albibasis	0001	100200	00012001	00110
T. bajaensis	0001	100100	00012001	?????
T. bifurcata	0001	110100	00012001	00200
T. buccata	0101	100100	00012001	00?00
T. costalis	0001	100100	00012001	00100
T. deserta	0001	100100	00012001	00200
T. desertensis	0001	100100	00012001	?????
T. fumipennis	0001	100100	00012001	00200
T. gigapeza	0111	121000	00012001	00101
T. granditarsa	0111	121000	00011001	00201
T. nevadensis	0011	100000	00012001	00200
T. nigripeza	0001	111000	00012001	?????
T. ornata	0001	100200	00012001	00110
T. polita	0001	100200	00012001	00110
T. punctipennis	0001	100200	00012001	00110
T. pygochroa	0001	100100	00012001	00200
T. suffusa	0001	100100	00012001	00200
T. triplex	0001	100000	00012001	00200
T. tumida	0101	121000	00012001	00200
T. barberi	0001	110000	10110001	?????
T. claripennis	0001	110000	10110001	00200
T. flavens	0101	100000	10110001	00?01
T. flavida	0001	110000	10110001	00200
T. lagunaensis	0001	110000	10110001	00200
T. nitidiventris	0001	100000	10110011	00200
T. plebs	0001	100000	10110011	00200
T. signifera	0001	110100	10110001	00200
T. annetteae	0101	100000	10211101	10100
T. arnaudi	0101	100000	10211101	10100
T. cinerea	0101	100000	10211101	10100
T. coloradensis	0101	100000	10211001	11100
T. crepida	0101	100000	10211101	10100
T. flava	0101	110000	10211101	10101
T. flavicornis	0101	100000	10211101	11101
T. kernensis	0101	100000	10211101	10100
T. litorea	0101	100000	10211101	10100
T. melanderi	0101	100000	10211101	10100
T. nuda	0101	100000	10211101	10100

clusters, we then produced a strict consensus tree from the pool of 157 cladograms (Figure 2), collapsing some nodes, especially in some species of the *T. fumipennis* species group. Mapping of characters on trees was done with WinClada software (Nixon, 1999–2002) with the "slow optimization."

We separate the species of *Trixoscelis* into three species groups of which two (the *fumipennis* and *nuda* groups) are monophyletic. The third group, our so-called *claripennis* group, is obviously not monophyletic but is retained as a loose assemblage of species that cannot be placed in the morphologically distinct *fumipennis* group. We do this for convenience but also because there are large numbers of Old World species (certainly more than has been found thus far in the New World) that remain undescribed and unplaced into species groups. Their addition may result in modified topologies, including an enlarged and more heterogeneous *fumipennis* group.

The *nuda* species group, including *T. annetteae, T. arnaudi, T. cinerea, T. coloradensis, T. crepida, T. flava, T. flavicornis, T. kernensis, T. litorea, T. melanderi,* and *T. nuda,* share a high gena; a simple, strap-like distiphallus; separated pre- and postgonites that are simple, lobe-like structures; and pregonites that bear strong setae. This group, to date, is known only from North America and includes the two species previously placed in *Zagonia, T. flava*, and *T. flavicornis*.

The *T. claripennis* group, which we acknowledge is an assemblage of convenience, not being monophyletic, includes *T. barberi*, *T. claripennis*, *T. flavens*, *T. flavida*, *T. lagunaensis*, *T. nitidiventris*, *T. plebs*, *T. signifera*, and a host of Palearctic and Afrotropical species. Species of this group have a short gena; a multilobed, complex, and heavily sclerotized distiphallus; a postgonite that is absent or fused to the pregonite; and a pregonite that is simple and bears setae along the ventral margin. Although we have recognized the *T. claripennis* group as distinct from the *T. fumipennis* group, in many of the parsimony cladograms, there was some merging of these two groups into a single assemblage.

Finally, the large, apparently monophyletic *T. fumipennis* group has a generally short gena, a heavily sclerotized and complex distiphallus, and fused gonites with a variously strong spicule directed posteriorly on a thin, curved, dorsal lobe. Species of this group also often exhibit a maculation pattern in the wing. This group includes a number of Palearctic and Afrotropical species along with *T. albibasis, T. bajaensis, T. bifurcata, T. buccata, T. costalis, T. deserta, T. desertensis, T. fumipennis, T. gigapeza, T. granditarsa, T. nevadensis, T. nigripeza,*

T. ornata, T. polita, T. punctipennis, T. pygochroa, T. suffusa, T. triplex, and *T. tumida* from the Nearctic Region. It also includes all four species previously placed in *Spilochroa* from the Neotropical Region (Gill, 1968).

Key to Nearctic Species of the *T. fumipennis* and *T. claripennis* Species Groups

1. Wing maculate, even if indistinctly and only anterior to vein R_{2+3} 2
   Wing entirely hyaline 14
2. Wing heavily maculate, mostly dark with hyaline spots [Figures 34, 41] 3
   Wing variously maculate, dark markings on more extensive hyaline background [Figures 37, 40]. 6
3. Costal cell with a central dark spot [Figure 41] 4
   Costal cell hyaline [Figure 34] 5
4. Abdomen shiny, dark brown . . . . . ***T. polita*** (Malloch)
   Abdomen microtomentose, gray with brown spots . . . . . ***T. ornata*** (Johnson)
5. Thorax with brown spots at bases of setae . . . . . ***T. albibasis*** (Malloch)
   Thorax entirely gray, without brown spots . . . . . ***T. punctipennis*** (Melander)
6. Gena moderately high to high, gena-to-eye ratio 0.28 or higher 7
   Gena moderately short, gena-to-eye ratio 0.26 or less 9
7. Gena high, gena-to-eye ratio 0.40 or more [Figures 21, 22]. . . . . ***T. buccata*** Melander
   Gena only moderately high, gena-to-eye ratio 0.28–0.33 [Figures 20, 24] 8
8. Thorax light brown with no vittae along dorsocentral, acrostichal, and supra-alar tracks; fore femur yellow, wing with only vague infuscation anterior to vein R_{2+3} [Figures 91, 92]; male epandrium yellowish. . . . . ***T. suffusa*** Melander
   Thorax light brown with distinct vittae along dorsocentral, acrostichal, or supra-alar tracks; fore femur dark, wing heavily infuscated [Figure 40], epandrium shiny black . . . . . ***T. fumipennis*** Melander
9. Thorax light brown with distinct vittae along dorsocentral, acrostichal, or supra-alar tracks, wing may be heavily maculate 10
   Thorax gray microtomentose with indistinct brown vittae, wing only lightly maculate 11
10. Portion of vein M between crossveins r–m and dm–cu whitish [Figure 90] . . . . . ***T. pygochroa*** Melander
    Vein M between crossveins dark [Figures 37, 38] . . . . . ***T. deserta*** Melander
11. Male hind basitarsus distinctly swollen 12
    Male hind basitarsus not swollen. 13
12. Gena very narrow, only 0.15 eye height, male surstylus in posterior view not bifurcated [Figure 123]. . . . . ***T. signifera***
    Gena higher, 0.24–0.26 eye height, male surstylus in posterior view bifurcated [Figure 11] . . . . . ***T. bifurcata,*** new species
13. Acrostichal setae in 2 rows . . . . . ***T. desertensis,*** new species
    Acrostichal setae in 4 rows . . . . . ***T. bajaensis,*** new species
14. Gena 0.12–0.25 eye height [Figure 143] 15
    Gena at least 0.33 eye height [Figures 169, 171] 23
15. Thorax usually light brown with vittae of varying intensity along dorsocentral and acrostichal tracks 16
    Thorax gray, sometimes with indistinct vittae between dorsocentral tracks 17
16. Abdomen shiny brown or black. . . . . ***T. nitidiventris*** Melander
    Abdomen gray to brown microtomentose . . . . . ***T. triplex*** Melander
17. Fore femur yellow to very light gray 18
    Fore femur black (rarely yellow in males) or dark gray 19
18. Dorsal half of anepisternum distinctly brown . . . . . ***T. nevadensis,*** new species
    Anepisternum uniformly gray . . . . . ***T. plebs*** Melander
19. Male hind basitarsus black, swollen . . . . . ***T. nigripeza,*** new species
    Male hind basitarsus yellow or brown. 20
20. Male basal flagellomere mostly to entirely bright yellow . . . . . ***T. flavida*** Melander
    Male basal flagellomere partly to mostly brown 21
21. Male surstylus short, triangular [Figure 106]. . . . . ***T. claripennis*** (Malloch)
    Male surstylus long, narrow 22

22. Male surstylus curved upward [Figure 127] . . . . . ***T. lagunaensis,*** new species
    Male surstylus nearly straight [Figure 105] . . . . . ***T. barberi,*** new species
23. Fore femur black or brownish, male hind basitarsus greatly swollen . . . . . ***T. tumida*** Melander
    Fore femur usually light to dark yellow (rarely with some darkening on posterior surface, male hind basitarsus swollen or not. 24
24. Mesonotum yellow . . . . . ***T. flavens*** Melander
    Mesonotum uniformly gray 25
25. Basal flagellomere yellowish; acrostichal setulae in 2 rows. . . . . ***T. nuda*** (Coquillett) species group (see separate key page 94)
    Basal flagellomere black; acrostichal setulae in 4 rows. 26
26. Distiphallus complex, with 3 long, narrow arms [Figure 51] . . . . . *T. gigapeza,* **new species**
    Distiphallus complex but with short, wider lobes [Figure 55] . . . . . ***T. granditarsa*** (Foster and Mathis)

The *T. fumipennis* Species Group

DIAGNOSIS. The species of the *fumipennis* species group are distinguished from those of the other species groups by the following combination of characters.

Head: Gena short to moderately short, gena-to-eye ratio 0.15–0.33 but in several species up to 0.55.

Thorax: Wing maculate in most species to varying degree, some species with wing hyaline.

Abdomen: Male terminalia: Epandrium generally rather large and distinct in undissected specimens, light to very dark, microtomentose to shiny. Distiphallus heavily sclerotized and complex; gonites fused and bearing a variously developed spicule directed posteriorly, often on a thin, curved, dorsal lobe.

REMARKS. This is the largest species group of *Trixoscelis* in North America and examination of illustrations (Hackman, 1970; Cogan, 1977; Collins, 1943; Woznica, 2000, 2007) of male terminalia of many Palearctic species indicates there are many more species of this group worldwide. The variously developed spicule on the gonites can be quite striking and seems to be unique to the subfamily Trixoscelidinae. The genus *Paratrixoscelis,* described from Mongolia, seems to be closely allied to this species group and is likely a synonym of *Trixoscelis*.

Trixoscelis albibasis (Malloch), new combination

FIGURES 3–5, 34

Diastata (Spilochroa) albibasis Malloch, 1931:30.

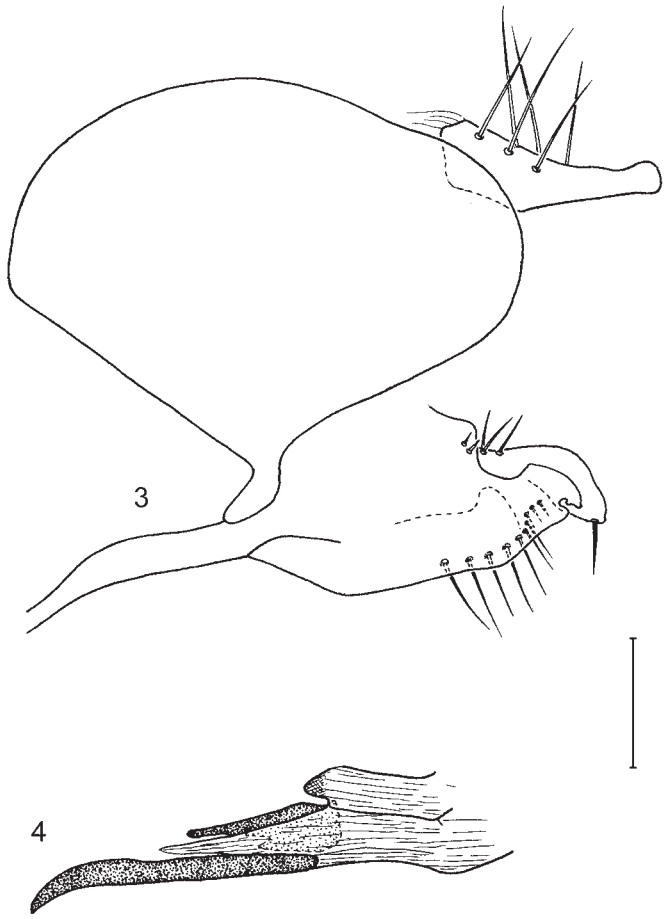
Spilochroa albibasis. —Wheeler, 1955:112 [key, generic combination]. —Vockeroth, 1965:817 [Nearctic catalog]. —Cole, 1969:433 [distribution, diagnosis].

DIAGNOSIS. Body light brown microtomentose, pleural sclerites darker brown somewhat shining, brown spots at bases of most setae including scutellar setae, 4 rows of acrostichal setae, wing heavily infuscated, with hyaline spots, costal cell hyaline; antenna mostly yellow, center of basal flagellomere may be mostly brown, gena short, gena-to-eye ratio only 0.15.

DESCRIPTION. Body length 2.50–3.60 mm.

Head: Eye higher than wide; ocellar triangle light gray microtomentose; frons bare, yellowish orange becoming darker dorsally, parafrons whitish-silver microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput very narrow, gray dorsally, becoming white ventrally, microtomentose with 1 row of short dorsoclinate setulae; antenna mostly yellow, center of basal flagellomere sometimes mostly brown; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.15, mostly white but with diffuse brown spot at base of oral vibrissa, microtomentose, bearing 1 row of short ventroclinate setae along ventral edge in addition to a pair of stronger convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, gray.

Thorax: Mesonotum light brown microtomentose with darker areas becoming light gray posterior to fourth dorsocentral seta including scutellum, light gray extends to at least the second abdominal tergite, brown spots at bases of most setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 somewhat irregular rows; apical scutellar setae about twice length of scutellum. Pleural sclerites distinctly darker than mesonotum, anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much



FIGURES 3–4. Structures of male terminalia of *Trixoscelis albibasis* (Malloch) (Mexico. Baja California Sur. Los Barriles [23°39'N, 109°42'W]): (3) epandrium, surstylus, hypandrium, and gonites, lateral aspect; (4) distiphallus, ventral aspect. Scale = 0.1 mm.

smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing (Figure 34) predominately infuscated, with round to oblong hyaline spots, one semicircular hyaline spot at wing tip between veins R_{4+5} and M, costal cell hyaline. Halter white. Legs entirely brownish yellow; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: First and second tergites light gray microtomentose, remainder of abdomen dark brown, evenly setulose; tergites 3, 4, and 5 with 2 vague gray spots. Male terminalia (Figures 3, 4): Epandrium concolorous with remainder of abdomen; surstylus (Figure 3) long triangular evenly endowed with setae, pre- and postgonite fused but distinct, pregonite with a row of setae along ventral margin, postgonite curved with one distal seta, (Figure 3), distiphallus complex with four narrow lobes (Figure 4). Female terminalia: Seventh sternite with a row of strong setae along posterior margin, distinct notch on anterior medial margin, seventh sternite and tergite fused but with distinct suture line; spermathecae spherical, ducts not sclerotized; eighth sternite lightly sclerotized, subtriangular with distinct lateral lobes each bearing several strong setae; hypoproct with 2 short, strong setae; epiproct very lightly sclerotized medially forming two triangles with 1 weak seta on tip of each.

TYPE MATERIAL. Malloch described *T. albibasis* from a single male specimen, the holotype, which is labeled "near Ledoux [handwritten] New Mexico/Aug 21/Cockerell/TypeNo. 43126 U.S.N.M. [red]/Diastata (Spilochroa) albibasis Type [handwritten] Det J. R. Malloch [printed] Type [white label with black sub-border]." The holotype is directly pinned, is in good condition (abdomen removed and dissected with structures in an attached microvial), and is deposited in the USNM (43126).

TYPE LOCALITY. United States. New Mexico. Mora: Ledoux (35°55.4′N, 105°21.7′W).

OTHER SPECIMENS EXAMINED. Neotropical: MEXICO. *Baja California Sur.* Los Barriles (23°39′N, 109°42′W), 29–30 Apr 1979, M. Wasbauer (1♂; USNM). *Sonora.* Bahia San Carlos (27°57.7′N, 111°01.5′W), 3 Mar 1963, P. H. Arnaud, Jr. (1♂, 1♀; USNM).

DISTRIBUTION (FIGURE 5). Nearctic: United States (New Mexico). Neotropical: Mexico (Baja California Sur, Sonora).

REMARKS. This species can be readily distinguished from *T. ornata* and *T. punctipennis* by the light gray band from the fourth pair of dorsocentral setae to the second tergite of the abdomen.

Trixoscelis bajaensis Foster and Mathis, new species

FIGURES 6–9, 19–20

DIAGNOSIS. Mesonotum gray, with brown vittae along the dorsocentral setae and the anterior intra-alar seta, 4 scattered rows of acrostichal setae, proepimeral seta present; wing vaguely maculate anterior to vein R_{4+5} and on crossvein dm–cu; antenna brown except for small area at base of arista yellow; vertex brown microtomentose; gena short, gena-to-eye ratio only 0.20; abdomen gray; male epandrium in undissected specimens bulbous, yellowish microtomentose in contrast to the rest of the abdomen.

DESCRIPTION. Body length approximately 2.50 mm (measurements taken after dissection).

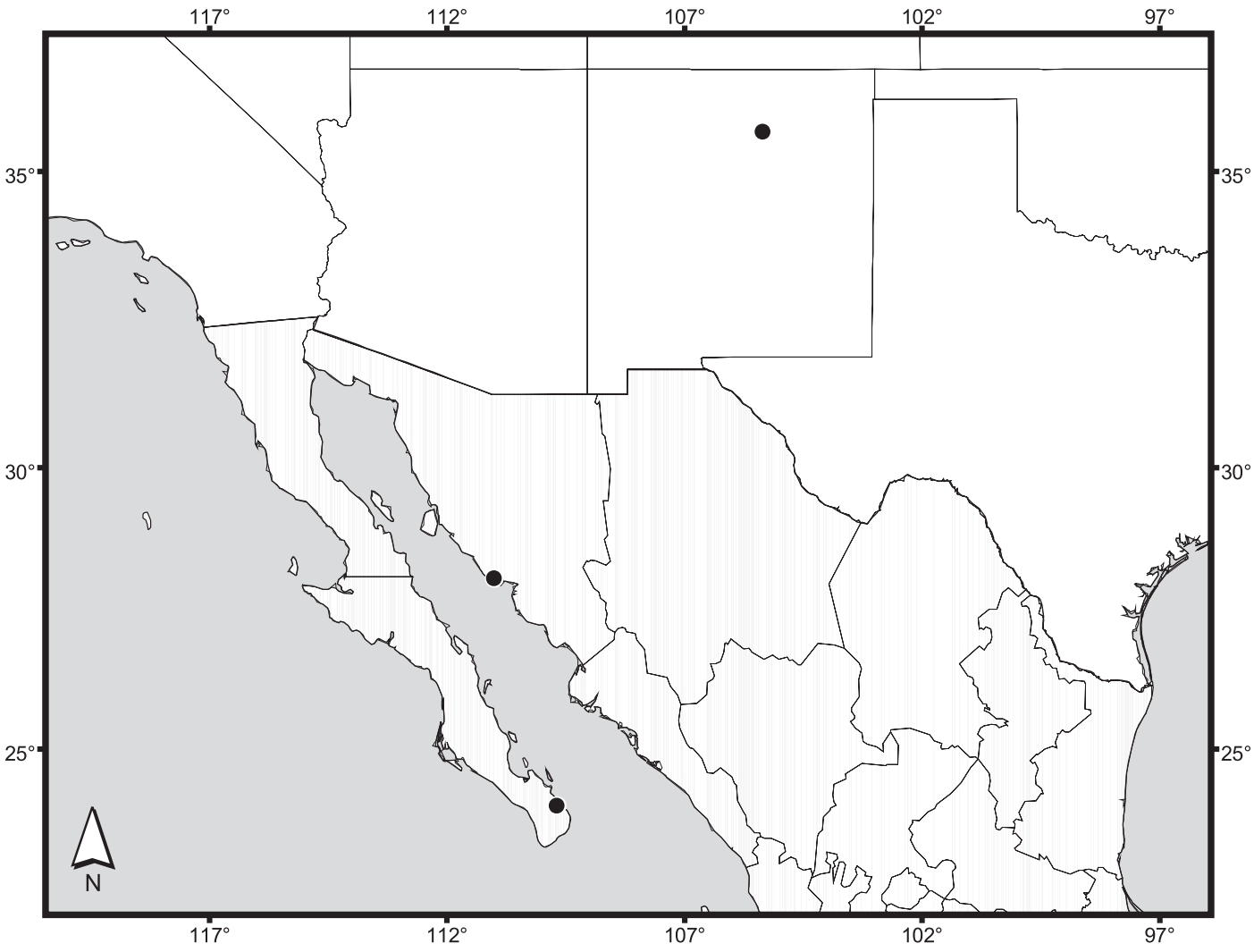
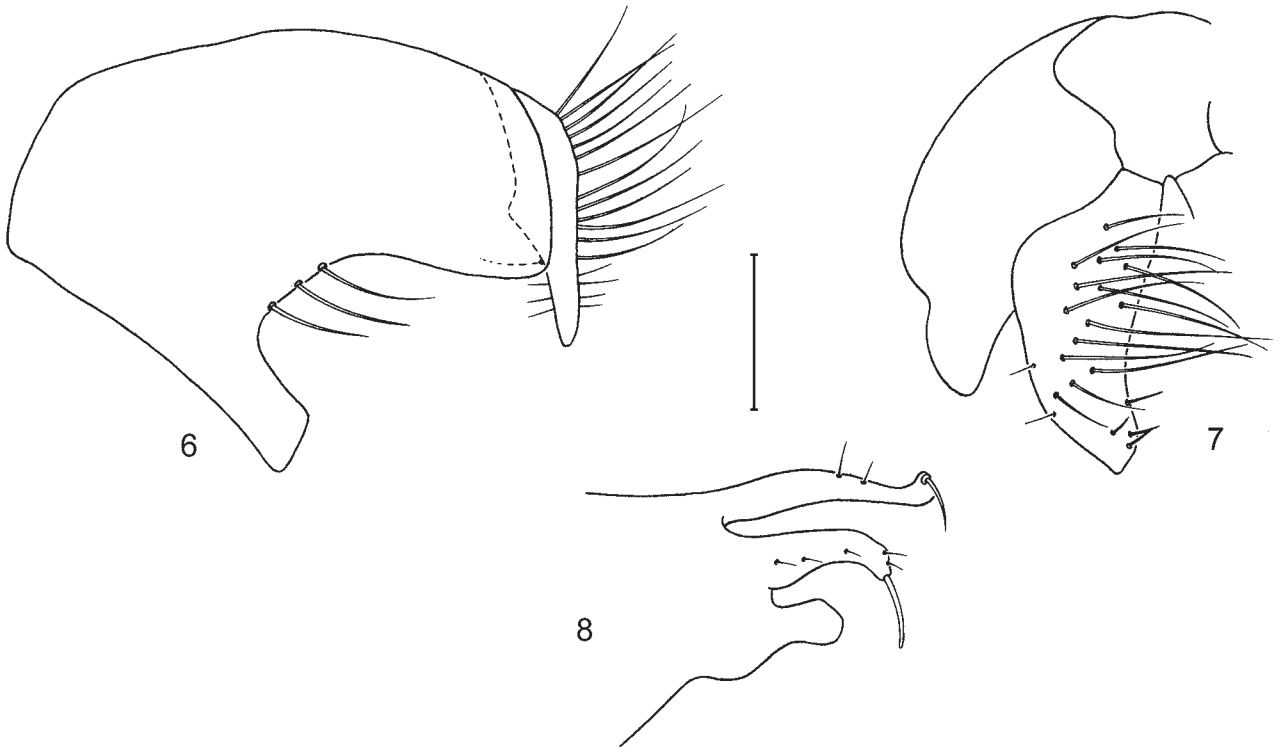


FIGURE 5. Distribution map for *Trixoscelis albibasis* (Malloch).

Head (Figures 19, 20): Eye round; ocellar triangle gray microtomentose; frons bare, mostly brown, parafrons white microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput narrow, gray microtomentose dorsally becoming concolorous with gena ventrally, with 1–2 rows of short dorsoclinate setulae; antenna brown except for small area at base of arista yellow; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.20, white microtomentose, bearing 1 row of 4–5 short ventroclinate setae along ventral edge in addition to a pair of strong convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, brown.

Thorax: Mesonotum gray, brown vittae along the dorsocentral setae and the anterior intra-alar. Dorsocentral setae 5(2+3); acrostichal setae in 4 irregular rows; apical scutellar setae only twice length of scutellum. Mesonotum sparsely covered with minute setae. Anepisternum gray, mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing vaguely maculate anterior to vein R_{4+5} and on crossvein dm–cu. Halter white. Fore femur light brown, otherwise legs entirely yellow, fifth tarsal segment slightly darker; fore femur with a



FIGURES 6–8. Structures of male terminalia of *Trixoscelis bajaensis* Foster and Mathis: (6) epandrium and surstylus, lateral aspect; (7) same, posterior aspect; (8) gonite, lateral aspect. Scale = 0.1 mm.

row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly gray microtomentose except epandrium yellowish-brownish microtomentose, extreme posterior edges of some sternites lighter, evenly setose. Male terminalia (Figures 6–8): Epandrium in undissected specimens yellow, distinctly in contrast to the uniformly gray abdomen; surstylus (Figures 6, 7) widely triangular, rather straight in lateral view, robust triangular in posterior view; pregonite and postgonite fused and trilobed (Figure 8) dorsal lobe long, thin, bearing a sharp re-curved seta distally, medial lobe slightly curved, also bearing a recurved seta distally, ventral-most lobe simple; basiphallus long, narrow, curving ventrally, distiphallus complex, with two strongly sclerotized areas and a thin distal strand. Female terminalia: Unknown.

TYPE MATERIAL. The holotype male is labeled "MEX[ICO]: B[aja]. Calif[ornia]. Sur Arroyo San Gregorio 13 km. (air) WNW La Purisima/24/25-IV-1983 M. Wasbauer coll[ector]. malaise trap/HOLOTYPE ♂ *Trixoscelis bajaensis* Foster & Mathis CSCA [red]." The holotype is double mounted (glued to a cardboard triangle on its right side), is in excellent condition with structures of the male terminalia clearly visible, and is deposited in the CSCA. Paratypes are as follows:

MEXICO. *Baja California Sur.* Rancho Tablon, Guillermo Prieto (21 km SW; 27°50′N, 113°19′W; Malaise trap), 14–17 Apr 1983, M. S. Wasbauer (3♂; CSCA, USNM).

Sonora: Bahia San Carlos (27°57.7′N, 111°01.5′W), 3 Mar 1963, P. H. Arnaud, Jr. (1♂; USNM).

TYPE LOCALITY. Mexico. Baja California Sur: Arroyo San Gregorio (13 km WNW of La Purísima; 26°13.6′N, 112°21.8′W).

DISTRIBUTION (FIGURE 9). Nearctic: Mexico (Baja California Sur, Sonora).

ETYMOLOGY. The species epithet, *bajaensis*, is of Latin derivation and refers to the type locality in Mexico.

REMARKS. This species is remarkably closely allied with *T. deserta* and *T. desertensis* but differs in the characters of the male postabdomen.

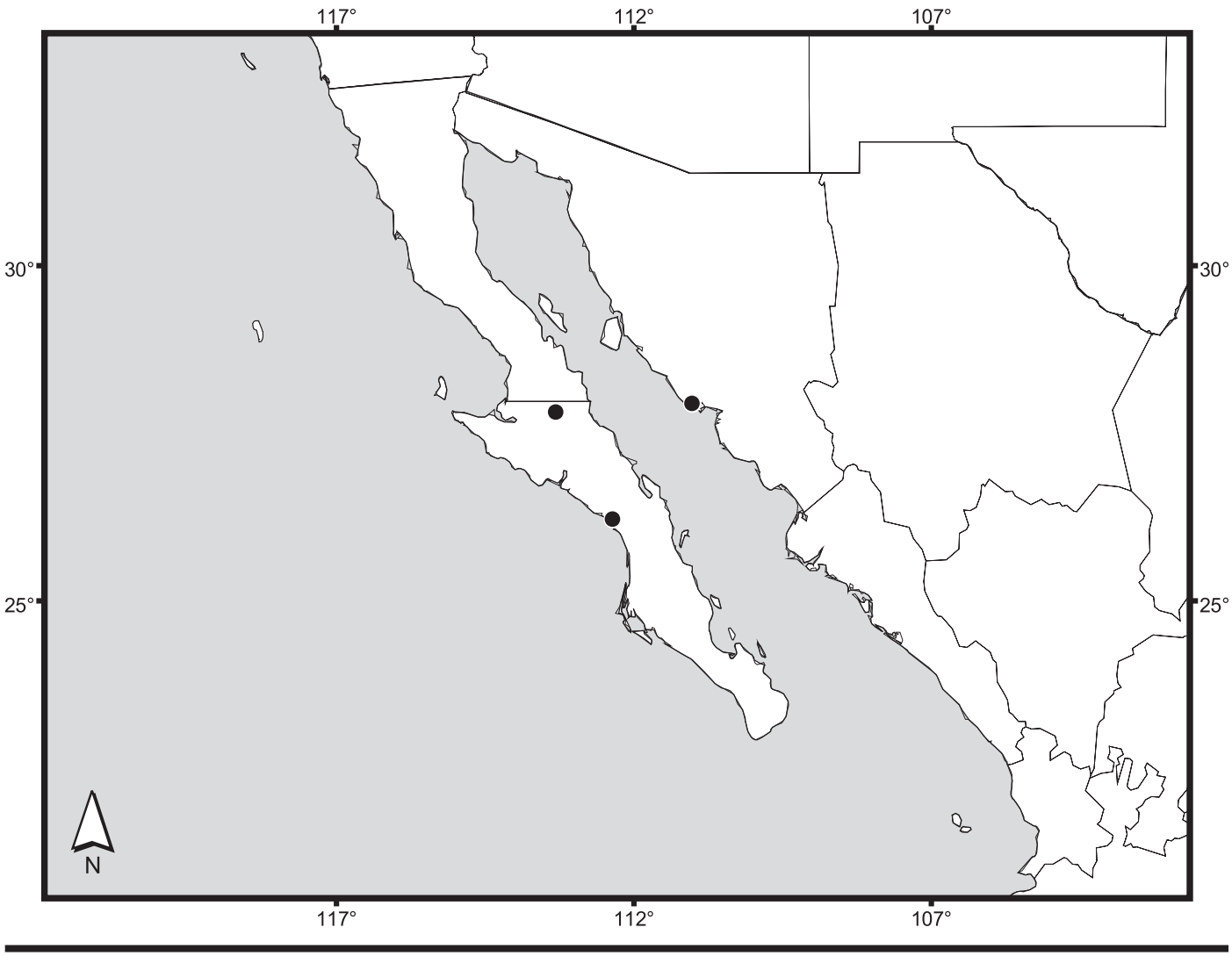


FIGURE 9. Distribution map for *Trixoscelis bajaensis* Foster and Mathis.

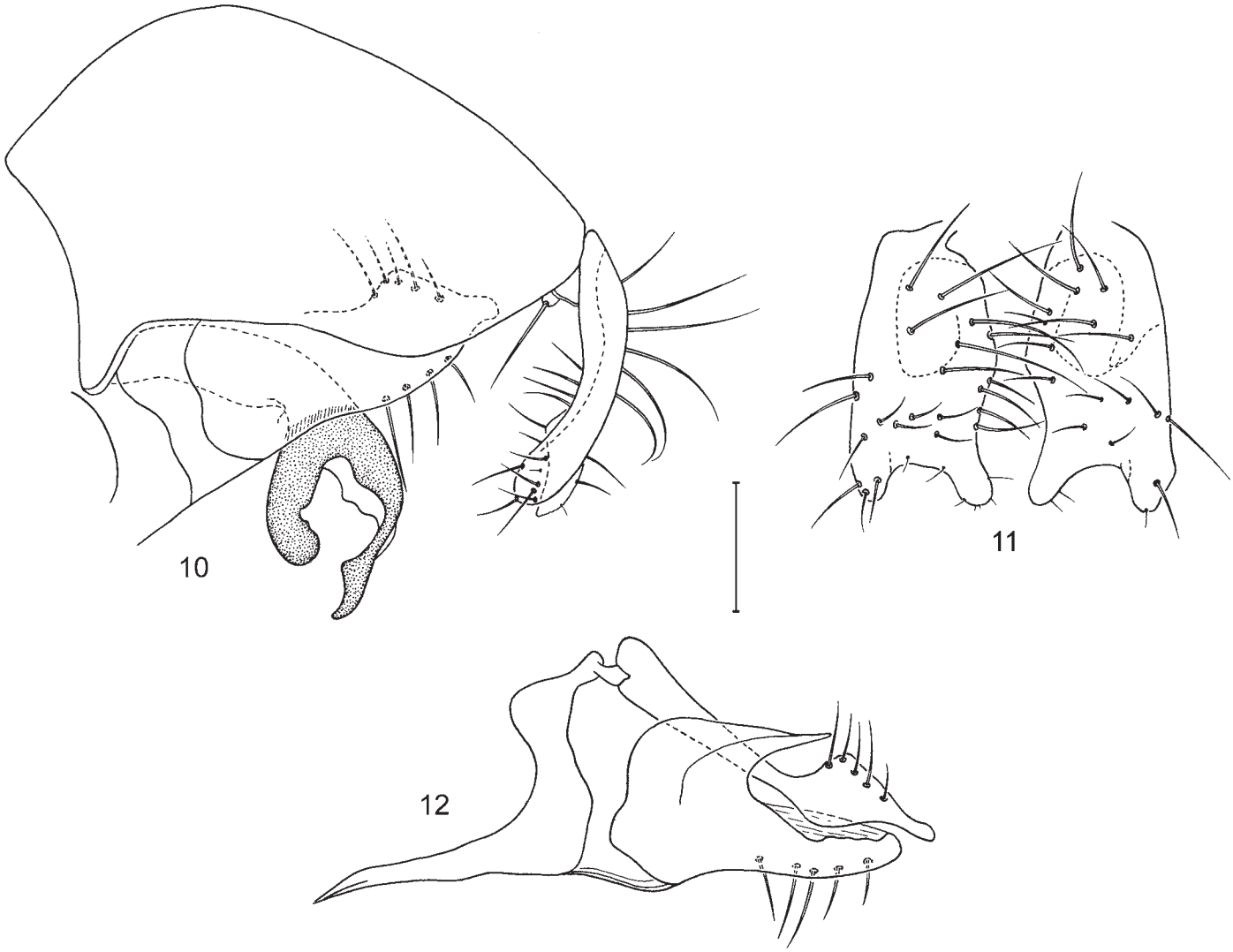
Trixoscelis bifurcata Foster and Mathis, new species

FIGURES 10–13, 35

DIAGNOSIS. Body gray, thorax with two brown vittae between dorsocentral setae and along postpronotal and notopleural line, 4 rows of acrostichal setae; wing infuscated anterior to vein R_{4+5}, darker anterior to vein R_{2+3}; antenna mostly brown, yellow only at base of basal flagellomere, especially on medial surface; vertex yellowish to brown microtomentose; gena-to-eye ratio 0.24–0.26; male epandrium in undissected specimens yellowish.

DESCRIPTION. Body length 2.96–3.00 mm; generally gray microtomentose.

Head: Eye higher than wide; ocellar triangle light gray microtomentose; frons bare, mostly brown becoming lighter anteriorly, parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput gray microtomentose with 2–3 rows of short dorsoclinate setulae; antenna mostly brown, yellow only at base of basal flagellomere, especially on medial surface; arista brown, with sparse hairs. Gena moderately short, gena-to-eye ratio 0.24–0.26, white microtomentose, bearing 1 row of 10–12 short ventroclinate setae along ventral edge in addition to a pair of stronger



FIGURES 10–12. Structures of male terminalia of *Trixoscelis bifurcata* Foster and Mathis (Mexico. Sonora. Bahia San Carlos): (10) epandrium, surstylus, gonites, distiphallus, lateral aspect; (11) surstyli, posterior aspect; (12) pre- and postgonites and hypandrium, lateral aspect. Scale = 0.1 mm.

convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, gray.

Thorax: Mesonotum uniformly gray microtomentose with 2 brown vittae between dorsocentral setae and along postpronotal and notopleural line, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 somewhat irregular rows; apical scutellar setae about twice length of scutellum. Anepisternum mostly gray with a brownish area under the setae, mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing (Figure 35) infuscated anterior to vein R_{4+5}, darker anterior to vein R_{2+3}. Halter yellow. Fore coxae grayish, fore femur uniformly gray, slightly swollen; all other femora and tibiae yellow, tarsi darker, male hind basitarsus slightly swollen; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly dark gray microtomentose except extreme posterior edges of sternites lighter; evenly setose. Male terminalia (Figures 10–12): Epandrium in undissected specimens yellowish; surstylus (Figures 10, 11) robust, recurved in lateral view, bifurcated in posterior view, pre- and postgonite separate, pregonite as in Figure 12, postgonite (Figure 12) long, thin, becoming triangular

distally with 4–5 dorsally directed, short setae, distiphallus (Figure 10) short, complex, darkly sclerotized. Female terminalia: seventh sternite and tergite strongly fused; spermathecae rather bulbous; eighth sternite with two distinct setaceous lobes; hypoproct with 2 short strong setae; epiproct with 2 weak setae.

Type Material. The holotype male is labeled "MEX[ICO]: Sonora Bahia San Carlos 3-III-1963 P. H. Arnaud, Jr./HOLOTYPE ♂ *Trixoscelis bifurcata* Foster & Mathis USNM [red]/USNM ENT 00118094 [plastic bar code label]." The holotype is double mounted (glued on the right side to a paper triangle on a pin), is in excellent condition (abdomen removed and dissected; structures in an attached microvial), and is deposited in the USNM. Paratypes are as follows:

MEXICO. *Baja California*. Rancho San Ignacio (26 km E Rosarito; 32°20.9′N, 117°02.5′W), 26–27 Mar 1982, M. S. Wasbauer (1♂, 1♀; CSCA).

Sonora. Bahia San Carlos (27°57.7′N, 111°01.5′W), 3 Mar 1963, P. H. Arnaud, Jr. (1♀; USNM).

UNITED STATES. *California*. **Imperial:** Ogilby Road, Chocolate Mountains (5 km S junction with highway; 78; 33°28′N, 115°35′W; Malaise trap), 20–22 Mar 1978, P. Adams, J. Slansky, M. S. Wasbauer (1♂; CSCA). **Riverside:** Palm Springs (33°49.8′N, 116°32.7′W), 26 Dec 1952, P. H. Arnaud, Jr. (1♂; USNM).

Type Locality. Mexico. Sonora. Bahia San Carlos (27°57.7′N, 111°01.5′W).

Distribution (Figure 13). Nearctic: Mexico (Baja California, Sonora), United States (California).

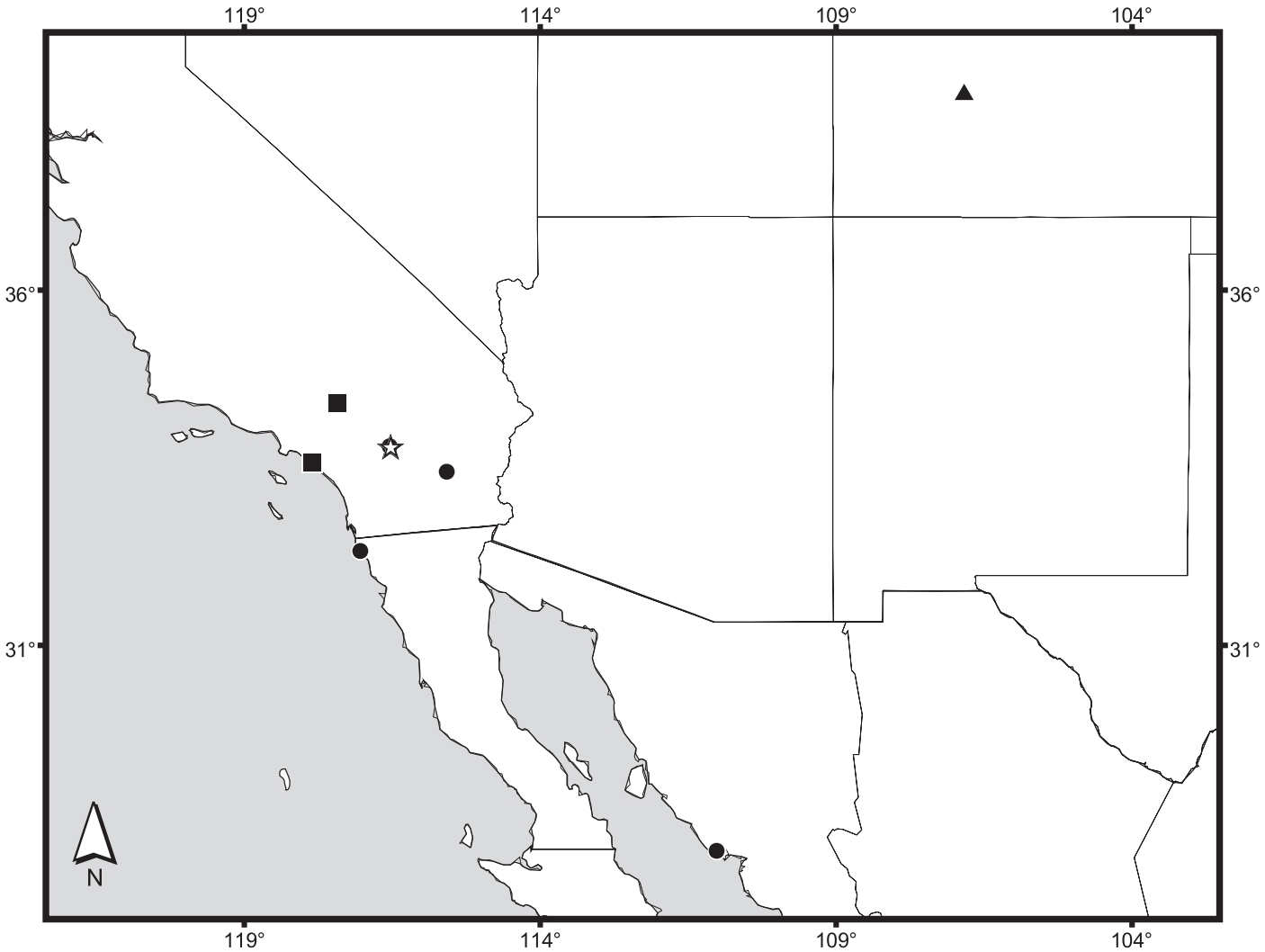


FIGURE 13. Distribution map for *Trixoscelis barberi* Foster and Mathis (squares), *T. bifurcata* Foster and Mathis (dots), *T. coloradensis* Foster and Mathis (triangle), and *T. desertensis* Foster and Mathis (star).

ETYMOLOGY. The species epithet, *bifurcata*, is of Latin derivation and refers to the unusually bifurcated surstylus of this species.

REMARKS. Externally, this species is unremarkable and would key to *T. signifera*. Examination of structures of the male terminalia, however, reveals a bifurcated surstylus and other differences that distinguish this species from *T. signifera*.

Trixoscelis buccata Melander

FIGURES 14–18, 21–22, 36

Trixoscelis buccata Melander, 1952:43. —Vockeroth, 1965:817 [Nearctic catalog]. —Cole, 1969:433 [distribution, diagnosis].

DIAGNOSIS. Body light brown; 2 or 4 rows of acrostichal setae; wing infuscate at crossveins, darker, smoky anterior to vein R_{4+5}; basal flagellomere light brown to yellowish; vertex brown to blackish; gena high, gena-to-eye ratio 0.40–0.55; male epandrium in undissected specimens yellowish.

DESCRIPTION. Body length 1.64–3.04 mm; uniformly light brown microtomentose.

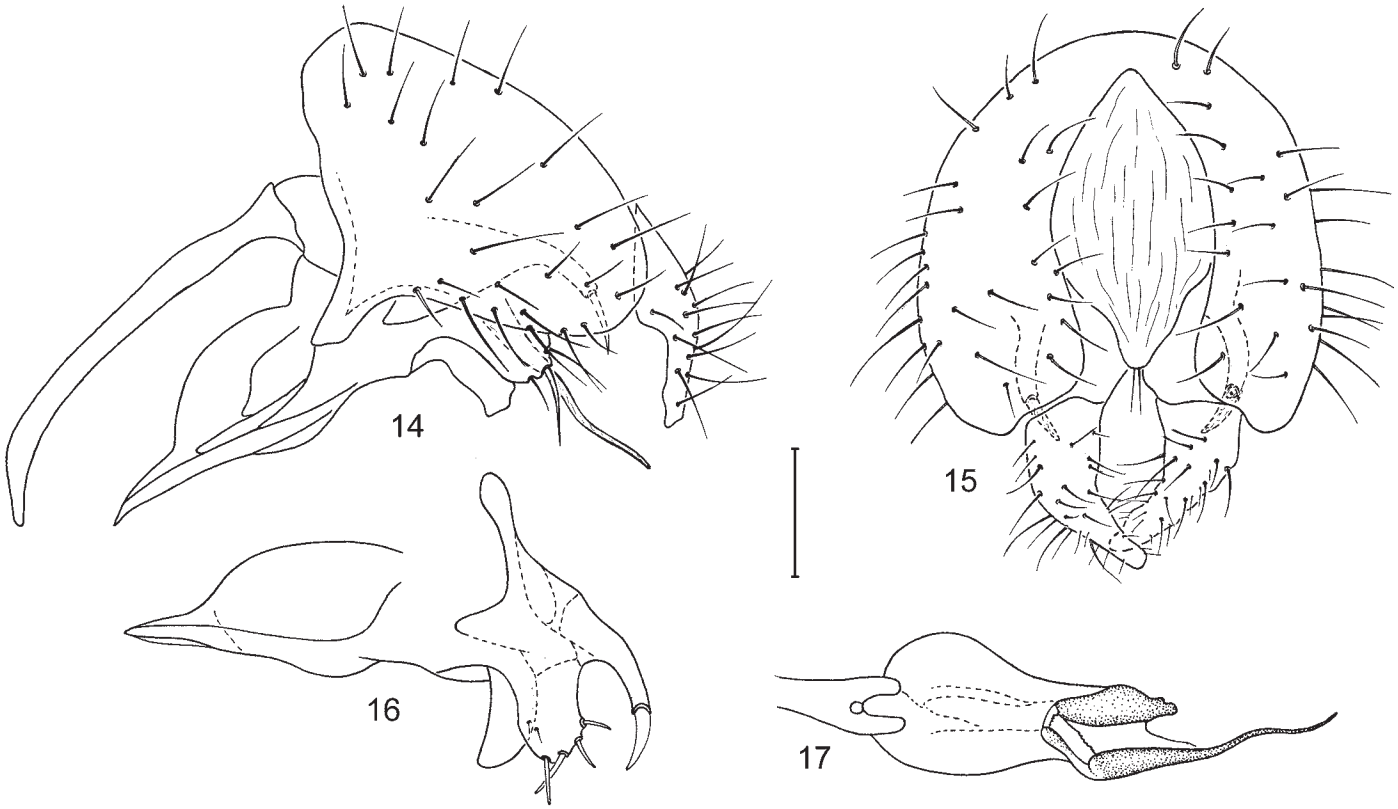
Head (Figures 21, 22): Eye higher than wide; ocellar triangle brown microtomentose; frons bare, yellow on ventral 2/3 brown to blackish dorsal 1/3, parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput gray microtomentose dorsal half, ventral half concolorous with gena, with 1–2 rows of short dorsoclinate setulae dorsally; antenna with basal flagellomere brown except area around arista yellow, scape and pedicel yellow; arista with sparse hairs. Gena-to-eye ratio 0.40–0.55, whitish microtomentose, bearing several short, scarcely discernible setulae ventrally and 2–3 slightly stronger setae posteriorly in addition to a pair of strong convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, white.

Thorax: Mesonotum uniformly light brown microtomentose, sparsely setulose. Dorsocentral setae 5(2+3); acrostichal setae in 4 irregular rows, may have 2 distinct rows plus a few scattered setulae forming the third and fourth rows; apical scutellar setae just over twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster with the larger seta; katepisternum with 2 longer setae and one shorter one between them in a row along the posterodorsal edge. Wing (Figure 36) smoky hyaline, darker anterior to vein R_{4+5}; junction of vein R_1 with costa and crossveins r–m and dm–cu also darkened. Halter white. Coxae, femora and tibiae yellow, tarsi darker; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces, otherwise legs evenly setulose except for preapical tibial setae on all tibiae.

Abdomen: Uniformly light brown microtomentose except posterior edges of sternites sometimes lighter, evenly setose. Male terminalia (Figures 14–17): Epandrium yellowish in undissected specimens, somewhat dorsally oblong; surstylus strong, distinct, subtriangular, with a medial curvature, endowed with many strong setae (Figures 14, 15); hypandrium ending in spatulate lobes on both sides posteriorly; pre- and postgonite fused, but postgonite (Figure 16) distinct and with terminal, sharp spine; pregonite spatulate, endowed with three or four setae posteriorly; aedeagus as in Figure 14; distiphallus strongly black sclerotized in two portions, one portion simple, thin ribbon-like (Figure 17). Female terminalia: Seventh sternite and tergite fused into a ring; spermathecae spherical; eighth sternite with small lateral setaceous lobes; hypoproct armed with two quite short but strong setae, epiproct without a pair of distinct setae.

TYPE MATERIAL. Melander designated two specimens from "Sabino Canyon, near Tucson, Arizona, May 5, 1942" as the "Types" and eleven other specimens as paratypes. Of the two so-called "type" specimens one is a female and the other is missing both its head and abdomen. This makes it nearly impossible to define *T. buccata* based on these types. Thus we herein designate one of the eleven so-called "paratypes" (= syntypes) that Melander had before him as the lectotype. The lectotype male of *Trixoscelis buccata* Melander, herein designated to stabilize and make more universal the use of this name, is the dorsal specimen of two flies on a double mount (vertically mounted on a minuten in a cardboard rectangle) that is labeled "UpStaAnaRiv Lost Creek 29/7/48 [29 Jul 1948] CAL[IFORNIA. **San Bernardino:**] A. L. Melander/ PARATYPE Trixoscelis buccata Melander [yellow]/A. L. Melander Collection 1961 [green stippling on right side]/ LECTOTYPE ♂ *Trixoscelis buccata* Melander Foster & Mathis USNM/USNM ENT 00118095 [plastic bar code label]." The ventral specimen on the pin, a paralectotype ♂, has had the abdomen removed and dissected, and the structures are in an attached microvial. The lectotype is deposited in the USNM. Other paralectotypes are as follows:

UNITED STATES. *Arizona*. **Pima:** Baboquivari Mountains (31°47.4′N, 111°35.2′W), 27 Apr 1947, A. L. Melander (2♂, 1♀; USNM); Sabino Canyon (31°52′N, 111°27.4′W), 5 May 1942, A. L. Melander (2♀, 1 unknown sex [lacking head and abdomen]; USNM).



FIGURES 14–17. Structures of male terminalia of *Trixoscelis buccata* Melander: (14) epandrium, surstylus, gonites, distiphallus, lateral aspect; (15) epandrium and surstyli, posterior aspect; (16) hypandrium and gonites, lateral aspect; (17) distiphallus, ventral aspect. Scale = 0.1 mm.

California. **Riverside:** Andreas Canyon (33°45.7′N, 116°32.2′W), 1 Apr 1945, A. L. Melander (1♂, 1♀; USNM). **San Bernardino:** Mojave Desert, Thorn (34°28.6′N, 117°16.6′W), 30 May 1944, A. L. Melander (2♀; USNM).

Colorado. **El Paso:** Manitou Springs (38°51.6′N, 104°55′W), 18 Jun 1940 (not 16 Jun 1940, as Melander [1952:43] published), A. L. Melander (1♂, 1♀; USNM).

Type Locality. United States. California. San Bernardino: Upper Santa Ana River, Lost Creek (35°03.5′N, 119°21.8′W).

Other Specimens Examined. MEXICO. *Baja California Sur.* Arroyo San Gregorio (13 km WNW of La Purísima; 26°13.6′N, 112°21.8′W), 24–24 Apr 1983, M. S. Wasbauer (3♂, 1♀; CSCA); Guillermo Prieto (21 km SW; 27°50′N, 113°19′W; Malaise trap), 3–5 Apr 1982, M. S. Wasbauer (1♀; CSCA); El Pescadero, Playa Los Cerritos (23°19.8′N, 110°10.6′W), 14–15 Apr 1979, M. S. Wasbauer (1♀; CSCA); Los Barriles (23°39′N, 109°42′W), 5–6 May 1979, M. S. Wasbauer (2♀; CSCA).

Sonora. Alamos (28°40′N, 110°22′W), 26 Feb 1963, P. H. Arnaud, Jr. (3♀; USNM).

UNITED STATES. *Arizona*. **Cochise:** Portal, Southwestern Research Station (8 km SW of Portal; 31°52.9′N, 109°12.2′W; 1631 m; Malaise trap), 23 May–9 Jun 1967, 1972, C. W. Sabrosky, W. W. Wirth (5♀; USNM); Ramsey Canyon (31°27.8′N, 110°17.4′W; 1585 m; 24 km S Sierra Vista), Huachuca Mountains, 12 Apr 1967, R. F. Sternitsky (1♀; CNC). **Coconino:** Flagstaff, Oak Creek Canyon, Sterling Canyon (35°01.5′N, 111°44.2′W; 1800 m; riparian woods), 17–25 Jul 1979, S. Peck, J. Peck (1♂; DEBU); Flagstaff (16 km NW, San Francisco Mountains; 35°20.5′N, 111°41′W; 2895 m; spruce, fir, aspen meadow, Malaise trap), 18–24 Jul 1979, S. Peck (1♀; DEBU); Oak Creek Canyon (34°54.8′N, 112°28.1′W), 21 Jun 1938, Christenson (1♂; USNM). **Greenlee:** Clifton, Hot Spring (33°04.8′N, 109°18.2′W), 27 Jun, H. S. Barber (1♀; USNM). **Maricopa:** Wickenburg (33°58.1′N, 112°43.8′W), 18 May 1950 A. H. Sturtevant (1♀;

USNM). **Yavapai:** Prescott (34°32.4′N, 112°28.1′W), 11 Nov 1950, A. H. Sturtevant (1♂, 1♀; USNM).

Colorado. **Rio Grande:** South Fork (37°40.2′N, 106°38.4′W; 2440 m), 20 Jun 1972, W. W. Wirth (4♂, 1♀; USNM).

New Mexico. **Catron:** Gila National Forest (Middle Fork of Gila River; 33°13.3′N, 108°14.6′W; riparian zone), 29 May 1991, B. J. Sinclair (1♂, 3♀; CNC); Gila National Forest, Whitewater Canyon (33°21.6′N, 108°04′W), 30 May 1991, J. E. Swann (2♂, 1♀; DEBU); Glenwood (33°19′N, 108°53′W), 13 Jun 1950, A. H. Sturtevant (1♂, 1♀; USNM); Glenwood (8 km E; 33°19′N, 108°52.5′W), 24 Jun 1953, W. W. Wirth (1♂; USNM); Luna (8 km W; 33°49.1′N, 108°57.3′W; 2255 m), 9–14 Jul 1979, S. Peck, J. Peck (4♀; DEBU); Whitewater Canyon (33°21.6′N, 108°03.9′W; Malaise trap), 1 Jun 1972, W. W. Wirth (3♂, 2♀; USNM). **Grant:** Cherry Creek, Pinos Altos (32°51.8′N, 108°13.3′W), 22 Jun 1953, W. W. Wirth (1♂; USNM); Gila National Forest near Gila River Forks (32°59.4′N, 108°33′W), 29 May 1991, J. E. Swann (5♂, 2♀; DEBU); Gila National Forest, Lake Roberts (33°02′N, 108°10′W; pan traps), 28 May–5 Jun 1991, J. E. Swann (17♂, 20♀; DEBU).

Texas. **Brewster:** Big Bend National Park, Dugout Wells (29°16.3′N, 103°08.1′W; 915 m), 13 May 1959, J. F. McAlpine (3♂; CNC).

Utah. **Wasatch:** Daniels Pass (40°17.8′N, 111°15.1′W; 153 m), 9 Jul 1961, J. G. Chillcott (1♂, 1♀; CNC).

DISTRIBUTION (FIGURE 18). Nearctic: Mexico (*Baja California Sur*, Sonora), United States (Arizona, California, Colorado, New Mexico, Texas, Utah).

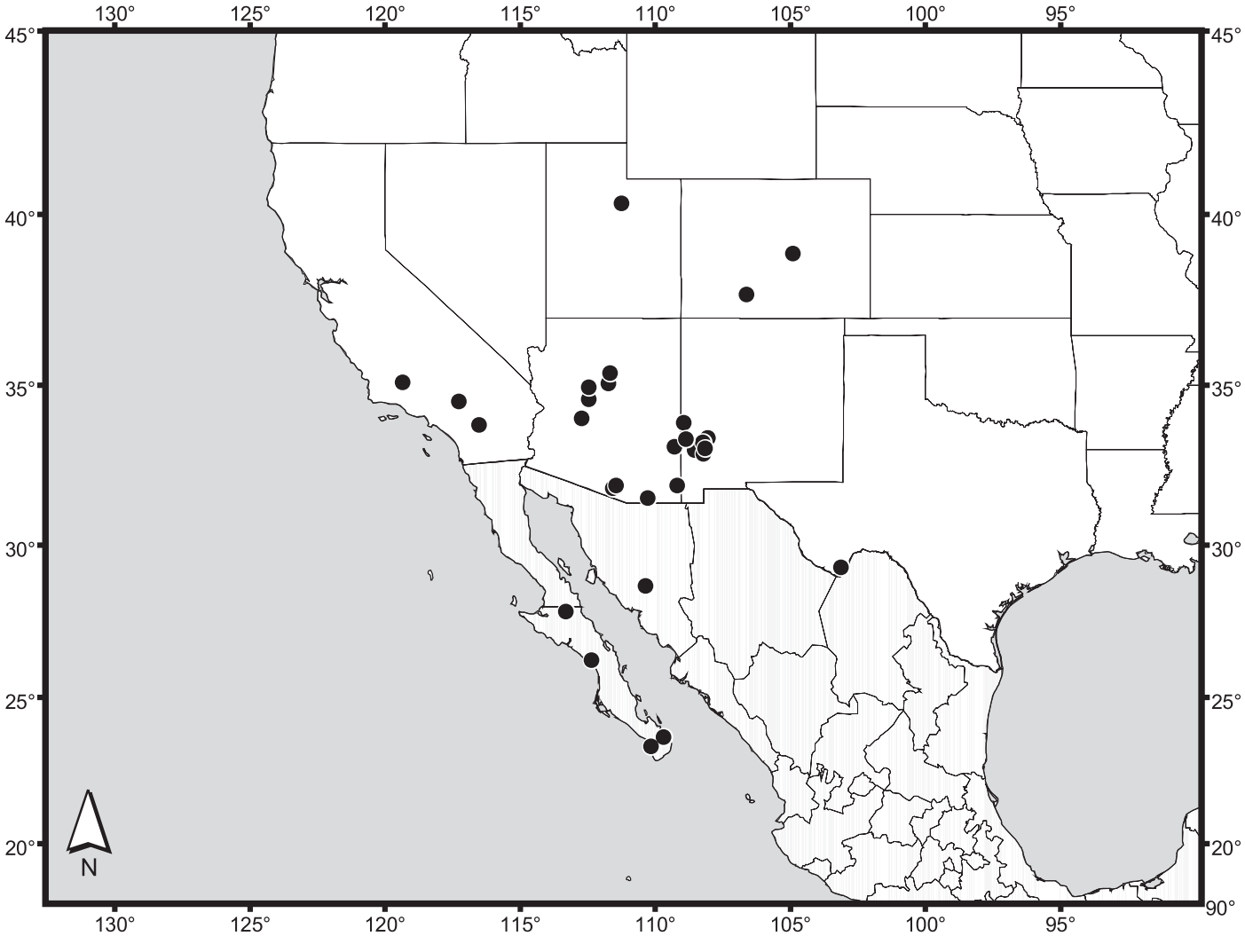
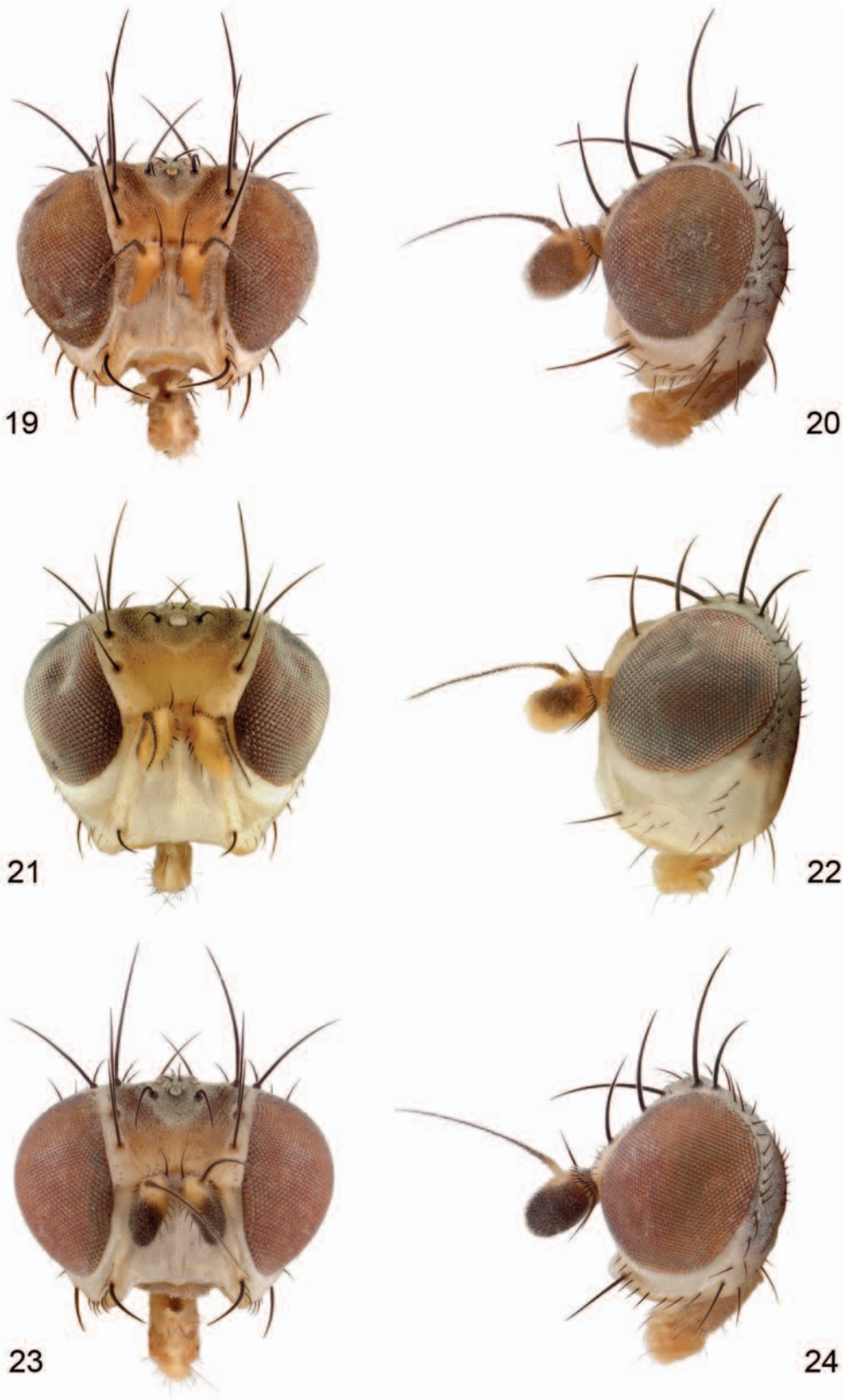


FIGURE 18. Distribution map for *Trixoscelis buccata* Melander.



FIGURES 19–24. Photographs of heads: (19) *Trixoscelis bajaensis*, anterior aspect; (20) same, lateral aspect; (21) *T. buccata*, anterior aspect; (22) same, lateral aspect; (23) *T. deserta*, anterior aspect; (24) same, lateral aspect.

REMARKS. The number of rows of acrostichal setulae is problematic as a reliable character for this species because some specimens appear to only have two rows, while others clearly have four. If there are only two clearly defined rows, then there are often a few other scattered setulae that form a vague third and fourth row of acrostichal setulae. The high, whitish gena and generally light color along with wing markings distinguish this species from most other congeners. Like other congeners, however, the wing markings can vary. We have seen specimens in which only crossvein dm–cu is clearly maculate.

Trixoscelis costalis (Coquillett)

FIGURES 25–28

Rhicnoessa costalis Coquillett, 1901:378.

Parodinia costalis (Coquillett). —Coquillett, 1902:187 [generic combination in footnote]. —Malloch, 1913:276 [key, diagnosis].

Trixoscelis costalis (Coquillett). —Melander, 1913a:169 [synonymy with *T. frontalis*]. —Melander, 1913b:296 [key, generic combination]. —Melander, 1952:44 [compared to *T. claripennis*]. —Gill, 1968:7 [Neotropical catalog, distribution]. —Cole, 1969:433 [note].

DIAGNOSIS. Mesonotum gray with brown vittae along dorsocentral and acrostichal rows, sometimes continuing over the scutellum, pleural sclerites brown, in sharp contrast to mesonotum, 4 rows of acrostichal setae, proepimeral seta present; wing smoky brown anterior to vein R_{2+3} and rarely vaguely darker along crossveins and vein CuA_1; antenna mostly light brown with yellowish areas on the flagellum; vertex gray microtomentose; gena short, gena-to-eye ratio only 0.15; abdomen mostly gray microtomentose, extreme lateral edges of tergites brown; male epandrium in undissected specimens large, light yellow microtomentose in contrast to the rest of the abdomen.

DESCRIPTION. Body length 1.69–3.50 mm.

Head: Eye higher than wide; ocellar triangle light gray to brown microtomentose; frons bare, light brown becoming darker dorsally, parafrons silvery microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput rather narrow, gray microtomentose dorsally becoming concolorous with gena ventrally, with 1–2 rows of short dorsoclinate setulae; antenna mostly light brown with yellowish areas on the flagellum; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.15, whitish microtomentose, bearing 1 row of 2–3 short ventroclinate setae along ventral edge in addition to a pair of strong convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, brown.

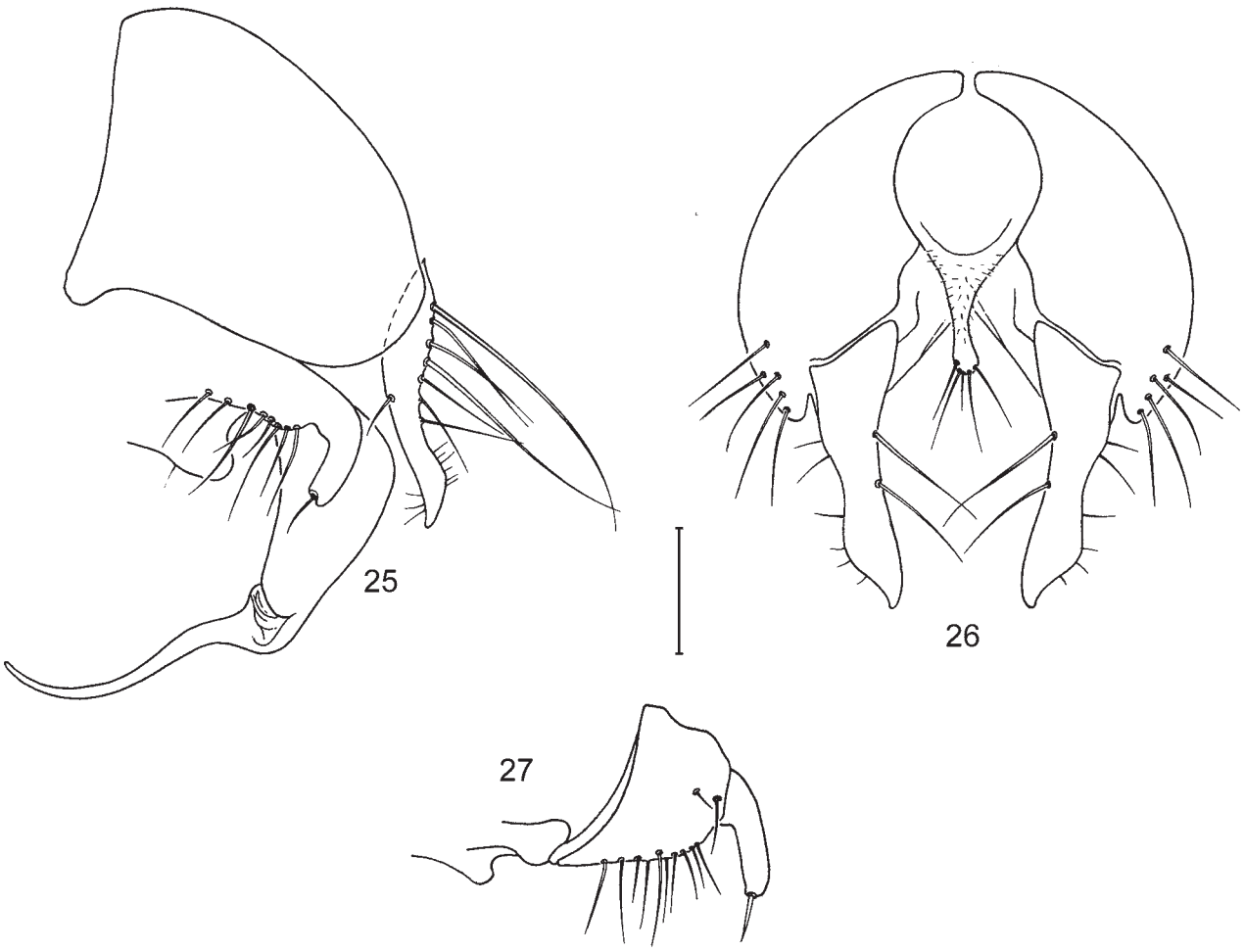
Thorax: Mesonotum gray microtomentose, with brown vittae along dorsocentral and acrostichal rows, sometimes continuing over the scutellum. Dorsocentral setae 5(2+3); acrostichal setae in 4 irregular rows; apical scutellar setae only slightly longer than scutellum. Mesonotum sparsely covered with minute setae. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing smoky brown from anterior margin to vein R_{2+3} and rarely vaguely darker along crossveins and vein CuA_1. Halter white. All coxae yellow, fore femur brown to black, slightly swollen, all other femora, tibiae and tarsi yellow; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Mostly gray microtomentose, extreme lateral edges of tergites brown.

Male terminalia (Figures 25–27): Epandrium in undissected specimens yellow, distinctly in contrast to the gray abdomen, cercus uniquely distinct and narrow; surstylus (Figures 25, 26) long narrow and rather straight, with somewhat sharp triangular tip, armed with long, strong seta on anterior surface; pre- and postgonite fused (Figures 25, 27) small, bearing short, sharp spicule on the postgonite remnant; ventrally, bearing many long, strong ventrally directed setae; aedeagus robust, complex, not as strongly sclerotized as most other *Trixoscelis* (Figure 25). Female terminalia: Seventh tergite and sternite forming strong, tight ring but with evident suture line, seventh sternite with row of 5–6 short, strong setae on posterior margin; spermathecae spherical; eighth sternite with weak, barely evident lateral lobes; hypoproct with 2 very short, strong setae, epiproct with 2 weak setae.

TYPE MATERIAL. Coquillett described *T. costalis* from two specimens from Tagus Cove, Albemarle Island (Galápagos Islands). One specimen labeled as "Type" in the USNM collection is labeled "Galapagos Isl[and] Albemarle [handwritten on white label]/Tagus Cove 3-23-99 [handwritten on white label]/Type No. 4715 U.S.N.M. [red]/Rhicnoessa costalis [white label folded in half]/Parodinia costalis Coq. [white label with black border]." The specimen is missing; all that remains is the double mount and label. The second syntype is apparently lost.

The neotype male, herein designated, is labeled "ECUADOR: Galapagos Islands Isla Santa Fe, arid zone, 10–50m, 4–6.iv.1989, Peck & Sinclair malaise (89–186) [white label]/NEOTYPE ♂ *Rhicnoessa costalis* Coquillett



FIGURES 25–27. Structures of male terminalia of *Trixoscelis costalis* (Coquillett): (25) epandrium, surstylus, gonites, distiphallus, lateral aspect; (26) epandrium and surstyli, posterior aspect; (27) gonites, lateral aspect. Scale = 0.1 mm.

Foster & Mathis CNC [red label]." The neotype is double mounted (glued to a paper triangle), is in excellent condition, and is deposited in the CNC.

Other Specimens Examined. ECUADOR. *Galápagos Islands*. **Española:** Bahia Manzanilla (01°22.1′S, 89°40.5′W; littoral zone; *Prosopis* and *Cryptocarpus* grove behind beach; dung trap, FIT, Malaise trap), 5–10 Jun 1985, S. Peck, J. Peck (1♂, 3♀; CNC). **Floreana:** Black Beach (30 km E; 01°14.2′S, 90°27′W; 120 m), 21–28 Mar 1989, S. Peck, B. J. Sinclair (7♂; CNC). **Genovesa:** Bahia Darwin (0°19.3′N, 89°57.3′W; 20 m; *Bursera* forest; Malaise trap), 10 Jan–27 Mar 1992, S. Peck (4♂, 5♀; CNC); El Barranco (= Prince Philip's Steps; 0°19.9′N, 89°57.6′W; arid zone), 12–16 Nov 2001, B. J. Sinclair (3♂; CNC). **Isabela:** Cerro Azul (1 km NE near Iguana; 0°55′S, 91°24.5′W; 85 m; pan trap), 19–25 May 1991, J. Heraty (1♀; CNC). **Marchena:** Punta Espejo (0°18′N, 90°28.5′W; *Bursera* grove, arid zone), 11–24 Mar 1992, S. Peck (5♂, 2♀; CNC); SW Playa (0°18.3′N, 90°31.3′W; arid zone, beach forest, dung trap), 11–23 Mar 1992, S. Peck (2♀; CNC). **San Cristobal:** Caseta (00°48′S, 89°24′W; 560 m; pampa; dung trap), 16–22 Feb 1989, B. J. Sinclair (2♀; CNC); El Progreso (1 km E; 0°54′S, 89°33′W; 380 m; agricultural zone), 14 Feb 1989, B. J. Sinclair (1♀; CNC). **Santa Cruz:** Academy Bay (0°44.9′S, 90°18.5′W; arid zone and thornscrub), 10 May–3 Jun 1985, S. Peck, J. Peck (18♂, 18♀; CNC); El Puntudo (00°39′S, 90°20.5′W; 650 m; *Scaleia* forest), 1–30 Mar 1989, S. Peck, B. J. Sinclair (1♂; CNC); Charles Darwin Research Station (0°44.5′S, 90°18.2′W; 10 m; arid zone), 1–30 Mar 1989, S. Peck (3♂; CNC). **Santa Fe:** (0°48.8′S, 90°02.1′W; arid zone; 10–50 m), 4–6 Apr 1989, S. Peck, B. J. Sinclair (1♂, 5♀; CNC); sweeping Sea Lion Beach (0°48.2′S, 90°02.5′W;

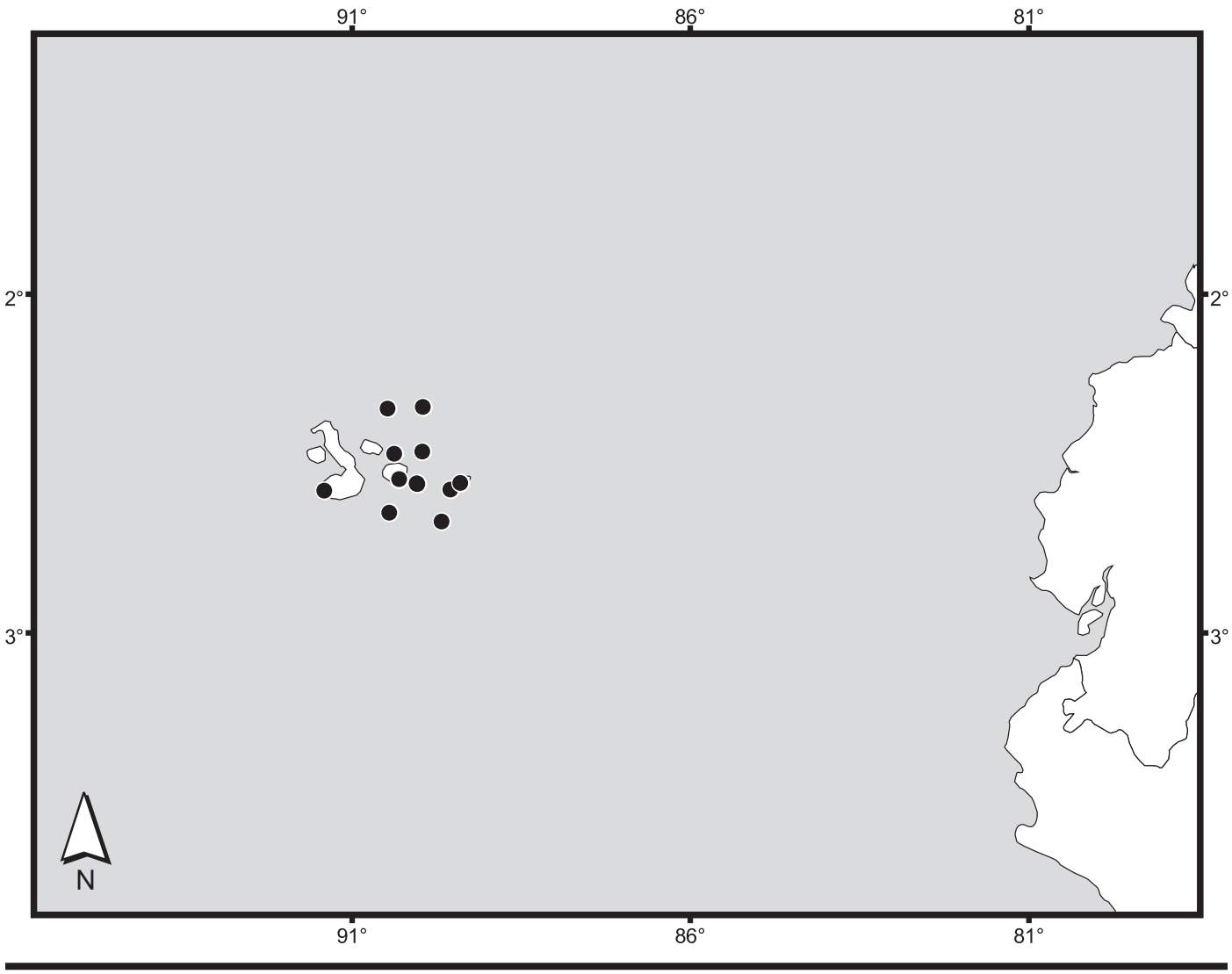


FIGURE 28. Distribution map for *Trixoscelis costalis* (Coquillett).

sweeping), 4 Apr 1989, B. J. Sinclair (2♀; CNC); Sea Lion Beach (0°48.2′S, 90°02.5′W; sea lion dung trap; littoral zone), 3–6 Jun 1989, B. J. Sinclair (4♀; CNC).

DISTRIBUTION (FIGURE 28). Neotropical: Ecuador (Galápagos Islands). Although erroneously reported from Arizona (Coquillett, 1902), this species is known thus far only from the Galápagos Islands.

REMARKS. Because the type specimen is destroyed and the status and location of the second syntype are unknown, it would have been impossible to confirm the validity of this species without the generous loan of CNC material collected by Peck and Sinclair. The specimens fit Coquillett's original description (1901) and Malloch's later treatment (1913) except for the color of the fore coxae and the number of dorsocentral setae, which was corrected by Malloch. Coquillett (p. 378) described the "coxae and front legs dark brown." We have found that the fore coxae are consistently white. Because the nearly 100 specimens from the Galápagos generally fit the original description and we found no other species in the series, we have based our concept of this species on this new material.

Trixoscelis deserta Melander

FIGURES 23–24, 29–33, 37–38

Trixoscelis deserta Melander, 1952:44. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:433 [distribution, diagnosis].

Trixoscelis mohavea Melander, 1952:47. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis]. **NEW SYNONYM**

DIAGNOSIS. Thorax light brown with vittae on mesonotum and diffuse brown strip on dorsal surface of anepisternum, 2 rows of acrostichal setae, proepimeral seta present; wing smoky brown, distinctly to vaguely darker brown anterior to vein R_{2+3} and vaguely darker along crossveins and vein CuA_1; antenna nearly completely brown except for small area at base of arista yellow; vertex brown microtomentose; gena short, gena-to-eye ratio only 0.15–0.22; abdomen blackish; male epandrium in undissected specimens large, light brown-yellow microtomentose in contrast to the rest of the abdomen.

DESCRIPTION. Body length 2.49–2.75 mm.

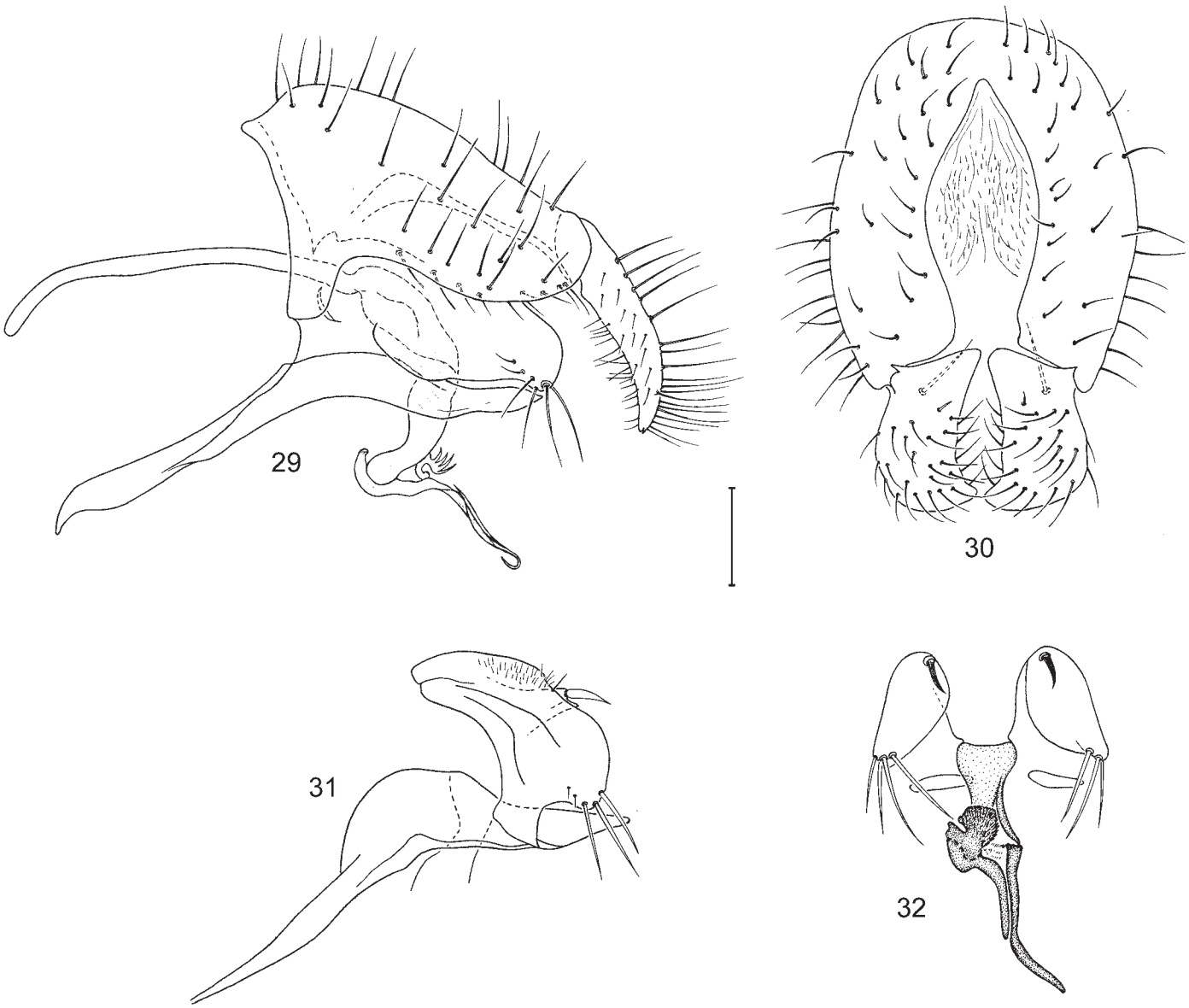
Head (Figures 23, 24): Eye wider than high; ocellar triangle light gray to brown microtomentose; frons bare, light brown becoming darker dorsally, parafrons silvery microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput rather narrow, gray microtomentose dorsally becoming concolorous with gena ventrally, with 1–2 rows of short dorsoclinate setulae; antenna nearly completely brown except for small area at base of arista yellow; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.15–0.22, whitish-yellow microtomentose, bearing 1 row of 2–3 short ventroclinate setae along ventral edge in addition to a pair of strong convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum light brown microtomentose, darker between acrostichal setae and along the dorsocentral row of setae. Dorsocentral setae 5(2+3); acrostichal setae in 2 irregular rows; apical scutellar setae only twice length of scutellum. Mesonotum sparsely covered with minute setae. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing (Figures 37, 38) smoky brown, distinctly darker brown anterior to vein R_{2+3} and vaguely darker along crossveins and vein CuA_1. Halter white to yellow. All coxae yellow, fore femur yellow to darker, grayish brown, slightly swollen, all other femora and all tibiae yellow, tarsi slightly darker; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly gray to blackish microtomentose except epandrium yellowish-brownish microtomentose, extreme posterior edges of sternites lighter, evenly setose. Male terminalia (Figures 29–32): Epandrium in undissected specimens yellow, distinctly in contrast to the uniformly gray abdomen; surstylus (Figures 29, 30) long robust, narrowing distally, slightly curved anteriorly in lateral view, somewhat long triangular in posterior view (Figure 30), armed with long, strong seta on anterior surface; pre- and postgonite fused (Figures 31, 32) small, bearing short, sharp spicule dorsomedially on the postgonite remnant, ventrally, a simple, rather large lobe bearing several long, strong posteroventrally directed setae; distiphallus thin, narrow, somewhat complex (Figures 29, 32). Female terminalia: Seventh tergite and sternite forming strong, tight ring; spermathecae conical with bulbous head ("ice cream cone" shaped); eighth sternite with small lateral lobe bearing only two strong setae; hypoproct with two short, strong setae, epiproct with only weak setulae.

TYPE MATERIAL. Melander described *T. deserta* from a single male, the holotype, that is labeled "Borego [sic Borrego; 33°13.2′N, 116°20.1′W] CAL[IFORNIA. **San Diego:**], Palm Canyon, 3 May 1945, A. L. Melander/HOLOTYPE Trixoscelis deserta Melander [red]/A. L. Melander Collection 1961 [green stippling on right side]." The holotype is double mounted (pinned upright on a minuten glued in a brown cardboard square), is in excellent condition, and is deposited in the USNM.

Melander described *T. mohavea* from four syntypes. We herein designate one of these syntypes as the lectotype. The lectotype male is labeled "MOJAVE DESERT, Piute Butte [**Los Angeles:** 34°39.5′N, 117°51′W], 12 V 44 CALIF[ORNIA], A. L. Melander/HOLOTYPE Trixoscelis mohavea Melander [red]/A. L. Melander Collection 1961 [green stippling on right side]/Trixoscelis mohavea Melander [handwritten]/LECTOTYPE ♂ *Trixoscelis mohavea* Melander Foster & Mathis USNM/USNM ENT 00118091 [plastic bar code label]." The specimen is double mounted (pinned ventrally with a minuten inserted in a small cardboard square), is in good condition (distal half of right wing missing), and is deposited in the USNM. We have also examined a female specimen that is labeled "ALLOTYPE," although this was not published by Melander. The so-called allotype is labeled "MOJAVE DESERT, Big Rock Wash, 13 V 44 CALIF[ORNIA], A. L. Melander/ALLOTYPE Trixoscelis mohavea Melander [red]/A. L. Melander Collection 1961 [green stippling on right side]." This specimen is also in excellent condition. The two paralectotypes are males, are double mounted together on the same minuten, and are labeled "MOJAVE



FIGURES 29–32. Structures of male terminalia of *Trixoscelis deserta* Foster and Mathis: (29) epandrium, surstylus, gonites, hypandrium, and aedeagus, lateral aspect; (30) epandrium and surstyli, posterior aspect; (31) gonites and hypandrium, lateral aspect; (32) gonites and aedeagus, ventral aspect. Scale = 0.1 mm.

DESERT, Piute Butte, 12 V 44 CALIF[ORNIA]/PARATYPE Trixoscelis mohavea Melander [yellow]/A. L. Melander Collection 1961 [green stippling on right side]." Both specimens are in excellent condition. The dorsal specimen has had the abdomen removed and dissected with the parts stored in an attached microvial.

TYPE LOCALITY. United States. California. San Diego: Borrego (33°13.2′N, 116°20.1′W).

OTHER SPECIMENS EXAMINED. MEXICO. Baja California: El Pescadero, Playa Los Cerritos (23°19.8′N, 110°10.6′W), 14–17 Apr 1979, M. S. Wasbauer (1♂, 4♀; CSCA).

UNITED STATES. *Arizona.* **La Paz:** Ehrenberg (16 km NE; 33°36.3′N, 114°31.5′W), 16 Apr 1969, R. R. Pinger (1♂; USNM). **Mohave:** Littlefield (36°53.1′N, 113°55.8′W), 1 May 2002, D. Mathis and W. N. Mathis (3♂, 2♀; USNM).

California. **Contra Costa:** Mitchell Canyon, north base of Mount Diablo (37°56.5′N, 121°56.2′W; 300–500 m), 26 Aug 1994, M. E. Erwin (5♂, 5♀; CSCA). **Humboldt:** Garberville (south fork Eel River; 40°38.5′N, 124°18.7′W), 7–8 Aug 1982, B. Phelps, M. S. Wasbauer (1♂, 1♀; CSCA). **Imperial:** Ogilby Road, Chocolate Mountains (5 km S junction with highway 78; 33°28′N, 115°35′W; Malaise trap), 16–22 Oct 1977, M. S. Wasbauer (1♀; CSCA). **Inyo:** Death Valley, Saratoga Springs (35°40.9′N, 116°25.3′W), 30 May 1953 (1♂; USNM); Death Valley (36°29′N, 117°06′W), Apr 1948, R. Coleman (2♀; USNM); Fish Lake Valley (9.5 km S, 6.5 km E Oasis; 37°29.5′N, 117°54.9′W), 16 Mar–8 Aug 1982, 1983, D. Giulliani (1♀; CSCA); Morning Star Mine (= "Morning Sun Mine"; 36°31.5′N, 117°47.7′W; 388.5 m), 4–5 Jun 1977, D. Giulliani (3♂, 3♀; CSCA); Mt. Whitney Fish Hatchery (8 km NW Independence; 36°48.2′N, 118°12′W), 28–29 Aug 1979, M. S. Wasbauer, P. Adams (2♂, 14♀; CSCA); Saline Valley (36°42.2′N, 117°48.9′W), 5–6 May 1977, D. Giulliani (15♂, 20♀; CSCA). **Los Angeles:** La Crescenta, base of Eagle Canyon (34°23.5′N, 118°23.3′W; 750–850 m), 26 Apr–26 Jun 1994, 2002, S. D. Gaimari (1♂, 6♀; CSCA); La Crescenta, Eagle Canyon (south base Mount Lukens; 34°15′N, 118°15′W; 600 m), 30 Jun 1994, S. D. Gaimari (3♂, 1♀; CSCA). **Nevada:** Grass Valley (39°13.1′N, 121°03.7′W; 760 m), 23 Jun 1979, M. S. Wasbauer, F. Hillerman (1♂, 2♀; CSCA). **Placer:** Rocklin (6.5 km S; 38°47.3′N, 121°14.1′W; Malaise trap), 2–4 Jun 1980, P. Adams, M. S. Wasbauer (1♂, 1♀; CSCA). **Riverside:** Indio (33°43.2′N, 116°13′W), 6 Aug 1949, E. R. Tinkham (1♂, 7♀; USNM); Thousand Palms (33°48.7′N, 116°22.6′W), 25 Mar–24 Apr 1955, W. R. Richards (5♂, 5♀; CNC); Thousand Palms, Willis Palms Oasis (33°49′N, 116°23.6′W), 25 Mar–3 Apr 1955, W. R. Richards, W. R. M. Mason (3♂, 1♀; CNC); Palm Springs, Andreas Canyon (33°45.7′N, 116°32.2′W), 10 Apr 1955, W. R. Richards (1♂; CNC); Thermal (33°38.4′N, 116°08.4′W), 9 Apr 1955, W. R. Richards (1♂; CNC); University of California, Riverside (33°58.5′N, 117°19.7′W, Malaise trap), 7–21 Jun 1983, D. Yu (1♂; DEBU). **Sacramento:** Sacramento River Levee (38°36.3′N, 121°33.3′W), 5 Oct 1969, M. Wasbauer (1♀; CSCA). **San Bernardino:** Helendale (34°44.6′N, 117°19.5′W), 18 May 1955 W. R. Richards, W. R. M. Mason (8♂, 14♀; CNC); Phelan (11.2 km E; Baldy Mesa Road; 34°26′N, 117°27′W), 15–31 May 1982, J. T. Huber (2♂; DEBU); Twenty-nine Palms (34°08.1′N, 116°03.3′W), 4 May 1958, A. L. Melander (1♂; USNM); Victorville (34°32.2′N, 117°17.5′W), 2–24 May 1952, 1953, 1955, G. A. Marsh, W. R. M. Mason, R. O. Schuster, A. H. Sturtevant (5♂; USNM). **San Diego:** Warner Springs, Agua Caliente Creek (33°16.7′N, 116°43.2′W; 945 m), 23–25 Aug 1980, P. Adams, M. S. Wasbauer (1♂; CSCA); Tecate (32°34.6′N, 116°37.7′W), 2 May 1966, R. Duke (1♀; USNM). **San Luis Obispo:** Montana de Oro State Park Dunes (5 km SW Los Osos; 35°15.8′N, 120°51.8′W), 16–17 Aug 1983, P. Adams, M. S. Wasbauer (1♀; CSCA). **Santa Barbara:** Colson Canyon Campground (24 km E Santa Maria; 34°55.8′N, 120°12.7′W), 8 Aug 1983, P. Adams, M. S. Wasbauer (20♂, 21♀; CSCA); Davey Brown Campground (19 km NE Los Olivos; 34°45.5′N, 119°57.1′W), 10 Aug 1983, P. Adams, M. S. Wasbauer (3♂; CSCA). **Shasta:** Redding (40°34.2′N, 122°22′W), 1–3 Jun 1979, 7 Jul 1979, T. R. Haig (6♂, 9♀; CSCA). **Siskiyou:** Fort Jones (41°36.5′N, 122°50.5′W), 6–10 Jun 1979, F. D. Horn (4♂, 5♀; CSCA). **Solano:** Gates Canyon (38°22.9′N, 122°02.3′W; 250–500 m), 23 Jul 1994, S. D. Gaimari (1♂, 1♀; CSCA). **Ventura:** Camarillo (34°13′N, 119°02.3′W; ex. walnut), 16 Sep 1970, D. Buettner (5♀; CSCA).

Nevada. **Clark:** Red Rock Canyon (36°08.7′N, 115°25′W), 11 May 2001, D. Mathis, W. N. Mathis (8♂; USNM). **Nye:** Mercury (36°39.6′N, 115°59.7′W), 13 Jun 1965, H. or S. Stapin (5♂, 3♀; USNM).

Utah. **Emery:** Green River (38°59.7′N, 110°09.7′W), 19 Jul 1988, D. Mathis, W. N. Mathis (1♀; USNM).

Wyoming. **Big Horn:** Red Gulch Road, Highway 14 (44°31.7′N, 107°50′W; shell pan traps in barren area nr. cottonwoods), 5–19 Aug 1990, J. E. Swann (1♂; DEBU); Red Gulch Road, Highway 14 (44°31.7′N, 107°50′W; shell pan traps in grass hammock in desert area; cow dung), 5–19 Aug 1990, J. E. Swann (1♂; DEBU).

Distribution (Figure 33). Nearctic: Mexico (Baja California), United States (Arizona, California, Nevada, Utah, Wyoming).

Remarks. Examination of the male terminalia of *T. mohavea* reveals it to be identical to *T. deserta*. Although both species were described in the same paper, page precedence gives seniority to *T. deserta*. We have discovered considerable variation in body size and wing coloration. We have examined many specimens that are diminutive in size or in which the wing maculation is quite light and limited to the cells anterior to vein R_{2+3}. Structures of the male terminalia, however, are identical with other specimens of *T. deserta*.

Trixoscelis desertensis Foster and Mathis, new species

FIGURES 13, 39, 42–45

Diagnosis. Mesonotum light brown, silvery on postpronotal and notopleural areas, 2 rows of

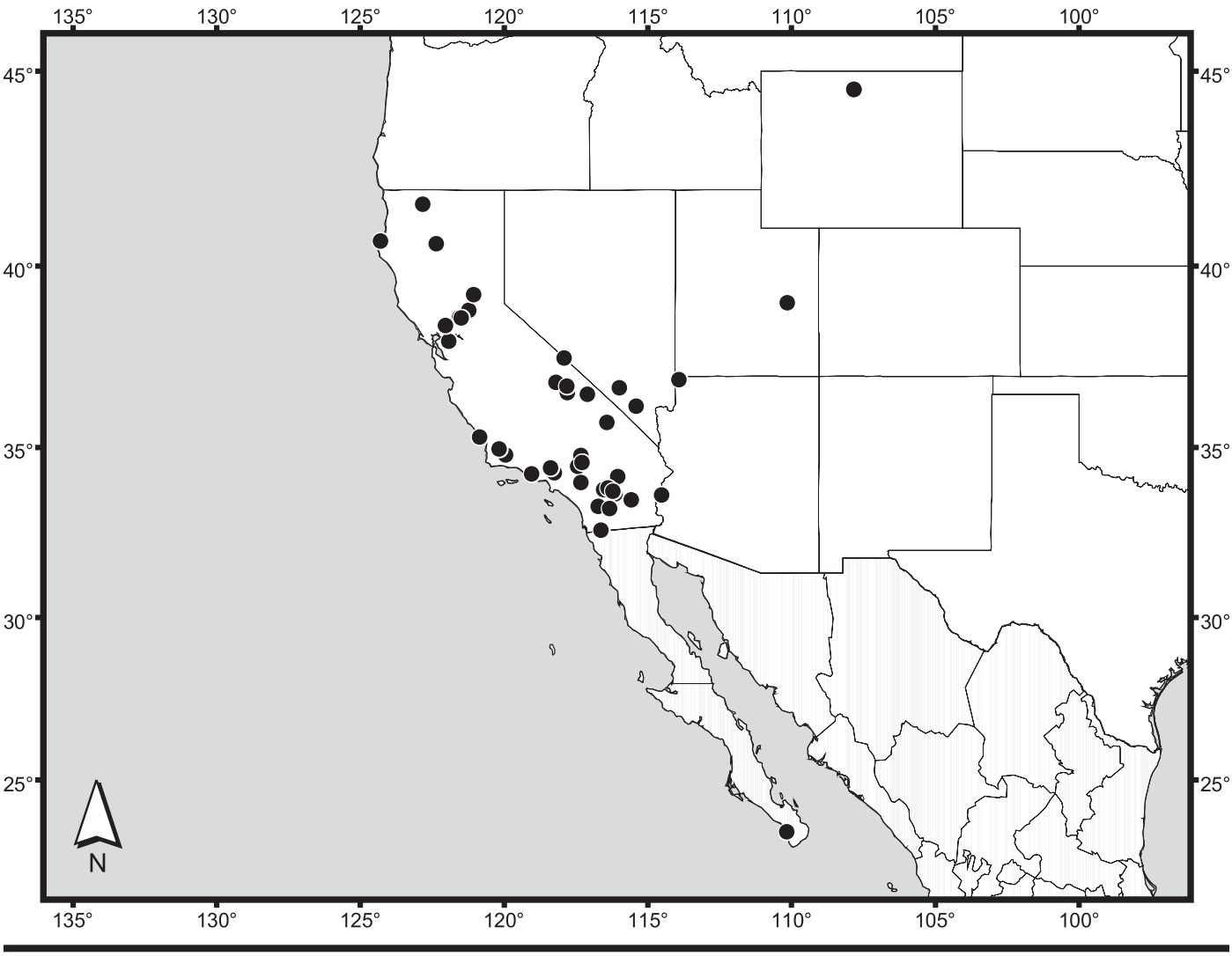


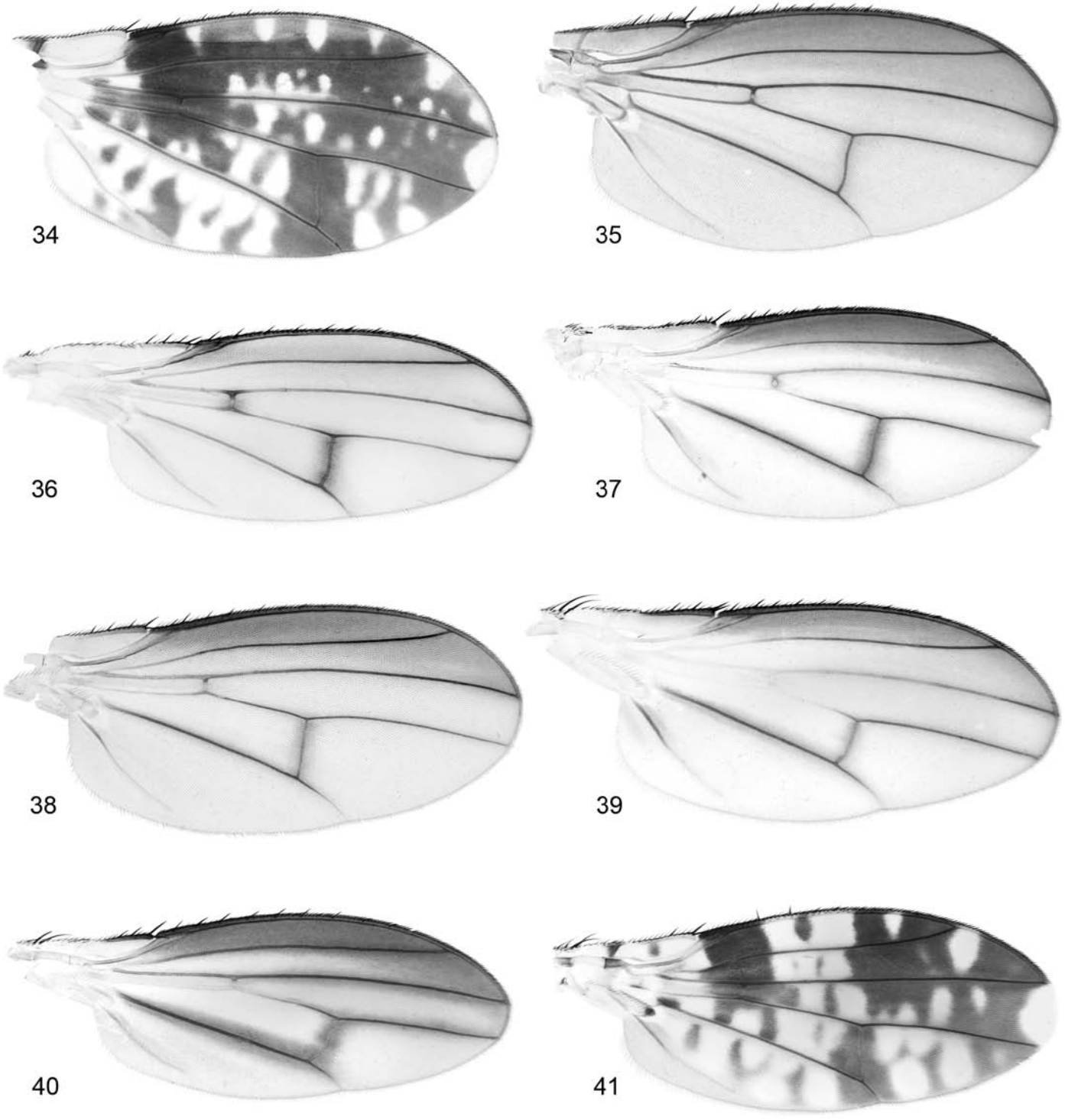
FIGURE 33. Distribution map for *Trixoscelis deserta* Melander.

acrostichal setae, proepimeral seta present; wing vaguely maculate anterior to vein R_{2+3} otherwise hyaline; antenna nearly completely brown except for small area at base of arista yellow; vertex brown microtomentose; gena short, gena-to-eye ratio only 0.20; abdomen blackish; male epandrium in undissected specimens large, light brown-yellow microtomentose in contrast to the rest of the abdomen.

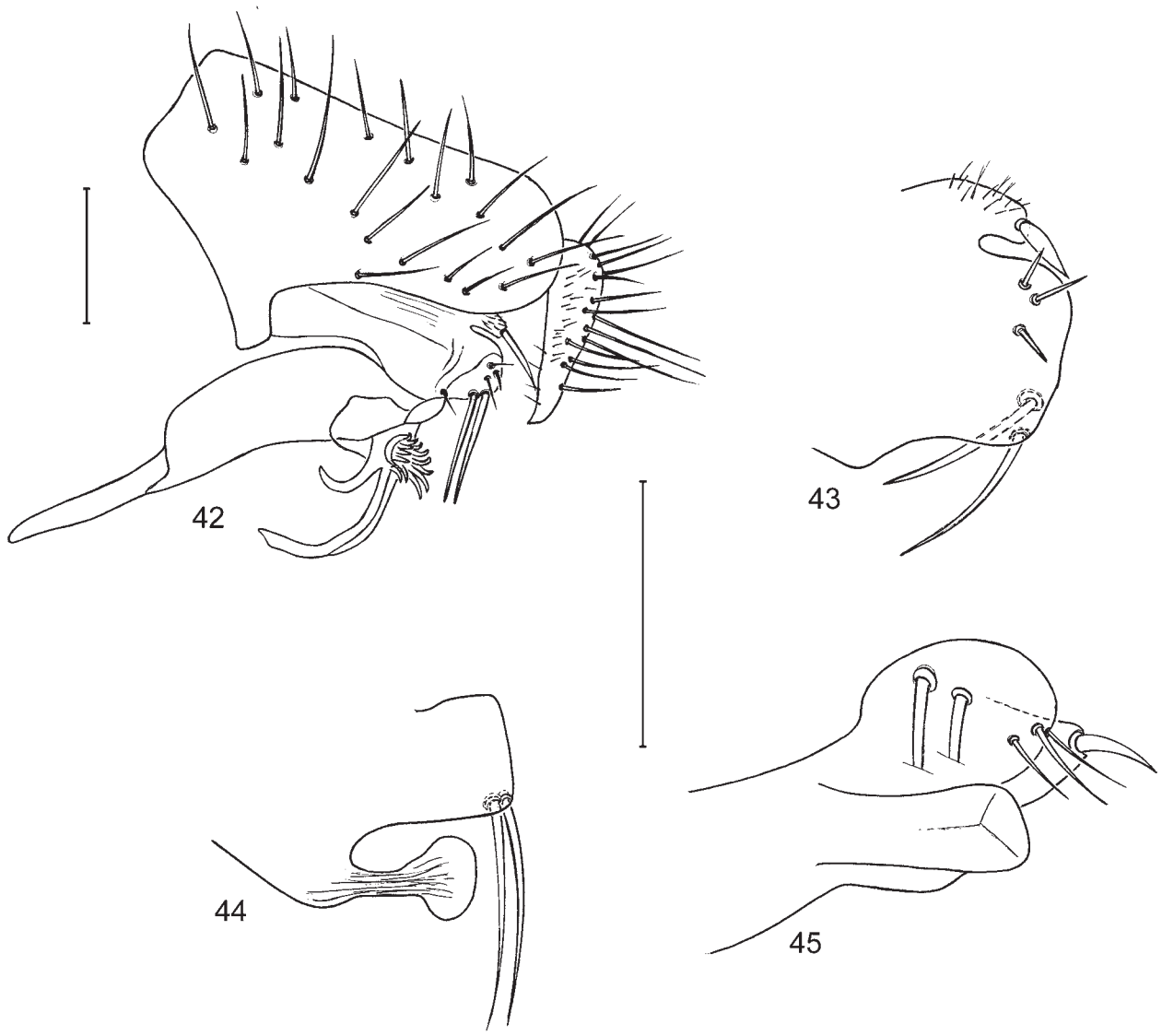
DESCRIPTION. Body length approximately 2.50 mm (measurement of both specimens taken after dissection).

Head: Eye round; ocellar triangle light gray to brown microtomentose; frons bare, yellow, becoming darker dorsally, parafrons silvery microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput narrow, gray microtomentose dorsally becoming concolorous with gena ventrally, with 1–2 rows of short dorsoclinate setulae; antenna nearly completely brown except for small area at base of arista yellow; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.20, white microtomentose, bearing 1 row of 6–8 short ventroclinate setae along ventral edge in addition to a pair of strong convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum light brown, silvery on postpronotal and notopleural areas. Dorsocentral setae



FIGURES 34–41. Photographs of right wings, dorsal aspects: (34) *Trixoscelis albibasis*; (35) *T. bifurcata*; (36) *T. buccata*; (37) *T. deserta* (dark); (38) *T. deserta* (light); (39) *T. desertensis*; (40) *T. fumipennis*; (41) *T. ornata*.



FIGURES 42–45. Structures of male terminalia of *Trixoscelis desertensis* Foster and Mathis (California. Riverside: Palm Springs): (42) epandrium, surstylus, gonites, and aedeagus, lateral aspect; (43) gonites, lateral aspect California. Riverside: Barton Flats; (44) same, latero-oblique aspect California. Riverside: Barton Flats; (45) same, ventral aspect California. Riverside: Barton Flats. Scale = 0.1 mm.

5(2+3); acrostichal setae in 2 irregular rows; apical scutellar setae only twice length of scutellum. Mesonotum sparsely covered with minute setae. Anepisternum brown medially, silvery both dorsally and ventrally, mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing (Figure 39) vaguely maculate anterior to vein R_{2+3} otherwise hyaline. Halter white. All coxae, femora, tibiae and basal four tarsal segments yellow, fifth tarsal segment dark; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly gray microtomentose except epandrium yellowish-brownish microtomentose, extreme posterior edges of sternites lighter, evenly setose. Male terminalia (Figures 42–45): Epandrium in undissected specimens yellow, distinctly in contrast to the uniformly gray

abdomen; surstylus (Figure 42) short robust, narrowing distally, slightly curved anteriorly in lateral view, somewhat long triangular in posterior view; pre- and postgonite fused (Figures 43–45) bearing long, robust, sharp spicule on the postgonite remnant, ventrally bilobed (Figures 43, 45), one lobe rather large, bearing two long, strong posteroventrally directed setae; aedeagus short, thin, weak, with a medial tuft of spicules (Figure 42). Female terminalia: Unknown.

Type Material. The holotype male is labeled "Barton Flats CAL[IFORNIA] 10/7/46 A. L. Melander./ PARATYPE Trixoscelis suffusa Melander [yellow]/A. L. Melander Collection 1961 [white label with green stippling on right third]HOLOTYPE ♂ *Trixoscelis desertensis* Foster & Mathis USNM [red]/USNM ENT 00118090 [plastic bar code label]." The holotype is double mounted (pinned with a minuten ventrally and mounted in a cardboard square), is in good condition (abdomen removed and dissected; structures in an attached microvial, right wing missing), and is deposited in the USNM. Paratype is as follows:

UNITED STATES. *California*. **Riverside:** Palm Springs (33°49.8′N, 116°32.7′W), 16 Mar 1954, A. L. Melander (1♂; USNM).

Type Locality. United States. California. San Bernardino: Barton Flats (34°10.4′N, 116°51.8′W).

Distribution (Figure 13). Nearctic: United States (California).

Etymology. The species epithet, *desertensis*, is of Latin derivation and refers to the desert habitat of the species and its apparent close relationship to *T. deserta*.

Remarks. This new species seems to be extremely close to *T. deserta* but differs in the morphology of the structures of the male terminalia.

Trixoscelis fumipennis Melander

FIGURES 1, 40, 46–50, 57–58

Trixoscelis fumipennis Melander, 1913a:168; 1952:46 [revision]. —Melander, 1952:46 [diagnosis, key]. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis].

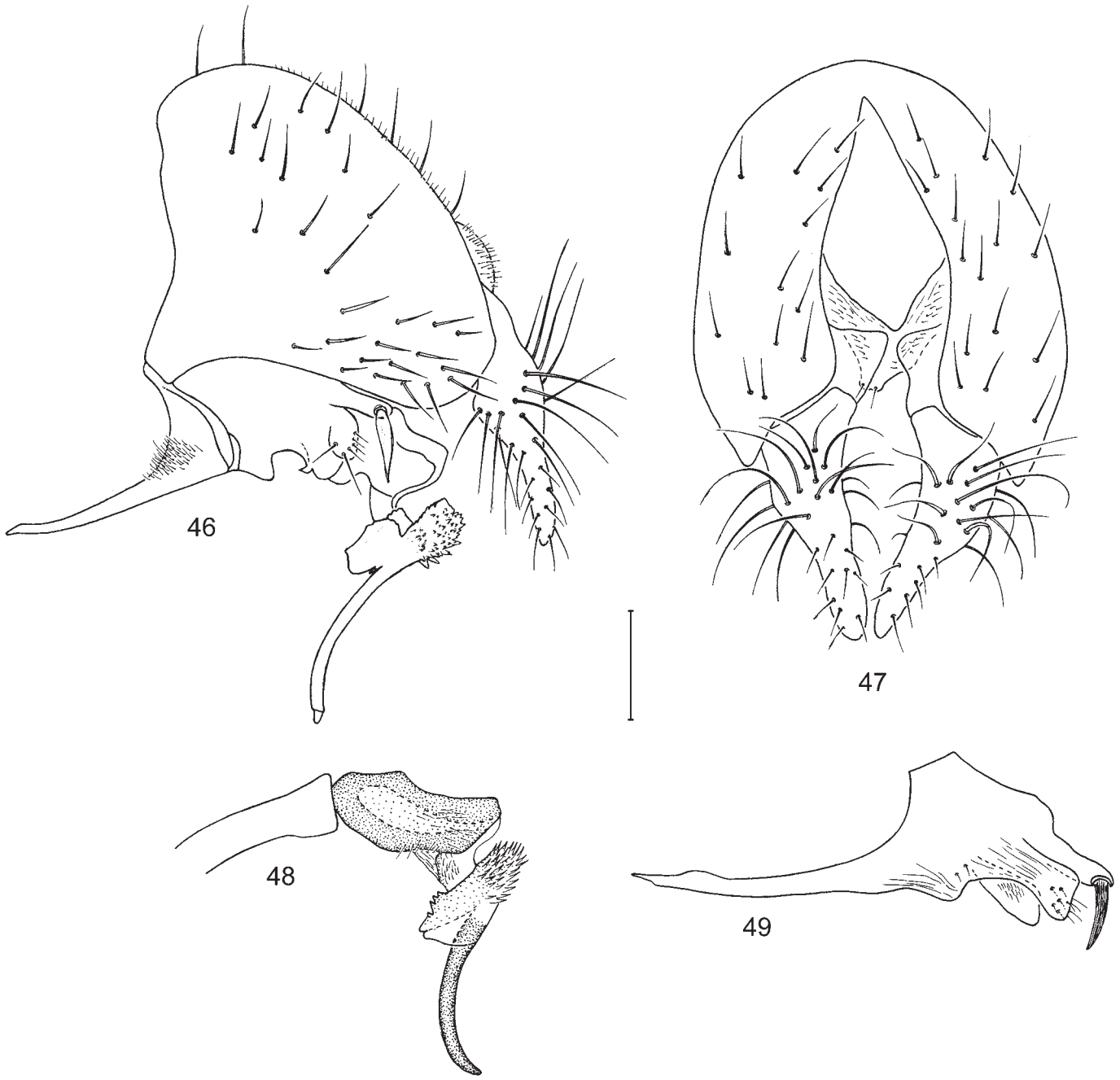
Diagnosis (Figure 1). Thorax brown with lighter stripes, 4 rows of acrostichal setae; antenna yellow to brown; vertex light gray-silvery microtomentose, fronto-orbital area between base of antenna and eye margin with an orange spot only seen in some angles; wing heavily infuscated with dark and whitish areas; gena-to-eye ratio 0.28–0.33; abdomen black, shiny; male epandrium in undissected specimens black, subshiny, enlarged, bulbous.

Description. Body length 2.30–2.75 mm; thorax brown, abdomen black.

Head (Figures 57, 58): Eye slightly wider than high, nearly round; ocellar triangle light gray microtomentose; frons bare, orange anteriorly becoming black dorsally around ocellar triangle, parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong, and divergent; occiput very narrow, gray microtomentose with 1 row of short dorsoclinate setulae; antenna mostly brown on lateral surfaces, yellow on medial surfaces and around base of arista; arista brown, with sparse hairs. Gena-to-eye ratio 0.28–0.33, white microtomentose, bearing 1 row of 2–3 short ventroclinate setae along ventral edge in addition to a pair of strong convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, dark yellow.

Thorax: Mesonotum light brown microtomentose with slightly but distinctly darker lines between acrostichal setae extended to the scutellum and along the line of the dorsocentral setae, an additional darker line along the line of the intra-alar setae, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 irregular rows; apical scutellar setae about twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 10–12 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing (Figure 40) heavily infuscated, darkest anterior to vein R_{2+3} and along crossveins and veins R_{4+5} and CuA_1, area within discal cell whitish. Halter white. Legs entirely yellow except fore femur light brown to black, fore tibia sometimes dark; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: May be entirely black or basal four segments dark brown subshiny, remaining distal segments black, distal margins of tergites black, evenly setose. Male terminalia (Figures 46–49): Epandrium (Figures 46, 47) uniformly black, somewhat vertically oblong; surstylus strong, distinct, long triangular, with medial curvature, endowed with many strong setae; hypandrium ending in spatulate setaceous lobes on both sides posteriorly; pre- and postgonite fused but distinct, postgonite (Figure 49) with terminal, pointed spine; pregonite spatulate, endowed with three or four setae posteriorly and some setulae; aedeagus (Figure 48) dark sclerotized, distiphallus simple, thin ribbon-like. Female terminalia: Seventh sternite and tergite strongly



FIGURES 46–49. Structures of male terminalia of *Trixoscelis fumipennis* Melander (Canada. Manitoba: Treesbank): (46) epandrium, cercus, surstylus, gonites, and aedeagus, lateral aspect; (47) epandrium and surstyli, posterior aspect; (48) aedeagus, lateral aspect; (49) gonites, lateral aspect. Scale = 0.1 mm.

fused, forming tight ring; spermathecae conical; eighth sternite with small but distinct setaceous lobes; hypoproct with two short but strong setae; epiproct sclerotized in two triangles each with a moderately strong seta at the posteriorly directed apex.

TYPE MATERIAL. The holotype female is labeled "Aweme, Manitoba, N. Criddle, VI 12 11/HoloTYPE 6018 [red]/TYPE *Trixoscelis fumipennis* Mel. [red; handwritten]/Trixosc[elis] fumipennis Mel. Typ. [handwritten]" The holotype is double mounted [glued on its

right side to a paper triangle], is in excellent condition, and is deposited in the ANSP (6018). There are two female paratypes in the USNM. They are double mounted on paper triangles and are labeled "Aweme, Manitoba, N. Criddle, VI 12 11/PARATYPE *Trixoscelis fumipennis* Mel. [red]/A. L. Melander Collection 1961 [white label with green stippling on right side]." One specimen is headless but is otherwise in moderately good condition; the other specimen is in good condition except all frontal setae are missing. There is one additional paratype (ANSP) that is labeled "Aweme, Manitoba, N. Criddle, VI 12 11/ Para-Type 6018.3 [blue]." The fourth and final paratype is deposited in the CNC and is labeled "*Trixoscelis fumipennis* Melander PARATYPE No. 2835 [yellow]*Trixoscelis fumipennis* Cresson PARATYPE No. 2835 [two hatch marks crossing out the info on a yellow label]\Aweme, Manitoba, N. Criddle, VI 11[or 12?] 11\PARATYPE *Trixoscelis fumipennis* [blue]." This paratype is in poor condition with the head missing as well as all legs except one mid coxa and femur and one hind coxa, femur, and tibia.

Type Locality. Canada. Manitoba. Aweme (49°42.5′N, 99°36.2′W).

Other Specimens Examined. CANADA. *Alberta*. Delburne (52°11.9′N, 113°14.1′W), 9 Jul 1979, D. H. Pengelly (1♀; DEBU); Drumheller, 25 km SE, Hoodoos (hillside grasses, sweeping) (51°22′N, 112°32′W), 16 Jul 1999, K. N. Barber (3♂; DEBU); Elkwater, Elkwater Park (49°39.6′N, 110°16.9′W), 26 May, 8 Jun–12 Jun 1952, 1956, L. A. Komotopetz, O. Peck (3♀; CNC); Empress (50°57.3′N, 110°0.3′W), 7 Jun 1957, Brooks, LacNay (1♂; CNC); Frank (49°36.1′N, 114°24.5′W), 15 Jun 1962, W. R. M. Mason (1♀; CNC); Grassy Lake (49°49.6′N, 111°42′W), 24 Jun 1974, J. F. McAlpine (1♂, 4♀; CNC); Lethbridge (49°41.6′N, 112°50.5′W), 5–7 Jul 1956, O. Peck (2♀; CNC); Manyberries (49°24′N, 110°41.7′W), 4 Jun 1952, A. R. Brooks (1♂, 3♀; CNC); Medicine Hat (50°02.4′N, 110°40.6′W), 7–23 Jun 1927, 1952, A. R. Brooks, F. S. Carr (3♀; CNC); Onefour (49°07.2′N, 110°28.2′W), 3 May 1956, O. Peck (1♂; CNC); Onefour (49°07.3′N, 110°28.2′W), 2 Aug 1980, G. Gibson (1♂; DEBU); Steveville (50°50.3′N, 111°36′W), 21 Aug 1957, A. R. Brooks, J. E. Brooks (1♂; CNC); Milk River Valley (8 km E Writing-on-Stone Provincial Park; 49°05′N, 111°38′W), 1 Aug 1980, G. Gibson (3♂, 1♀; DEBU).

British Columbia. Fife (49°04′N, 118°12′W; 8 km E), 8 Jun 1959, R. E. Leech (1♂; CNC); Lytton (40 km N; 50°31′N, 121°43′W; 600 m; alfalfa, sage, clover, and mustard), 13 Jun 2000, H. Goulet, Gillespie (2♂; DEBU); Lytton (50°14′N, 121°34′W; 200 m; alfalfa, sage, rose and cactus), 13 Jun 2000, H. Goulet, Gillespie (2♂; DEBU); Okanogan Valley near Osoyoos (49°02′N, 119°27′W), 10 Jul 1980, S. A. Marshall (2♂, 1♀; DEBU); Oliver, McIntyre Creek (50°02′N, 118°33′W), 6 Jun 1959, R. E. Leech (3♀; CNC); Oliver (49°10.8′N, 119°33.9′W), 14–25 May 1959, R. E. Leech, E. E. MacDougall (2♂, 2♀; CNC); Osoyoos, Haynes Eco. Reserve (49°02′N, 119°27′W; pan trap; *Pursbia/Aristida* steppe), 20 May–14 Jun 1987, G. G. Cannings (5♀; DEBU); Robson (49°20′N, 117°41′W), 5 Jun 1952, H. R. Foxlee (1♀; CNC).

Manitoba. Aweme (49°42.5′N, 99°36.2′W), 12 Jun 1916, N. Criddle (1♂, 1♀; USNM); Bald Head Hills (12 km W Glenboro; 49°40.9′N, 99°18.3′W), 1 Aug 1983, K. N. Barber (1♂; DEBU); Stockton (49°35.3′N, 99°27.2′W; 3.2 km W), 6 Aug 1958, R. B. Madge (1♀; CNC). Treesbank (49°39.9′N, 99°36.1′W), 12 Jun–23 Jul 1915, N. Criddle, J. M. Aldrich (9♂, 7♀; USNM); Shilo (49°48.1′N, 99°38.5′W; 4.8 km S), 30 Jul 1958, R. L. Hurley (1♂, 1♀; CNC); Shilo (49°48′N, 99°38.6′W; 8 km SW), 8 Jun–22 Jul 1958, R. B. Madge, C. D. F. Miller, J. G. Chillcott (1♂, 5♀; CNC).

Nova Scotia. Camp Aldershot (45°04.6′N, 64°29.8′W), Jul 1966, K. M. Evans (3♂, 2♀; CNC).

Ontario. Acorn Lodge (Highway 21, 0.7 km S Ausable River Cut; 43°13.1′N, 81°52.2′W; mowed grasses on stable sand, sweeping), 16 Jun 2000, K. N. Barber (3♂, 3♀; DEBU); Algonquin Provincial Park (45°50.2′N, 78°25.8′W), 29 Jun 1958, T. H. Scholten (1♂; DEBU); Batchawana Bay Provincial Park (46°56′N, 84°33′W; grasses on sand near entrance, sweeping), 4 Jul 2000, K. N. Barber (3♂, 3♀; DEBU); Brockville, 1000 Islands Regional Airport (mowed grasses on stable sand, sweeping) (44°38′N, 75°44′W), 10 Jun 2004, K. N. Barber (3♂, 3♀; DEBU); Cambridge, Kossuth Road next to golf course (mowed grasses on stable sand, sweeping) (43°27′N, 80°19′W), 10 Jun 2007, K. N. Barber (3♂, 3♀; DEBU); Chapleau, Brownlee Cemetery (mowed grasses on stable sand, sweeping) (47°49′N, 83°24′W), 17 Jun 2004, K. N. Barber (3♂, 3♀; DEBU); Corkery, cemetery (45°16′N, 76°06′W; mowed grasses on stable sand, sweeping), 25 Jul 2007, K. N. Barber (1♂, 2♀; DEBU); Dunn's Valley, Shaw Road, D. V. Cemetery (46°27′N, 83°36′W; mowed grasses on stable sand, sweeping), 6 Jul 2007, K. N. Barber (2♀; DEBU); Flinton, St. John the Evangelist RC Church (44°41′N, 77°12′W; mowed grasses on stable sand, sweeping), 9 Jul 2001, K. N. Barber (1♀; DEBU); Garden River Indian Reservation, Bell's Point Campground (46°32′N, 84°12′W; mowed grasses on stable sand, sweeping), 25–26 Jul 2000, K. N. Barber (3♀; DEBU); Goulais River, Pine Shores Road, G. R. Cemetery (46°41′N, 84°25′W; mowed grasses on stable sand, sweeping), 30 Jun 2007,

K. N. Barber (3♂, 3♀; DEBU); Grand Bend, Pinery Provincial Park (43°18.2′N, 81°45.4′W), 17 Jul 1982, K. N. Barber (1♂; DEBU); Guelph (43°32.2′N, 80°13.7′W), 19 Jun 1981, M. Eymann (1♀; DEBU); Hamilton, Kinsmen Playground, Beach Boulevard (43°16′N, 79°46′W; mowed grasses on stable sand, sweeping), 13 Aug 2000, K. N. Barber (1♀; DEBU); Hawk Junction, Community Centre (48°05′N, 84°33′W; mowed grasses on stable sand, sweeping), 17 Jun 2004, K. N. Barber (2♀; DEBU); Hawk Junction, Pine Grove Cemetery (48°05′N, 84°33′W; mowed grasses on stable sand, sweeping), 17 Jun 2004, K. N. Barber (3♂, 3♀; DEBU); Huntsville (9.5 km E of junction of highways 11 and 60; 45°21′N, 79°06′W; mowed grasses on stable sand, sweeping), 7 Jul 2005, K. N. Barber (1♂; DEBU); Hwy 69, 4 km WSW Foot's Bay (45°06′N, 79°47′W; mowed grasses on stable sand, sweeping), 8 Sep 2004, K. N. Barber (1♂, 1♀; DEBU); Iron Bridge (3.1 km S, Sunset Cemetery; 46°15′N, 83°11′W; mowed grasses on stable sand, sweeping), 1 Sep 2003, K. N. Barber (3♂, 3♀; DEBU); Manitoulin Island, Michaels Bay Park (45°36′N, 82°06′W; mowed grasses on stable sand, sweeping), 30 Aug 2004, K. N. Barber (3♂; DEBU); Manitoulin Island, Providence Bay, "The Country Corner" (45°40′N, 82°16′W; mowed grasses on stable sand, sweeping), 30 Jul 2004, K. N. Barber (3♂, 3♀; DEBU); Manitoulin Island, Little Current, Holy Trinity Angli. Cemetery (45°58′N, 81°56′W; mowed grasses on stable sand, sweeping), 30 Aug 2004, K. N. Barber (3♂, 3♀; DEBU); Manitoulin Island, Burpee Mills Cemetery (4.4 km W Poplar; 45°46′N, 82°32′W; mowed grasses on stable sand, sweeping), 22 Jul 2000, K. N. Barber (3♂; DEBU); Massey (46°12′N, 82°04′W; railside grasses on stable sand, sweeping), 12 Jun 2004, K. N. Barber (3♂, 4♀; DEBU); Maynard (44°43′N, 75°34′W; cemetery, mowed grasses on stable sand, sweeping), 10 Jun 2004, K. N. Barber (5♂, 5♀; DEBU); Metcalfe (45°14.1′N, 75°28.3′W), 22 Jul 1993, B. E. Cooper (1♀; CNC); Midland (8 km S, Huronia Municipal Airport; 44°41′N, 79°55′W; mowed grasses on stable sand, sweeping), 1 Sep 2003, K. N. Barber (3♂, 3♀; DEBU); Neys Provincial Park near Visitor Center (48°46′N, 86°37′W; mowed grasses on stable sand, sweeping), 25 Jun 2003, K. N. Barber (3♂, 3♀; DEBU); Ottawa, Mer Bleue Bog (45°24′N, 75°30′W), 14–24 Jun 1980, K. N. Barber (2♂, 8♀; CNC) (19♂, 28♀; DEBU); Ottawa (45°20′N, 75°35′W; damp, second growth *Acer Betula* wood), 15 Jun 1998, J. R. Vockeroth (1♂; CNC); Pancake Bay Provincial Park (46°56′N, 84°40′W; grasses on sand near picnic shelter, sweeping), 4 Jul 2000, K. N. Barber (3♂, 3♀; DEBU); Port Colburne, Lakeshore Road West (mowed grasses on stable sand, sweeping) (42°52′N, 79°16′W), 14 Aug 2000, K. N. Barber (1♂, 3♀; DEBU); Prescott, 1.4 km NW, MacIntosh Road opposite sand hills (mowed grasses on stable sand, sweeping) (44°43′N, 75°32′W), 10 Aug 2000, K. N. Barber (3♂, 3♀; DEBU); Prescott, Sandy Hill Cemetery (44°43′N, 75°31′W; mowed grasses on stable sand, sweeping), 7 Jun 2004, K. N. Barber (5♂, 5♀; DEBU); Rutherglen (2.4 km E; 46°16′N, 79°00′W; grasses on disturbed sand hill, sweeping), 6 Jul 2001, K. N. Barber (1♂, 3♀; DEBU); Rydal Bank (6.6 km N, Sands Cemetery; 46°23′N, 83°43′W; mowed grasses on stable sand, sweeping), 6 Jul 2007, K. N. Barber (1♂, 2♀; DEBU); Sault St. Marie, Pine Grove Cemetery (46°35′N, 84°16′W; mowed grasses on stable sand, sweeping), 1 Jul 2007, K. N. Barber (3♂, 3♀; DEBU); Sault St. Marie (12 km W Pointe des Chenes Park; 46°28′N, 84°31′W; mowed grasses on stable sand, sweeping), 18 Jun 2000, K. N. Barber (5♂, 5♀; DEBU); Sault St. Marie (10 km W, airport road, airport entrance; 46°29′N, 84°29′W; mowed grasses, sweeping), 19 Jun 2000, K. N. Barber (5♂, 5♀; DEBU); Sault St. Marie (12 km W, CFS hanger opposite Pointe des Chenes Park; 46°28′N, 84°31′W; mowed grasses on stable sand, sweeping), 17 Aug 1999, K. N. Barber (1♀; DEBU); St. Joseph Island, Beech Beach (46°07′N, 83°53′W; mowed grasses on stable sand, sweeping), 9–23 Jul 2000, K. N. Barber (3♂, 4♀; DEBU); Thessalon, Peace Park (46°15′N, 83°33′W; mowed grasses on stable sand, sweeping), 3 Jul 2000, K. N. Barber (3♂, 3♀; DEBU); Thessalon, Lakeside Park (46°15′N, 83°34′W; mowed grasses on stable sand, sweeping), 3 Jul 2000, K. N. Barber (2♂, 3♀; DEBU); Walford (1.3 km W; Walford Protestant Cemetery; 46°12′N, 82°14′W; mowed grasses on stable sand, sweeping), 6 Jul 2001, K. N. Barber (3♂, 3♀; DEBU); Wawa (5 km S; Kinniwabi Pines Motel; 48°46′N, 86°37′W; mowed grasses on stable sand, sweeping), 17 Jun 2003, K. N. Barber (3♂, 3♀; DEBU); Webbwood, St. Lawrence Cemetery (46°15′N, 81°54′W; mowed grasses on stable sand, sweeping), 2 Sep 2002, K. N. Barber (2♀; DEBU); White River, "Black's Cabin" (48°36′N, 85°15′W; mowed grasses on stable sand, sweeping), 14 Jun 2003, K. N. Barber (3♂, 3♀; DEBU).

Quebec. M. Ste. Marie–Low (45°56.5′N, 75°52.7′W; 550 m), 22 Jun 1965, J. R. Vockeroth (1♂; CNC).

Saskatchewan. Assiniboia (49°38′N, 105°59′W), 15–25 Jun 1955, A. R. Brooks and J. R. Vockeroth (3♀; CNC); Cut Knife, Attons Lake (52°50′N, 108°51.7′W), 30 May 1940, A. R. Brooks (5♀; CNC); Elbow (51°07′N, 106°35′W), 3 Apr–12 Jul 1960, A. R. Brooks (3♂, 9♀; CNC); Grasslands National Park, Snake Pit Prairie Dog Town (49°07′N, 107°26′W), 7 Jun 1998, Christopherson, Raab (1♀; DEBU); Grasslands National Park, Larson

Prairie Dog Town (49°07′N, 107°26′W), 12 Jul 1998, Christopherson, Raab (2♀; DEBU); Grasslands National Park, Monument Prairie Dog Town (49°07′N, 107°26′W), 29 Jun 1998, Christopherson, Raab (1♀; DEBU); Grasslands National Park (49°07′N, 107°26′W), 05 Jun 1998, Christopherson (3♂, 2♀; DEBU); Grasslands National Park, Val Marie (49°14′N, 107°44′W; pitfall trap), 14 Jul 1996 (5♂, 4♀; DEBU); Grasslands National Park, Val Marie, Prairie Dog RBT (49°14′N, 107°44′W), 22 Jul 1997, S. A. Marshall, Finnamore (1♂, 2♀; DEBU); Lumsden (50°39′N, 104°52′W), 12 Jul 1958, A. and J. Brooks (2♀; CNC); Pike Lake (51°54′N, 106°49′W), 24 May 1940, A. R. Brooks (2♂, 1♀; CNC); Saskatoon (52°07.8′N, 106°40.2′W), 13 Apr–4 Aug 1925, 1949, 1950, 1957, A. R. Brooks, K. M. King (5♂, 9♀; CNC). Saskatoon, S. Saskatoon River valley, off Central Avenue (52°10′N, 106°43′W);prairie grasses, sweeping) 12 Jul 1999, K. N. Barber (3♂, 1♀; DEBU); Saskatoon, 13 km S, Beaver Creek Conservation Area (51°58′N, 106°43′W), prairie grasses, sweeping) 12 Jul 1999, K. N. Barber (3♂, 3♀; DEBU).

Yukon Territory. Klondike Loop (32 km N Whitehorse; 60°44′N, 135°03′W; dry slope, pan trap), 27 Jun–14 Jul 1987, S. A. Marshall (1♀; DEBU).

UNITED STATES. *Arizona*. **Coconino:** Bonito Park (32 km N Flagstaff; 35°22.1′N, 111°33.3′W; 2125 m; sweeping ponderosa pine meadow), 5–8 Aug 1984, B. V. Brown (5♂; DEBU).

Colorado. **El Paso:** Colorado Springs (38°50′N, 104°49.3′W), 20 Jun 1961, G. C. Steyskal (1♂; USNM). **Jefferson:** Golden, Mt. Vernon Canyon (39°41.7′N, 105°12.6′W; 2200 m), 31 Jul 1961, C. H. Mann (1♀; CNC). **Larimer:** Estes Park (40°23.6′N, 105°29.6′W; 2290 m), 20 Jul 1961, C. H. Mann (1♀; CNC).

Michigan. **Alger:** Au Train (3 km E; 46°25.8′N, 86°50.2′W; short grasses on stable sand, sweeping), 23 Jul 1999, K. N. Barber (1♂, 3♀; DEBU). **Cheboygan:** Huron Beach, 19 km NW, Highway 23 rest area (45°38′N, 84°13′W; mowed grasses on stable sand, sweeping), 14 Jul 2000, K. N. Barber (3♂, 3♀; DEBU). **Chippewa:** Riverview RV Campground, Bay Mills Indian Res. (46°27′N, 84°35′W; mowed grasses on stable sand, sweeping), 29 Jul 2000, K. N. Barber (2♀; DEBU). **Crawford:** Grayling (5 km S, mile 252 on I-75, rest area; 44°39′N, 84°42.9′W), 22 Jun 2003, K. N. Barber (2♂, 2♀; DEBU). **Iosco:** Tawas Point State Park (44°15.2′N, 83°26.8′W; mowed grasses near lighthouse), 14 Jul 2000, K. N. Barber (3♀; DEBU). **Livingston:** E. S. George Reserve Field (42°36′N, 83°55′W), 7 Aug 1958, A. Wenner (1♂; USNM). **Sanilac:** Forestville (mowed grasses on stable sand, sweeping) (43°39′N, 82°36′W), 14 Jul 2000, K. N. Barber (1♂, 2♀; DEBU). **St. Clair:** Lakeport State Park (43°07.4′N, 82°29.7′W; mowed grasses on stable sand, sweeping), 14 Jul 2000, K. N. Barber (3♂, 3♀; DEBU).

Montana. **Hill:** Havre (43°33′N, 109°40.7′W), 13 Jun 1916, J. M. Aldrich (5♀; USNM). **Ravalli:** Hannon Memorial Fishing access, Route 93 (45°58′N, 114°08.2′W), 16 Jun 1996, R. S. Zack (1♂; WSU). **Sheridan:** Medicine Lake (48°30.1′N, 104°30.1′W), 9 Jun 1969, W. W. Wirth (1♀; USNM).

Nebraska. **Cherry:** Valentine (8 km S; 42°52′N, 100°33′W), 14 Jul 1986, T. Henry, A. G. Wheeler (1♀; USNM). **Garden:** Lisco (11.3 km SE, Sand Hills; 41°20.2′N, 101°57.3′W; 1100 m), 10 Jun 1994, S. D. Gaimari (1♀; CSCA). **Thomas:** Halsey (41°54.2′N, 100°16.1′W), 22 Aug 1958, R. Henzlik (1♂; USNM).

New Mexico. **Socorro:** Water Canyon (32 km W Socorro; 33°51.4′N, 107°25′W; 2135 m), 28 Jun–7 Jul 1979, S. Peck, J. Peck (15♂, 9♀; DEBU).

New York. **St. Lawrence:** Ogdensburg (6.4 km S, Eel Weir Road, Pine Hill Cemetery; 44°47′N, 75°29′W; mowed grasses on stable sand, sweeping), 11 Jun 2004, K. N. Barber (1♂, 2♀; DEBU).

North Dakota. **Grand Forks:** University Park (47°55.5′N, 97°03.7′W), Jun 1896, R. P. Currie (1♂, 1♀; USNM). **Mountrail:** White Lake (48°23.5′N, 102°27.8′W), 8 Jun 1969, W. W. Wirth (1♂; USNM).

Oregon. **Wallowa:** Joseph (45°21.3′N, 117°13.8′W), 13 Jun 1973, P. W. Oman, C. Musgrave (1♂, 1♀; DEBU).

Utah. **Duchesne:** Helper (32 km N; Avintaquin Campground; 39°53.1′N, 110°46.6′W), 18 Jul 1988, D. Mathis, W. N. Mathis (1♂; USNM).

Washington. **Spokane:** Dartford (47°47.1′N, 117°25′W), 22–28 Jun, 6–12 Jul 1970, R. D. Gray (3♂, 4♀; WSU); Liberty Lake (47°38.9′N, 117°05.5′W), 26 Jun 1924, A. L. Melander (3♀; USNM). **Whitman:** Pullman (46°43.9′N, 117°10.8′W), Washington State University Golf Course, 7 Jul 1976, R. D. Akre (1♀; WSU).

Distribution (Figure 50). Nearctic: Canada (Alberta, British Columbia, Manitoba, Nova Scotia, Ontario, Quebec, Saskatchewan, Yukon), United States (Arizona, Colorado, Michigan, Montana, Nebraska, New Mexico, New York, North Dakota, Oregon, Utah, Washington).

Remarks. Considerable variation exists in the coloration of the basal flagellomere. It may be entirely yellow to entirely light brown. We have also noted some variation in the intensity of the wing maculation. Indeed, most specimens have a strong wing coloration easily seen with the naked eye. We have seen a very few specimens,

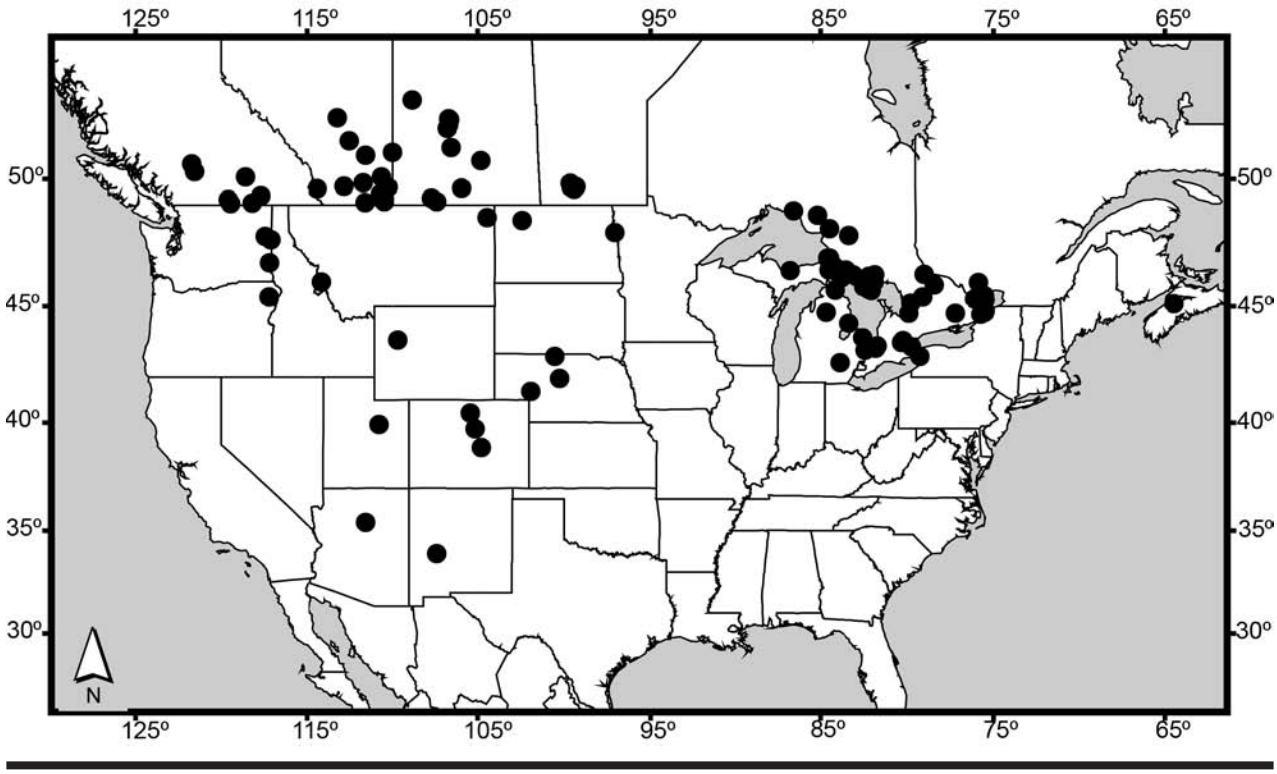


FIGURE 50. Distribution map for *Trixoscelis fumipennis* Melander.

however, with only very light maculation that are identical in all other respects to other specimens of *T. fumipennis*. A unique feature of this species is the orange coloration of the small space between the antennal base and the eye margin.

Trixoscelis gigapeza Foster and Mathis, new species

FIGURES 51–52

DIAGNOSIS. Body gray microtomentose; 2–4 rows of scattered acrostichal setae; wing hyaline; basal flagellomere mostly brown, area around base of arista yellow, scape and pedicel yellow; vertex brown laterad of ocellar triangle; gena high, gena-to-eye ratio 0.45–0.50; male epandrium in undissected specimens light brown, darker than remainder of abdomen, shiny.

DESCRIPTION. Body length approximately 2.30–3.25 mm.

Head: Eye as high as wide; ocellar triangle gray microtomentose; frons bare, yellow, parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput mostly gray microtomentose ventral 1/5 concolorous with gena, with 1–2 rows of short dorsoclinate setulae dorsally, one row of several setae ventrally; antenna with basal flagellomere mostly brown, area around base of arista yellow, scape and pedicel yellow; arista brown, with sparse hairs. Gena-to-eye ratio 0.45–0.50, white microtomentose, bearing several short, scarcely discernible setulae ventrally and 2–3 slightly stronger setae posteriorly in addition to a pair of strong convergent oral vibrissae, extreme ventral margin shiny, chitinous; face white, convex; palpus yellow, labellum as long as head, straight, clypeus indistinct.

Thorax: Mesonotum uniformly gray microtomentose, sparsely setulose. Dorsocentral setae 5(2+3); acrostichal setae in 2–4 irregular rows; apical scutellar setae twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster with the larger seta; katepisternum with 2 longer setae and one shorter one between them in a row along the posterodorsal edge. Wing hyaline.

Halter white. Coxae, femora, and tibiae yellow, fore femur darker, tarsi brown, male basitarsus swollen, hind basitarsus largest; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces, otherwise legs evenly setulose except for preapical tibial setae on all tibiae.

Abdomen: Uniformly gray microtomentose, evenly setose. Male terminalia (Figure 51): Epandrium male epandrium in undissected specimens light brown, darker than remainder of abdomen, shiny; surstylus strong, distinct, long triangular, endowed only with a few weak setulae (Figure 51); pre- and postgonite fused but distinct, pregonite (Figure 51) a rounded lobe with 4–5 moderately strong setae along ventral margin, postgonite long, curved; distiphallus strongly black sclerotized, quite complex with several long narrow arms (Figure 51). Female terminalia: Seventh sternite quite large, fused to seventh tergite but with evident suture line; spermathecae very long and narrow; eighth sternite weak, oval with small strongly sclerotized lateral lobes each with cluster of setae on posterior margin; hypoproct with 2 short, strong setae; epiproct with 2 weak setae.

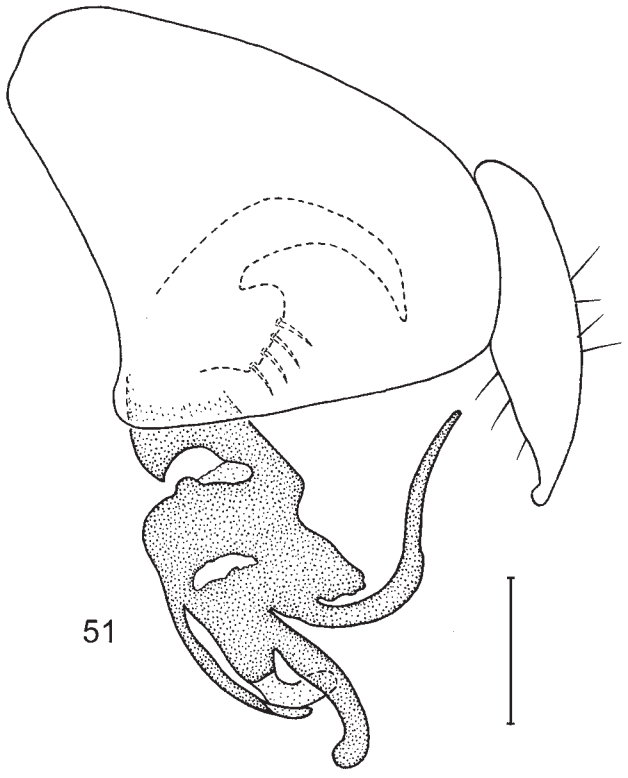


FIGURE 51. Structures of male terminalia of *Trixoscelis gigapeza* Foster and Mathis: epandrium, surstylus, gonites, and aedeagus, lateral aspect. Scale = 0.1 mm.

TYPE MATERIAL. The holotype male is labeled "Daggett, Cal[ifornia] 14 IV 1955 W. R. M. Mason/ HOLOTYPE ♂ *Trixoscelis gigapeza* Foster & Mathis CNC [red]." The holotype is glued directly to the pin on its right side, is in excellent condition (abdomen removed and dissected; structures in an attached microvial), and is deposited in the CNC. Paratypes are as follows:

UNITED STATES. *California.* **San Bernardino:** Daggett (34°51.8′N, 116°53.3′W), 13–14 Apr 1955, W. R. M. Mason (1♂, 1♀; CNC); Newberry Springs (34°49.6′N, 116°41.3′W), 14 Apr 1955, W. R. M. Mason (1♂; CNC); Phelan (11.2 km E; Baldy Mesa Road; 34°25.6′N, 117°34.3′W; pan traps), 15–31 May 1982, J. T. Huber (3♂, 2♀; DEBU). **San Diego:** Borrego (N end Clark Lake; 33°20.3′N, 116°16.7′W), 23 Mar 1978, P. Adams, J. Slansky, M. S. Wasbauer (1♂, 2♀; CSCA).

TYPE LOCALITY. United States. California. San Bernardino: Daggett (34°51.8′N, 116°53.3′W).

DISTRIBUTION (FIGURE 52). Nearctic: United States (California).

ETYMOLOGY. The species epithet, *gigapeza*, is of Latin derivation and refers to the large tarsal segments or "feet" of this species.

REMARKS. Externally, this species closely resembles *T. granditarsa,* but structures of the male terminalia exhibit strong differences in the surstylus, gonites, and distiphallus.

Trixoscelis granditarsa (Foster and Mathis), new combination

FIGURES 53–56, 59–60

Pelomyia granditarsa Foster and Mathis, 2003:14.

DIAGNOSIS. Body gray microtomentose; 2 or 4 rows of scattered acrostichal setae; wing hyaline; lateral surface of basal flagellomere brown, medial surface yellow basally, brown distally, scape and pedicel yellow; vertex brown laterad of ocellar triangle; gena high, gena-to-eye ratio 0.45–0.50; male epandrium in undissected specimens large, yellowish.

DESCRIPTION. Body length 2.88–3.40 mm; uniformly gray microtomentose.

Head (Figures 59, 60): Eye as high as wide; ocellar triangle gray microtomentose; frons bare, yellow, parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate

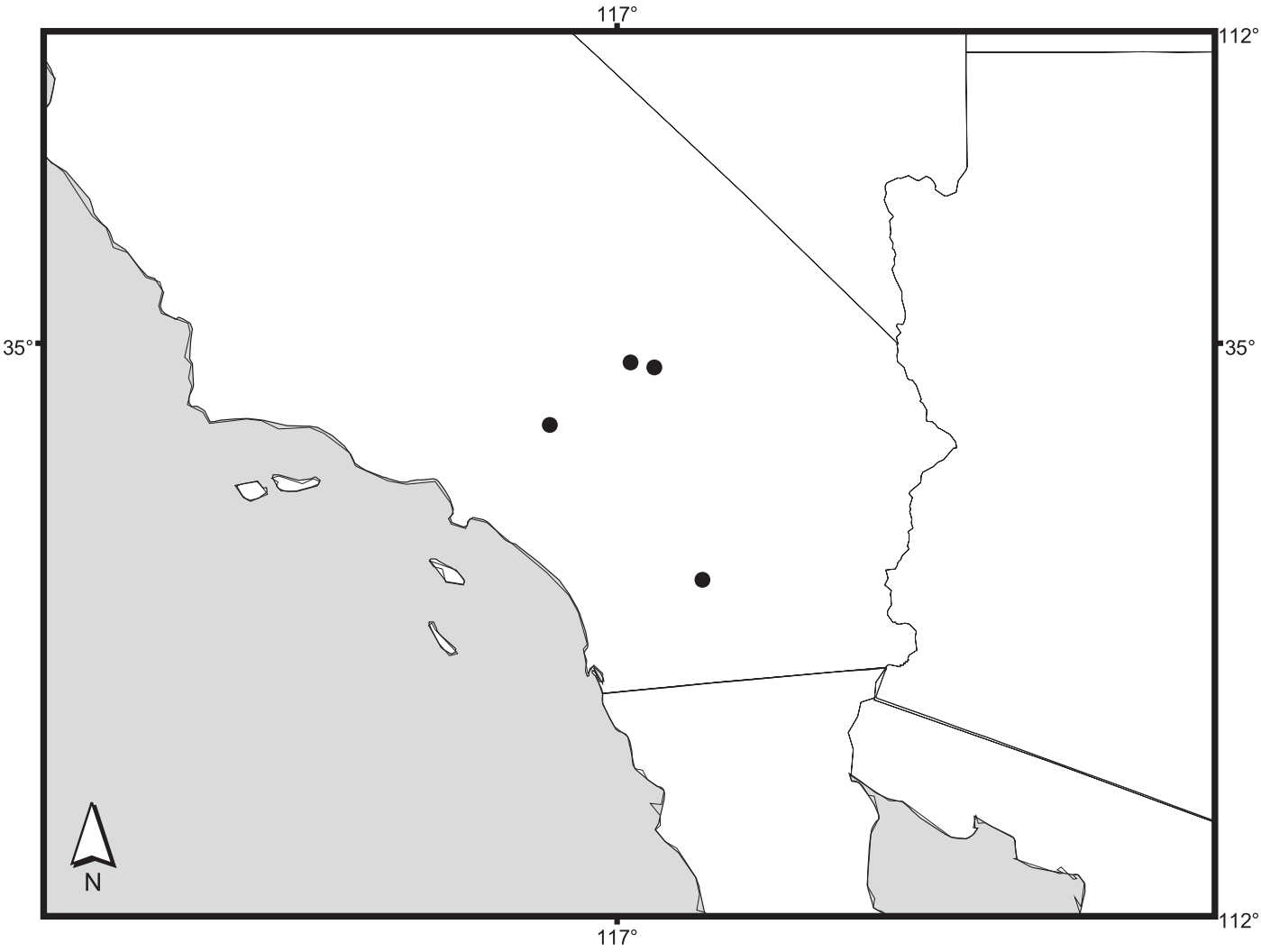
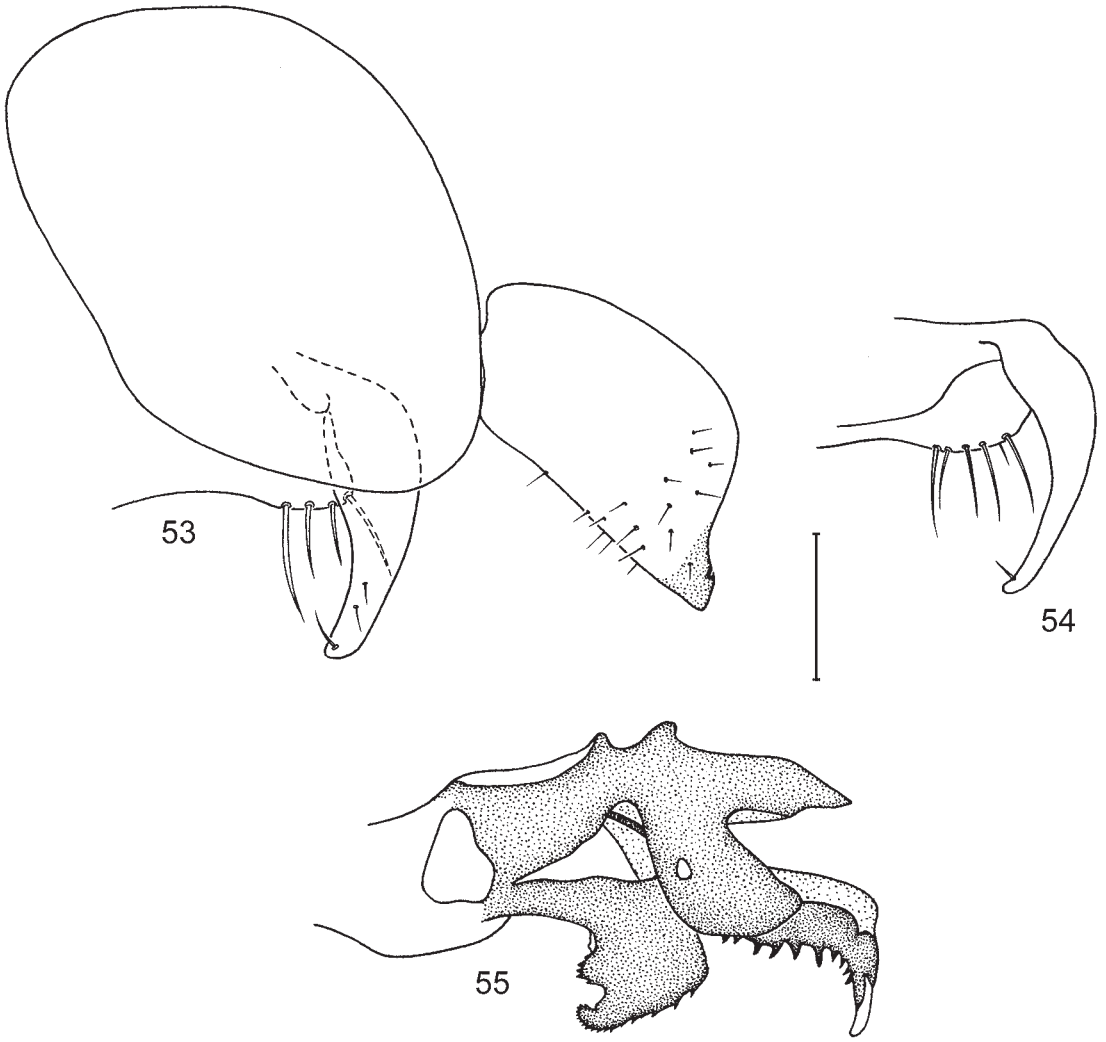


FIGURE 52. Distribution map for *Trixoscelis gigapeza* Foster and Mathis.

postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput mostly gray microtomentose ventral 1/5 concolorous with gena, with 1–2 rows of short dorsoclinate setulae dorsally, one row of several setae ventrally; antenna with basal flagellomere brown laterally, medially yellow on proximal half, brown on distal half, scape and pedicel yellow; arista brown, with sparse hairs. Gena-to-eye ratio 0.45–0.50, white microtomentose, bearing several short, scarcely discernible setulae ventrally and 2–3 slightly stronger setae posteriorly in addition to a pair of strong convergent oral vibrissae, extreme ventral margin shiny, chitinous; face white, convex; palpus yellow, labellum as long as head, straight, clypeus indistinct.

Thorax: Mesonotum uniformly gray microtomentose, sparsely setulose. Dorsocentral setae 5(2+3); acrostichal setae in 2–4 irregular rows; apical scutellar setae twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster with the larger seta; katepisternum with 2 longer setae and one shorter one between them in a row along the posterodorsal edge. Wing hyaline. Halter white. Coxae, femora, and tibiae yellow, fore femur may be slightly darker, tarsi brown, male first and second tarsal segments swollen, hind ones greatly so; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces; otherwise, legs evenly setulose except for preapical tibial setae on all tibiae.



FIGURES 53–55. Structures of male terminalia of *Trixoscelis granditarsa* (Foster and Mathis) (California. San Bernardino: Poison Canyon): (53) epandrium, surstylus, and gonites, lateral aspect; (54) gonites, lateral aspect; (55) aedeagus, lateral aspect. Scale = 0.1 mm.

Abdomen: Uniformly gray microtomentose, evenly setose. Male terminalia (Figures 53–55): Epandrium yellow in undissected specimens, oblong; surstylus strong, distinct, subtriangular, endowed only with a few weak setulae (Figure 53); pre- and postgonite fused, pregonite (Figure 54) a simple lobe with 4–5 setae along ventral margin, postgonite curved, subtriangular; distiphallus strongly black sclerotized, quite complex with many short lobes (Figure 55). Female terminalia: Seventh sternite and tergite strongly fused; spermathecae elongate, 4× longer than wide; eighth sternite reduced to two distinct setaceous lobes; hypoproct with many weak setae; epiproct with two weak setae.

TYPE MATERIAL. The holotype male is labeled "B-15 1932/Las Vegas, Nev Apr 15, 1932 E. W. Davis/ Lepidium fremonti [Brassicaceae]/2017A/HOLOTYPE Pelomyia granditarsa ♂ Foster & W. N. Mathis USNM[red label; species name and '♂ Foster &' handwritten]." The holotype is double mounted (glued to a paper triangle), is in poor condition (mostly greasy and partially covered with mounting glue), and is deposited in the USNM.

OTHER SPECIMENS EXAMINED. UNITED STATES. *California*. **Riverside:** Banning (33°55.5′N, 116°52.6′W), 7 Apr 1931, A. C. Browne (1♀; CSCA). **San Bernardino:** Poison Canyon (35°39.3′N, 117°27.5′W), 10 Apr 2003, W. N. Mathis, T. Zatwarnicki (6♂, 3♀;

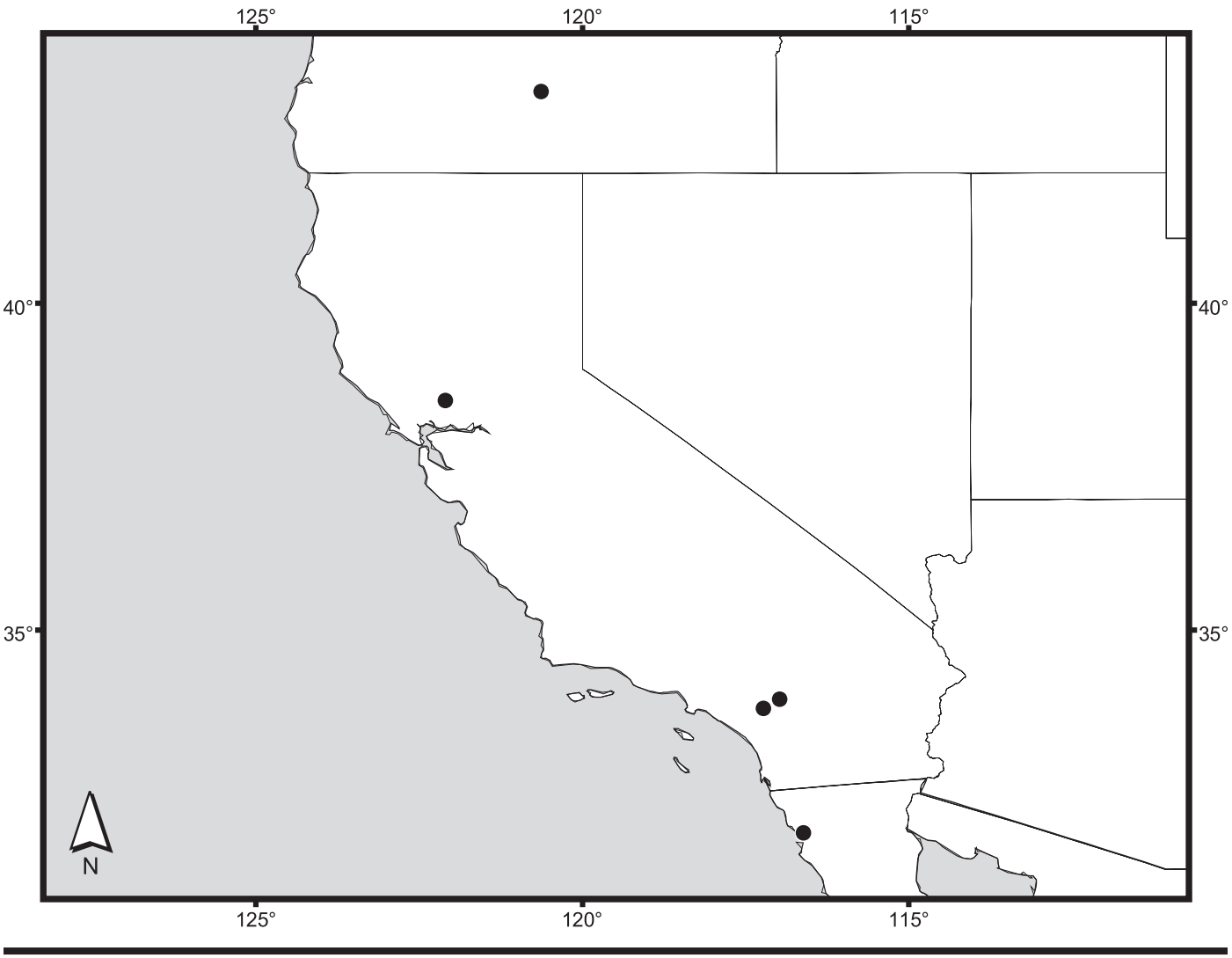


FIGURE 56. Distribution map for *Trixoscelis granditarsa* (Foster and Mathis).

USNM); Apple Valley (34°30′N, 116°32.2′W), 10 May 1955, W. R. Richards (1♀;CNC). **San Diego:** Borrego (north end Clark Lake; 33°20.3′N, 116°16.7′W; Malaise trap), 23 Mar 1978, P. Adams, J. Slansky, M. S. Wasbauer (1♂, 2♀; CSCA).

TYPE LOCALITY. United States. Nevada. Clark: Las Vegas (36°10.5′N, 115°08.2′W).

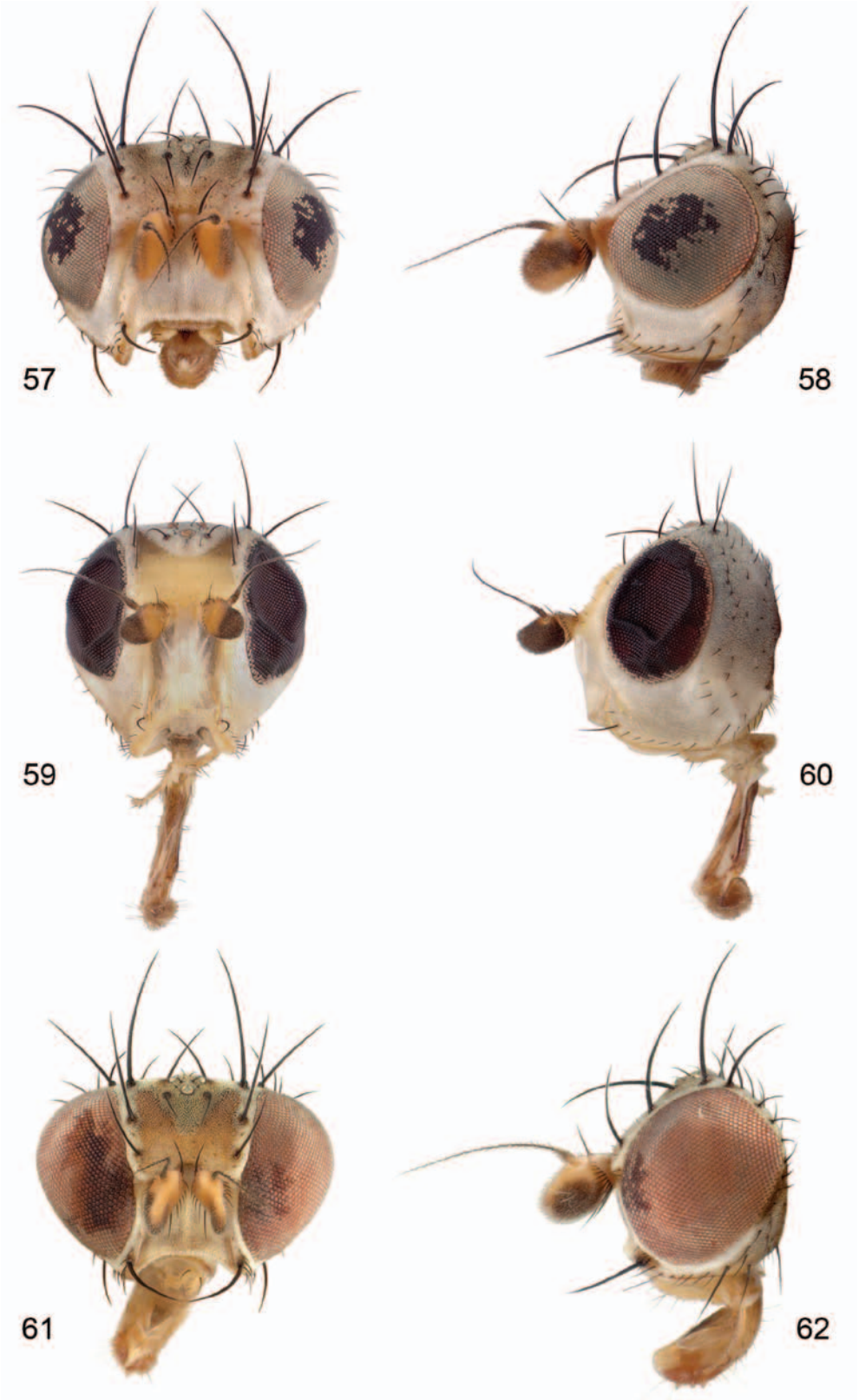
DISTRIBUTION (FIGURE 56). Nearctic: United States (California, Nevada).

REMARKS. This species so closely resembles the genus *Pelomyia* of the family Tethinidae, even to the extent of having a shiny chitinous stripe along the ventral margin of the gena, that it was originally placed in that genus based on a single specimen (Foster and Mathis, 2003). This species and *T. gigapeza* also bear a resemblance to *Stuckenbergiella*, as illustrated by Cogan (1971), but do not exactly fit the description. The collection of many specimens on a recent trip to California has allowed us to thoroughly examine this enigmatic species, and we can now correctly place it in *Trixoscelis*.

Trixoscelis nevadensis Foster and Mathis, new species

FIGURES 63–65

DIAGNOSIS. Body gray microtomentose; 2 rows of acrostichal setae, proepimeral seta present; wing hyaline; antenna nearly completely yellow except for small area in center of lateral surface of basal flagellomere;



FIGURES 57–62. Photographs of heads: (57) *T. fumipennis*, anterior aspect; (58) same, lateral aspect; (59) *T. granditarsa*, anterior aspect; (60) same, lateral aspect; (61) *T. ornata*, anterior aspect; (62) same, lateral aspect.

vertex brown microtomentose; gena short, gena-to-eye ratio only 0.15; abdomen gray.

DESCRIPTION. Body length approximately 1.70–2.50 mm (measurement taken after dissection).

Head: Eye round; ocellar triangle light gray to brown microtomentose; frons bare, yellow, becoming darker dorsally, parafrons silvery microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput narrow, gray microtomentose dorsally becoming concolorous with gena ventrally, with 1–2 rows of short dorsoclinate setulae; antenna nearly completely yellow except for small area in center of lateral surface of basal flagellomere, arista brown, with sparse hairs. Gena short, 0.15 eye height, white microtomentose, bearing 1 row of 6–8 short ventroclinate setae along ventral edge in addition to a pair of strong convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum gray microtomentose, vague vittae along dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 2 irregular rows; apical scutellar setae only twice length of scutellum. Mesonotum sparsely covered with minute setae. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing hyaline. Halter white. Fore and hind femora light gray, all coxae, mid femur, tibiae and basal four tarsal segments yellow, 5th tarsal segment darker; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly gray microtomentose. Male terminalia (Figures 64, 65): Surstylus (Figure 64) short robust, narrowing distally, slightly curved anteriorly in lateral view, somewhat long triangular in posterior view; pre- and postgonite fused but distinct (Figure 65), postgonite remnant bearing long, thin, curved lobe armed with strong, short spicule distally, ventral lobe rather large, bare except for a few sparse setulae on medial surface; aedeagus short, thin, weak, with complex sclerotization. Female terminalia: Seventh sternite and tergite strongly fused; spermathecae spherical; eighth sternite with two distinct setaceous lobes each bearing 2 strong setae; hypoproct with 2 short, strong setae; epiproct with two weak setae.

TYPE MATERIAL. The holotype male is labeled "USA.N[E]V[ADA]. Clark: Red Rock Canyon 36°08.7 'N, 115°25'W 11 May 2001 D. & W. N. Mathis/HOLOTYPE ♂ *Trixoscelis nevadensis* Foster & Mathis USNM [red]/USNM ENT 00118086 [plastic bar code label]." The holotype is double mounted (pinned from right side with a minuten mounted in a white silicone block), is in excellent condition (abdomen removed and dissected; structures in an attached microvial), and is deposited in the USNM. Paratypes are as follows:

UNITED STATES. *California*. **Imperial:** Holtville (3.2 km E; 32°48.7'N, 115°22'W), 24 Apr 1973, P. W. Oman (1♂, 1♀; DEBU). **Riverside:** Morongo Valley (33°57.6'N, 116°31.5'W; 915 m), 19 Apr 1955, W. R. M. Mason (1♂; CNC); Palm Springs (33°49.8'N, 116°32.7'W) 23 Apr 1944, A. L. Melander (1♂; USNM. This specimen was among the paratype series of *T. suffusa*).

Nevada. **Clark:** Red Rock Canyon (36°08.7 'N, 115°25'W), 11 May 2001, D. Mathis and W. N. Mathis (1♀; USNM).

TYPE LOCALITY. United States. Nevada. Clark: Red Rock Canyon (36°08.7 'N, 115°25'W).

DISTRIBUTION (FIGURE 63). Nearctic: United States (California, Nevada,).

ETYMOLOGY. The species epithet, *nevadensis*, is of Latin derivation and refers to the type locality in Nevada.

REMARKS. This species is very similar to *T. deserta* but shows distinct differences in structures of the male terminalia, particularly the gonites. The surstylus also lacks the strong seta on the anterior face.

Trixoscelis nigripeza Foster and Mathis, new species

FIGURES 63, 66–68

DIAGNOSIS. Mesonotum gray, brown vittae along the dorsocentral and acrostichal rows of setae, 4 scattered rows of acrostichal setae, proepimeral seta present, wing hyaline; antenna yellow except dorsal portion of outer surface of basal flagellomere brown; vertex black microtomentose; gena short, gena-to-eye ratio only 0.17–0.22; abdomen gray; male epandrium in undissected specimens somewhat bulbous, light gray in contrast to the darker gray abdomen.

DESCRIPTION. Body length approximately 2.00 mm (measurement taken after dissection).

Head: Eye round; ocellar triangle gray microtomentose; frons bare, yellow anteriorly, rather black posteriorly, parafrons white microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong,

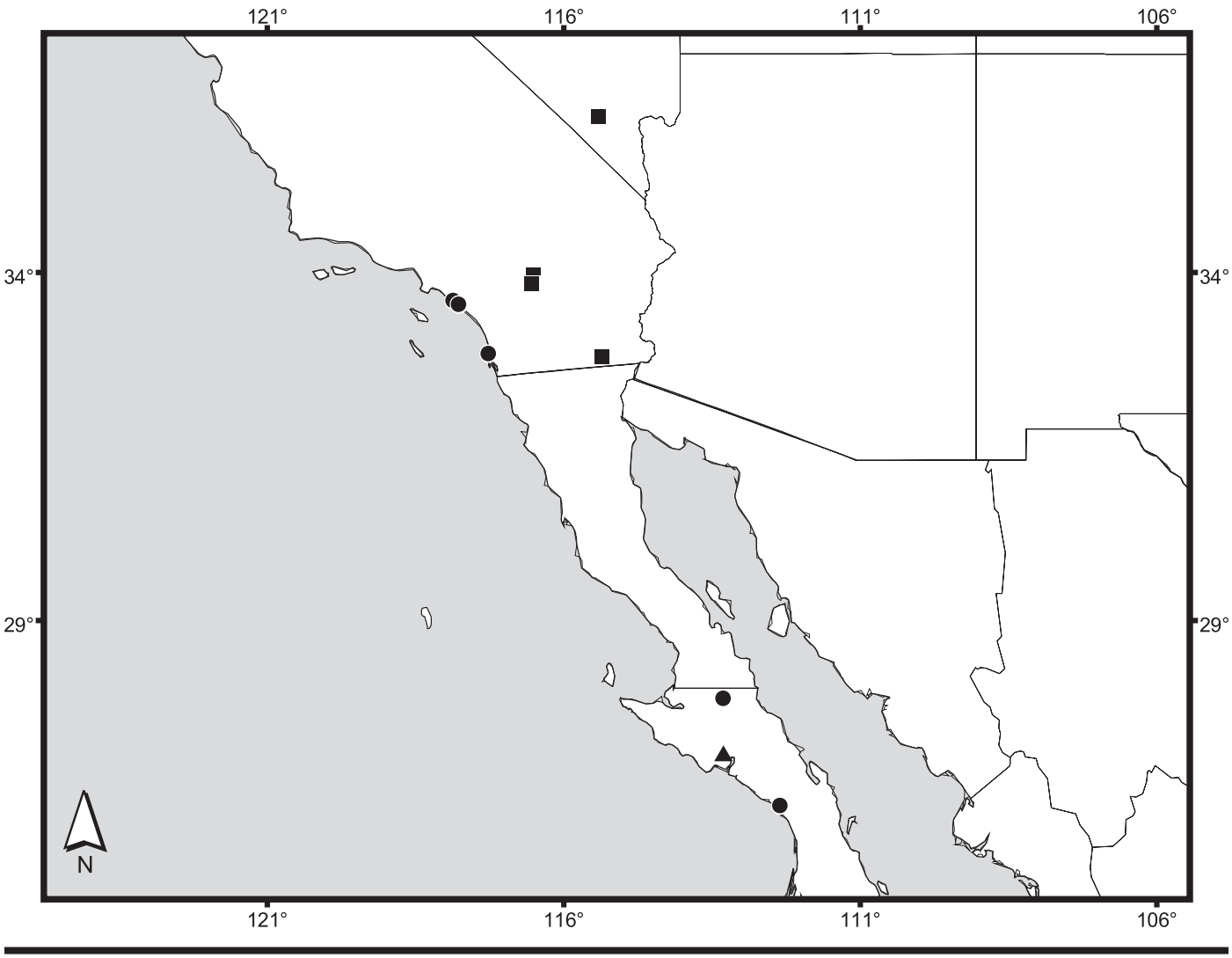
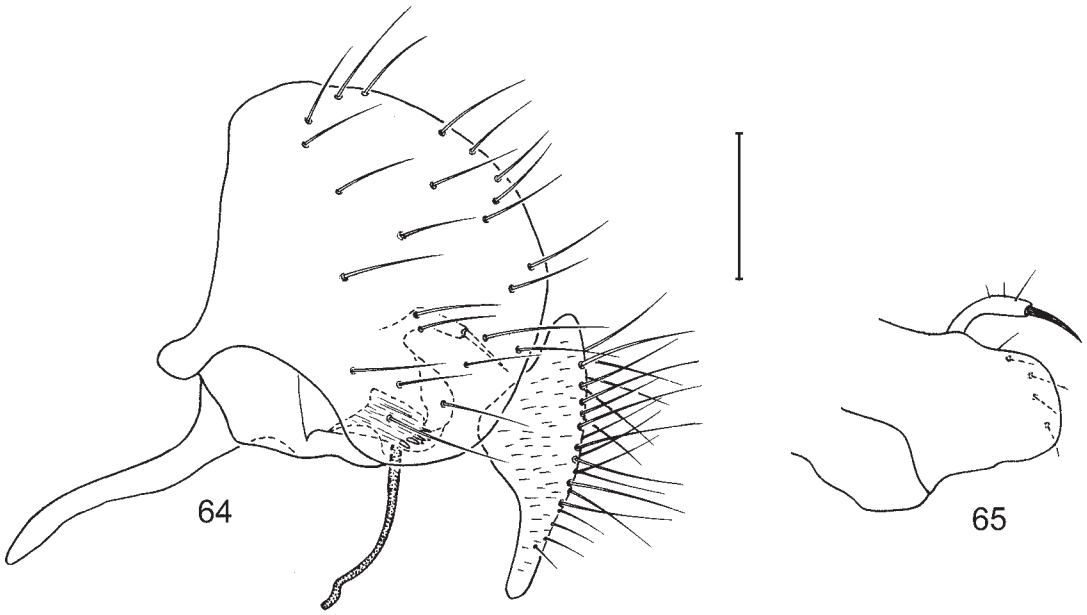


FIGURE 63. Distribution map for *Trixoscelis lagunaensis* Foster and Mathis (dots), *T. nigripeza* Foster and Mathis (triangle), and *T. nevadensis* Foster and Mathis (squares).

widely separated and convergent; lateral vertical seta long, strong and divergent;occiput widens posteriorly, gray microtomentose dorsally becoming concolorous with gena ventrally, with 1–2 rows of short dorsoclinate setulae; antenna yellow except dorsal portion of outer surface of basal flagellomere brown; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.17–0.22, white microtomentose, bearing 1 row of 4–5 short ventroclinate setae along ventral edge in addition to a pair of strong convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct.

Thorax: Mesonotum gray, brown vittae along the dorsocentral and acrostichal rows of setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 irregular rows; apical scutellar setae only twice length of scutellum. Mesonotum sparsely covered with minute setae. Anepisternum mostly gray, brownish dorsally, mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing hyaline. Halter white. Coxae gray dorsally, yellow ventrally, fore and hind femora gray, tibia yellow, male mid and hind basistarsomere black and clearly swollen; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly gray microtomentose except epandrium yellow, evenly setose. Male terminalia (Figures 66–68): Epandrium in undissected specimens light gray, distinctly in contrast to the uniformly darker gray abdomen; surstylus (Figure 66) widely triangular, anteriorly curving



FIGURES 64–65. Structures of male terminalia of *Trixoscelis nevadensis* Foster and Mathis (Nevada. Clark: Red Rock Canyon): (64) epandrium, surstylus, distiphallus, and hypandrium, lateral aspect; (65) gonites, lateral aspect. Scale = 0.1 mm.

in lateral view, robust triangular in posterior view; pre- and postgonite fused, complex (Figure 68) with postgonite remnant bearing sharp spicule distally, pregonite portion rather amorphous with a patch of setulae on the posterior margin; distiphallus (Figure 67) complex, strongly sclerotized, with two short strands distally. Female terminalia: Unknown.

TYPE MATERIAL. The holotype male is labeled "MEX[ICO]: B[aja]. Calif[ornia]. Sur Rancho Tablon area, 13 km. S[outh]. Guillermo Prieto/14/17 April 1983 M. Wasbauer coll[ector]. malaise trap/HOLOTYPE ♂ *Trixoscelis nigripeza* Foster & Mathis CSCA [red]." The holotype is double mounted (glued to a cardboard triangle on its right side), is in fair condition (right basal flagellomere missing, left eye with small blob of dirt embedded dorsally, left wing slightly damaged, left leg missing tarsal segments 2–5; abdomen removed and dissected; structures in an attached microvial), and is deposited in the CSCA. Paratypes are as follows.

MEXICO. *Baja California Sur.* Rancho Tablon, Guillermo Prieto (21 km SW; 27°50′N, 113°19′W; Malaise trap), 14–17 Apr 1983, M. S. Wasbauer (1♂; CSCA).

TYPE LOCALITY. Mexico. Baja California Sur. Rancho Tablon, Guillermo Prieto (21 km SW; 27°50′N, 113°19′W; Malaise trap).

DISTRIBUTION (FIGURE 63). Nearctic: Mexico (Baja California Sur).

ETYMOLOGY. The species epithet, *nigripeza*, is of Latin derivation and refers to the black mid and hind basitarsi of the male.

REMARKS. The female is unknown to date; however, the male mid and hind basitarsi are black and distinctly swollen, making this species quite distinct from its congeners.

Trixoscelis ornata (Johnson), new combination

FIGURES 41, 61–62, 69–70

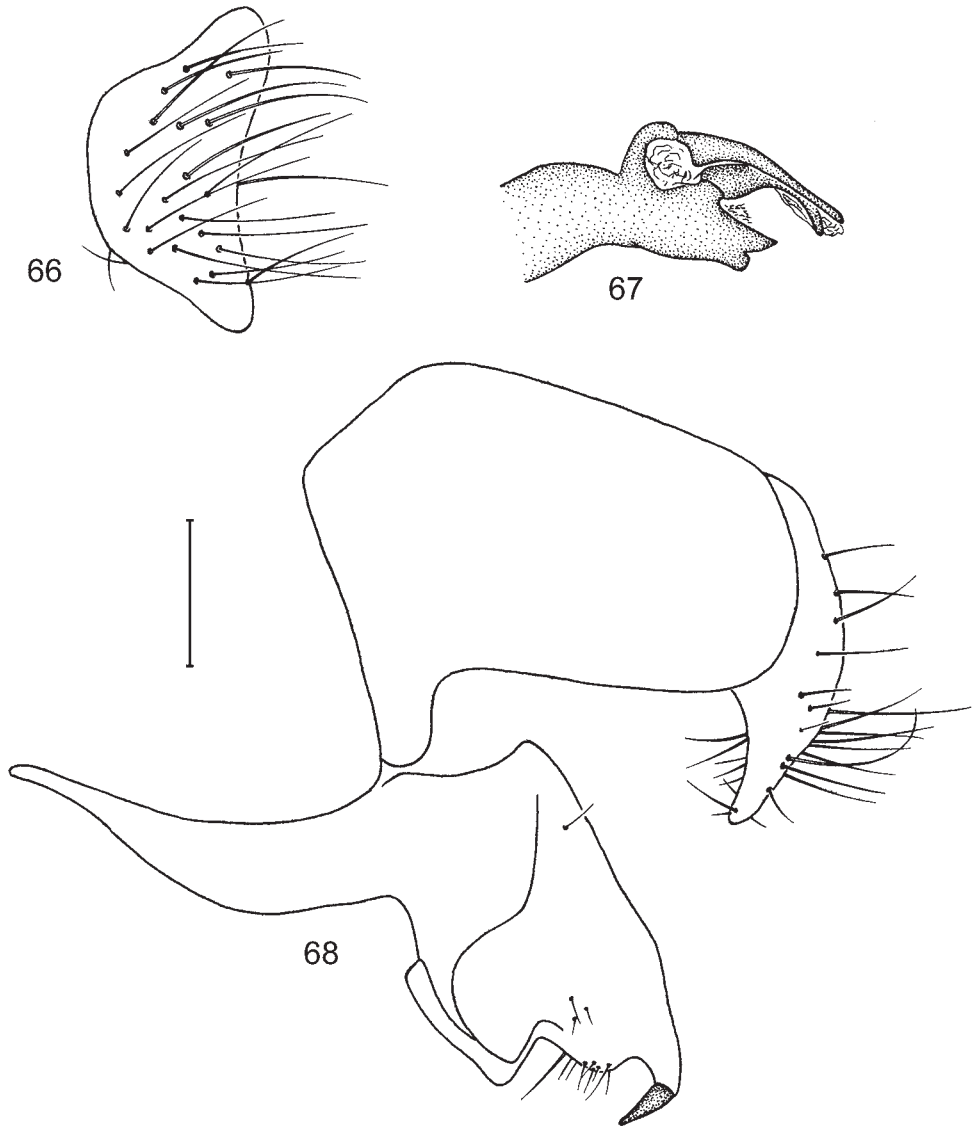
Heterochroa ornata Johnson, 1895:306.

Peratochaetus ornatus. —Czerny, 1903:97 [generic combination]. —Aldrich, 1905:571 [Nearctic catalog].

Spilochroa ornata—. Williston, 1908:297–298 [generic combination, key, figures of head, wing]. —Melander, 1913b:288 [diagnosis]; 1952:40 [key, diagnosis]. —Wheeler, 1955:111 [key]. —Vockeroth, 1965:817 [Nearctic catalog]. —Gill, 1968:7 [Neotropical catalog]. —Cole, 1969:433 [distribution, diagnosis].

Diastata (Spilochroa) ornata. Malloch, 1931:30 [generic combination].

DIAGNOSIS. Body yellowish brown, thorax may be yellow-brown to gray microtomentose, often with brown spots at bases of all setae including scutellar setae; 4 rows of acrostichal setae; wing heavily infuscated,

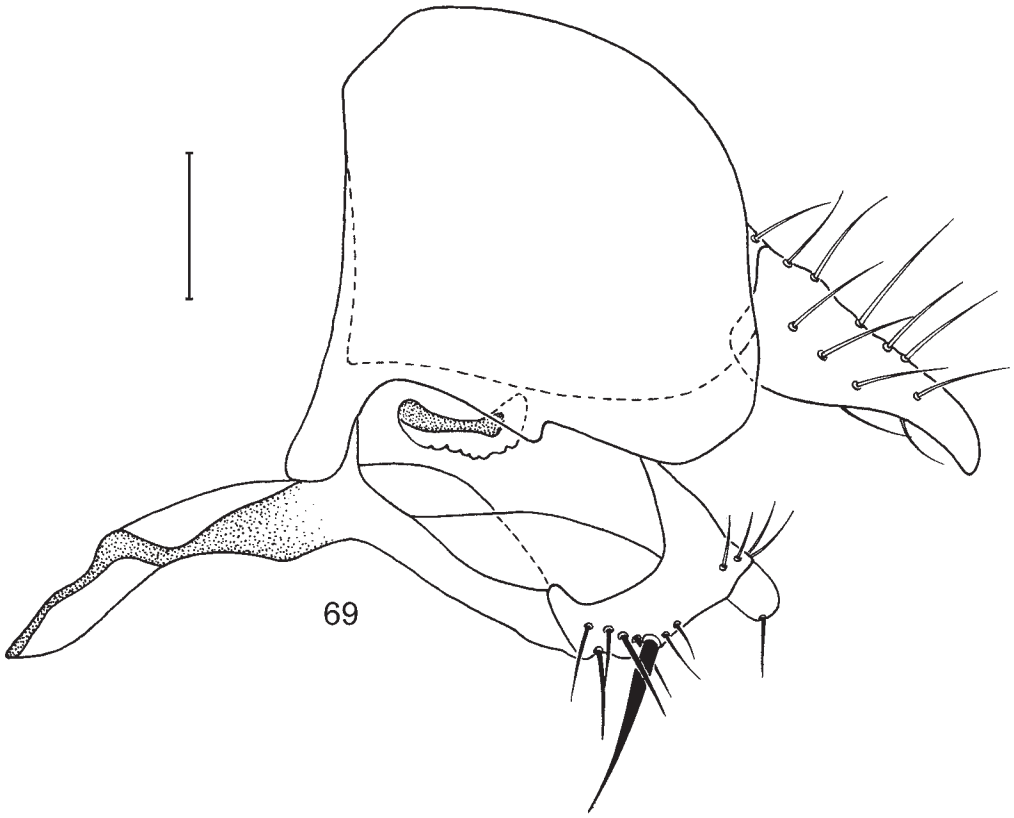


FIGURES 66–68. Structures of male terminalia of *Trixoscelis nigripeza* Foster and Mathis (Mexico. Baja California Sur: Rancho Tablon): (66) surstylus, posterior aspect; (67) distiphallus, lateral aspect; (68) epandrium, surstylus, hypandrium, and gonites, lateral aspect. Scale = 0.1 mm.

with hyaline spots, costal cell with a central spot; antenna mostly yellow to mostly brown; vertex brown; gena very short, gena-to-eye ratio only 0.10; male epandrium in undissected specimens concolorous with abdomen.

DESCRIPTION. Body length 2.12–2.86 mm.

Head (Figures 61, 62): Eye higher than wide; ocellar triangle light gray microtomentose; frons bare, yellowish orange becoming darker dorsally, parafrons whitish-silver microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput very narrow, gray dorsally, becoming white ventrally, microtomentose with 1 row of short dorsoclinate setulae; antenna mostly yellow to mostly brown; arista brown, with sparse hairs. Gena very short, gena-to-eye ratio 0.10, mostly white but with brown spot at base of oral vibrissa and faint brown along ventral row of setae, microtomentose, bearing 1 row of short ventroclinate setae along ventral edge in addition to a pair of



FIGURES 69. Structures of male terminalia of *Trixoscelis ornata* (Johnson) (Dominican Republic. LaVega: near Jarabacoa, Salto Baiguate (19°05.7'N, 70°37'W; 570 m)): epandrium, surstylus, hypandrium, and gonites, lateral aspect. Scale = 0.1 mm.

stronger convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum nonuniformly varying from light yellowish brown to gray microtomentose often with brown spots at bases of all setae including scutellar setae, scutellum often marked with brown areas as well, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 somewhat irregular rows; apical scutellar setae about twice length of scutellum. Pleural sclerites slightly darker than mesonotum, anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing (Figure 41) heavily infuscated, with round to oblong hyaline spots, one semicircular hyaline spot at wing tip between veins R_{4+5} and M, costal cell with a central spot. Halter white. Legs entirely yellow except fore femur may be darker brown, slightly swollen; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Gray microtomentose with brown spots. Uniformly and evenly setose. Male terminalia (Figure 69): epandrium brown, concolorous with abdomen, with a notch along the ventral edge (Figure 69); surstylus long triangular evenly endowed with setae; pre- and postgonites fused into one complex structure with postgonite remnant bearing one weak terminal seta pregonite portion with one very strong seta and several weaker ones; distiphallus complex with longest lobe blunt (not figured, identical to *T. polita* [Figure 72]). Female terminalia: Seventh sternite with row of strong setae along the posterior margin, seventh sternite and tergite fused but with distinct suture line; spermathecae spherical, ducts not sclerotized; eighth sternite lightly sclerotized medially with distinct lateral lobes bearing 2 strong setae each; hypoproct with 2 short, strong setae; epiproct with weak setae.

TYPE MATERIAL. Johnson described *T. ornata* from one male specimen, which he incorrectly identified as female. The holotype is labeled "Drayton Isl. Fl[orid] a [29°22.14′N, 81°38.85′W] 5.9.94 [date handwritten,

white label]/ HOLOTYPE No. [red label with no number]/ Type 7854 [number is handwritten on a red label]/ C. W. Johnson Collection [white]." The holotype is male, is in good condition, and is deposited in the MCZ.

OTHER SPECIMENS EXAMINED. Nearctic: UNITED STATES. *Arizona*. **Cochise:** Portal, Southwestern Research Station (8 km SW of Portal; 31°52.9′N, 109°12.2′W; 1631 m), 8–18 Aug 1978, S. Wasbauer (1♂, 1♀; CSCA). **Maricopa:** Avondale (32°26.1′N, 112°21′W), 27 Dec 1960, Darden (1♂; USNM).

Florida. **Alachua:** Gainesville (29°39.1′N, 82°19.5′W), 22 Mar–15 Apr 1956, G. B. Merrill, R. A. Morse (1♂, 1♀; USNM). **Collier:** Seminole State Park (25°58.6′N, 81°36.2′W), 17 May 1973, W. W. Wirth (1♂; USNM). **Indian River:** Vero Beach (27°38.3′N, 80°23.8′W), 18 Feb 1914, G. G. Ainslee (1♂; USNM). **Lee:** Sanibel Island (26°26.4′N, 82°06.8′W; Malaise trap), 11 May 1973, W. W. Wirth (5♂, 4♀; USNM). **Marion:** Ocala (29°11.2′N, 82°08.4′W), 18–22 Feb 1918 (2♀; USNM). **Miami-Dade:** Biscayne Bay (25°30′N, 80°25′W), A. Slosson (1♂, 1♀; USNM); Coconut Grove (25°42.8′N, 80°15.4′W), 15 May 1916 (1♀; USNM); Hialeah (25°51.5′N, 80°16.7′W), 14 Jul 1965, C. Stegmaier (5♂, 3♀; USNM). **Orange:** Orlando (28°24.9′N, 81°17.9′W), 7 Feb 1918, G. G. Ainslie (1♂, 1♀; USNM). **Volusia:** (29°10.1′N, 81°31.3′W), 5 Aug 1956, H. A. Denmark (1♀; USNM).

Georgia. **Chatham:** Savannah (32°05′N, 81°06′W; privy trap), 8 Oct 1954, J. W. Kilpatrick (1♀; USNM).

Texas. **Bexar:** San Antonio (29°25.5′N, 98°29.6′W), 14 Dec 1957, D. H. Bixby (1♀; USNM). **Cameron:** Brownsville (25°54.1′N, 97°29.8′W), 30 Apr–1 Sep 1954, Townsend (2♀; USNM); Brownsville, Los Borregos (25°52.4′N, 97°26.8′W), 24 May 1904, H. S. Barber (1♀; USNM). **Kerr:** Kerrville (30°02.8′N, 99°08.4′W), 16 Jun–22 Sep 1953, L. J. Bottimer (2♂; 6♀; USNM). **Terrell:** Dryden (30°02.7′N, 102°06.9′W), Apr–May 1954, O. Schomberg (1♂; USNM). **Travis:** Austin (30°18.1′N, 97°45.7′W), 16–25 Oct 1950, 1952, M. R. Wheeler (2♂; USNM).

Neotropical: BAHAMAS. **New Providence Island:** (24°57′N, 77°23.7′W), 19 May 1960, C. D. Babb (1♀; USNM).

MEXICO. **Oaxaca:** Mitla (16°55.6′N, 96°20.9′W), 10 Aug 1962 (2♀; USNM). **Sonora:** Alamos (29°13′N, 110°08′W), 24 Feb 1963, P. H. Arnaud, Jr. (1♀; USNM). **Veracruz:** Ocotal Chico (18°20′N, 94°48′W), 4–5 May 1985, W. N. Mathis (1♀; USNM).

West Indies: DOMINICAN REPUBLIC. **LaVega:** near Jarabacoa, Salto Baiguate (19°05.7′N, 70°37′W; 570 m), 16 May 1998, W. N. Mathis (1♂, 3♀; USNM). **Pedernales:** Pedernales (18°01.8′N, 71°44.7′W; 570 m), 19–20 Mar 1999, W. N. Mathis (3♂; USNM). **Peravia:** San Jose de Ocoa (9 km S; 18°31′N, 70°30.1′W; human dung), 19 Jul 1987, A. L. Norrbom (4♀; USNM).

JAMAICA. **St. Andrew:** Cross Roads (18°15′N, 77°30′W), 5 Oct 1954, T. H. Farr (1♂, 1♀; USNM); Kingston (17°58′N, 76°48′W), 27 Aug 1903, M. Grabham (2♀; USNM). **St. Ann:** Runaway Bay (18°28′N, 77°20′W; Malaise trap), 1–8 Mar 1970, W. W. Wirth (1♀; USNM).

PUERTO RICO. **Mayagüez:** Mona Island (18°05.2′N, 67°53.4′W), Jul 1955, W. F. Pippin (1♂, 2♀; USNM). **Yauco:** Guanica Insular Forest (17°58.1′N, 66°51.7′W), 6 Jul 1953, J. A. Ramos, J. Maldonado (1♂; USNM).

DISTRIBUTION (FIGURE 70). Nearctic: United States (Arizona, Florida, Georgia, New Mexico, Texas). Neotropical: Bahamas, Mexico (Oaxaca, Sonora), West Indies (Dominican Republic, Jamaica, Mona Island, Puerto Rico).

REMARKS. This species exhibits a rather spotted thorax and abdomen and differs from *T. polita* in having the abdomen gray to brown microtomentose, while *T. polita* shows a shiny, dark brown abdomen. Structures of the male terminalia are similar, demonstrating a close relationship, but an obvious difference is the notch along the ventral edge of the epandrium in *T. ornata*. *Trixoscelis ornata* and *T. polita* have a central brown spot in the costal cell, easily differentiating them from *T. albibasis* and *T. punctipennis*. All four species were previously placed in the genus *Spilochroa*.

Trixoscelis polita (Malloch), new combination

FIGURES 71–74, 88

Diastata (Spilochroa) polita Malloch, 1931:30.

Spilochroa polita. —Wheeler, 1955:111 [key, generic combination]. —Vockeroth, 1965:817 [Nearctic catalog]. —Cole, 1969:433 [distribution, diagnosis].

Spilochroa geminata Sabrosky, 1961:233. —Vockeroth, 1965:817 [Nearctic catalog]. —Gill, 1968:7 [Neotropical catalog]. **NEW SYNONYM**

DIAGNOSIS. Body yellowish brown, thorax may be yellow-brown to gray microtomentose, abdomen polished dark brown; 4 rows of acrostichal setae; wing heavily infuscated, with hyaline spots, costal cell with a central spot; antenna mostly yellow to mostly brown; vertex brown; gena very short, gena-to-eye ratio only 0.10; male epandrium in undissected specimens concolorous with abdomen.

DESCRIPTION. Body length 2.12–2.86 mm.

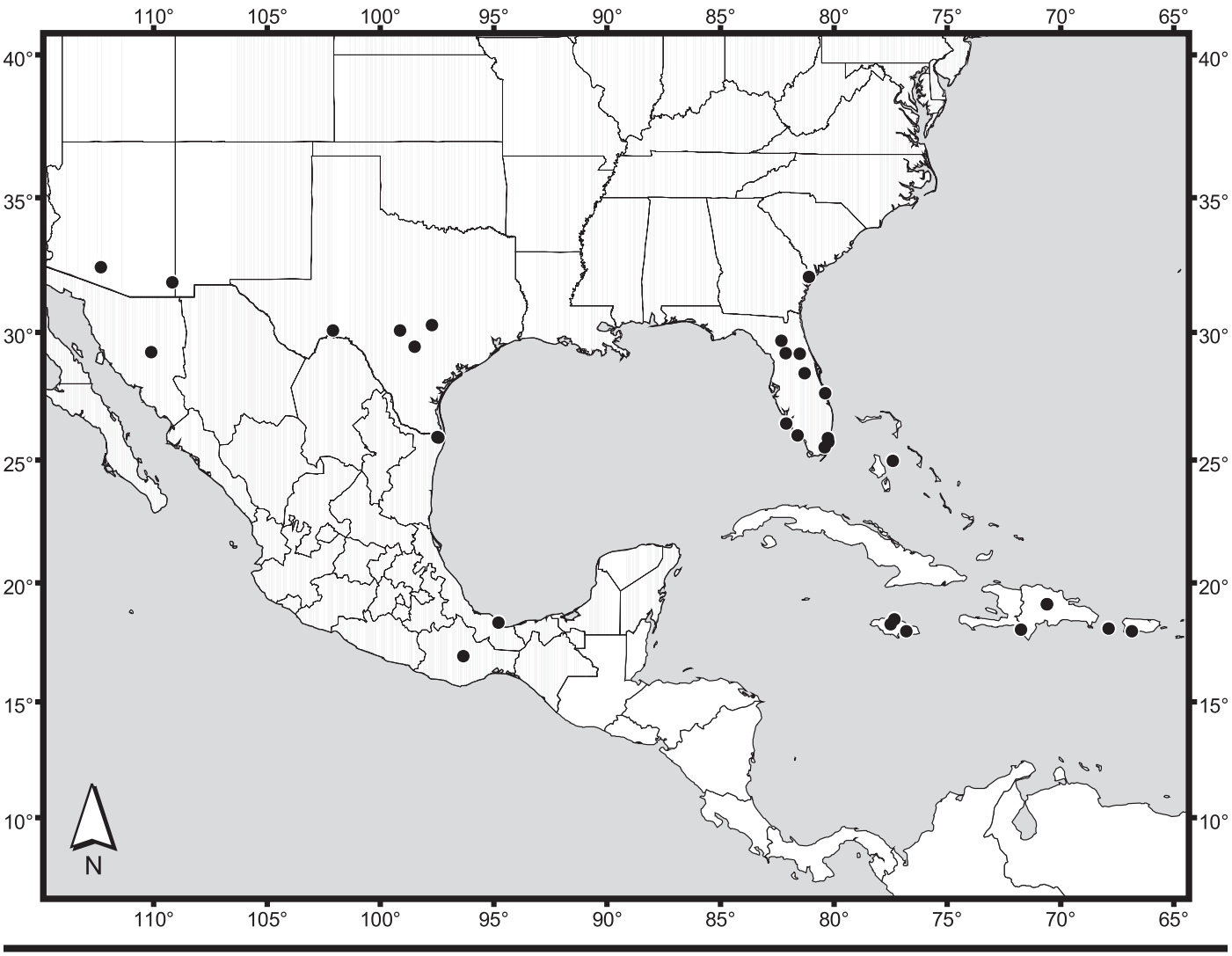
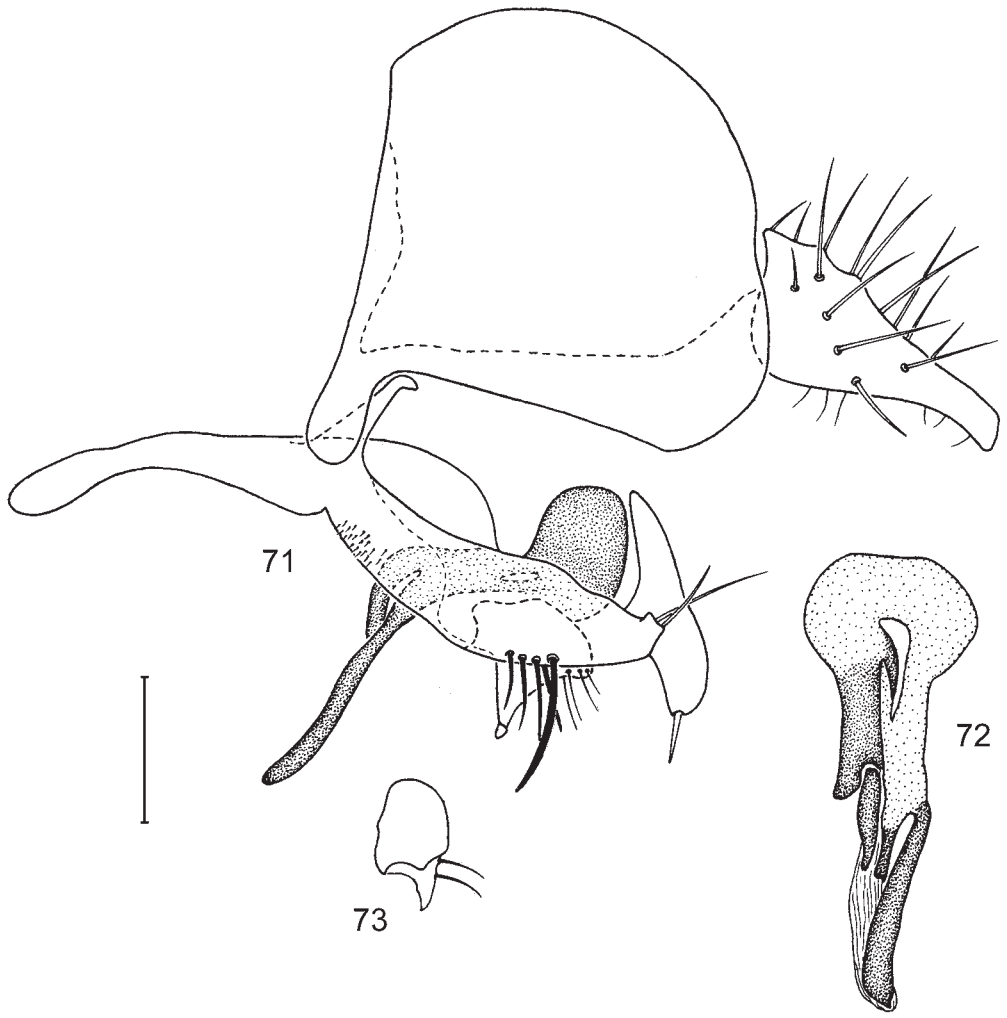


FIGURE 70. Distribution map for *Trixoscelis ornata* (Johnson).

Head: Eye higher than wide; ocellar triangle light gray microtomentose; frons bare, yellowish orange becoming darker dorsally, parafrons whitish-silver microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput very narrow, gray dorsally, becoming white ventrally, microtomentose with 1 row of short dorsoclinate setulae; antenna mostly yellow to mostly brown; arista brown, with sparse hairs. Gena very short, gena-to-eye ratio 0.10, mostly white but with brown spot at base of oral vibrissa and faint brown along ventral row of setae, microtomentose, bearing 1 row of short ventroclinate setae along ventral edge in addition to a pair of stronger convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum generally uniformly light yellowish brown to gray microtomentose, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 somewhat irregular rows; apical scutellar setae about twice length of scutellum. Pleural sclerites slightly darker than mesonotum, anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing (Figure 88) heavily infuscated, with round to oblong hyaline spots, one semicircular hyaline spot at wing tip between veins R_{4+5}



FIGURES 71–73. Structures of male terminalia of *Trixoscelis polita* (Malloch) (Mexico. Baja California: Los Barriles): (71) epandrium, surstylus, hypandrium, gonites, and aedeagus, lateral aspect; (72) distiphallus, ventral aspect; (73) postgonite, ventroblique aspect. Scale = 0.1 mm.

and M, costal cell with a central spot. Halter white. Legs entirely yellow except fore femur may be darker brown, slightly swollen; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Highly polished dark brown; evenly setose. Male terminalia (Figures 71–73): epandrium brown, concolorous with abdomen; surstylus (Figure 71) long triangular evenly endowed with setae; pre- and postgonite fused into one complex structure (Figure 71) with postgonite remnant bearing one weak terminal seta pregonite portion with one very strong seta and several weaker ones; distiphallus complex with longest lobe blunt (Figure 72). Female terminalia: Seventh sternite with row of medium strength setae along the posterior margin, seventh sternite and tergite fused but with distinct suture; spermathecae spherical, ducts not sclerotized; eighth sternite ovoid with distinct lateral lobes bearing several strong setae each; hypoproct with 2 short, strong setae extremely close set appearing as one; epiproct very lightly sclerotized medially forming two subtriangles with 1 weak seta on the tip of each.

Type Material. Malloch based *Diastrata polita* on three female specimens. The holotype specimen is labeled "N[ew]. Mexico airplane P. Glick/ Type No. 43124 U. S. N. M./Diastata (Spilochroa) polita Type [handwritten] Det. J. R. Malloch [printed] [white label with black border]." The holotype is double mounted (glued on right side on a paper triangle with still dried and unprocessed abdomen in an attached microvial), in good condition,

and is deposited in the USNM. Paratypes are as follows: UNITED STATES. *Texas*. **McLennan:** Waco (31°33.6′N, 97°11.3′W), no date given, G. W. Belfrage (1♀; USNM).

New Mexico. **Dona Ana:** Las Cruces (32°18.7′N, 106°46.7′W), no date given, Townsend (1♀; USNM).

Sabrosky described *Spilochroa geminata* from 19 specimens (8♂, 11♀), including the holotype. The holotype male is labeled "Buckeye [33°22.2′N, 112°35′W] Ariz[zona]. Maricopa Co[unty] 1-18-61 Steiner-Wick Lu. fru. fly trap[white handwritten label]/HOLOTYPE Spilochroa geminata ♂ C. W. Sabrosky [red]/TypeNo. 65671 U.S.N.M. [red]/Spilochroa geminata SABR. Det. Sabrosky [white with black border]." The holotype is double mounted (glued on right side on a paper triangle), is in good condition, and is deposited in the USNM. Paratypes are as follows:

Nearctic: UNITED STATES. *Arizona*. **Maricopa:** Avondale (32°26.1′N, 112°21′W, trap), 6 Dec 1961 (1♂, 2♀; USNM); Buckeye (33°22.2′N, 112°35′W, "Lu. Fru. Fly trap"), 11–18 Jan 1961, 9 Dec 1960, L. Darden, Steiner-Wick, A. N. Villa (2♂, 9♀; USNM); Cavecreek Post Office (4.8 km S; 33°31′N, 111°57′W), June 1952, H. K. Gloyd (1♂; USNM). **Pima:** Tucson (32°09.4′N, 110°52.6′W), 17 Jun 1917, J. M. Aldrich (2♂; USNM).

MEXICO. *Sonora:* Imuris (30°47′N, 110°52′W), 16 Apr 1952, R. E. Ryckman (1♂; USNM).

Type Locality. United States. New Mexico.

Other specimens examined. Nearctic: UNITED STATES. *Arizona*. **Cochise:** Douglas (45 km N; Highway 80; 31°40′N, 109°32.7′W), 12 Aug 1978, Freeberg, J. Slansky, M. S. Wasbauer (3♂; CSCA); Portal, Southwestern Research Station (8 km SW of Portal; 31°52.9′N, 109°12.2′W; 1631 m), 8–18 Aug 1978, S. Wasbauer (7♂, 2♀; CSCA).

Maricopa: Avondale (33°26.1′N, 112°21′W), 6–27 Dec 1960, 1961, L. Darden (1♂, 1♀; USNM); Buckeye (33°22.2′N, 112°35′W), 6 Jan–10 Dec 1960, 1961, L. Darden, A. N. Villa (4♀; USNM); Litchfield Park (33°29.6′N, 112°21.5′W), 6 Jan–15 Dec 1960, 1961, L. Darden (2♀; USNM); Phoenix (33°26.9′N, 112°04.5′W), 13 Dec 1960, E. O. Johnson (1♀; USNM). **Santa Cruz:** Nogales (31°20.4′N, 110°56′W), 14 Jun 1963, J. T. Aguero (1♂; USNM).

California. **Orange:** Orange (33°48.3′N, 117°49.4′W; ex. California pepper), 17 Nov 1979, J. Harris (1♀; CSCA). **Imperial:** Ogilby Road, Chocolate Mountains (5 km S junction with highway 78; 33°28′N, 115°35′W), 20–22 Mar 1978, P. Adams, J. Slansky, M. S. Wasbauer (1♂, 4♀; CSCA).

Texas. **Kerr:** Kerrville (30°02.8′N, 99°08.4′W), 16 Jun–22 Sep 1953, L. J. Bottimer (1♀; USNM). **Uvalde:** Speir Ranch, Uvalde (5 km NW; 29°12.8′N, 99°47.5′W), 2 May 1977, T. Eichlin, M. S. Wasbauer, (1♂; CSCA).

Neotropical: MEXICO. *Baja California*. El Pescadero, Playa Los Cerritos (23°19.8′N, 110°10.6′W), 14–17 Apr 1979, M. S. Wasbauer (4♂, 15♀; CSCA);. Los Barriles (23°39′N, 109°42′W), 27–28 Apr, 5–6 May 1979, M. S. Wasbauer (26♂, 31♀; CSCA); Miraflores (6.5 km WSW; 28°02′N, 113°14′W), 22–24 Apr 1979, M. S. Wasbauer (2♂, 11♀; CSCA); San Isidro (5.6 km WNW; 31°18′N, 116°20′W; Canyon/Oasis), 22–23 Apr 1983, M. S. Wasbauer (1♀; CSCA); Sierra de la Laguna (27.8 air km ENE Todos Santos; 23°31.7′N, 110°02′W; 1830 m), 17–18 Dec 1979 (1♀; CSCA).

Baja California Sur. Rancho Tablon, Guillermo Prieto (21 km SW; 27°50′N, 113°19′W; Malaise trap), 14–18 Apr 1983, M. S. Wasbauer (4♂, 15♀; CSCA).

Sonora: Imuris (30°47′N, 110°52′W), 15 Apr 1952, R. E. Ryckman (1♀; USNM); Bahia San Carlos (27°57.7′N, 111°01.5′W), 16 Feb–19 May 1984, 1988, E. M. Fisher (4♂, 7♀; CSCA); Bahia San Carlos (27°57.7′N, 111°01.5′W), 3 Mar 1963, P. H. Arnaud, Jr. (5♀; USNM).

Distribution (Figure 74). Nearctic: United States (Arizona, California, New Mexico, Texas). Neotropical: Mexico (Sonora, Baja California, Baja California Sur).

Remarks. This species is easily distinguished from the closely related *T. ornata* by the shiny, dark brown abdomen and the rather uniformly gray thorax.

Trixoscelis punctipennis (Melander), new combination

FIGURES 75–76, 89

Spilochroa punctipennis Melander, 1913a:167; 1952:39 [diagnosis, key]. —Wheeler, 1955:112 [key]. —Vockeroth, 1965:817 [Nearctic catalog]. —Cole, 1969:433 [distribution, diagnosis].

Diagnosis. Body light brown microtomentose, pleural sclerites darker brown somewhat shining, brown spots at bases of most setae including scutellar setae; 4 rows of acrostichal setae; wing heavily infuscated, with hyaline spots, costal cell hyaline or completely darkened; antenna mostly yellow, center of basal flagellomere may be mostly brown; gena short, gena-to-eye ratio only 0.15.

Description. Body length approximately 2.50–2.70 mm.

Head: Eye higher than wide; ocellar triangle light gray microtomentose; frons bare, yellowish orange

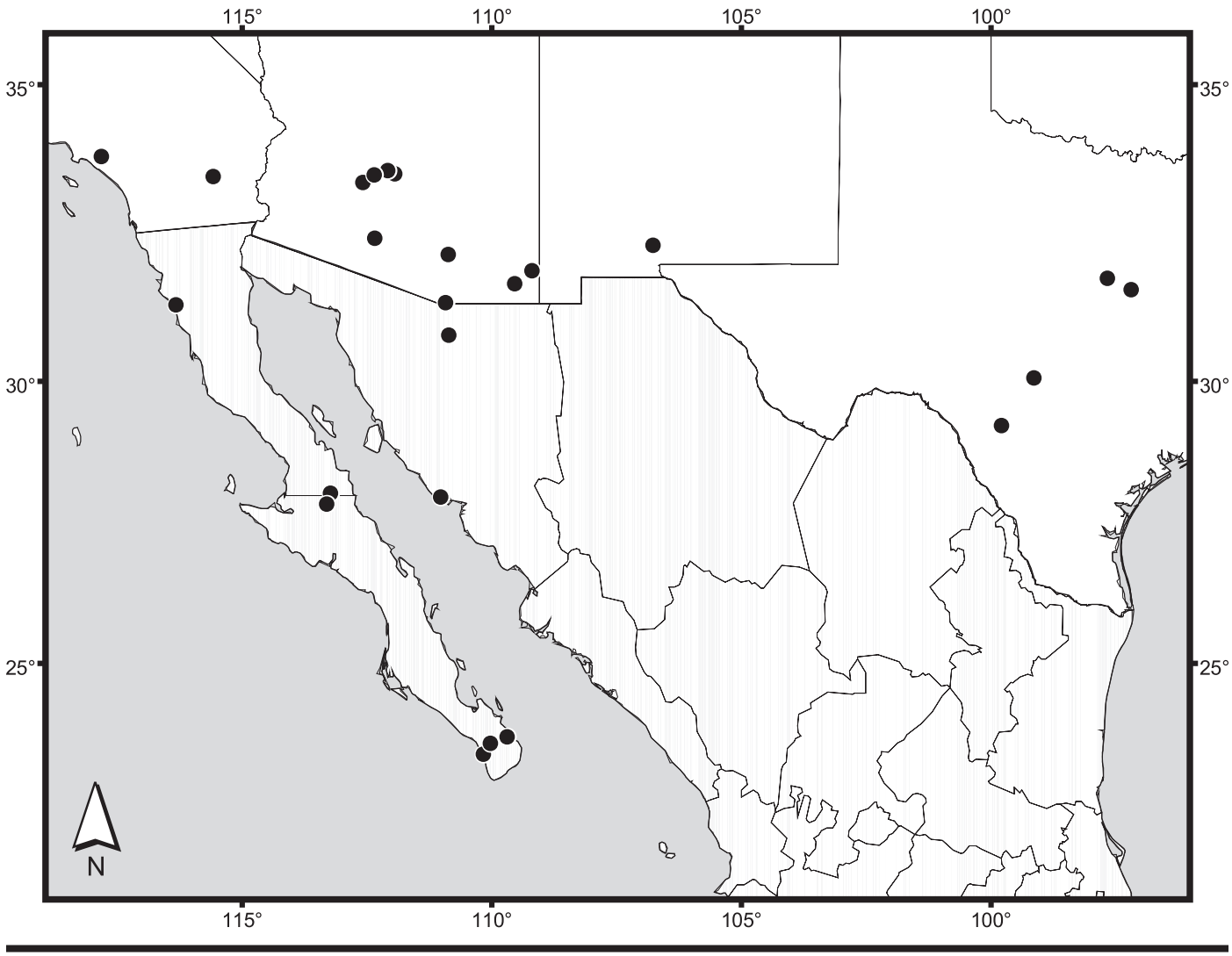


FIGURE 74. Distribution map for *Trixoscelis polita* (Malloch).

becoming darker dorsally, parafrons whitish-silver microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput very narrow, gray dorsally, becoming white ventrally, microtomentose with 1 row of short dorsoclinate setulae; antenna mostly yellow, center of basal flagellomere may be mostly brown; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.15, mostly white but with diffuse brown spot at base of oral vibrissa, microtomentose, bearing 1 row of short ventroclinate setae along ventral edge in addition to a pair of stronger convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, gray.

Thorax: Mesonotum usually uniformly light brown microtomentose sometimes with a brown strip between dorsocentral setae extended to and including the scutellum, brown spots at bases of most setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 somewhat irregular rows; apical scutellar setae about twice length of scutellum. Pleural sclerites slightly to distinctly darker than mesonotum, anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing (Figure 89) heavily infuscated, with round to oblong hyaline spots, one semicircular hyaline spot at wing tip between veins R_{4+5}

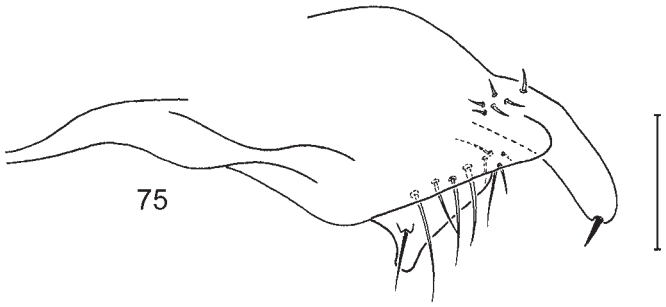


FIGURE 75. Structures of male terminalia of *Trixoscelis punctipennis* (Melander) (Mexico. Baja California Sur: El Pescadero, Playa Los Cerritos): gonites, lateral aspect. Scale = 0.1 mm.

and M, costal cell hyaline. Halter white. Fore femur dark brown remainder of legs entirely light brownish yellow; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly gray microtomentose; evenly setose. Male terminalia (Figure 75): Epandrium concolorous with remainder of abdomen; surstylus long triangular evenly endowed with setae; pre- and postgonites fused into one complex structure (Figure 75) with postgonite remnant bearing one weak terminal seta, pregonite portion with row of weak setae along ventral margin; distiphallus complex with longest lobe blunt distiphallus (not figured but see Figure 4) complex with four narrow lobes as in *T. albibasis* (Figure 4). Female terminalia: Seventh sternite with wide notch on anterior margin and with row of medium strength setae along the posterior margin, seventh sternite and tergite fused but with distinct suture; spermathecae spherical, ducts not sclerotized; eighth sternite not evident but with distinct lateral lobes bearing several strong setae each; hypoproct with 2 short, strong setae extremely close set appearing nearly as one; epiproct with weak setae only.

TYPE MATERIAL. Melander described *T. punctipennis* from three specimens. The holotype is a male, one paratype is a female and the third specimen is missing. The holotype male is labeled "Pecos N[ew] M[exico]/July 26/ C[oc]k[ere]ll [handwritten]/Type No. 18239 U.S.N.M. [red]/Spilochroa punctipennis Type Mel[ander] [white label with black border]." The holotype is pinned directly, is in good condition (verdigris on pin below specimen), and is deposited in the USNM. Paratype is as follows:

UNITED STATES. *New Mexico*. **San Miguel**: Las Vegas Hot Springs (35°39.2′N, 105°17.5′W), 11, 18 Aug, H. S. Barber (1♀; USNM).

TYPE LOCALITY. United States. New Mexico. San Miguel: Pecos (35°34.5′N, 105°40.5′W).

OTHER SPECIMENS EXAMINED. Neotropical: MEXICO. *Baja California Sur.* El Pescadero, Playa Los Cerritos (23°19.8′N, 110°10.6′W), 14–17 Apr 1979, M. Wasbauer (5♂; 4♀; CSCA, USNM).

DISTRIBUTION (FIGURE 76). Nearctic: United States (New Mexico). Neotropical: Mexico (Baja California Sur).

REMARKS. Specimens of *T. punctipennis* are distinguished from other closely related species (*T. ornata* and *T. albibasis*) by the generally uniformly gray coloration of the thorax and abdomen. We have only a few specimens of this apparently rare species, but several of them show a brown longitudinal band between the dorsocentral setae extended over the scutellum as well. This species seems most closely related to *T. albibasis,* based on slight but consistent differences in the form of the male postgonites. The distiphallus is apparently identical in both species.

Trixoscelis pygochroa Melander

FIGURES 77–82, 90

Trixoscelis pygochroa Melander, 1952: 49. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis].

DIAGNOSIS. Thorax light brown with silvery gray microtomentum, with slightly darker brown vittae along line of acrostichal setae, dorsocentral setae and supra-alar setae; 2 rather regular rows of acrostichal setae; wing infuscated anterior to vein R_{4+5}, along both crossveins, and along vein CuA_1; antenna with scape grayish or yellowish, pedicel yellow, basal flagellomere yellow up to base of arista, remainder dark brown; gena moderately short, gena-to-eye ratio 0.25; abdomen gray microtomentose; male epandrium in undissected specimens bulbous, gray dorsally becoming yellowish.

DESCRIPTION. Body length 2.12–3.28 mm.

Head: Eye round, as high as wide; ocellar triangle light gray microtomentose; frons bare, light brown becoming dark brown laterad of ocellar triangle; parafrons silvery microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 pair, strong, additional 2–3 shorter ocellar setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, additional 2–3 shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput narrow, gray microtomentose with one row of short dorsoclinate setulae in addition to several scattered setae dorsally and ventrally; antenna with scape grayish or yellowish, pedicel

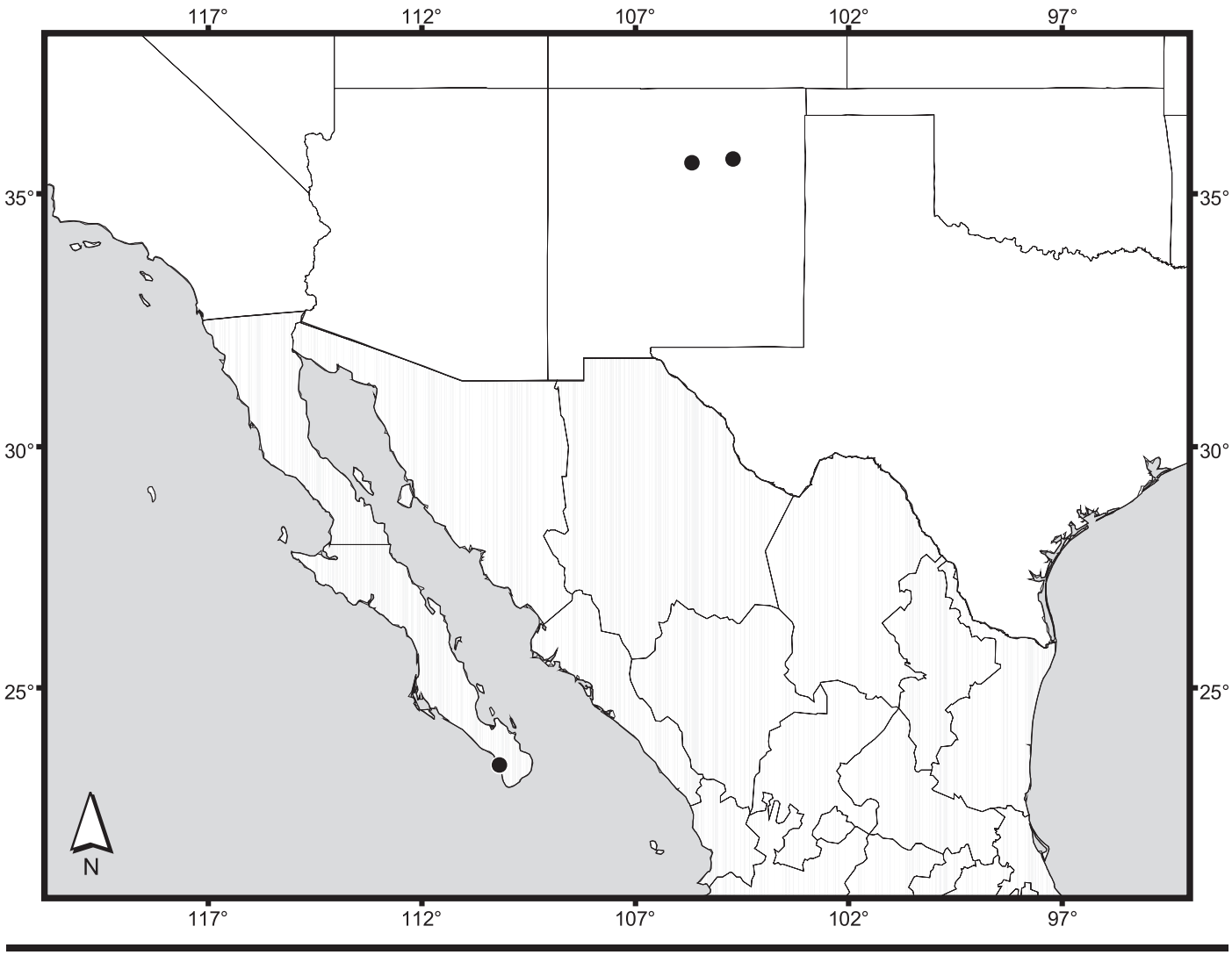
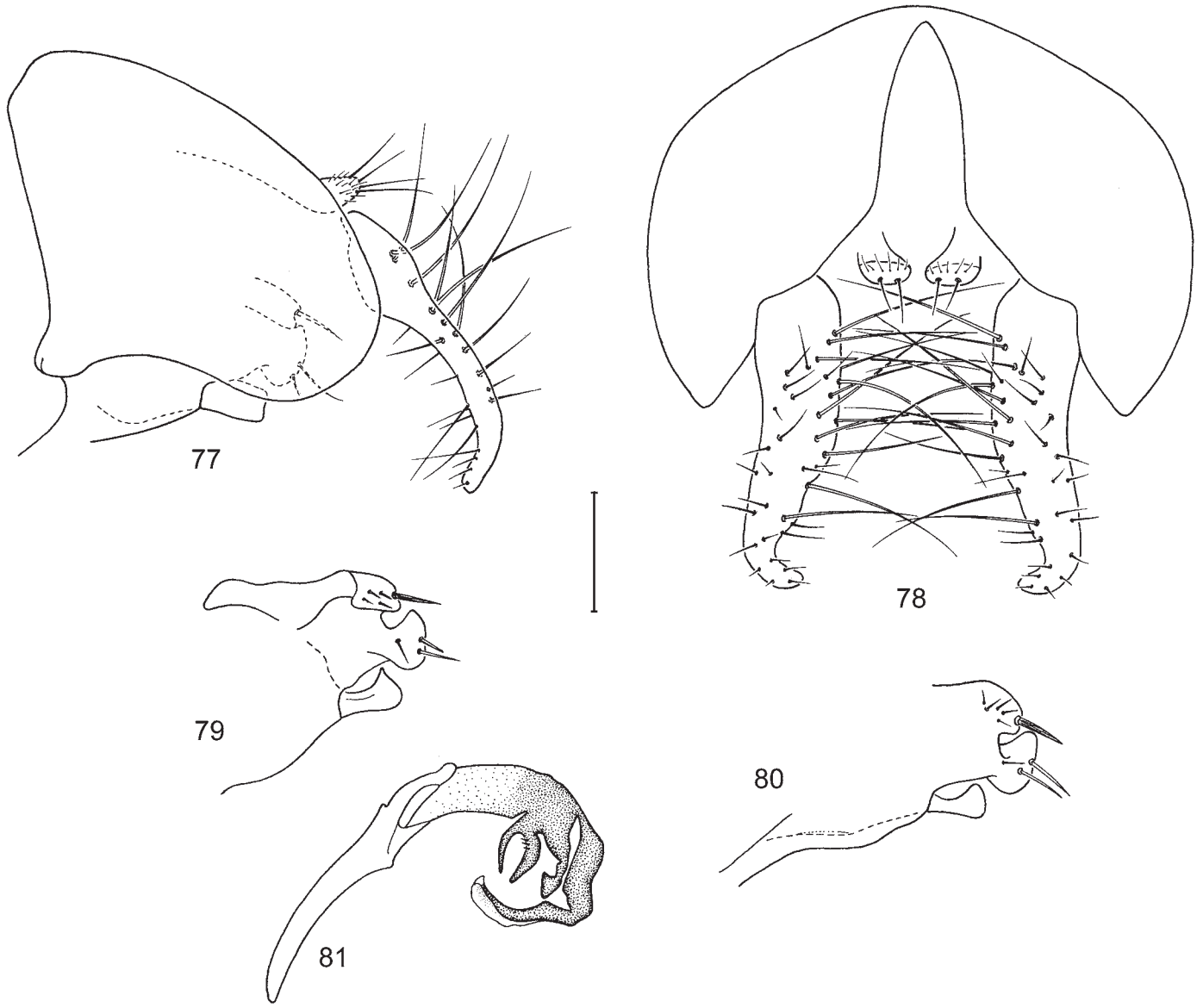


FIGURE 76. Distribution map for *Trixoscelis punctipennis* (Melander).

yellow, basal flagellomere yellow up to base of arista, remainder dark brown, arista dark brown with sparse hairs. Gena moderately short, gena-to-eye ratio 0.25, white microtomentose, a row of weak, small sometimes indistinct setulae along the ventral margin in addition to a pair of stronger convergent oral vibrissae; face white, palpus yellow, clypeus small indistinct, brown.

Thorax: Mesonotum light brown with silvery gray microtomentum, with slightly darker brown vittae along lines of acrostichal setae, dorsocentral setae and supra-alar setae. Dorsocentral setae 5(2+3); acrostichal setae strong in 2 rather neat rows; apical scutellar setae only about twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing (Figure 90) infuscated anterior to vein R_{4+5}, along both crossveins, and along vein CuA_1. Halter white. Legs entirely yellow or fore femur light gray, apical tarsomeres darker, fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly grayish microtomentose, evenly setulose. Male terminalia (Figures 77–81): Epandrium (Figures 77, 78) in undissected specimens slightly enlarged, somewhat bulbous, gray dorsally becoming yellowish ventrally; surstylus (Figures 77, 78) long, narrow, strongly curved anteriorly in lateral view becoming black distally, curved inward in posterior view, endowed with many long, thin setae; pre- and postgonite fused, pregonite remnant a simple lobe with 2 or 3 setae (Figures 79, 80),



FIGURES 77–81. Structures of male terminalia of *Trixoscelis pygochroa* Melander: (77) epandrium, cercus, surstylus, and gonites, lateral aspect; (78) epandrium and surstyli, posterior aspect; (79) gonites, lateral aspect; (80) same, ventroblique aspect; (81) aedeagus, lateral aspect. Scale = 0.1 mm.

postgonite portion a simple lobe with short, strong posteriorly directed seta; basiphallus dark, rectangular, distiphallus black, complex, with 4 strands of sclerotization (Figure 81). Female terminalia: Seventh sternite and tergite strongly fused; spermathecae conical; eighth sternite with rounded strongly sclerotized lobes bearing 3–4 strong setae; hypoproct with 2 short, strong setae in addition to several weak setulae; epiproct with 2 weak setae.

TYPE MATERIAL. Melander based *T. pygochroa* on a male and female specimen from Palm Springs, California, collected on different dates. We herein designate the male as lectotype. Both specimens are damaged. The male is missing the head, and the female is missing both wings. Our redescription is based on characters from both specimens. The lectotype specimen is labeled "PalmSpr[i]ngs CAL[IFORNIA] 24/4/44 A. L. Melander/HOLOTYPE *Trixoscelis pygochroa* Melander [red]/A. L. Melander Collection 1961 [white label with green stippling on right side]/Trixoscelis pygochroa Melander [white; handwritten]/LECTOTYPE ♂ Trixoscelis nitidiventris Melander Foster & Mathis USNM/USNM ENT 00118083 [plastic bar code label]." The lectotype

is double mounted (pinned from ventral side with a minuten mounted in a cardboard square), is in good condition (missing the head; structures of the male terminalia in an attached microvial), and is deposited in the USNM. Paralectotypes are as follows:

UNITED STATES. *California*. **Riverside:** Palm Springs (33°49.8′N, 116°32.7′W), 10 Nov 1944, A. L. Melander (1♀; USNM).

TYPE LOCALITY. United States. California. Riverside: Palm Springs (33°49.8′N, 116°32.7′W).

OTHER SPECIMENS EXAMINED. MEXICO. *Baja California:* El Crucero (25.7 km SE Laguna Chapala; 29°23′N, 114°22′W; 600 m), 13 Apr 1983, M. S. Wasbauer (2♀; CSCA). Rancho San Ignacio (26 km E Rosarito; 32°20.9′N, 117°02.5′W; Malaise trap), 26–27 Mar 1982, J. Slansky, M. S. Wasbauer (2♂, 2♀; CSCA).

Baja California Sur. Arroyo San Gregorio (13 km WNW of La Purísima; 26°13.6′N, 112°21.8′W), 24–24 Apr 1983, M. S. Wasbauer (1♂, 2♀; CSCA). Rancho Tablon, Guillermo Prieto (21 km SW; 27°50′N, 113°19′W; Malaise trap), 3–17 Apr 1982, 1983, M. S. Wasbauer (1♂, 8♀; CSCA).

UNITED STATES. *Arizona*. **Coconino:** Tuba City (36°08.1′N, 111°14.4′W; 1430 m; desert grass, scrub) 22–25 Jul 1979, S. Peck, J. Peck (1♂; DEBU).

California. **Imperial:** Westmoreland (31°01.9′N, 115°37.4′W), 10 Apr 1917, J. M. Aldrich (2♂; USNM). **Inyo:** Trona Golf Club (35°49.7′N, 117°19.8′W), 25–28 Apr 2002, D. Mathis, W. N. Mathis (2♂, 4♀; USNM). **San Diego:** Anza-Borrego Desert State Park, Clark Dry Lake (33°13.7′N, 116°15.7′W), 31 Mar 1977, J. Slansky, M. S. Wasbauer (2♂, 4♀; CSCA); Borrego (N end Clark Lake; 33°20.3′N, 116°16.7′W), 23 Mar 1978, P. Adams, J. Slansky, M. S. Wasbauer (32♂, 29♀; CSCA).

Utah. **Emery:** Wild Horse Creek (2.4 km NW Wild Horse Butte; 38°34.7′N, 110°43.2′W; 1495 m), 26–27 Jul 1982, A. K. Menke, K. Menke (2♂; USNM).

Wyoming. **Uinta:** Lonetree (41°03.3′N, 110°09.3′W; 2320 m; sagebrush, carrion), 1–9 Aug 1979, S. Peck, J. Peck (2♂; DEBU).

DISTRIBUTION (FIGURE 82). Nearctic: Mexico (Baja California, Baja California Sur), United States (Arizona, California, Utah, Wyoming).

REMARKS. Specimens of *T. pygochroa* and *T. deserta* can often be difficult to distinguish from each other, especially where the maculation pattern in the wing is reduced. The body coloration of the two species is virtually identical. Structures of the male terminalia are the only reliable characters to separate these two rather common species.

Trixoscelis suffusa Melander

FIGURES 83–87, 91–92

Trixoscelis suffusa Melander, 1952:50. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis].

DIAGNOSIS. Thorax light brown to yellow microtomentose with indistinct lighter area along lateral edges of mesonotum becoming lighter yellow on ventral portion of anepisternum and katepisternum, 2 irregular rows of sometimes weak acrostichal setae; wing faintly darkened anterior to vein R_{2+3} only; antenna with scape and pedicel yellowish, basal flagellomere yellowish only along ventral margin, dorsal area brown to black; gena moderately short 0.28; abdomen gray, darker than thorax; male epandrium in undissected specimens somewhat enlarged, yellowish ventrally, gray dorsally.

DESCRIPTION. Body length 1.79–2.50 mm.

Head: Eye nearly round; ocellar triangle light gray microtomentose; frons bare, orange becoming brown laterad of ocellar triangle; parafrons silvery microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput quite narrow, very light gray microtomentose with one row of short dorsoclinate setulae in addition to only a few evenly scattered setae dorsally and ventrally; antenna with scape and pedicel yellowish, basal flagellomere yellowish only along ventral margin, dorsal area brown to black, arista dark brown with sparse hairs. Gena moderately short, gena-to-eye ratio 0.28, white microtomentose, a row of setulae along the ventral margin in addition to a pair of stronger convergent oral vibrissae; face white, palpus yellow, clypeus small indistinct, yellow.

Thorax: Thorax light brown to yellow microtomentose with indistinct lighter area along lateral edges of mesonotum becoming lighter yellow on ventral portion of anepisternum and katepisternum. Dorsocentral setae 5(2+3); acrostichal setae weak in 2 irregular rows; apical scutellar setae only about twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing (Figures 91, 92) only faintly darkened anterior to vein R_{2+3}, otherwise clear. Halter white. Legs may be

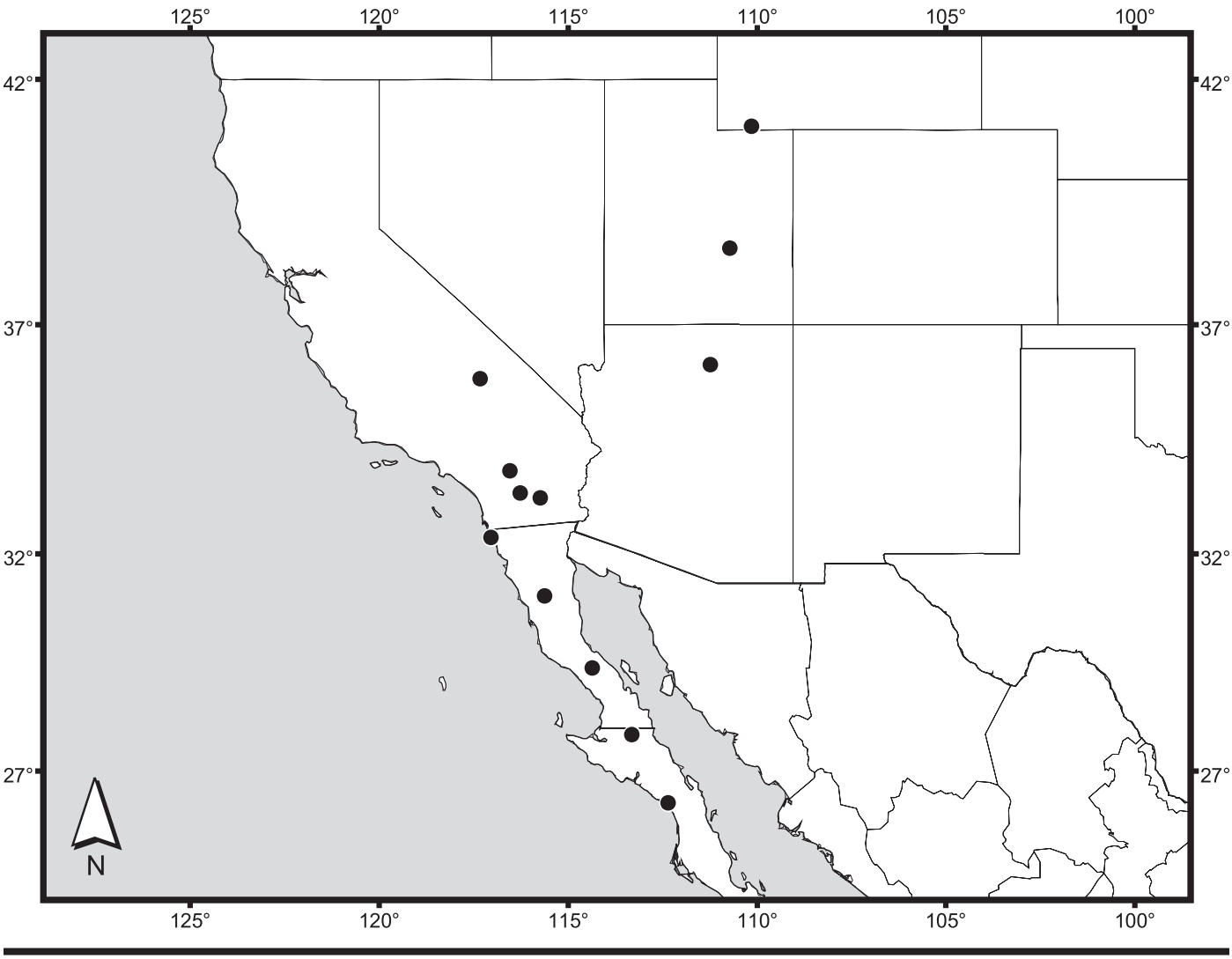
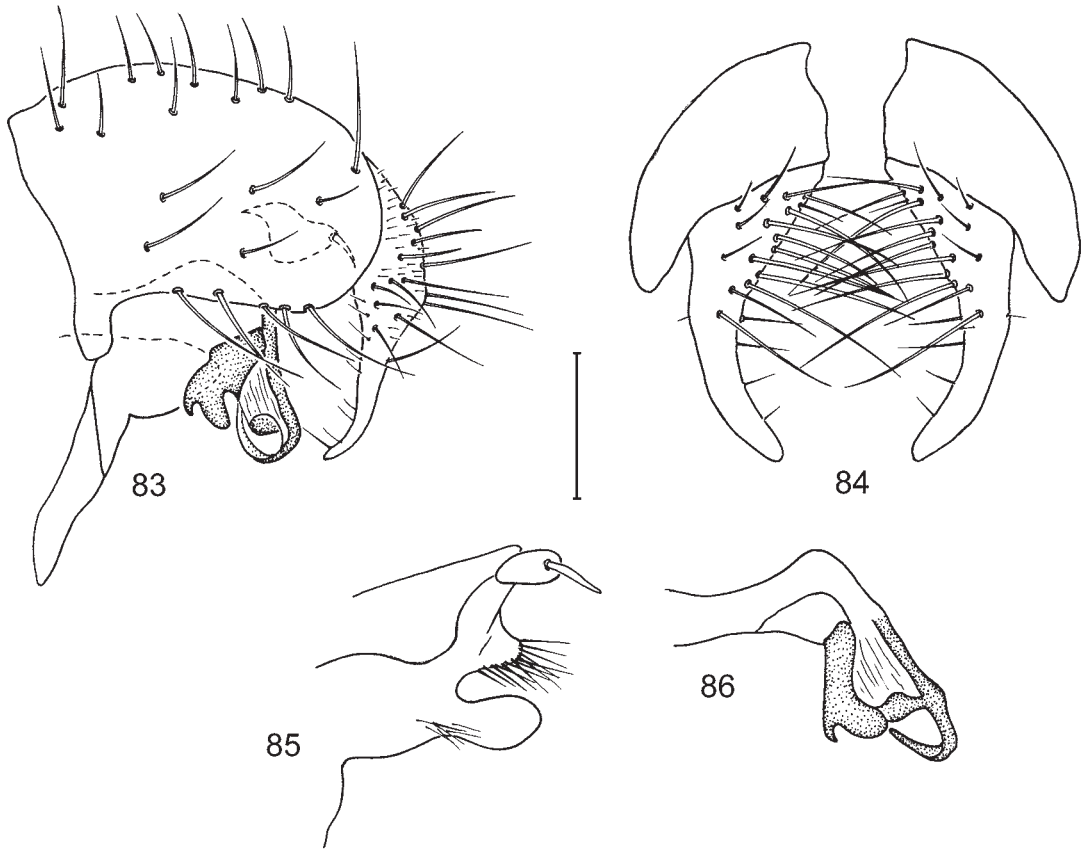


FIGURE 82. Distribution map for *Trixoscelis pygochroa* Melander.

entirely yellow or fore femur may be slightly darker, apical tarsal segments darker, fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly gray microtomentose, evenly setulose. Male terminalia (Figures 83–86): Epandrium in undissected specimens slightly enlarged, somewhat bulbous, gray dorsally becoming yellowish ventrally; surstylus (Figures 83, 84) long, narrow, slightly curved anteriorly in lateral view, curved inward in posterior view, endowed with many long, thin setae; pre- and postgonite fused but distinct, postgonite remnant bearing short, terminal seta, (Figure 85); pregonite portion bilobed, the dorsal lobe with tuft of weak setulae, ventral lobe bare except for tuft of very weak setulae somewhat anteriorly; aedeagus black, complex, with two areas of sclerotization (Figure 86). Female terminalia: seventh sternite and tergite strongly fused; spermathecae spherical; eighth sternite reduced to two distinct setaceous lobes; hypoproct with two distinct setae in addition to several other weaker ones; epiproct with two weak setae.

TYPE MATERIAL. Melander described *T. suffusa* from 28 specimens collected in California and Washington. We have examined all 28, two of which were not published. Melander wrote that the "types" are from Oak Glen, California, with a collection date of 2 July 1945. There is only one such specimen in the series and it is a male. We herein designate this specimen as lectotype. The lectotype specimen is labeled "Oak Glen [34°03′N, 116°56.9′W] CAL[IFORNIA. **San Bernardino:**] 2/7/45 A. L. Melander/HOLOTYPE *Trixoscelis suffusa* Melander [red]/ A. L. Melander Collection 1961 [white label with



FIGURES 83–86. Structures of male terminalia of *Trixoscelis suffusa* Melander: (83) epandrium, surstylus, hypandrium, and distiphallus, lateral aspect; (84) epandrium and surstyli, posterior aspect; (85) gonites, lateral aspect; (86) distiphallus, lateral aspect. Scale = 0.1 mm.

green stippling on right side]/Trixoscelis suffusa Melander [handwritten]/LECTOTYPE ♂ Trixoscelis suffusa Melander Foster & Mathis USNM/USNM ENT 00118082 [plastic bar code label]." The lectotype is double mounted (pinned from ventral side with a minuten mounted in a cardboard square), is in good condition (structures of the male terminalia in an attached microvial; some mesonotal setae rubbed off, some setae of the head disoriented), and deposited in the USNM. Paralectotypes are as follows:

UNITED STATES. *California*. **Riverside:** Mount Home Canyon (33°32.4′N, 116°29′W), 13 May 1947, A. L. Melander (1♀; USNM); **San Bernardino:** Barton Flats (34°10.4′N, 116°51.8′W), 7 Sep 1946, A. L. Melander (1♀; USNM); Crestline (34°14.5′N, 117°17.1′W), 4 Jul 1942, A. L. Melander (1♂, 2♀; USNM); Falls Valley (34°05′N, 116°54.8′W), 10 Jul 1940, A. L. Melander (1♀; USNM); Mountain Home (34°06′N, 117°W), 9 Jul–24 Aug 1944, 1945 (3♂, 3♀; USNM); Scotland (34°14.5′N, 117°29.9′W), 19 Sep 1943, A. L. Melander (5♀; USNM); 7-Oaks, 20 Jun 1945, A. L. Melander (1♂; USNM; labeled as a paratype but not published as such); South Fork Santa Ana River (34°10.3′N, 116°49.8′W), 18 Jun 1945, A. L. Melander (1♀; USNM; labeled as a paratype but not published as such) Victorville (34°32.2′N, 117°17.5′W), 22 May 1945, A. L. Melander (1♂; USNM). **San Diego:** Oak Grove (33°23.1′N, 116°47.4′W), 8 May 1945, A. L. Melander (2♀; USNM). **San Luis Obispo:** Morro Bay (35°20.1′N, 120°51.1′W), 27 Jul 1940, A. L. Melander (1♀; USNM).

Washington. **Chelan:** Entiat (47°40.6′N, 120°12.5′W), 26 Jul 1919, A. L. Melander (1♀; USNM). **Klickitat:** Goldendale (45°49.2′N, 120°49.3′W), 23 Jul 1921, A. L. Melander (3♀; USNM).

TYPE LOCALITY. United States. California. San Bernardino: Oak Glen (34°03′N, 116°56.9′W).

OTHER SPECIMENS EXAMINED. UNITED STATES. *Arizona*. **Mohave:** Littlefield (36°53.1′N, 113°55.8′W), 1 May 2002, D. Mathis, W. N. Mathis (1♀; USNM).

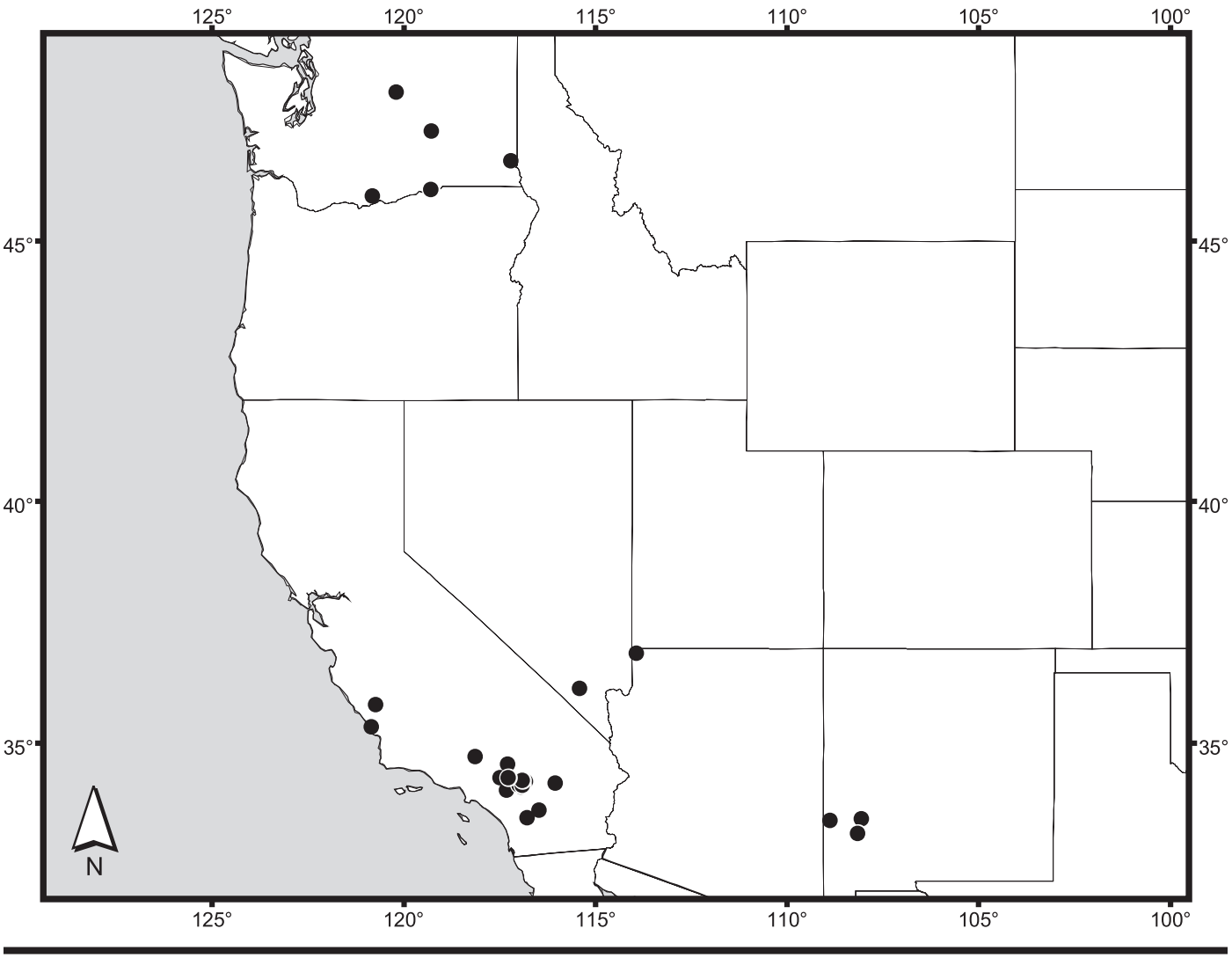


FIGURE 87. Distribution map for *Trixoscelis suffusa* Melander.

California. **Los Angeles:** Lancaster (34°41.9′N, 118°08.2′W), 5 Jul 1956, E. I. Schlinger (1♂; USNM). **Monterey:** Nacimiento (35°48.5′N, 120°44.5′W), 13–14 Aug 1969, B. Hocking (2♀; CNC). **Riverside:** University of California, Riverside (33°58.5′N, 117°19.7′W, Malaise trap); 7–21 Jun 1983, D. Yu (2♂, 5♀; DEBU). **San Bernardino:** Mountain Home (34°06′N, 117°W), 29 Jun 1949, 4 Aug 1953, A. L. Melander (1♂, 2♀; USNM); Twenty-nine Palms (34°08.1′N, 116°03.3′W), 6 Oct 1949, A. L. Melander (1♂; USNM).

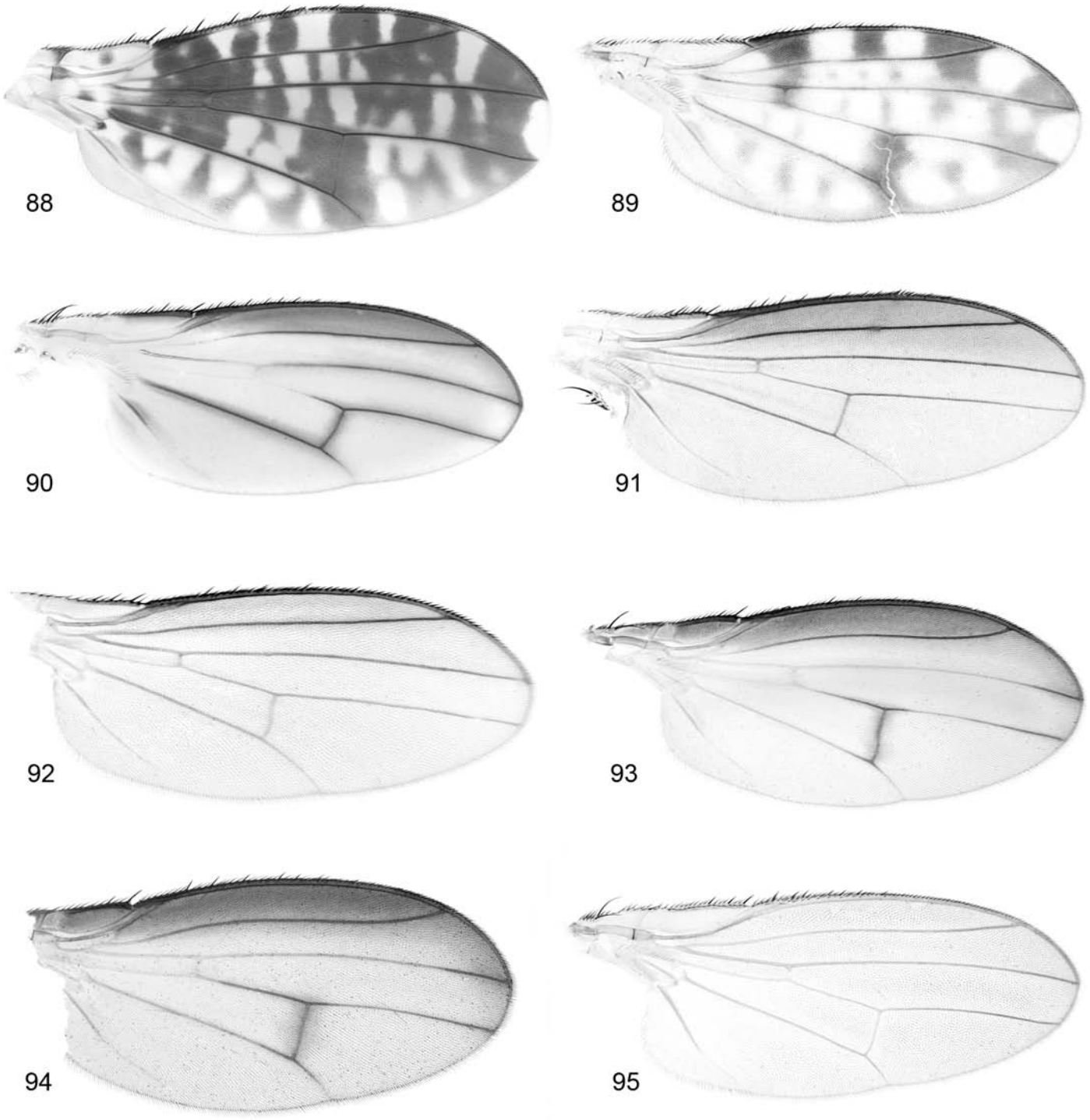
Nevada. **Clark:** Red Rock Canyon (36°08.7′N, 115°25′W), 11 May 2001, D. Mathis and W. N. Mathis (1♂, 1♀; USNM).

New Mexico. **Catron:** Gila National Forest, Whitewater Canyon (33°21.6′N, 108°04′W), 30 May 1991, J. E. Swann (1♂, 1♀; DEBU); Glenwood (33°19′N, 108°53′W), 1 Jun 1972, W. W. Wirth (1♀; USNM). **Grant:** Gila National Forest, Lake Roberts (33°02′N, 108°10′W), 29 May 1991, J. E. Swann (1♂, 1♀; DEBU).

Oregon. **Umatilla:** McNary, McNary Dam Wildlife Area (45°56.4′N, 119°17.9′W), 11 Aug 1993, R. S. Zack (1♂; WSU).

Washington. **Grant:** O'Sullivan Dam (46°59′N, 119°17.5′W), 22 Jul 1954, M. T. James (5♂, 3♀; USNM, WSU). **Whitman:** Colton (16 km SW; Steptoe Canyon; 46°27.1′N, 117°12.4′W), 3 Aug 1974, W. J. Turner (8♂, 3♀; WSU).

DISTRIBUTION (FIGURE 87). Nearctic: United States (Arizona, California, Nevada, New Mexico, Oregon, Washington).



FIGURES 88–95. Photographs of right wings, dorsal aspects: (88) *Trixoscelis polita*; (89) *T. punctipennis*; (90) *T. pygochroa*; (91) *T. suffusa* (dark); (92) *T. suffusa* (light); (93) *T. signifera* (light); (94) *T. signifera* (dark); (95) *T. cinerea*.

REMARKS. This small, somewhat frail appearing species is very similar in appearance to *T. deserta* and *T. pygochroa*. It differs from them not only in structures of the male terminalia but in having the wing only vaguely darkened anterior to vein R_{2+3} and with no darkening on the crossveins. This character varies, however.

Trixoscelis triplex Melander

FIGURES 96–99

Trixoscelis triplex Melander, 1952:50. —Vockeroth, 1965:818 [Nearctic catalog]. —Gill, 1968:7 [catalog, distribution]. —Cole, 1969:434 [distribution, diagnosis].

DIAGNOSIS. Thorax light brown microtomentose with distinct vittae along the line of the dorsocentral and acrostichal setae and a lighter one extended from the anterior edge of the mesonotum to the anterior intra-alar seta, 2 rather straight rows of acrostichal setae; wing hyaline; antenna with scape and pedicel yellowish, basal flagellomere varies from light brown to black except area around base of arista yellow; gena moderately short, gena-to-eye ratio 0.20–0.25; abdomen gray, darker than thorax; male epandrium in undissected specimens slightly enlarged, concolorous with abdomen.

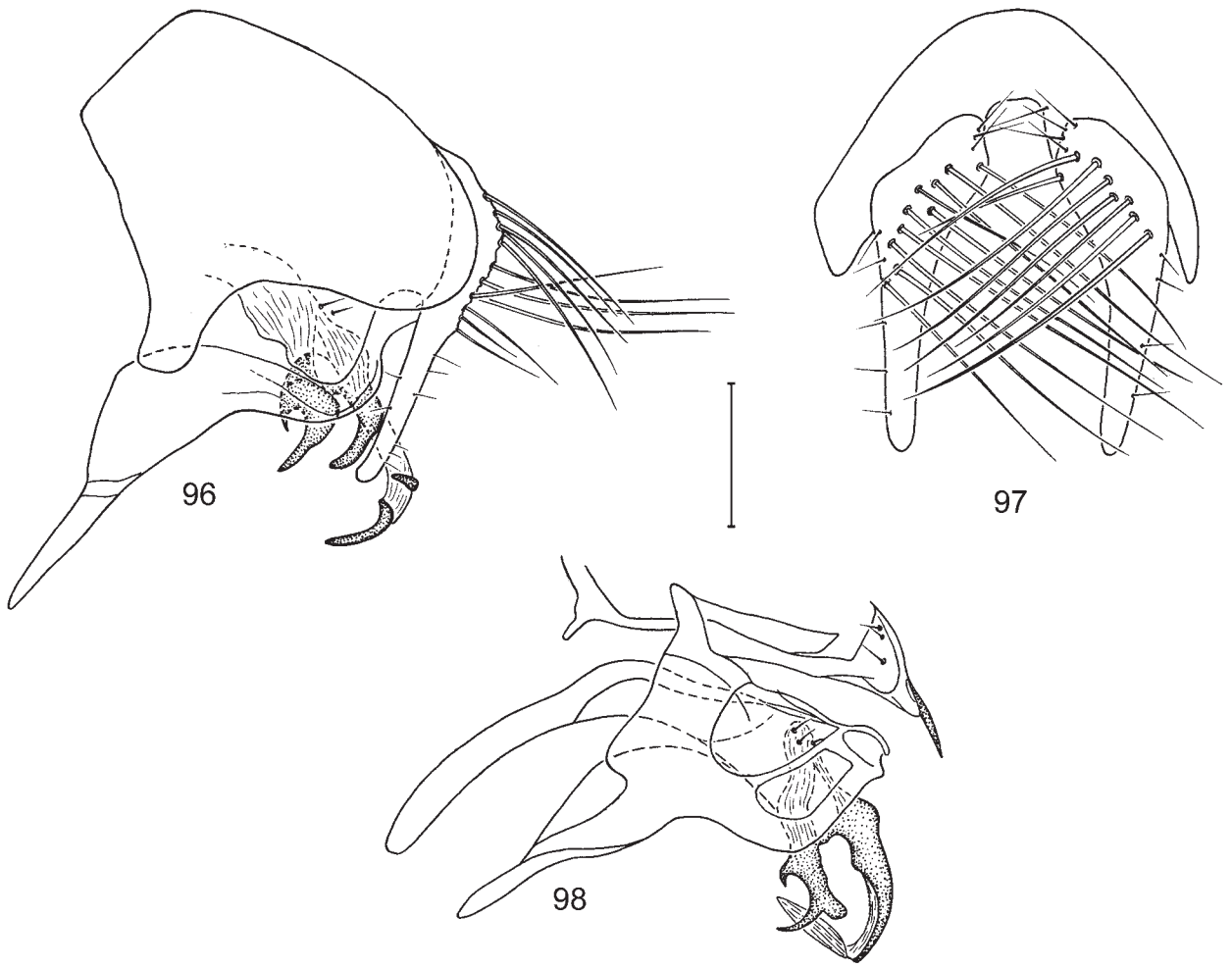
DESCRIPTION. Body length 1.72–2.93 mm.

Head: Eye nearly round; ocellar triangle light gray microtomentose; frons bare, yellow becoming brown laterad of ocellar triangle; parafrons silvery microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput quite narrow, very light gray microtomentose with one row of short dorsoclinate setulae in addition to only a few scattered setae dorsally and ventrally; antenna with scape and pedicel yellow; in females, basal flagellomere mostly black, yellow only around base of arista, in males, basal flagellomere mostly yellow area around base of arista black, arista dark brown with sparse hairs. Gena moderately short, gena-to-eye ratio 0.20–0.25, white microtomentose, a row of setulae along the ventral margin in addition to a pair of stronger convergent oral vibrissae; face white, palpus yellow, clypeus small indistinct, light brown.

Thorax: Thorax light brown microtomentose with distinct vittae along the line of the dorsocentral and acrostichal setae and a lighter one extended from the anterior edge of the mesonotum to the anterior intra-alar seta, abdomen gray, darker than thorax. Dorsocentral setae 5(2+3), 2 rather straight rows of acrostichal setae; apical scutellar setae only about twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing hyaline. Halter white. Legs entirely yellow except fore femur and fore tarsus light gray, apical tarsomeres on remaining legs darker, fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly grayish to brownish microtomentose, evenly setulose. Male terminalia (Figures 96–98): Epandrium in undissected specimens slightly enlarged, may be concolorous with remainder of abdomen or somewhat yellowish; surstylus (Figures 96, 97) darkened distally, long, narrow, pointed, with row of 6–8 long, strong, posteroventrally directed setae along dorsal margin; pre- and postgonite largely separated, pregonite complex (Figure 98); postgonite with short, strong seta directed posteriorly; aedeagus black, complex (Figure 98). Female terminalia: Seventh sternite and tergite strongly fused; spermathecae spherical; eighth sternite darkly sclerotized, hemispherical with two distinct setaceous lobes each bearing 3–4 strong setae; hypoproct with two short, strong setae; epiproct with two weak setae.

TYPE MATERIAL. Melander described *T. triplex* from 14 specimens collected in California and Mexico. We have seen all original specimens. Melander stated that the "types" are from Organ Pipe Cactus National Monument in Arizona and were collected on 18 April 1947. Because there are two such specimens both on the same pin and they are a male and a female we herein designate the male specimen as lectotype. The lectotype is labeled "Organpipe Mon[ument] ARIZ[ONA] 18/4/47 A. L. Melander/HOLOTYPE *Trixoscelis triplex* Melander [red]/ALLOTYPE *Trixoscelis triplex* Melander [red]/A. L. Melander Collection 1961 [white label with green stippling on right side]/Trixoscelis triplex Melander [handwritten]/LECTOTYPE ♂ *Trixoscelis triplex* Melander Foster & Mathis USNM [red]/USNM ENT 00118081 [plastic bar code label]." The lectotype is the top specimen of two and both are double mounted (pinned from ventral side with a minuten mounted in a cardboard square), is in excellent condition (structures of the male terminalia in an attached microvial), and are deposited in the USNM. Other paralectotypes are as follows:



FIGURES 96–98. Structures of male terminalia of *Trixoscelis triplex* Melander (locality unknown): (96) epandrium, surstylus, hypandrium, and gonites, lateral aspect; (97) epandrium and surstyli, posterior aspect; (98) pregonite, postgonite, hypandrium, aedeagus, and aedeagal apodeme, lateral aspect. Scale = 0.1 mm.

MEXICO. *Sonora:* Sonoyta (31°51.8′N, 112°51.4′W), 21 Apr 1947, A. L. Melander (1♀; USNM).

UNITED STATES. *Arizona*. **Mohave:** Ligurta (Golden Valley; 35°21.9′N, 114°14.8′W), 9 Apr 1947, A. L. Melander (1♀; USNM). **Pima:** Sabino Canyon (31°52′N, 111°27.4′W), 5 May 1942 (*Melander, in error, wrote that this specimen is dated 5 June 1942*), A. L. Melander (1♀; USNM); Organ Pipe National Monument (32°02.5′N, 112°52.5′W), 15 Apr 1947, A. L. Melander (1♂; USNM).

California. **Imperial:** Gordon's Well (33°08.9′N, 115°19.5′W), 8 Apr 1947, A. L. Melander (1♀; USNM). **Riverside:** Palm Springs (33°49.8′N, 116°32.7′W), 23–24 Apr 1944, A. L. Melander (1♂, 1♀; USNM). There was another male of this series but we have determined that it is actually *T. nevadensis* new species). **San Diego:** Borrego, Palm Canyon (33°13.2′N, 116°20.1′W), 2–4 May 1945, A. L. Melander (2♂, 2♀; USNM).

Type Locality. United States. Arizona. Pima: Organ Pipe National Monument (32°02.5′N, 112°52.5′W).

Other Specimens Examined. UNITED STATES. *Arizona*. **Cochise:** Portal, Southwestern Research Station (8 km SW of Portal; 31°52.9′N, 109°12.2′W; 1631 m), 14 May 1976, G. A. Foster (1♂; USNM). **Pima:** Organpipe Cactus National Monument (32°02.5′N, 112°52.5′W), 21 Apr 1979, K. N. Barber (1♂; DEBU).

California. **Imperial:** Glamis (32°59.9′N, 115°04.3′W), 17 Apr 1969, R. R. Pinger (5♂, 3♀; USNM); Ogilby Road, Chocolate Mountains (5 km S junction with highway 78; 33°28′N, 115°35′W; Malaise trap), 20–22 Mar

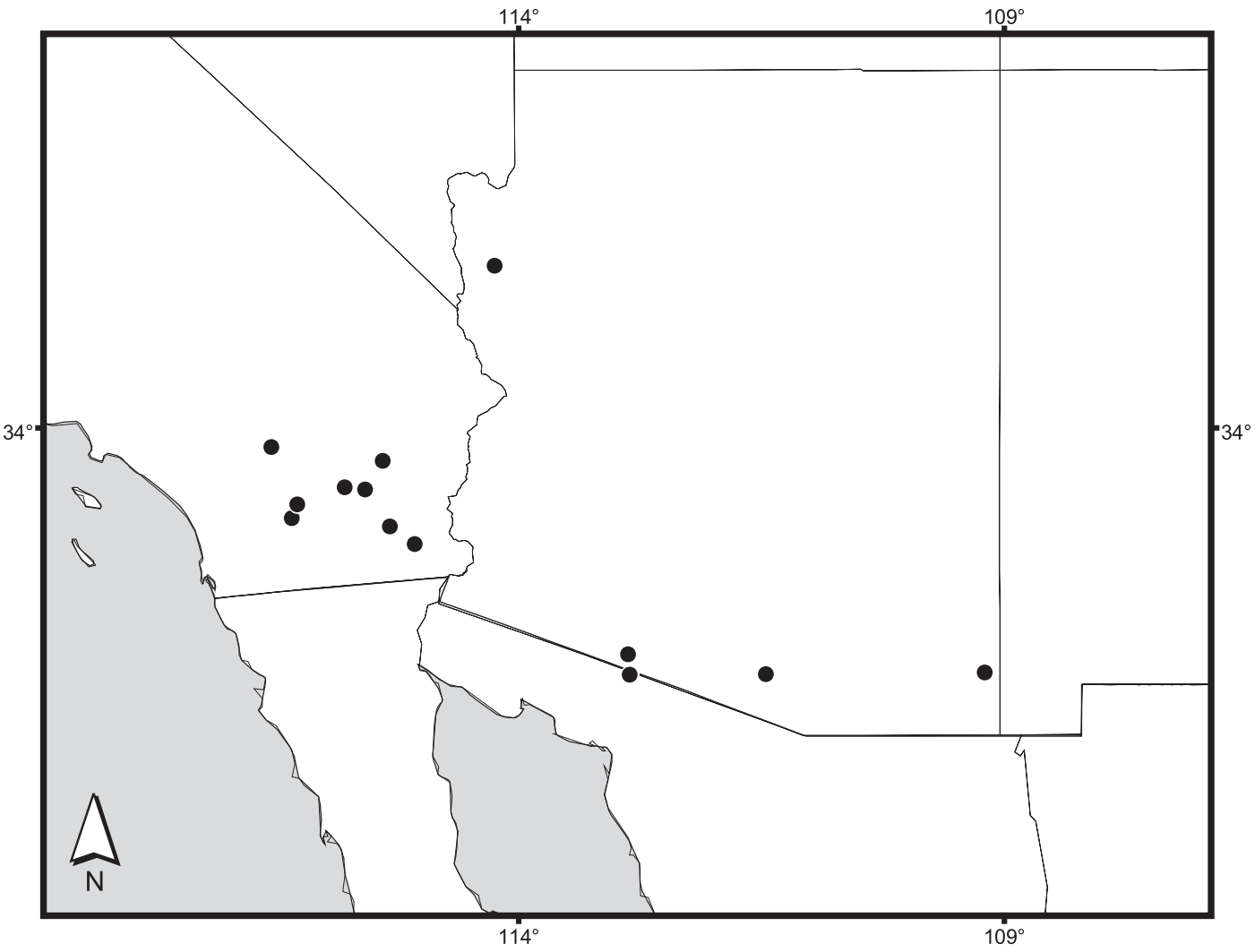


FIGURE 99. Distribution map for *Trixoscelis triplex* Melander.

1978, P. Adams, J. Slansky, M. S. Wasbauer (1♂; CSCA). **Riverside:** Desert Center (33°42.8′N, 115°24.1′W), 2 May 1955, W. R. M. Mason (5♂, 11♀; CNC); Hunter's Spring (33°29.3′N, 115°47.5′W), 10 May 1952 (1♀; USNM). **San Diego:** Borrego (N end Clark Lake; 33°20.3′N, 116°16.7′W; Malaise Trap), 23 Mar 1978, P. Adams, J. Slansky, M. S. Wasbauer (3♂, 5♀; CSCA).

Distribution (Figure 99). Nearctic: Mexico (Sonora), United States (Arizona, California).

Remarks. This species has distinctive brown vittae on the mesonotum along the dorsocentral and acrostichal tracks and the anterior portion of the intra-alar seta. They are more distinct than the vittae found in other *Trixoscelis* species. Structures of the male terminalia are unusual in having a series of comparatively long, robust setae along the dorsal margin of the surstylus. These setae cannot usually be seen in undissected specimens, which typically have these structures curled inside the abdomen.

Trixoscelis tumida Melander

FIGURES 100–104, 116–117

Trixoscelis tumida Melander, 1952:51. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis].

Diagnosis. Mesonotum light brown microtomentose becoming somewhat orange laterally, entirely without brown vittae, dorsocentral setae with dark area around base, 4 irregular rows of acrostichal setae; wing

hyaline; antenna with scape and pedicel yellowish, basal flagellomere mostly brown to black except around base of arista; gena moderately high, gena-to-eye ratio 0.33; abdomen gray, darker than thorax; male epandrium in undissected specimens not enlarged, brownish to somewhat orange in contrast to the uniformly gray abdomen.

DESCRIPTION. Body length 2.19–3.22 mm.

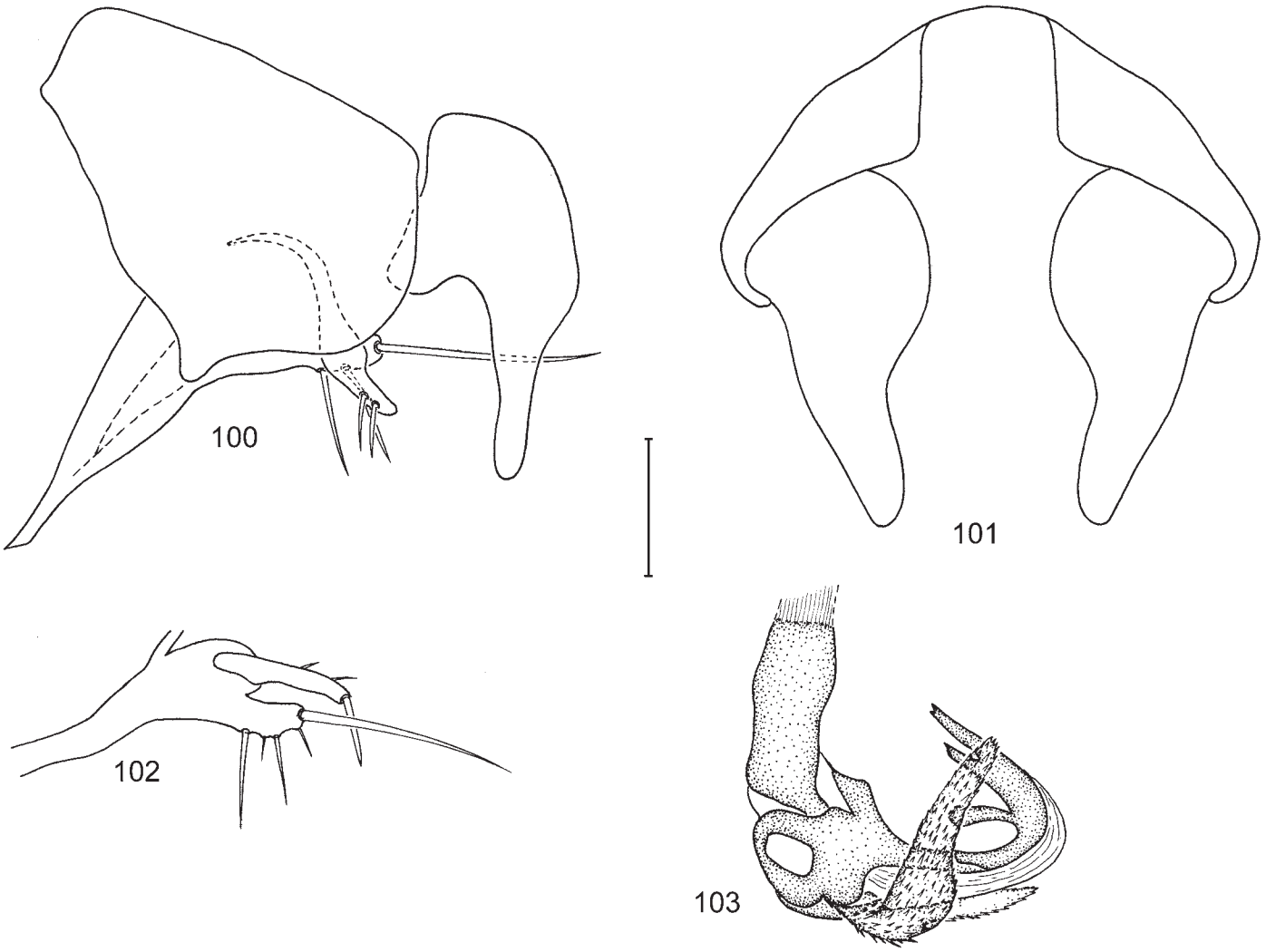
Head (Figures 116, 117): Eye nearly round; ocellar triangle light gray microtomentose; frons bare, yellow becoming slightly darker laterad of ocellar triangle; parafrons silvery microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput wide, gray microtomentose with one row of short dorsoclinate setulae in addition to only a few scattered setae dorsally and ventrally, occiput extends into gena under eye; antenna with scape and pedicel yellowish, basal flagellomere mostly brown to black except around base of arista, arista dark brown with sparse hairs. Gena moderately high, gena-to-eye ratio 0.33, white microtomentose, a row of setulae along the ventral margin in addition to a pair of stronger convergent oral vibrissae; face white, palpus yellow, clypeus small indistinct, light brown.

Thorax: Mesonotum light brown microtomentose becoming somewhat orange laterally, entirely without brown vittae, dorsocentral setae with dark area around base; abdomen gray, darker than thorax, abdomen gray, darker than thorax. Dorsocentral setae 5(2+3), 4 scattered rows of acrostichal setae; apical scutellar setae only about twice length of scutellum. Proepimeron with 1 seta. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing hyaline. Halter white. Legs yellow except fore femur and fore and hind tarsi light brown, the basitarsus tending to be the darkest, male hind basitarsus distinctly swollen, fore basitarsus slightly so, fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly gray microtomentose, evenly setulose. Male terminalia (Figures 100–103): Epandrium in undissected specimens not enlarged, brownish to somewhat orange in contrast to uniformly gray abdomen; surstylus (Figures 100, 101) entirely devoid of setae, rather robust, rectangular at base becoming spatulate distally, spatulate area darker then rest of surstylus, pre- and postgonite fused but distinct, pregonite (Figure 102) narrow, endowed with long, strong seta directed posteriorly, postgonite reduced to narrow lobe with three or four short setae at tip; aedeagus black, complex (Figure 103). Female terminalia: seventh sternite and tergite strongly fused; spermathecae rather bulbous; eighth sternite with two distinct setaceous lobes; hypoproct with two short strong setae; epiproct with two weak setae.

TYPE MATERIAL. Melander described *T. tumida* from 29 specimens collected in California, Washington, and Oregon. Melander designated the two specimens from Washington, a male and female, as "types." Of the 12 male and 15 female "paratypes" he reported, only seven males and 13 females are in the USNM collection. We have found that three specimens (2♀ from Palm Springs and 1♂ from Corona del Mar) are clearly not conspecific with others of the type series. The Corona del Mar specimen is *T. lagunaensis* new species, the ♀ specimens are of uncertain identity. Therefore the existing actual paralectotype series of *T. tumida* consists of 17 specimens (plus the female "type" now becomes an additional paralectotype bringing the new total to 18 paralectotypes). Melander wrote that the "types" are from Lucerne [48°12.1′N, 120°35.5′W; 338 m], on Lake Chelan, Washington, and were collected on 29 July 1919. We are designating the male as lectotype. The lectotype male is labeled "LakeChelan Lucerne W[ASHINGTO]N 29 July [19]19/ A. L. Melander"/HOLOTYPE *Trixoscelis tumida* Melander [red]/ A. L. Melander Collection 1961 [white label with green stippling on right side]/ LECTOTYPE ♂ Trixoscelis tumida Melander Foster & Mathis USNM [red]/USNM ENT 00118080 [plastic bar code label]." The specimen is double mounted (pinned from ventral side with a minuten mounted in a cardboard square), is in excellent condition, and is deposited in the USNM. Paralectotypes are as follows:

UNITED STATES. *California*. **Amador:** Silver Lake (38°31.3′N, 120°19.4′W), 1 Aug 1935, H. H. Kiefer (1♀; CSCA); **Los Angeles:** Big Pines (34°22.7′N, 117°41.4′W), 2–9 Aug 1944, A. L. Melander (2♀; USNM); Mojave Desert, Lovejoy Springs (34°36.3′N, 117°49.8′W), 10 Sep 1944, A. L. Melander (1♂; USNM). **San Bernardino:** Barton Flats (34°10.4′N, 116°51.8′W, 31 Aug–4 Sep 1944, A. L. Melander (3♂, 3♀; USNM); Crestline (34°14.5′N, 117°17.1′W), 4 Jul 1942, A. L. Melander (2♀; USNM); Jenks Lake (34°09.9′N, 116°52.9′W), 20 Jun 1944, A. L. Melander (1♀; USNM); **San Diego:** Green Valley (32°54.4′N, 116°34.9′W), 26 Jul 1944, A. L. Melander (1♂, 3♀; USNM).



FIGURES 100–103. Structures of male terminalia of *Trixoscelis tumida* Melander (locality unknown): (100) epandrium, surstylus, hypandrium, and gonites, lateral aspect; (101) epandrium and surstyli, posterior aspect; (102) gonites, lateral aspect; (103) aedeagus, lateral aspect. Scale = 0.1 mm.

Oregon. **Hood River:** Mount Hood (45°22.4′N, 121°41.7′W; 915 m), 29 Jul 1921, A. L. Melander (1♂; USNM).

Washington. **Chelan:** Lake Chelan, Lucerne (48°12.1′N, 120°35.5′W; 338 m), 29 Jul 1919, A. L. Melander (1♀; USNM).

TYPE LOCALITY. United States. Washington. Chelan: Lake Chelan, Lucerne (48°12.1′N, 120°35.5′W; 338 m).

OTHER SPECIMENS EXAMINED. UNITED STATES. *California.* **Alpine:** Carson Pass (38°41.6′N, 119°59′W), 28 Jul 1930, H. H. Keifer (1♂; CSCA); Monitor Pass (1.6 km S; 38°40.5′N, 119°37.2′W; 2630 m), 22–23 Aug 1979, P. Adams, M. S. Wasbauer (1♂; CSCA). **Contra Costa:** Mitchell Canyon, north base of Mount Diablo (37°52.9′N, 121°54.8′W; 300–500 m), 26 Aug 1994, M. E. Erwin (2♂, 5♀; CSCA). **Modoc:** Cedar Pass, Warner Mountains (41°33.8′N, 120°16.1′W; 1825 m), 8 Aug 1965 (9♀; USNM). **Nevada:** Truckee (39°19.7′N, 120°11′W), 16 Jul 1916, H. G. Dyar (11♂, 27♀; USNM). **San Bernardino:** Falls Valley (34°05′N, 116°54.8′W), 10 Jul 1940, A. L. Melander (1♂;USNM); Lost Creek (34°10.1′N, 116°49.5′W), 4 Jul 1958, A. L. Melander (1♂; USNM); South Fork Santa Ana River (34°10.3′N, 116°49.8′W), 18 Jun–2 Aug 1942, 1945, 1947, A. L. Melander (3♂, 3♀; USNM); Sugar Loaf (34°143.6′N, 116°49.7′W), 21

Sep 1954, J. C. Hall (1♂; USNM); Upper Santa Ana River (35°03.5′N, 119°21.8′W), 25–30 Jun 1949, 1956, A. L. Melander (2♂; USNM). **Toulumne:** Pinecrest (38°11.3′N, 119°59.5′W), 15 Aug 1948, P. H. Arnaud, Jr. (3♂, 1♀; USNM); Belle Meadows (38°10′N, 119°56.5′W), 18 Aug 1948, P. H. Arnaud, Jr. (1♂; USNM). **Siskyou:** Mount Shasta, McBride Springs Campground (41°21.2′N, 122°17.1′W; 1585 m), 20–22 Jul 1965, 1968, D. D. Munroe (6♂, 3♀; CNC).

Nevada. **Douglas:** near junction US 395 & 50 to Lake Tahoe (39°07.2′N, 119°46.3′W), 15 Jun 1957, R. W. Coleman (1♂; WSU). **Lyon:** Wellington (7 km NW; 38°45.5′N, 119°22.6′W), 28 May 1974, M. S. Wasbauer, J. Slansky (1♂, 1♀; CSCA). **Ormsby:** Clear Creek Campground (39°06.9′N, 119°53.4′W; 1980 m), 27 Jul 1968, D. D. Munroe (1♂; CNC).

Oregon. **Baker:** Cougar Creek (60 km SE Union; 44°56.9′N, 117°24.9′W; 1243 m), E. J. Davis (1♂; WSU); Lower Goose Creek (58 km SE Union; 44°49.1′N, 117°27.6′W; 1220 m), 24–31 Aug 1975, E. J. Davis (6♂, 3♀; WSU); Lower Goose Creek (36 km SE Union; 44°48′N, 117°26′W; 1350 m), 13–19 Aug 1975, E. J. Davis (4♂, 2♀; WSU); Velvet Creek (45 km SE Union; 45°01.9′N, 117°30.1′W; 1438 m), 17–23 Aug 1975 (1♂; WSU). **Union:** Lower Lick Creek (42 km SE Union; 45°07′N, 117°37′W; 1305 m), 24–31 Aug 1975, E. J. Davis (6♂; WSU).

Washington. **Asotin:** Anatone (6.5 km S near Fields Spring State Park; 46°08.1′N, 117°07.9′W; 1100 m), 12 Aug 1980, W. J. Turner (1♂; WSU). **Chelan:** Malaga, Colockum Research Unit (47°22.3′N, 120°12.1′W), 11–25 Jun 1970 (1♂, 1♀; WSU). **Okanogan:** Conconully, Salmon Meadows (48°32.8′N, 119°44.9′W; 1372 m), 5–7 Aug 1975, W. J. Turner (2♂, 1♀; WSU); Twisp (6.5 km E; Rt. 20; 48°29.8′N, 120°07.3′W; Malaise trap CO2), 19 Jul 1972, W. J. Turner, W. B. Garnett (1♂; WSU). **Yakima:** Tieton Ranger Station (5 km SW; 46°40.6′N, 121°04.6′W; Milk Creek), 16 Jul 1972, W. J. Turner, W. B. Garnett (2♂, 1♀; WSU).

Distribution (Figure 104). Nearctic: United States (California, Nevada, Oregon, Washington).

Remarks. The distinctive and swollen hind basitarsus of males makes this species easy to identify. The fore basitarsus, although only slightly swollen, is still noticeable.

The *T. claripennis* Species Group

Diagnosis. The species of the *claripennis* species group are distinguished from those of the other species groups by the following combination of characters: Head: Gena very short to short, gena-to-eye ratio 0.12–0.22, only in one species (*T. flavens*) up to 0.37. Thorax: Wing hyaline, maculate in only one species (*T. signifera*). Abdomen: Male terminalia: Epandrium small and indistinct in relation to remainder of abdomen in undissected specimens. Aedeagus sclerotized in bands and complex; pre- and postgonite fused into one lobe generally armed with short setae or setulae along ventral margin.

Remarks. The monophyly of this species group is improbable but not beyond question, based on the hypothetical phylogenies we have generated. The reduced and fused pre and postgonite complex and distinctive distiphallus can be observed in many Palearctic species as well. Two species, *T. plebs* and *T. nitidiventris,* show a distinctive and unique cluster of spicules on the medial distiphallus. This character is shared with several Palearctic species based on illustrations in the Palearctic literature.

Trixoscelis barberi Foster and Mathis, new species

FIGURES 13, 105

Diagnosis. Body gray; thorax with two brown vittae between dorsocentral setae and along postprotonal and notopleural line, 4 rows of acrostichal setae; wing hyaline, not smoky and without infuscations; antenna mostly yellow, slightly brownish tint in center of basal flagellomere; vertex yellowish to light gray microtomentose; gena short, gena-to-eye ratio only 0.17; epandrium small and indistinct in relation to remainder of abdomen in undissected specimens.

Description. Body length 1.78–2.31 mm.

Head: Eye higher than wide; ocellar triangle light gray microtomentose; frons bare, yellow becoming darker dorsally, parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput gray microtomentose with 1–2 rows of short dorsoclinate setulae; antenna mostly yellow except brown on dorsal half of basal flagellomere; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.17, white microtomentose, bearing 1 row of 2–3 short ventroclinate setae along ventral edge in addition to a pair of stronger convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum uniformly gray microtomentose with 2 brown vittae between dorsocentral setae and

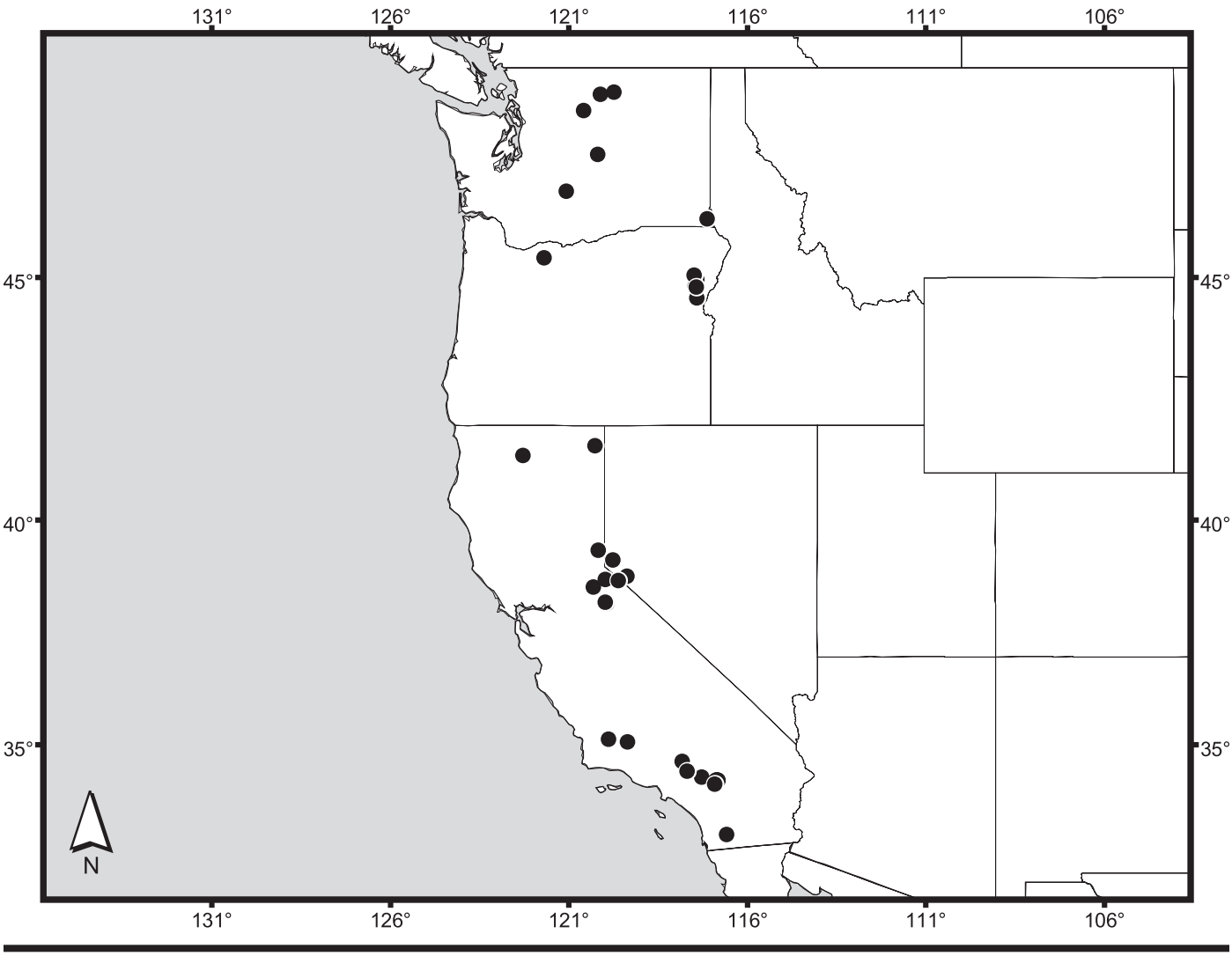


FIGURE 104. Distribution map for *Trixoscelis tumida* Melander.

along postprotonal and notopleural line, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 somewhat irregular rows; apical scutellar setae about twice length of scutellum. Anepisternum with brownish coloration along dorsal half or so, mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing hyaline with brown veins. Halter white. Coxae yellow; fore femur dark brown to black, slightly swollen; all other femora, tibiae and tarsi yellow except fifth tarsomere darker, male hind basitarsus slightly swollen; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly dark gray microtomentose except extreme posterior edges of sternites lighter; evenly setose. Male terminalia (Figure 105): Epandrium small and indistinct in relation to remainder of abdomen in undissected specimens; surstylus (Figure 105) long, robust, with anterior curvature, strongly setulose, long triangular in posterior view; pre- and postgonites fused into one structure, simple spatulate with a row of short but strong setae along ventral margin (Figure 105); aedeagus complex sclerotized.

Type Material. The holotype male is labeled "PalmSprings CAL[IFORNIA] 24/4/44 ALMelander/ PARATYPE Trixoscelis sagulata Melander [yellow]/ ALMelander Collection 1961 [green stippling on right side]/HOLOTYPE ♂ *Trixoscelis barberi* Foster & Mathis

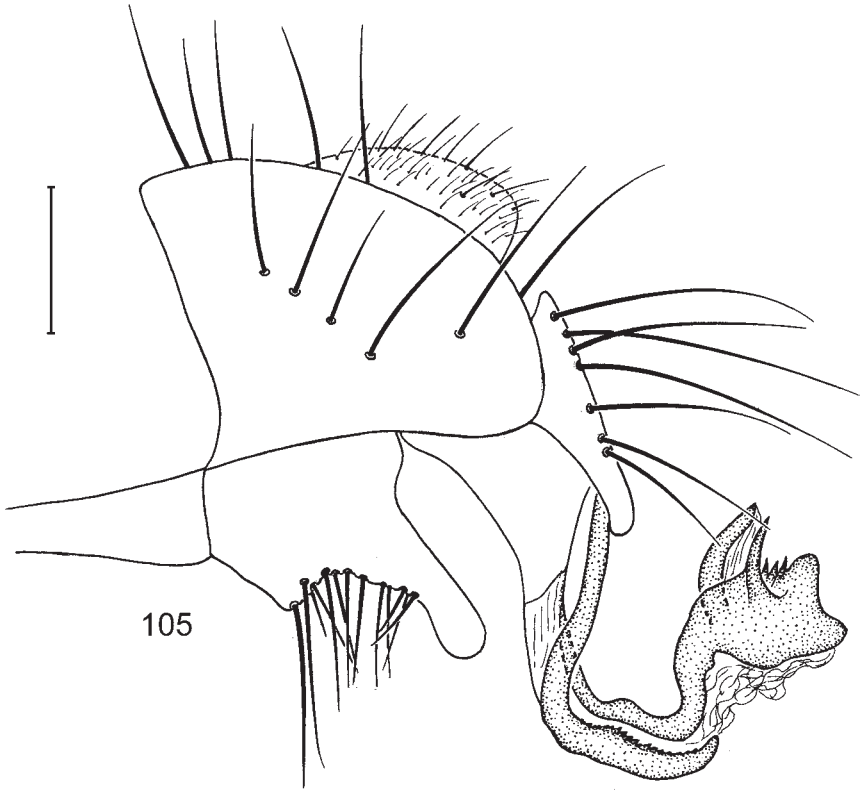


FIGURE105. Structures of male terminalia of *Trixoscelis barberi* Foster and Mathis (California. Orange: Corona del Mar): epandrium, surstylus, gonites, distiphallus, lateral aspect. Scale = 0.1 mm.

USNM [red]/USNM ENT 00118096 [plastic bar code label]." The holotype is double mounted (pinned from ventral side with a minuten mounted in a cardboard square), is in excellent condition (abdomen removed and dissected; structures in an attached microvial), and is deposited in the USNM. Paratypes are as follows:

UNITED STATES. *California*. **Orange:** Corona del Mar (33°35.9′N, 117°52.4′W), 28 Dec 1944, A. L. Melander (1♂; USNM This specimen was among the syntypes, now a paralectotype, series for *T. sagulata*.). **San Bernardino:** Phelan (11.2 km E; Baldy Mesa Road; 34°26′N, 117°27′W; pan traps), 15–31 May 1982, J. T. Huber (2♂, 1♀; DEBU).

TYPE LOCALITY. United States. California. Riverside: Palm Springs (33°49.8′N, 116°32.7′W).

DISTRIBUTION (FIGURE 13). Nearctic: United States (California).

ETYMOLOGY. The species epithet, *barberi*, is a Latin genitive patronym to honor and recognize Kevin N. Barber for his numerous contributions to the systematics of acalyptrate Diptera and for his valuable insights on collecting specimens of *Trixoscelis*.

REMARKS. This species is very closely allied with *T. claripennis* but shows distinct differences in structures of the male terminalia, particularly the surstyli, gonites, and aedeagus.

Trixoscelis claripennis (Malloch)

FIGURES 106–110

Parodinia claripennis Malloch, 1913:276.

Trixoscelis claripennis (Malloch). —Vockeroth, 1965:817 [Nearctic catalog]. —Melander, 1913a:169 [synonymy with *frontalis*]. —Melander, 1952:44 [discussion, reversal of synonymy with *frontalis*]. —Vockeroth, 1965:817 [Nearctic catalog]. —Cole, 1969:433 [distribution, diagnosis].

Trixoscelis sagulata Melander, 1952:49. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis]. **NEW SYNONYM**

DIAGNOSIS. Body gray; thorax microtomentose, with two very faint brown vittae between dorsocentral and supra-alar setae, 4 rows of acrostichal setae; wing hyaline, not smoky and without infuscations; antenna mostly yellow, slightly brownish tint in center or dorsum of basal flagellomere; vertex yellowish to light gray microtomentose; gena short, gena-to-eye ratio only 0.15–0.22; male epandrium in undissected specimens dark, shiny.

DESCRIPTION. Body length 1.65–2.75 mm.

Head: Eye higher than wide; ocellar triangle light gray microtomentose; frons bare, yellow becoming darker dorsally, parafrons whitish-silver microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput gray microtomentose with 1–2 rows of short dorsoclinate setulae; antenna mostly yellow with only a slight brownish tint in center or dorsum of basal flagellomere; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.15–0.22, whitish yellow microtomentose, bearing 1 row of 2–3 short ventroclinate setae along ventral edge in addition to a pair of stronger convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum uniformly gray microtomentose except for two very faint brown vittae between dorsocentral and supra-alar setae, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 somewhat irregular rows; apical scutellar setae about twice length of scutellum. Anepisternum with brownish coloration along dorsal half or so, mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing hyaline with yellowish veins. Halter white to yellow. Coxae yellow, fore femur dark brown to black, slightly swollen; all other femora and tibiae yellow, tarsi darker; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly dark gray microtomentose except extreme posterior edges of sternites lighter; evenly setose. Male terminalia (Figure 106–109): Epandrium dark, shiny; surstylus (Figure 106) short triangular in posterior view evenly endowed with setae; pre- and postgonites fused into one structure, simple spatulate with row of short but strong setae along ventral margin (Figures 106, 108); basiphallus (Figure 109) covered with weak setulae, distiphallus trilobed, complex (Figures 106, 107). Female terminalia: Seventh tergite and sternite forming a strong, tight ring; spermathecae square-cylindrical; eighth sternite without lateral lobes; hypoproct without short, strong setae; epiproct with only weak setulae.

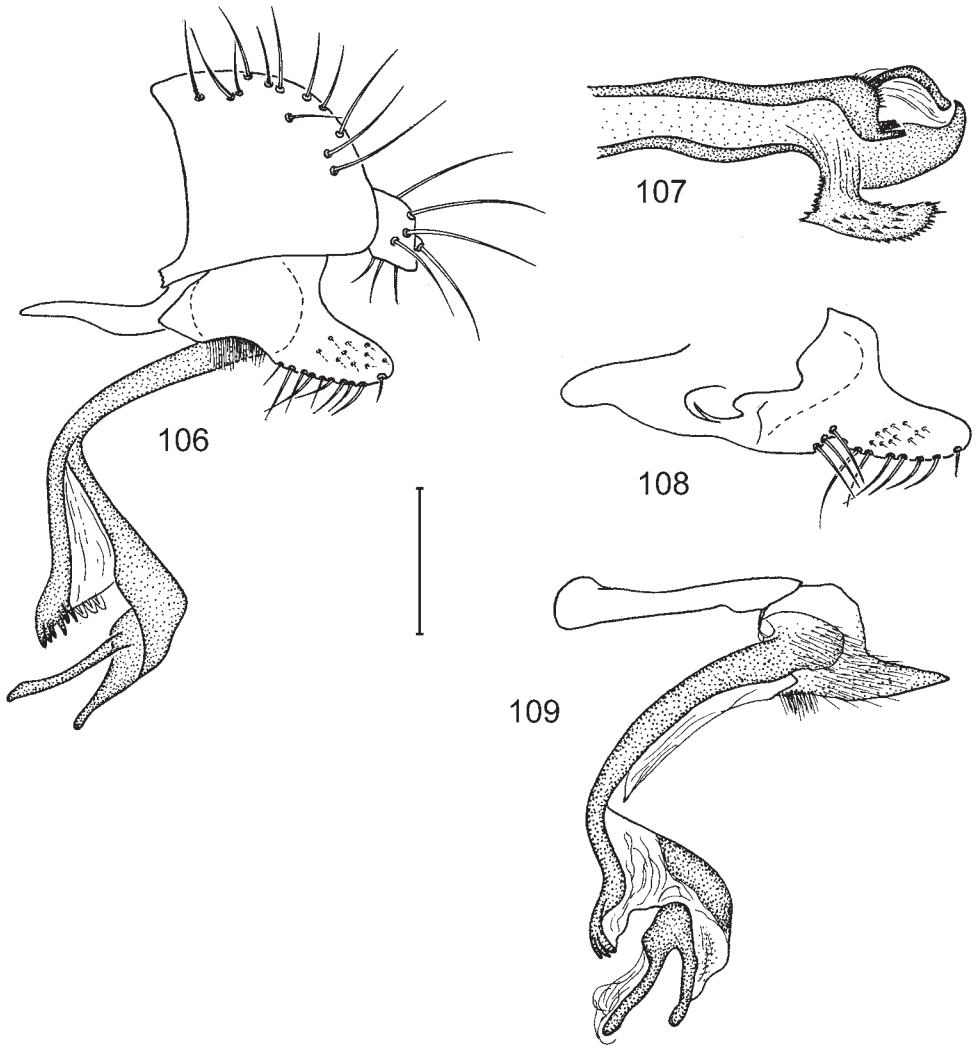
TYPE MATERIAL. Malloch described *T. claripennis* from nine specimens that were collected in Arizona by H. S. Barber. The specimen he designated as "Type" is a male in excellent condition and is labeled "Williams, 29-5, ARIZ[ONA]/Type No. 15557, U.S.N.M.[red]/Parodinia claripennis Malloch Type [handwritten on white label with black border]." The holotype is double mounted (glued to a paper triangle), is in good condition (the wing tips are slightly damaged but otherwise the specimen is in good condition), and is deposited in the USNM (15557). We located six of the other eight specimens cited by Malloch as paratypes. Malloch stated that he had eight paratypes from Williams, Bright Angel, and Flagstaff, Arizona. We have one male and five females collected by H. S. Barber from both Williams and Flagstaff, Arizona. Four of the specimens from Williams have the same collecting data as the holotype. We have not located the specimens from Bright Angel. The paratypes are as follows:

Arizona. **Coconino:** Flagstaff (35°11.9′N, 111°39.1′W), 4 Jul, H. S. Barber (1♀; USNM); Williams, 7 Jun, H. S. Barber (1♀; USNM); Williams (35°15′N, 112°11.5′W), 29 May, H. S. Barber (1♂, 3♀; USNM).

Coquillett (1902) had earlier identified these same nine specimens from Arizona as *T. costalis,* which he had originally described as *Rhicnoessa costalis* from the Galápagos Islands (Coquillett, 1901). The holotype specimen of *R. costalis* is destroyed. There is a handwritten label (by C. W. Sabrosky) in the type tray of this species, indicating that this specimen was determined to be lost on 27 January 1949. In Coquillett's original description he indicated that there were two specimens but does not say where the second was deposited.

Regarding *T. costalis,* Malloch (1913:276) wrote that there was only one specimen in the USNM and that it was "not in very good condition." He described the nine Arizona specimens as *T. claripennis* based on significant differences in the wings, *T. costalis* having some infuscation along the costal margin and *T. claripennis* having hyaline wings.

We have been fortunate to have access to nearly 100 specimens of what we have identified as *T. costalis* from fieldwork done by S. Peck and B. J. Sinclair in the 1980s and 1990s and deposited in the Canadian National Collection. We provided a detailed treatment with illustrations of the male terminalia earlier in this study.



FIGURES 106–109. Structures of male terminalia of *Trixoscelis claripennis* (Malloch) (California. Los Angeles: Whitewater Canyon): (106) epandrium, surstylus, gonites, distiphallus, lateral aspect; (107) distiphallus, lateral posterior aspect; (108) gonites, lateral aspect; (109) aedeagus, lateral aspect. Scale = 0.1 mm.

Melander (1952) based *T. sagulata* on 33 specimens (17♂, 16♀). He wrote (p. 49) that the "types" are from "Whitewater Canyon, California, November 11, 1944." There are three males and one female that are so labeled. Two of the males are mounted on the same minuten. We designate the top one as the lectotype as it is in the best condition of the three specimens. The lectotype specimen is labeled "Whitewater Can[yon] CALIF[ORNIA] 11/XI/44 A. L. Melander/HOLOTYPE *Trixoscelis sagulata* Melander [red]/Trixoscelis sagulata Melander [white handwritten]/LECTOTYPE ♂ Trixoscelis sagulata Melander Foster & Mathis USNM/USNM ENT 00118093 [plastic bar code label]." The lectotype is double mounted (pinned from ventral side with a minuten mounted in a cardboard square; another specimen below the lectotype has been dissected; structures of the male terminalia are in an attached microvial), is in good condition (right wing missing), and is deposited in the USNM. Paralectotypes are as follows:

UNITED STATES. *Arizona*. **Cochise:** Huachuca Mountains (31°29.3′N, 110°24.5′W), 3 May 1948, A. L. Melander (1♂; USNM); Huachuca Mountains, Miller Canyon (31°25.8′N, 110°14.2′W), 2 May 1948, A. L. Melander (2♀; USNM). **Pinal:** Superior (33°17.6′N, 111°05.8′W), 13 Apr 1935, A. L. Melander (1♂; USNM).

California. **Los Angeles:** Whitewater Canyon (34°21.4′N, 118°21.2′W), 11 Nov 1944, A. L. Melander (2♂, 1♀; USNM). **Riverside:** Cathedral City (33°46.8′N, 116°27.9′W), 22–23 Nov 1944, A. L. Melander (1♂, 1♀; USNM); Devils Garden (33°58.2′N, 116°37.1′W), 26 Nov 1946, A. L. Melander (1♀; USNM); Indio (33°43.2′N, 116°13′W), 13 Dec 1944, A. L. Melander (2♀; USNM); Morongo Valley (33°57.6′N, 116°31.5′W), 26 Nov 1946, A. L. Melander (1♂; USNM); Palm Springs (33°49.8′N, 116°32.7′W), 24 Apr–22 Nov 1934, 1943, 1944, A. L. Melander (7♂, 1♀; USNM); Salton Beach (33°28.2′N, 115°53′W), 12 Nov 1945, A. L. Melander (1♀; USNM). **San Bernardino:** Oak Glen (34°03′N, 116°56.9′W), 19 Jun 1946, A. L. Melander (1♀; USNM). **San Diego:** Borrego, Palm Canyon (33°13.2′N, 116°20.1′W), 7–10 Nov 1934, 1945, A. L. Melander (1♂, 1♀; USNM); La Jolla (32°50.8′N, 117°16.5′W), 29 Dec 1934, A. L. Melander (1♂, 4♀; USNM).

Utah. **Washington:** Zion National Park (37°18′N, 113°03.1′W), 20 Apr 1935, A. L. Melander (1♂, 1♀; USNM).

TYPE LOCALITY. United States. Arizona. Coconino: Williams (35°15′N, 112°11.5′W).

OTHER SPECIMENS EXAMINED. CANADA. *British Columbia*. Oliver (49°10.8′N, 119°33.9′W), 14 May 1959, E. E. MacDougall (1♂; CNC).

MEXICO. *Baja California*. Rancho San Ignacio (26 km E Rosarito; 32°20.9′N, 117°02.5′W), 26–27 Mar 1982, J. Slansky, M. S. Wasbauer (1♀; CSCA).

Baja California Sur: Guillermo Prieto (21 km SW; 27°50′N, 113°19′W; Malaise trap), 3–5 Apr 1982, M. S. Wasbauer (2♀; CSCA).

UNITED STATES. *Arizona*. **Pinal:** Oracle (12 km S; 32°36′N, 110°46.2′W), 28 Apr 1967, D. M. Wood (1♀; CNC).

California. **Riverside:** Palm Desert (33°43.3′N, 116°22.4′W; 915 m), 4 Apr 1955, W. R. Richards (1♀; CNC); Rancho Mirage (33°44.4′N, 116°24.8′W), 6 Apr 1955, W. R. M. Mason (2♀; CNC); Thousand Palms (33°48.7′N, 116°22.6′W), 20 Mar–5 Apr 1955, W. R. Richards (3♂, 11♀; CNC); Thousand Palms, Willis Palms Oasis (33°49′N, 116°23.6′W), 18 Mar 1955, W. R. M. Mason (1♀; CNC). **San Bernardino:** Twenty-nine Palms (34°08.1′N, 116°03.3′W), 4 Oct 1949, A. L. Melander (1♀; USNM). **San Diego:** Borrego (north end Clark Lake; 33°20.3′N, 116°16.7′W), 23 Mar 1978, P. Adams, J. Slansky, M. S. Wasbauer (2♂, 3♀; CSCA).

Nevada. **Lyon:** Wellington (7 km NW; 38°45.5′N, 119°22.6′W), 28 May 1974, J. Slansky, M. S. Wasbauer (1♀; CSCA).

DISTRIBUTION (FIGURE 110). Nearctic: Canada (British Columbia), Mexico (Baja California, *Baja California Sur*), United States (Arizona, California, Nevada, Utah).

REMARKS. The synonymy proposed herein of *T. sagulata* with *T. claripennis* is based on essentially identical structures of the male terminalia of the syntype, now a paratype of *T. sagulata*, which is double mounted on the same pin as the lectotype (itself undissected), with those of the topotypical paratype of *T. claripennis*. The aedeagus of the *T. claripennis* paratype is missing but the terminalia are otherwise identical to *T. sagulata*. They are also essentially identical in external characters. The differences between *T. claripennis* and *T. flavida* are rather slight: the postgonite of *T. claripennis* is much broader than *T. flavida* and the aedeagus of *T. claripennis* lacks or has much reduced "teeth" on the primary lobe. The latter character can vary, depending on the orientation of the specimen, etc. The aedeagus of *T. flavida* also has conspicuous "teeth" on the tertiary lobe, whereas the tertiary lobe of *T. claripennis* has much shorter "teeth." There seems to be some slight variation in the width of the postgonite of *T. flavida*. We have observed a much narrower postgonite in some specimens (Figure 125). Finally, the male basal flagellomere of *T. flavida* is entirely bright yellow while that of *T. claripennis* shows a brown tint in the center of the outer lateral surface.

Trixoscelis flavens Melander

FIGURES 111–115, 118–119

Trixoscelis flavens Melander, 1952:45. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis].

DIAGNOSIS. Head and thorax entirely brownish yellow; 4 rows of acrostichal setae, proepimeral seta present; wing hyaline with no infuscations; antenna completely yellow except basal flagellomere brown anterior to base of arista; vertex yellow; gena high, gena-to-eye ratio 0.37; abdomen black; male epandrium in undissected specimens yellow.

DESCRIPTION. Body length 2.65–3.39 mm.

Head (Figures 118, 119): Higher than wide. Eye slightly higher than wide; ocellar triangle yellow microtomentose; frons bare, uniformly yellow; parafrons silvery-yellow microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta;

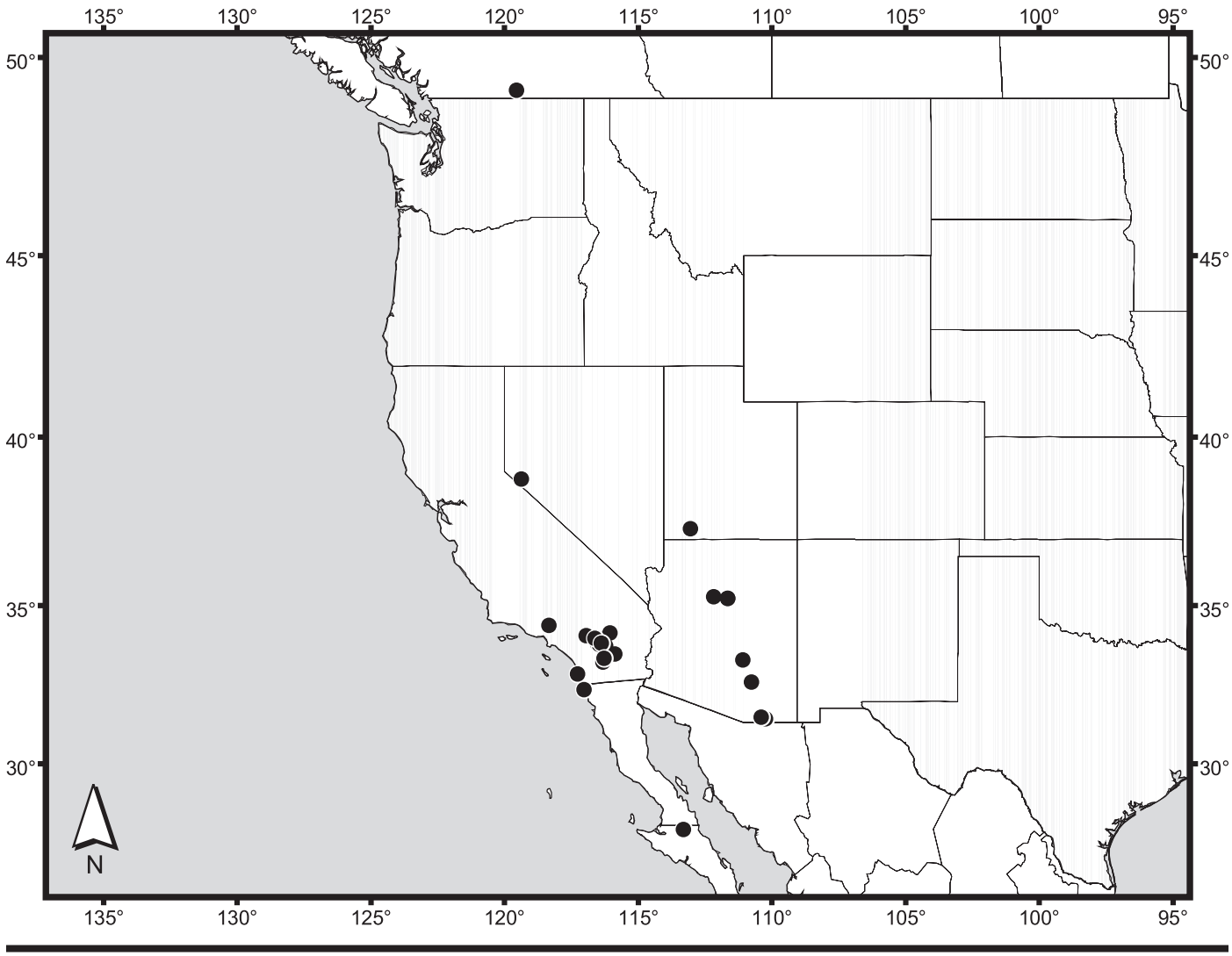
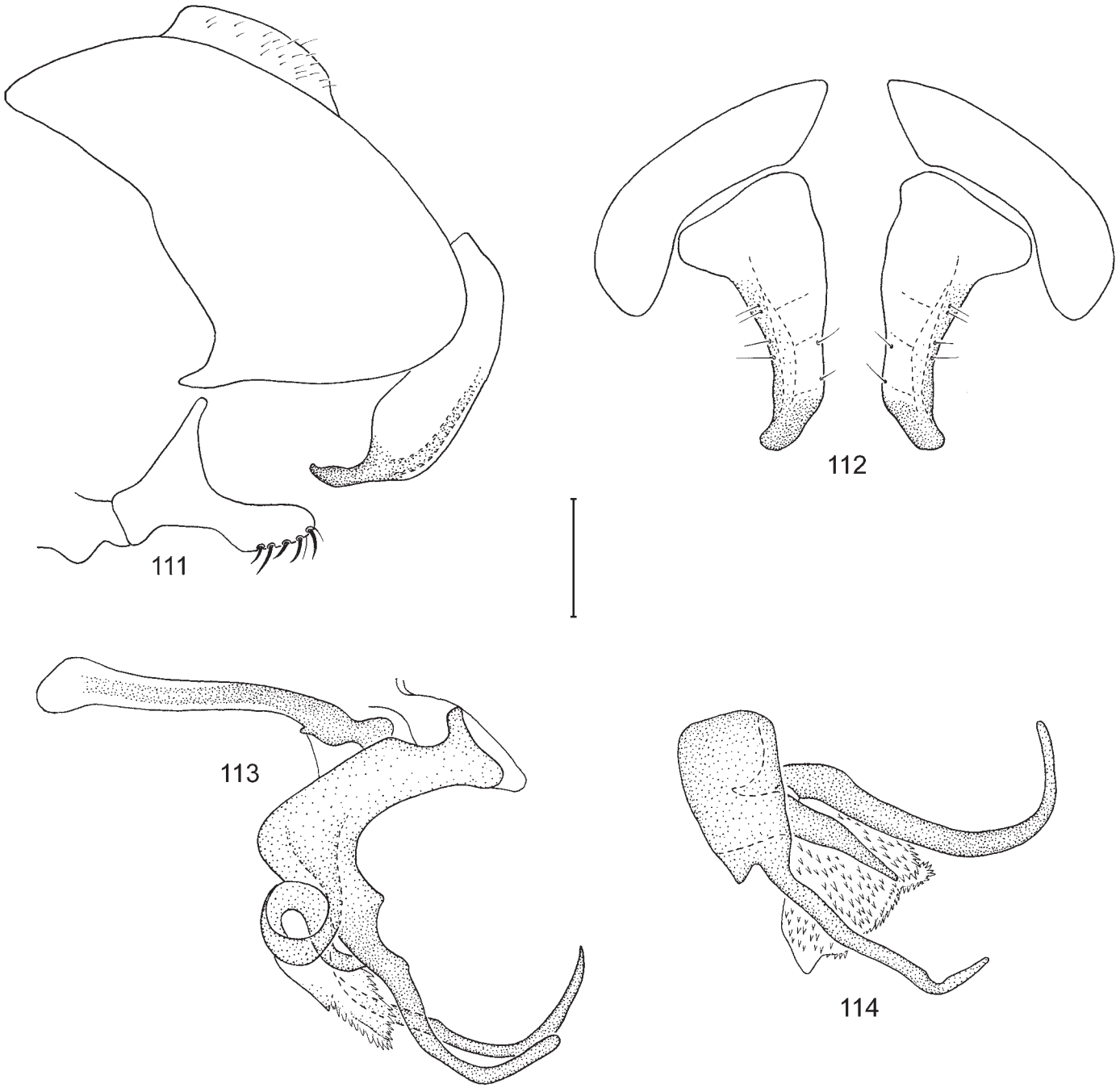


FIGURE 110. Distribution map for *Trixoscelis claripennis* (Malloch).

medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput rather wide, yellow microtomentose, with 1 row of short dorsoclinate setulae in addition to several scattered setulae dorsally and ventrally; antenna completely yellow except basal flagellomere brown anterior to base of arista; arista brown, with sparse hairs. Gena high, gena-to-eye ratio 0.37, yellow microtomentose, bearing a row of 3–4 setulae along ventral margin in addition to a pair of strong convergent oral vibrissae; face yellow; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum light brownish yellow, covered with many minute setae; acrostichal setae in 4 irregular rows; apical scutellar setae not more than twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and 1–2 very short setulae along the posterodorsal edge. Wing hyaline. Halter yellow. All coxae, femora, tibiae, and tarsi yellow; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

Abdomen: Uniformly gray to black microtomentose; evenly setulose. Male terminalia (Figures 111–114): Epandrium in undissected specimens yellow; surstylus (Figures 111, 112) robust, roughly triangular in posterior view, slightly curved anteriorly in lateral view, ending in dark, thick point, nearly bare with only few weak setulae; pre- and postgonites separate, pregonite (Figure 111) a simple, spatulate lobe, with few short thick setae along ventral margin, postgonite a small inconspicuous lobe attached to the posterior edge of the hypandrium; distiphallus complex, with three long thin lobes, somewhat resembling



FIGURES 111–114. Structures of male terminalia of *Trixoscelis flavens* Melander (Utah. Emery: Wild Horse Creek): (111) epandrium, cercus, surstylus, and gonites, lateral aspect; (112) epandrium and surstyli, posterior aspect; (113) aedeagus and aedeagal apodeme, lateral aspect; (114) distiphallus, dorsoblique aspect. Scale = 0.1 mm.

a pitchfork with badly bent tines, darkly sclerotized (Figures 113, 114). Female terminalia: Spermathecae 4× longer than wide; eighth sternite with small, lateral setaceous lobes; hypoproct without short, strong setae, epiproct with only weak setulae.

TYPE MATERIAL. *Trixoscelis flavens* was described from a single female, the holotype, that is labeled "Lind [46°58.3′N, 118°36.9′W] WASH[INGTON. **Adams:**], 11 Jun 1919. FW Carlson/HOLOTYPE Trixoscelis flavens Melander [red]/A. L. Melander Collection

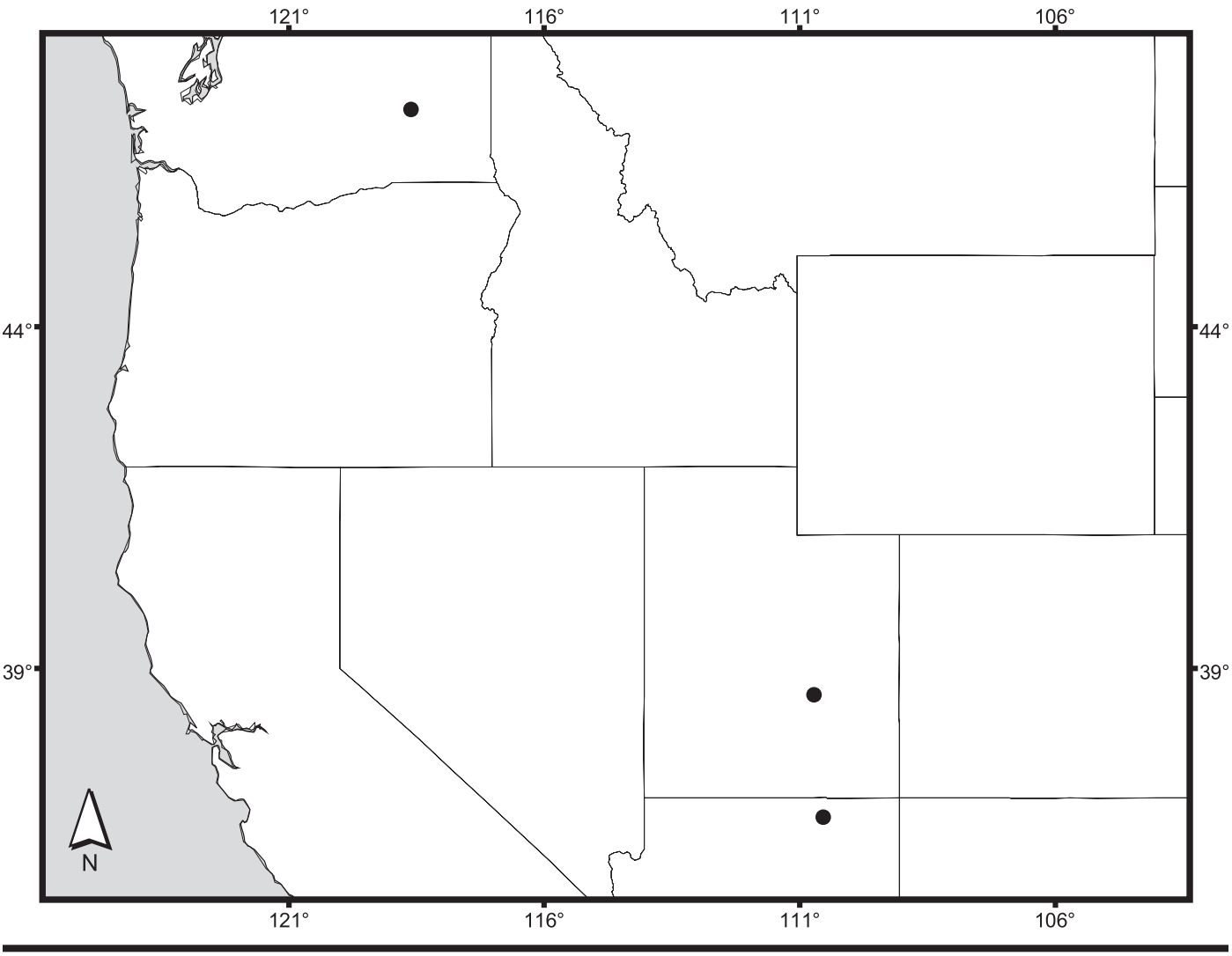


FIGURE 115. Distribution map for *Trixoscelis flavens* Melander.

1961 [white label with green stippling on right side]." The holotype is directly pinned, is in excellent condition, and is deposited in the USNM.

Type Locality. United States. Washington. Adams: Lind (46°58.3′N, 118°36.9′W.

Other Specimens Examined. UNITED STATES. *Arizona*. **Navajo:** Navajo National Monument (36°41.2′N, 110°32.2′W; 2225 m), 26–27 Jul 1979, S. Peck, J. Peck (1♂; DEBU).

Utah. **Emery:** Wild Horse Creek (2.4 km NW Wild Horse Butte; 38°34.7′N, 110°43.2′W; 1495 m), 26–27 Jul 1982, A. K. Menke, Kurt Menke (26♂, 16♀; USNM).

Washington. **Adams:** Lind (46°58.3′N, 118°36.9′W), 5 Jun 1919, F. W. Carlson (2♀; WSU).

Distribution (Figure 115). Nearctic: United States (Arizona, Utah, Washington).

Remarks. The validity of this species had been uncertain, awaiting males that were conspecific with the female holotype. We were fortunate to find a large series of males and females that A. S. Menke and Kurt Menke collected in Utah. The females match well with the holotype, and we assume that this series is conspecific with the holotype. This species is almost entirely yellowish except for the abdomen, which is light gray. On the basis of the high gena and the shape of the head, this species would seem to be closely related to *T. nuda* or to *T. cinerea*. The male epandrium and surstylus also show an affinity with those two species; the aedeagus, however, is quite complex compared

FIGURES 116–121. Photographs of heads: (116) *Trixoscelis tumida*, anterior aspect; (117) same, lateral aspect; (118) *T. flavens*, anterior aspect; (119) same, lateral aspect; (120) *T. flavida*, anterior aspect; (121) same, lateral aspect

with that of *T. nuda* and *T. cinerea* and is strong evidence that *T. flavens* is part of the *T. claripennis* species group.

Trixoscelis flavida Melander

FIGURES 120–126

Trixoscelis flavida Melander, 1952: 45. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis].

Trixoscelis frontalis of authors, *nec* Fallén [misidentification]. —Melander, 1913a:169 [discussion]. —Melander, 1913b:296 [key]. —Vockeroth, 1965:818 [Nearctic catalog].

DIAGNOSIS. Body gray, rarely mostly pale; 4 rows of acrostichal setae; wing hyaline, not smoky and without infuscations; antenna usually mostly yellow, basal flagellomere may be brown in center in females, entirely yellow in males; vertex yellowish to light gray microtomentose; gena short, gena-to-eye ratio only 0.15; male epandrium in undissected specimens usually gray microtomentose, some specimens with yellowish epandrium.

DESCRIPTION. Body length 1.83–2.93 mm.

Head (Figures 120, 121): Eye higher than wide; ocellar triangle light gray microtomentose; frons bare, yellow becoming darker dorsally, parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput gray microtomentose with 1–2 rows of short dorsoclinate setulae; antenna usually yellow, basal flagellomere may be brown in center in females, entirely yellow in males; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.15, whitish-yellow microtomentose, bearing 1 row of 2–3 short ventroclinate setae along ventral edge in addition to a pair of strong convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum uniformly gray microtomentose, sparsely covered with setae much shorter than the dorsocentral setae, a distinct brown area on the dorsal half of the proepisternum, anepisternum, and the extreme ventral portion of the postpronotal lobe. Dorsocentral setae 5(2+3); acrostichal setae in 4 irregular rows; apical scutellar setae about 3× length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing hyaline with yellowish veins. Halter white to yellow. Coxae yellow, fore femur dark brown to black (rarely yellow), slightly swollen, fore tibia and tarsi dark brown; all other femora and tibiae yellow, tarsi darker; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces.

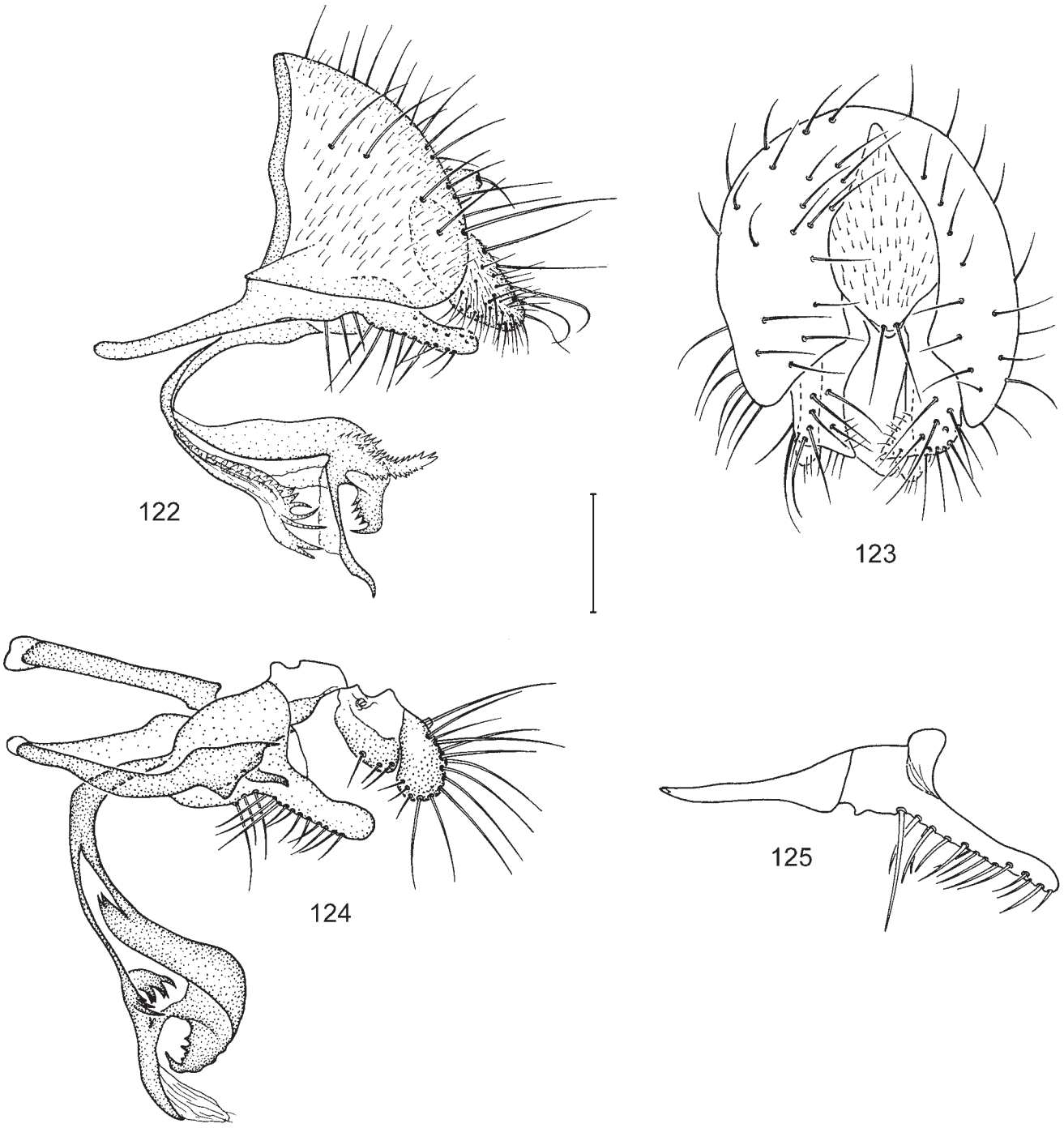
Abdomen: Uniformly dark gray microtomentose except extreme posterior edges of sternites lighter; evenly setose. Male terminalia (Figures 122–125): Epandrium usually uniformly gray microtomentose but may rarely be yellow, details as in Figures 122, 123; surstylus small, somewhat teardrop shaped, endowed with many long setae along margin (Figures 122, 123); pre- and postgonites (Figures 124, 125) fused, oblong, with 2 rows of short setae along ventral margin; aedeagus (Figures 122, 124) complex, appearing trilobed, partially sclerotized. Some variation exists in the width of the fused pre- and postgonite (Figure 124, 125). Female terminalia: Seventh tergite and sternite forming strong, tight ring; spermathecae spherical; eighth sternite with reduced lateral lobes each with 3–4 setae; hypoproct without short, strong setae; epiproct with only weak setulae.

TYPE MATERIAL. Melander described *T. flavida* from a type series of seven specimens without designation of a holotype. He labeled one of these specimens, however, as "type" and it is from Mill Creek in Walla Walla, Washington. There are three specimens so labeled in the USNM, two males and one that is missing its abdomen. We have designated as lectotype one of the males that is labeled "Walla Walla, W[ASHINGTO]N[. **Walla Walla:**], Mill Creek [46°02.3′N, 118°28.7′W], 2–6 July 22, A. L. Melander/PARATYPE Trixoscelis flavida Melander [yellow]/A. L. Melander Collection 1961 [white label with green stippling on right side]/LECTOTYPE ♂ Trixoscelis flavida Melander Foster & Mathis USNM/ USNM ENT 00118088 [plastic bar code label]." The lectotype is double mounted (pinned ventrally on minuten), is in good condition, and is deposited in the USNM. Paralectotypes are as follows:

UNITED STATES. *Washington*. **Walla Walla:** Walla Walla, Mill Creek (46°02.3′N, 118°28.7′W), 2–6 July 1922, A. L. Melander (1♂, 1 unknown sex; USNM). **Whitman:** Pullman (46°43.9′N, 117°10.8′W), 16 Jun 1912, A. L. Melander (1♂; USNM). Pullman (46°43.9′N, 117°10.8′W), 16 Jun 1918, A. L. Melander (1♀; USNM). Union Flat (46°49.6′N, 117°59.9′W), 16 Jun 1916, A. L. Melander (1♀; USNM).

Oregon. **Marion:** Salem (44°56.6′N, 123°02.1′W), 4 Jul 1917, A. L. Melander (1♀; USNM).

TYPE LOCALITY. United States. Washington. Walla Walla: Mill Creek (46°02.3′N, 118°28.7′W).



FIGURES 122–125. Structures of male terminalia of *Trixoscelis flavida* Melander (labeled as *T. frontalis*) (Washington. Walla Walla: Mill Creek): (122) epandrium, cercus, surstylus, gonites, and aedeagus, lateral aspect; (123) epandrium and surstyli, posterior aspect; (124) cercus, aedeagus, aedeagal apodeme, and gonites, lateral aspect; (125) gonites, lateral aspect (California. San Bernardino: Lytle Creek). Scale = 0.1 mm.

Other Specimens Examined. CANADA. *Alberta*. Oyen (51°21.2′N, 110°29′W), 22 Jul 1979, D. H. Pengelly (2♀; DEBU).

British Columbia. Boundary Creek Provincial Park (49°04′N, 118°46′W), 30 Jul 1980, G. Gibson (1♂, 1♀; DEBU); Bowser (49°26′N, 124°40′W), 31 May–20 Jun 1955, R. Coylee, G. E. Shewell, J. R. McGillis (10♂, 15♀; CNC); Cranbrook (49°30′N, 115°46′W), 16 Jul 1980, G. Gibson (3♂, 3♀; DEBU); Cranbrook (15 km S; 49°29′N, 115°46′W; flight intercept trap), 27 Jun–4 Jul 1980 (1♂; DEBU); Cranston (20 km E; 49°03′N, 117°56′W), 1 Jul 1980, S. A. Marshall (1♀; DEBU); Cultus Lake (49°03.3′N, 121°59.3′W), 15 Jul 1948, H. R. Foxlee (1♂; CNC); Gagnon Road (9.6 km W of Terrace; 54°31′N, 128°36′W), 9 Jul 1960, C. H. Mann (1♀; CNC); Goldstream (48°29′N, 123°33′W), 6–16 Aug 1927, 1963, W. Downes (3♀; CNC); Kamloops (50°40.6′N, 120°20.5′W), 11 Jun 1972, N. L. H. Krauss (1♀; USNM); Kaslo (49°54.2′N, 116°56.1′W), 25 Jun–7 Jul, R. P. Currie (3♂, 4♀; USNM); Keremeos (49°12.4′N, 119°49.7′W), 19 Jul 1910, A. L. Melander (1♀; USNM); Kleanza Creek (24 km E. of Terrace; 54°36′N, 128°25′W), 17 Jun–13 Jul 1960, C. H. Mann, R. Pilfrey, J. G. Chillcott (2♂, 10♀; CNC); Ladysmith (48°59′N, 123°49′W), 2 Jun 1955, R. Coylee (1♂, 2♀; CNC); Langford (48°27′N, 123°30′W), 7–8 Aug 1962, 1963, D. Evans (2♀; CNC); Lytton, 40 km N., 600 m (50°31′N, 121°43′W; alfalfa, sage, clover, and mustard), 13 Jun 2000, H. Goulet, J. Gillespie (24♂, 28♀; DEBU); Lytton (50°40′N, 121°46′W; 200 m) (alfalfa, sage, rose, and cactus), 13 Jun 2000, H. Goulet, J. Gillespie (6♂, 10♀; DEBU); Metchosin (48°23′N, 123°32′W), 5 Sep 1963 (2♂, 1♀; CNC); Merritt, Midday Valley (50°06.7′N, 120°47.5′W; *Pinus ponderosa*), 9 Jul 1923, R. Hopping (6♀; CNC); Mission City (49°08′N, 122°18′W), 15 Jun 1953, G. J. Spencer (1♂; CNC); Oliver (49°10.8′N, 119°33.9′W), 13–14 May 1959, E. E. MacDougell (1♂, 2♀; CNC); Oliver, Vaseaux Lake (49°11′N, 119°33′W), 28 May 1959, L. A. Kelton (2♀; CNC); Osoyoos, Haynes Ecological Reserve (49°02′N, 119°27′W; pan trap; *Purshia/Aristida* steppe), 20 May–14 Jun 1987, G. G. Cannings (3♀; DEBU); Penticton (49°30′N, 119°35′W), 5 Jul–21 Aug 1931, 1967, R. D. Bird, J. R. Vockeroth (3♂, 2♀; CNC); Qualicum Bay (49°24′N, 124°38′W), 21 Jun 1955, 19 Jul 1955, G. E. Shewell (9♂, 18♀; CNC); Robson (49°20′N, 117°41′W), 4 Apr–30 Jul 1947, 20 Aug 1948, 10 Jun 1950, 8 Jun–19 Jul 1952, H. R. Foxlee (3♂, 13♀; CNC); Royal Oak (48°29′N, 123°23′W), 18 Aug 1917, W. Downes (1♀; CNC); Saanich (48°33′N, 123°22′W), 9 Jun 1927, J. Stanley (2♂, 5♀; CNC); Shames (29 km SW of Terrace; 54°25′N, 128°56′W), 17–24 Jul 1960, B. Heming, C. H. Mann (1♀; CNC); Skagit (F.I.) (13 km W Hope; 49°23′N, 121°26.8′W), 8–28 Jul 1980, S. A. Marshall (1♀; DEBU); Summerland (49°36′N, 119°40′W), 18 Jun–15 Sep 1930, 1931, A. N. Gartnell, A. A. Dennys (2♀; CNC); Terrace (54°31′N, 128°36′W), 10 Jun–21 Jul 1960, W. R. Richards, C. H. Mann (3♀; CNC); Terrace (52 km SW; 54°29′N, 128°37′W), 6 Jun 1960, J. G. Chillcott (1♂, 1♀; CNC); Vancouver Island (48°22.7′N, 123°43′W), 12 Jul 1924, A. L. Melander (1♂; USNM); Vancouver Island, Deep Bay (49°30′N, 124°13′W), 16 Jun 1955, 1960, R. Coyles (3♂, 4♀; CNC); Vernon (50°15.5′N, 119°16′W), 1–2 Jul 1937, D. B Waddell, 21 Aug–3 Sep 1931, R. D. Bird (6♂, 4♀; CNC); Victoria (48°26′N, 123°21′W), 10 Jul–12 Sep 1924, 1963, A. L. Melander (2♂; CNC, USNM); Zymoetz (9.6 km E Terrace; 54°33′N, 128°29′W; on flowers and leaves of Devil's Club), 3 Jun 1960, J. G. Chillcott (2♀; CNC).

MEXICO. *Baja California*. El Crucero (25.7 km SE Laguna Chapala; 29°23′N, 114°22′W; 600 m), 13 Apr 1983, M. S. Wasbauer (1♂, 1♀; CSCA). Rancho San Ignacio (26 km E Rosarito; 32°20.9′N, 117°02.5′W), 26–27 Mar 1982, J. Slansky, M. S. Wasbauer (1♀; CSCA).

Baja California Sur: Arroyo San Gregorio (13 km WNW of La Purísima; 26°13.6′N, 112°21.8′W), 24 Apr 1983, M. S. Wasbauer (1♂, 1♀; CSCA).

UNITED STATES. *Arizona*. **Apache:** Alpine Luna Lake (33°49.7′N, 109°04.9′W; 2410 m; pine meadows), 9–14 Jul 1979, S. and J. Peck (6♀; DEBU). **Cochise:** Chiricahua Mountains, Herb Martyr Forest Camp (31°52.3′N, 109°14′W; 1875 m), 30 Apr 1979, K. N. Barber (1♂, 2♀; DEBU); Portal, Southwestern Research Station (8 km SW of Portal; 31°52.9′N, 109°12.2′W; 1631 m), 23 May–5 Jun 1967, C. W. Sabrosky (2♀; USNM). **Coconino:** Flagstaff, Oak Creek Canyon, Sterling Canyon (35°01.5′N, 111°44.2′W; 1800 m; riparian woods), 17–25 Jul 1979, S. and J. Peck (4♀; DEBU); Flagstaff (35°11.9′N, 111°39.1′W; 2165 m; ponderosa pine meadow, Malaise trap), 18–25 Jul 1979, S. Peck, J Peck (11♂, 7♀; DEBU). **Maricopa:** Phoenix (33°34.3′N, 112°05.3′W), 11 May 1954, CDC (1♀; USNM). **Mohave:** Littlefield (36°53.1′N, 113°55.8′W), 27 Mar 1931, E. W. Davis (1♀; USNM). **Navajo:** Holbrook (24 km SE; 34°54′N, 110°09′W; 1920 m; grassland carrion traps), 14–16 Jul 1979, S. Peck, J. Peck (1♂; DEBU); Navajo National Monument (36°41.2′N, 110°32.2′W; 2225 m; pinion-juniper, carrion traps), 26–27 Jul 1979, S. Peck, J. Peck (2♂; DEBU); Winslow (35°01.5′N, 110°41.8′W; Little Colorado River crossing at Route 180), 17 May 1976, G. A. Foster (4♀; USNM). **Pima:** Madera Canyon, Dutch John Spring (31°43.8′N, 110°51.7′W), 3 Jun 1991,

J. E. Swann (1♂; DEBU). **Yavapai:** Congress (34°09.8′N, 112°51′W), 23–26 Apr 1967, D. M. Wood (1♀; CNC).

California. **Alameda:** Alameda (37°45.9′N, 122°14.5′W; salt marsh), 5 May 1908 (2♀; ANSP); Berkeley (37°52.3′N, 122°16.4′W), 16 May-Sep 1907, 1921, 1932, J. M. Aldrich, C. Fuchs, A. H. Sturtevant (2♂, 4♀; USNM); Berkeley (37°52.3′N, 122°16.4′W), 30 Apr 1968, D. D. Munroe (5♂, 13♀; CNC); Berkeley Hills (37°53′N, 122°14.3′W), 11 Apr–9 May 1908 (3♂, 2♀; ANSP). Live Oak Park (37°53.1′N, 122°16.1′W), 7 Jun 1945, A. L Melander (1♀; USNM). **Contra Costa:** Lafayette (37°53.1′N, 122°07.1′W), 11 May 1963, L. G. Bock (1♀; WSU). **Del Norte:** Crescent City (30 km N; 41°45.5′N, 124°12.1′W), 28 Jun 1972, G. C. Steyskal (4♂; USNM); Smith River (41°56.2′N, 124°12.2′W; Pherocon apple maggot trap), 3–16 Sep 1983 (1♀; CSCA). **El Dorado:** Placerville (38°43.8′N, 120°47.9′W; ex. pear tree), 19 May 1930 (1♀; CSCA). **Fresno:** Sanger (36°42.5′N, 119°33.4′W), 24–25 Apr 1949, R. E. Ryckman (1♂, 2♀; USNM); Sierra National Forest (37°15′N, 119°11.2′W), 7 Aug 1955, C. R. Quick (1♀; USNM). **Humboldt:** Garberville (south fork Eel River; 40°38.5′N, 124°18.7′W), 7–8 Aug 1982, M. S. Wasbauer (1♀; CSCA); Korbel (40°52.2′N, 123°57.5′W), 12 Jun 1960, T. R. Haig (1♀; CSCA); Redwood Creek, Bair's Reach (41°17.5′N, 124°05.5′W), 19 Jun, H. S. Barber (1♂; USNM). **Imperial:** Ogilby Road, Chocolate Mountains (5 km S junction with highway 78; 33°28′N, 115°35′W; Malaise trap), 16–22 Oct 1977, P. Adams, J. Slansky, M. S. Wasbauer (2♂, 4♀; CSCA); Palo Verde (33°26′N, 114°43.9′W), 7 Apr 1949, W. W. Wirth (1♂; USNM). **Inyo:** Falls Spring (35°51.3′N, 117°22.9′W), 25 Apr 2002, D. Mathis, W. N. Mathis (1♂; USNM); Trona Golf Club (35°49.7′N, 117°19.8′W), 25 Apr 2002, D. Mathis, W. N. Mathis (1♂; USNM). **Kern:** Arvin (35°12.6′N, 118°49.7′W), 14 Mar 1935, A. L. Melander (1♂, 1♀; USNM); Bakersfield (32 km NE, Cow Flat Creek; 35°30.1′N, 118°41.6′W; 500 m), 25 Apr 2002, S. D. Gaimari (1♂, 3♀; CSCA); Bakersfield (25 km W, Kern River; 35°30.4′N, 119°25.8′W; 50 m; sweeping riverside vegetation), 24 Apr 2002, S. D. Gaimari (31♂, 20♀; CSCA); Onyx (11.2 km E; 35°41.4′N, 118°13′W), 12 Jun 1961, H. F. Howden (1♀; CNC). **Lake:** Clear Lake (38°57.5′N, 122°37.6′W), 18 Jun 1935, A. L. Melander (1♂, 2♀; USNM); McLaughlin Reserve (38°51′N, 122°25′W), 30 Apr 2005, K. A. Williams (1♂; CSCA). **Lassen:** Wendel (40°20.9′N, 120°13.9′W; on alfalfa), 4 Jun 1931, A. C. Browne (1♀; CSCA). **Los Angeles:** Camp Angelus (34°25.3′N, 118°31.4′W; *Ceanothus*), 22–30 May 1947, A. L. Melander (11♂, 3♀; USNM); Claremont (34°05.8′N, 117°43.2′W), Baker, M. Metz (1♂, 3♀; USNM); Claremont (34°05.8′N, 117°43.2′W), Essig (1♂, 2♀; USNM); Gorman (8 km SE; 34°47.5′N, 118°51.1′W), 30 Mar 1968, M. S. Wasbauer (1♀; CSCA); La Crescenta, base of Eagle Canyon (34°23.5′N, 118°23.3′W; 750–850 m), 26 Apr 2002, S. D. Gaimari (12♂, 17♀; CSCA); Mojave (34°36.3′N, 117°49.8′W), 11 Nov 1914, A. Wetmore (1♀; USNM); Mojave Desert, Big Rock Wash (34°40′N, 117°52.3′W), 13 May 1944, A. L. Melander (1♂; USNM); Mojave Desert, Lovejoy Buttes (34°36.1′N, 117°51.1′W), 25 May 1947, A. L. Melander (1♀; USNM); Mojave Desert, Lovejoy Springs (34°36.3′N, 117°49.8′W), 10 May 1944, A. L. Melander (1♂, 1♀, USNM); Pasadena (34°08.9′N, 118°08.7′W), 25 Mar 1929, A. H. Sturtevant (1♀; USNM); San Clemente Island transect, Thirst to White Rock (32°53.5′N, 118°26.4′W), 10 May 1973, D. R. Miller (2♂; USNM); San Clemente Island, China Canyon (32°55′N, 118°30′W; 183 m; ex. *Prunus*), 13 May 1973, D. R. Miller (2♂; USNM); Saugus (34°24.7′N, 118°32.4′W), 12 May 1918, F. M. Jones (1♂; ANSP); Snow Creek, Whitewater (34°02′N, 117°50.3′W), 7–24 Mar 1955, W. R. M. Mason (4♂; CNC); Whitewater (34°21.4′N, 118°21.2′W), 9 Apr 1955, 16 May 1954, A. L. Melander (1♂, 1♀; USNM). **Marin:** Alpine Lake (37°56.4′N, 122°38.3′W; Lily Pond; 460 m), 12 May–19 Jul 1970, D. D. Munroe (4♂, 2♀; CNC); Inverness (38°06.1′N, 122°51.4′W), 10 May 1968, D. D. Munroe (2♂, 4♀; CNC); Novato (38°06.5′N, 122°34.2′W), 18 May 1969, I. Baker (1♀; USNM); Point Reyes (38°0.1′N, 122°59.8′W), 17–19 Apr 1980, S. A. Marshall (3♂, 1♀; DEBU). **Mendocino:** Fort Bragg (39°26.8′N, 123°48.3′W), 2 Jul 1973, J. R. Vockeroth (2♂, 5♀; CNC); Hopland (Russian River; 38°58.4′N, 123°07′W), 4 May 1968, W. J. Turner (1♂; WSU). **Modoc:** Adin Pass (41°20.8′N, 120°55.3′W), 6 Jul 1979, T. R. Haig (1♀; CSCA); Cedar Pass, Warner Mountains (41°33.8′N, 120°16.1′W; 1825 m), 8 Aug 1965 (1♂; CNC). **Mono:** Mono Lake (38°01′N, 119°0.6′W), 22 Jul 1911, 1949, J. M. Aldrich, A. L. Melander (3♂, 2♀; CNC, USNM). **Monterey:** Carmel-by-the-Sea (36°13.3′N, 125°55.4′W), 5 Sept 1920, A. H. Sturtevant (1♂; USNM); Kirk Creek (35°59.3′N, 121°29.8′W), 12 Aug 1969, R. Hocking (1♂, 1♀; CNC); Pacific Grove (36°37.1′N, 121°55′W), 8 May–27 Aug 1920, 1921, A. H. Sturtevant (3♂, 6♀; USNM); Salinas (36°40.7′N, 121°39.3′W), 25 May 1952, P. H. Arnaud, Jr. (1♀; USNM). **Napa:** Bothe Napa Valley State Park (38°32.8′N, 122°32.1′W), 15 May 1980, K. S. Corwin (4♂, 2♀; CSCA); St. Helena (38°25.6′N, 122°19.6′W), 3 Jun 1909, C. Fuchs (4♂, 13♀; ANSP). **Nevada:** Grass Valley (39°13.1′N, 121°03.7′W; 760 m), 23 Jun 1979, M. S. Wasbauer, F. Hillerman (5♂, 2♀; CSCA). **Orange:**

Corona del Mar (33°35.9′N, 117°52.4′W), 25 Mar–28 Dec 1944, 1946, A. L. Melander (2♀; USNM); Crystal Cove (33°34.8′N, 117°50.7′W), 6 Apr 2005, D. Mathis, W. N. Mathis (1♀; USNM); Knotts Ranch (33°50.6′N, 118°33.4′W), 11 Apr 1956, A. L. Melander (1♂; USNM); Placentia (33°52.5′N, 117°52.1′W), 17 Jul 1964, C. Johnson (2♂; CSCA); San Clemente (33°25.6′N, 117°36.7′W), 26 Mar–5 Jun 1945, 1946, A. L. Melander (2♂, 1♀; USNM); Santa Ana Canyon (33°51.4′N, 117°49.1′W), 29 Mar 1950, A. L. Melander (1♂; USNM). **Placer:** Rocklin (6.5 km S; 38°47.3′N, 121°14.1′W; Malaise trap), 2–4 Jun 1980, P. Adams, M. S. Wasbauer (5♂, 7♀; CSCA). **Riverside:** Andreas (33°45.5′N, 116°37.1′W), 1 April 1945, A. L. Melander (3♂, 1♀; USNM), 4 Apr 1955, W. R. Richards (2♀; USNM); Andreas Canyon (33°45.7′N, 116°32.2′W), 20–27 Oct 1934, 1951, A. L. Melander, A. H. Sturtevant (2♀; USNM); Blythe (33°36.6′N, 114°35.8′W), 24 Apr–1 May 1955, W. R. Richards (4♂, 5♀; CNC); Coachella (33°40.8′N, 116°10.4′W), 27 Oct 1930 (1♂; USNM); Desert Center (33°42.8′N, 115°24.1′W), 2 May 1955, W. R. M. Mason (1♀; CNC); Fan Hill Canyon (16 km NE Thousand Palms; 33°53.1′N, 116°15.9′W), 6 Apr 1955, W. R. M. Mason (2♂; CNC); Gavilan Hills (33°47.1′N, 117°22.2′W), 11 Apr 1954, A. L. Melander (1♀; USNM); Indio (33°43.2′N, 116°13′W), 26 Apr–13 Dec 1944, 1949, A. L. Melander, R. E. Ryckman (1♂, 5♀; USNM); Indio (33°43.2′N, 116°13′W), 7–21 Mar 1955, W. R. M. Mason, W. R. Richards (3♂, 2♀; CNC); Lake Elsinore (33°39.6′N, 116°21.2′W), 25 May 1944, A. L. Melander (1♀; USNM); La Quinta (33°39.8′N, 116°18.6′W), 18 Nov 1952, A. L. Melander (1♂; USNM); Mg. Spring Canyon (near Indio; 33°43.2′N, 116°13′W), 5 Apr 1945, A. L. Melander (1♀; USNM); Morongo Valley (33°57.6′N, 116°31.5′W), 19 April 1944, A. L. Melander (1♂; USNM); Palm Springs, Palm Canyon (33°49.8′N, 116°32.7′W), 15 Mar 1955, W. R. Richards (1♀; CNC); Palm Springs (33°49.8′N, 116°32.7′W), 2 Apr–29 Dec 1945, 1952, 1953, 1955, P. H. Arnaud, Jr., W. R. M. Mason, A. L. Melander (3♂, 9♀; CNC, USNM (2♀; collected on 2 Apr 1945, A. L. Melander were part of the syntype series of *T. tumida*); Rancho Mirage (33°44.4′N, 116°24.8′W), 6 Apr 1955, W. R. M. Mason (18♂, 24♀; CNC); Riverside (33°58.8′N, 117°22.4′W; ex. oats), 19 Mar 2002, E. Drake (3♂, 4♀; CSCA); Riverside (33°58.8′N, 117°22.4′W), 1 Feb–25 May 1935, 1942, 1944, 1950, A. L. Melander (4♂, 3♀; USNM); Temecula (33°29.6′N, 117°08.9′W), 7 Jun 1945, A. L. Melander (2♀; USNM); Thermal (33°38.4′N, 116°08.4′W), 14 Mar 1955, W. R. Richards (1♂; CNC); Thousand Palms (33°48.7′N, 116°22.6′W), 18 Mar–6 Jun 1955, W. R. M. Mason, W. R. Richards (12♂, 25♀; CNC); Thousand Palms, Willis Palms Oasis (33°48.7′N, 116°22.6′W), 8 Mar–5 Apr 1955, W. R. Richards (2♂, 4♀; CNC); University of California, Riverside (33°58.5′N, 117°19.7′W; Malaise), 7–21 Jun 1981, 1983, E. M. Fisher, D. Yu (8♀; CSCA, DEBU). **Sacramento:** Horticultural Commission (3♂, 3♀; CSCA); Andrus Island (38°09.5′N, 121°35.9′W), 31 Mar 1931 (3♀; CSCA); Carmichael (38°37′N, 121°19.7′W), 22–26 Apr 1931, 22 Jun 1931, E. Gammon (1♂, 5♀; CSCA); Hood (28°22.1′N, 121°31′W), 16 Apr 1931 (1♂, 1♀; CSCA); Courtland (38°19.9′N, 121°34.1′W; ex. alfalfa mustard), 4 May 1932, S. Lockwood (3♂, 1♀; CSCA); Folsom (8 km N; 38°40.7′N, 121°10.6′W), 16 Apr 1961, W. E. Simonds (1♂; CSCA); Hood (38°22.1′N, 121°31′W), 15 Apr 1931 (1♂, 3♀; CSCA); Orangevale (38°40.7′N, 121°13.5′W), 24 May 1930, H. H. Keifer (3♂, 1♀; CSCA); Rio Linda (38°41.5′N, 121°26.9′W), 15 May 1930, A. C. Browne (3♂, 17♀; CSCA); Sacramento (38°35.1′N, 121°30.3′W), 30 Mar–12 Jul 1917, 1931, 1960, 1962, 1976, J. M. Aldrich, H. H. Keifer, I. Savage, W. E. Simonds, M. S. Wasbauer (23♂, 23♀; CSCA, USNM); Sacramento River Levee (38°36.3′N, 121°33.3′W), 24 Mar–15 May 1966, 1970, F. Andrews, M. S. Wasbauer (1♂, 2♀; CSCA). **San Bernardino:** Baldwin Lake E, Hilltop on Rose Mine Road (34°15.2′N, 116°44′W; 2142 m), 26 May 2003, J. Skevington (1♂; CSCA); Barton Flats (34°10.4′N, 116°51.8′W; *Ceanothus*), 20–22 Jun 1945, 1948, A. L. Melander (2♀; USNM); Barton Flats, South Fork Camp (34°10.4′N, 116°51.8′W), 3 Sep 1944. A. L. Melander (1♂; USNM); Big Bear Lake (34°14.6′N, 116°54.7′W), 13 May–6 Jul 1942, 1955, A. L. Melander, W. R. Richards (2♂, 2♀; CNC, USNM); Crestline (34°14.5′N, 117°17.1′W), 4 June 1947, A. L. Melander (1♂; USNM); Daggett (34°51.8′N, 116°53.3′W), 14 Apr 1955, W. R. M. Mason (1♀; CNC); Helendale (34°44.6′N, 117°19.5′W), 18 May 1955, W. R. M. Mason, W. R. Richards (3♂, 1♀; CNC); Loma Linda (34°02.9′N, 117°15.7′W), 25 Apr 1949, R. E. Ryckman (1♀; USNM); Lytle Creek (34°15.5′N, 117°30′W), 10 May 1953, A. L. Melander (1♂, 1♀; USNM); Mountain Home (34°06′N, 117°W), 7 July 1945, 29 Sep 1954, A. L. Melander (3♂, 1♀; USNM); New York Mountains (Keystone Canyon, 7 km S Ivanpah; 35°19.4′N, 115°12.6′W; 1650 m), 6–7 Apr 1978, T. Eichling, M. S. Wasbauer (1♀; CSCA); Phelan (11.2 km E Baldy Mesa Road; 34°25.6′N, 117°34.3′W; pan traps), 15–31 May 1982, J. T. Huber (2♂, 1♀; DEBU); South Fork Santa Ana River (34°10.3′N, 116°49.8′W), 18 Jul 1947, A. L. Melander (1♀; USNM); Tecopa (19 km ESE; 35°47.7′N, 116°05.2′W), 13–14 Apr 1978, T. Eichlin, M. S. Wasbauer

(4♀; CSCA); Twenty-nine Palms (32 km NE; 34°10′N, 115°57.3′W), 3 Apr 1969, R. R. Pinger (1♂; USNM); Upland (34°05.8′N, 117°38.9′W; citronella bait trap), 16 May 1950 (1♂; CSCA); Upper Santa Ana River (35°03.5′N, 119°21.8′W), 13 May–26 Jun 1947, 1956, 1957, A. L. Melander (1♂, 2♀; USNM); Verdemont (34°11.6′N, 117°22.1′W), 22 May 1945, A. L. Melander (1♂; USNM); Victorville (34°32.2′N, 117°17.5′W), 2–24 May 1953, 1955, G. A. Marsh, W. R. M. Mason, R. Shuster, W. R. Richards (5♂, 7♀; CNC, USNM). **San Diego:** Anza-Borrego State Park (2.4 km SE of Scissors Crossing; 33°05.5′N, 116°27.3′W; 685 m), 18 Apr 2003, S. D. Gaimari, E. M. Fisher (7♂, 5♀; CSCA); Borrego Springs (33°15.4′N, 116°22.5′W), 30 Apr 1960, M. S. Wasbauer (1♂; CSCA); Borrego (north end Clark Lake; 33°20.3′N, 116°16.7′W; Malaise trap), 23 Mar 1978, P. Adams, J. Slansky, M. S. Wasbauer (1♂, 1♀; CSCA); Borrego State Park, Clark Dry Lake (33°13.7′N, 116°15.7′W), 1 Apr 1977, J. Slansky, M. S. Wasbauer (2♀; CSCA); Borrego (north end Clark Lake; 33°20.3′N, 116°16.7′W), 23 Mar 1978, P. Adams, J. Slansky, M. S. Wasbauer (7♀; CSCA); Borrego, Palm Canyon (33°13.2′N, 116°20.1′W), 3 May 1945, A. L. Melander (2♂; USNM); El Cajon (32°47.7′N, 116°54.8′W; on pupae *Harrisina brillians*), "winter" 1946–47 (1♀; USNM); Imperial Beach (32°35.6′N, 117°07.4′W), 5 Apr 2005, D. Mathis, W. N. Mathis (1♀; USNM); La Jolla (32°50.8′N, 117°16.5′W), 28 Mar 1946, A. L. Melander (1♂; USNM); Lake Henshaw (33°13.9′N, 116°45.6′W), 7 May 1945, A. L. Melander (1♀; USNM); Oak Grove (33°23.1′N, 116°47.4′W), 8 May 1945, A. L. Melander (6♂, 2♀; USNM); Palomar Mountain (33°19.4′N, 116°52.7′W), 14 Jun 1948, A. L. Melander (1♀; USNM); Pauma Valley (33°18.2′N, 116°58.9′W; ex. orange), 29 Aug 1959, C. Johnson (1♀; CSCA); San Diego (32°42.9′N, 117°09.4′W), 28 Jun 1917, J. M. Aldrich (1♂, 2♀; USNM). **San Francisco:** San Francisco, Lake Merced (37°43.3′N, 122°29.8′W), 3 May 1968, P. H. Arnaud, Jr. (1♂; USNM); San Francisco (37°46.5′N, 122°25.4′W), 29 Apr–8 Aug 1929, 1954, P. H. Arnaud, Jr., H. H. Keifer (1♂, 2♀; USNM). **San Luis Obispo:** Morro Bay (35°20.3′N, 120°51.1′W), 16 Jun–27 Jul 1940, 1957, A. L. Melander (1♂, 3♀; USNM). **San Mateo:** Atherton (37°27.7′N, 122°11.9′W), 7 May 1953, 14 Jul 1951, P. H. Arnaud, Jr. (9♂, 6♀; USNM); Redwood City (37°29.1′N, 122°14.2′W), 26 Jun 1946, 27 Apr 1947, 2 May 1953, 23 May 1954, 15 May–1 Jun 1960, P. H. Arnaud, Jr. (7♂, 5♀; USNM). **Santa Barbara:** Santa Cruz Island, Field Station (33°59.8′N, 119°43.6′W; pan traps), 19–22 Mar 1982, J. T. Huber (1♂; DEBU); Santa Cruz Island, between head of Alamos Canyon and Centinela (34°01′N, 119°48.5′W; sweeps of low vegetation near pines), 21 Mar 1982, J. T. Huber (8♂, 5♀; DEBU); Santa Cruz Island, Christy Beach and Canyon (34°01.5′N, 119°52.4′W; pan traps), 22 Mar 1982, J. T. Huber (36♂, 11♀; DEBU); Santa Cruz Island, Water Canyon (35°00.2′N, 119°45.8′W), 17 Jun 1967, R. O. Shuster (1♀; CSCA); Santa Maria (35°55.3′N, 120°06.1′W), 3 Jun 1950 (1♂, 1♀; CSCA). **Santa Clara:** Alviso (37°25.6′N, 121°58.5′W), 13 May 1921, A. H. Sturtevant (1♂; USNM); Palo Alto (37°26.7′N, 122°09.6′W), 3 Apr–26 Sep 1921, A. H. Sturtevant (6♂, 6♀; USNM); Stanford University (37°25.6′N, 122°10.2′W), 12 May 1952, 6 May 1953, 1–29 Apr 1954, 23 Apr–2 May 1961, P. H. Arnaud, Jr. (2♂, 7♀; USNM). **Santa Cruz:** Felton (37°02.1′N, 122°04.4′W), 17–18 May 1947, P. H. Arnaud, Jr. (3♀; USNM); Watsonville (36°54.6′N, 121°45.4′W), 9 May 1921, A. H. Sturtevant (1♂, 3♀; USNM). **Shasta:** Fall River Mills (10 km W; 41°0.3′N, 121°27′W), 5 Apr 1959, M. T. James (1♂; WSU); Redding (40°34.2′N, 122°22′W), 1 Jun 1980, T. R. Haig (1♂; CSCA). **Siskyou:** Granada (41°34.7′N, 122°04.2′W; ex. alfalfa), 25 May 1930, M. L. Jones (1♀; CSCA); McBride Springs Campground (41°21.2′N, 122°17.1′W; 1463–1585 m), Mount Shasta, 20–22 Jul 1965 (4♀; CNC); Shadow Creek (11.25 km W of Cecilville; 41°08.4′N, 123°08′W), 5 Sep 1968, G. M. Buxton, A. B. Gurney (2♀; USNM). **Solano:** Fairfield (38°15′N, 122°02.6′W), 12 Apr 1959, P. H. Arnaud, Jr. (2♂; USNM); Gates Canyon (38°22.9′N, 122°02.2′W; 250–500 m), 14–20 Jun 1994, S. D. Gaimari (1♂; CSCA); Lake Berryessa (1.4 km SW Monticello Dam; 38°30.20′N, 122°06.39′W), 4 Jun 2002, S. D. Gaimari (6♂, 2♀; CSCA); Stebbins Cold Canyon Reserve (38°31′N, 122°06′W; 100 m), 20 May 2003, S. D. Gaimari (1♀; CSCA); Stebbins Cold Canyon Reserve, Hilltop along Blue Ridge (38°33.3′N, 122°06.3′W; 445 m), 20 May 2003, J. Skevington (1♀; CSCA). **Sonoma:** Bodega Marine Station (38°18.4′N, 123°04.1′W), 3 May 1968, D. D. Munroe (2♂, 1♀; CNC); Cotati (38°19.9′N, 122°41.5′W; ex. purple vetch), 13 Jun 1939, S. Lockwood (1♂, 2♀; CSCA); Mesa Grande (38°28.1′N, 123°01.9′W), May 1908, J. P. Baumberger (2♂, ANSP). **Trinity:** Shasta Spring (40°44.1′N, 122°54.7′W), Jul 1915, A. L. Melander (1♀; USNM). **Tulare:** Ash Mountain (36°29.9′N, 118°50′W; 1 km SE, Sequoia National Park Headquarters (flume debris trap), 25 Apr 1984, R. D. Haines (1♂; CSCA). **Ventura:** Wheeler Canyon, Maricopa Road (34°20.1′N, 119°08.4′W), 1 Jun 1958, W. E. Simonds (4♀; CSCA). **Yolo:** Davis (38°32.7′N, 121°44.4′W), 27 Apr 2005, K. A. Williams (1♂; CSCA); Woodland (38°40.7′N, 121°46.4′W; ex. alfalfa), 17 Jun 1930, A. C. Browne (1♀; CSCA).

Colorado. **El Paso:** Manitou (38°51.6′N, 104°55′W), 18 Jun 1940, A. L. Melander (1♂; USNM). **Larimer:** Loveland (40°23.9′N, 105°04.5′W), Aug 1955, H. Stalker (1♀; USNM). **Rio Grande:** South Fork (37°40.2′N, 106°38.4′W; 2440 m), 20 Jun 1972 (1♂, 1♀; USNM).

Idaho. **Ada:** Boise (43°36.8′N, 116°12.2′W; sawmill window), no date given, J. M. Aldrich (1♂, 3♀, USNM). **Bonner:** Priest Lake (48°29.4′N, 116°54.2′W), 3 Sept 1919, A. L. Melander (1♀; USNM). **Elmore:** Glenns Ferry (42°57.3′N, 115°18.1′W; *Filipes rosea*), 14 Jun 1927 (2♀; USNM). **Gooding:** Gooding (1.6 km NE; Wood River; 42°56.3′N, 114°42.8′W), 6–7 Jul 1980, M. S. Wasbauer (1♀; CSCA); Wendell (42°46.4′N, 114°42.3′W), 22 May 1931, D. E. Fox (1♀; USNM). **Jerome:** Jerome (42°43.5′N, 114°31.1′W), 10 Jun 1930 (1♀; USNM). **Kootenai:** Fourth of July Canyon (47°33.6′N, 116°26.3′W), 27 Jul 1918, A. L. Melander (1♂; USNM); Coeur d′Alene (47°40.7′N, 116°46.8′W), 27 Jul–24 Aug 1916, 1944, A. L. Melander (2♀; USNM); Harrison (16 km NE; 47°28′N, 116°46′W), 24–28 Jul 1977, W. J. Turner (1♀; WSU). **Latah:** Indian Hills area of Moscow (46°44.2′N, 117°01′W), 3 Jul 1993, R. S. Zack (1♀; WSU); Moscow Mountain (46°48.2′N, 116°52.1′W), 8 Jun–7 Jul 1912, 1915, 1918, 1919, 1921, 1948, M. T. James, A. L. Melander (11♂, 7♀; USNM, WSU); Moscow (46°44′N, 117°01′W; on parsnip flowers), 1 Jun–2 Jul 1912, 1916, 1970, J. M. Aldrich, W. F. Barr (9♂,83♀; DEBU, USNM); Potlatch (46°55.3′N, 116°53.9′W), 4 Sept 1912, J. M. Aldrich (2♂, 2♀; USNM); St. Joseph National Forest, Giant White Pine Campground (47°0.6′N, 116°40.7′W), 16 Aug 1970, W. B. Garnett (1♂; WSU); Viola (46°50.3′N, 117°01.5′W), 26 Jun 1912, J. M. Aldrich (1♂; USNM); Yale (46°51.7′N, 116°41.8′W), 10 Sept 1912, J. M. Aldrich (1 ♀; USNM). **Nez Perce:** Craig Mountain (46°04.6′N, 116°51.1′W), 8 Jun 1918, A. L. Melander (1♂; USNM); Lewiston (46°27.8′N, 116°58.6′W), 21–22 Jun 1948, 1954, R. R. Sanders, A. H. Sturtevant (7♂, 28♀; USNM); Lewiston (13 km NW, top of grade; 46°28′N, 116°59′W), 30 Jun 1975, W. J. Turner (1♂; WSU). **Washington:** Weiser (Route 95; 44°15.1′N, 116°58.2′W), 3 May 1990, R. S. Zack (1♀; USNM).

Maryland. **Montgomery:** Plummers Island (38°58.2′N, 77°10.6′W), 2 Jun 1912, W. L. McAtee (1♀; USNM). **Prince George's:** Laurel (39°06.1′N, 76°54′W), 16–24 May 1967, D. R. Smith (2♀; USNM).

Montana. **Glacier:** Glacier Park, Two Medicine Lake (48°28.6′N, 113°23.3′W), 3 Aug 1935, A. L. Melander (1♂; USNM). **Sanders:** Perma (47°21.8′N, 114°35.1′W), 25 Aug 1918, A. L. Melander (1♂; USNM); Thompson Falls (47°35.7′N, 115°20.8′W), 25 Aug 1918, A. L. Melander (1♂; USNM). **Sheridan:** Medicine Lake (48°30.1′N, 104°30.3′W), 9 Jun 1969, W. W. Wirth (2♀; USNM).

Nevada. **Clark:** Las Vegas (36°10.5′N, 115°08.2′W), 16 Apr 1932, E. W. Davis (1♀; USNM); Overton (36°32.6′N, 114°26.8′W), 15 Oct 1929, D. E. Fox (1♀; USNM). **Ormsby:** Clear Creek Campground (39°06.9′N, 119°53.4′W; 1980 m), 27 Jul 1968, D. D. Munroe (1♀; CNC). **Washoe:** Indian School, Pyramid Lake (39°49.9′N, 119°21.5′W), Jul 1911, J. M. Aldrich (1♀; USNM); Reno (39°31.8′N, 119°48.8′W), 28 Aug 1915, 12 Jul 1952, H. G. Dyar (2♂; USNM).

New Mexico. **Bernalillo:** Tijeras (10.2 km S; 35°05′N, 106°22.5′W; 730 m), 23–26 Aug 1975, S. Peck (1♂; DEBU). **Catron:** Gila National Forest, riparian zone, Whitewater Creek Canyon (33°18.9′N, 108°53.2′W), 30 May 1991, B. J. Sinclair (1♀; CNC); Luna (10 km S; 33°48.9′N, 108°57.3′W; 2440 m; pond, pine forest, Malaise trap), 9–14 Jul 1979, S. Peck, J. Peck (1♀; DEBU); Luna (13 km SE; 33°48.9′N, 108°57′W; 2690 m), 9–14 Jul 1979, S. Peck, J. Peck (3♂, 1♀; DEBU); San Francisco River (8 km W Luna; 35°05′N, 106°23′W; 2255 m), 9–14 Jul 1979, S. Peck, J. Peck (3♂, 7♀; DEBU). **Grant:** Cherry Creek, Pinos Altos (32°51.8′N, 108°13.3′W), 22 Jun 1953, W. W. Wirth (1♂, 1♀; USNM); Gila National Forest, near Lake Roberts (33°02′N, 108°10′W; dry stream bed), 28 May–5 Jun 1991, J. E. Swann (9♂, 5♀; DEBU); Gila National Forest, near Lake Roberts (33°02′N, 108°10′W), 29 May 1991, J. E. Swann (3♂, 1♀; DEBU). **Santa Fe:** Glorieta Baldy (35°39.1′N, 105°48′W; 3290–3600 m), 19 Jun–4 Jul 1979, S. Peck, J. Peck (3♀; DEBU); Santa Fe (22.5 km NE; 35°42′N, 105°57′W, 2925 m), 18 Jun–3 Jul 1979, S. Peck, J. Peck (1♀; DEBU). **Socorro:** Magdalena Mountains, Water Canyon (24 km W Socorro; 34°02.9′N, 107°11.1′W; 2200 m), 2 Oct 1982, V. Hornoff (2♀; CNC); Water Canyon (32 km W Socorro; 33°51.4′N, 107°25′W; 2135 m), 28 Jun–7 Jul 1979, S. Peck, J. Peck (3♂, 7♀; DEBU); South Baldy Peak (33°59.5′N, 107°11.3′W; 3170 m), 28 Jun–7 Jul 1979, S. Peck, J. Peck (1♂, 4♀; DEBU). **Torrance:** Manzano Red Canyon Camp (34°36.1′N, 106°21.8′W; 2990 m), 17–30 Jun 1979, S. Peck, J. Peck (1♂, 3♀; DEBU).

Oregon. **Baker:** Cougar Creek (60 km SE Union; 44°56.9′N, 117°24.9′W; 1244 m), 28 Jun 1977, E. J. Davis (1♀; WSU); Wetmore Campground (44°31.5′N, 118°18.1′W; Malaise trap), 29 Jun–5 Jul 1965 (2♂; CNC). **Benton:** Corvallis (44°33.9′N, 123°15.7′W), no date given, R. W. Lauderdale (1♀; USNM); Corvallis (44°33.9′N, 123°15.7′W), 2–9 Jul 1972, G. C. Steyskal (3♂, 4♀,USNM); Corvallis (44°33.9′N, 123°15.7′W), 18 May 1972, Wayne N. Mathis (2♀;

DEBU); Corvallis (44°33.9′N, 123°15.7′W), 10 Jul 1935, E. Gray (1♂; DEBU); Finley National Wildlife Refuge (44°24.6′N, 123°19.5′W), 3 Jul 1972, G. C. Steyskal (1♂; USNM). **Coos:** 7-Devils State Recreation Site (43°14.2′N, 124°23.4′W; beach), 30 Jul 2005, D. Mathis, W. N. Mathis (3♂; USNM). **Curry:** Pistol River (4.8 km SE; 42°16.6′N, 124°23.7′W), 28 Jun 1972, G. C. Steyskal (1♀; USNM); Gold Beach (12.9 km N; 42°24.5′N, 124°25.3′W), 29 Jun 1972, G. C. Steyskal (5♂; USNM). **Douglas:** Elkton (13 km W; 43°38.3′N, 123°34.1′W), 16 Jun 1971, G. C. Steyskal (1♂,3♀; USNM). **Harney:** Pike Creek (42°34.5′N, 118°31.7′W; 1320 m), 7 Aug 2005, D. Mathis, W. N. Mathis (1♂; USNM). **Hood River:** Hood River Rapids (45°42.9′N, 121°30.7′W), 29 Jul 1921, A. L. Melander (1♀; USNM); Mount Hood (45°32.3′N, 121°34.1′W; 915 m), 29 Jul 1921 (2♂; USNM). **Klamath:** Klamath Falls (42°13.5′N, 121°46.9′W), 22 Jun 1971, G. C. Steyskal (3♂, 5♀; USNM). **Lane:** Florence (3.2 km S; 43°58.9′N, 124°06′W), 7 Jul 1971, G. C. Steyskal (4♂; USNM); Willamette National Forest (44°15′N, 122°0.1′W; in canopy of *Pseudotsuga menziesii*), 1976 (no other date given), Voegtlin, Christy (2♂, 1♀; USNM). **Lincoln:** Waldport (4 km N; 44°26′N, 120°04.1′W), 1 Jun 1971, P. W. Oman (1♂, 1♀; DEBU). **Marion:** Aurora (45°13.9′N, 122°45.4′W), 20 Jun 1925, A. L. Melander (2♀; USNM). **Morrow:** Heppner (Willow Creek; 45°21.2′N, 119°33.5′W), 18 Jun 1991, R. S. Zack (2♂, 7♀; WSU). **Polk:** Dallas (44°55.2′N, 123°19′W), 22 Aug 1951 (1♂, 2♀, USNM). **Umatilla:** McNary, McNary Dam Wildlife Area (453°56.4′N, 119°17.9′W), 11 Aug 1993, R. S. Zack (7♂, 17♀; WSU); Umapine (45°58.6′N, 118°29.8′W), 21 Jun 1921, A. L. Melander (1♂, 2♀; USNM). **Union:** Jordan Creek (SSW La Grande; 45°18.6′N, 118°16.7′W; 1475 m), 15–21 Jun 1975, E. J. Davis (1♀; WSU). **Wallowa:** Troy (45°56.8′N, 117°27.1′W), 10 Aug 1926, A. L. Melander (1♀; USNM); Wallowa Lake State Park (9.6 km S Enterprise; 45°16.1′N, 117°12.7′W; Malaise trap with dry ice; 3000′–4000′ [915–1220 m]), W. J. Turner (6♂, 1♀; WSU).

Texas. **Brewster:** Big Bend National Park, Dugout Wells (29°16.3′N, 103°08.1′W; 915 m), 13 May 1959, J. F. McAlpine (2♂; CNC).

Utah. **Cache:** Logan Canyon (41°44.4′N, 111°47.6′W), 2 Jul–19 Aug 1970, 1976, G. F. Knowlton (1♂, 2♀; USNM, WSU). **Duchesne:** Uinta Mountains, Rocky Sea Pass (40°41.7′N, 110°46.2′W; 3434 m), 30 Jul–12 Aug 1979, S. Peck, J. Peck (1♀; DEBU). **Grand:** 15 km N Green River (39°7′N, 110°6.6′W), 29 May 2007, D. Mathis, W. N. Mathis (1♀: USNM). **Kane:** Sand Spring-Coral Pink Sand Dunes (37°4.6′N, 112°39.9′W), 16 May 2001, D. Mathis and W. N. Mathis (4♂; USNM). **Utah:** Goshen Hot Springs (39°57.8′N, 111°51.2′W), 18 Apr 2003, W. N. Mathis, T. Zatwarnicki (1♂; USNM).

Washington. **Adams:** Lake Paha (46°58.1′N, 118°34.4′W), 20 Jul 1920, R. C. Shannon (1♂; USNM); Lind (46°58.3′N, 118°36.9′W), 5 Jun 1990, R. S. Zack (3♂, 8♀; WSU); Lind (NNE; Washington State University Experimental Station; 46°58.3′N, 118°36.9′W), 5 Jun 1990, R. S. Zack (8♀; WSU); Ritzville (47°07.7′N, 118°22.8′W), 15 Jun–8 Jul 1920, 1936, P. W. Oman, R. C. Shannon (1♂, 1♀; USNM); Sand Hills Park (19.5 km W Washtucna; 46°46.8′N, 118°31.6′W), 13 Jun 1989, R. S. Zack (1♂, 3♀; WSU). **Asotin:** Asotin Creek (46°20.6′N, 117°03.2′W), 11 May 1924, A. L. Melander (1♀; USNM); Cloverland (13 km S; 46°15′N, 117°15′W; Blue Mountains), 30 Jun 1956, M. Coffey (1♂, 2♀; WSU); Fields Spring State Park (46°04.9′N, 117°10.2′W), 31 Jul 1971, W. J. Turner (1♀; WSU); Grande Ronde (46°04.8′N, 116°58.8′W), 10 Jun 1980, G. C. Steyskal (2♂, 2♀; USNM); Grande Ronde (27.4 km S Anatone; 46°04.8′N, 116°58.8′W; 595 m), 15 Jun 1977, W. J. Turner (1♂, 1♀; WSU); Silcott (46°24.9′N, 117°11.8′W), 14 Jun 1980, G. C. Steyskal (4♂, 4♀; USNM); Snake River, opposite Clarkston (46°25′N, 117°02.7′W), 3 May 1925, A. L. Melander (1♂; USNM). **Benton:** Kennewick (46°12.7′N, 119°08.2′W), 20 May–7 Jun 1916, 1921, A. L. Melander (4♂, 6♀; USNM); Prosser (46°12.4′N, 119°48′W), 24 Apr 1951, E. Klotermeyer (1♂; WSU); Richland (46°17.3′N, 119°17.5′W), 6 Jun 1974, N. E. Woodley (2♀; WSU); West Richland (46°17.1′N, 119°17.2′W), 4 Jun 1975, N. E. Woodley (2♀; WSU). **Chelan:** Cashmere (47°31.3′N, 120°28.2′W), 29 May 1917, A. L. Melander (1♀; USNM); Telma (47°50.6′N, 120°48.9′W; Lake Wenatchee), 18 Jul 1972, W. B. Garnett (1♀; WSU); Wanatchee (15 km SE; Squilchuck State Park 47°18.5′N, 120°22.4′W), 17 Jun 1973, W. J. Turner (1♂; WSU); Winesap (47°45.6′N, 120°12′W), 11 Jun 1942, R. D. Shenefelt (1♂; WSU). **Clallam:** Olympia National Park, Elwha River (48°09′N, 123°33.6′W), 6 Jul 1968, W. W. Wirth (1♀; USNM); Port Angeles (48°07.1′N, 123°25.8′W), 12 Jul 1942, R. D. Shenefelt (1♂; WSU). **Clark:** Vancouver (45°38.1′N, 122°36′W), 2 Jun–10 Jul 1970 (4♂, 2♀; WSU). **Cowlitz:** Woodland (45°54.3′N, 122°48.6′W), 23 May 1910, A. L. Melander (1♀; USNM). **Ferry:** Republic (14.5 km S; Sanpoil River Hwy 21; 47°56.9′N, 118°40.8′W; Malaise trap with dry ice; 650 m), 23 Jul 1975, W. J. Turner (1♂, 5♀; WSU); Republic (15 km S, 10-Mile Campground; 48°35.1′N, 118°09′W; Malaise trap with dry ice), 7 Jul 1972, W. J. Turner, W. B. Garnett (2♀; WSU); Republic (52 km E, Colville National Park, Sherman Creek; 48°35.1′N, 118°08.46′W; Malaise trap with dry ice),

27–28 Jul 1973, W. J. Turner, D. Corredor (1♀; WSU). **Franklin:** Eltopia (16 km W; 46°27.5′N, 119°02′W), 29 May 1957, E. F. Dailey (12♀; WSU); Eltopia (48 km N; 46°50′N, 119°02′W), 29 May 1957, E. F. Dailey (12♂, 16♀; WSU); Port of Pasco (46°12.6′N, 119°02.9′W), 6 Jun 2006, D. Mathis, W.N. Mathis (1♀; USNM). **Garfield:** Central Ferry (46°37.6′N, 117°49.1′W), 7 Jun 1970 (2♀; WSU); Lower Granite Dam (16 km W; 46°39.6′N, 117°25.9′W; sand dunes), 12 Jul 1993, R. S. Hanley (1♀; WSU). **Grant:** Burke (10.5 km N, Highway 7; 47°06′N, 119°52.5′W), 30 Apr (1♀; WSU); Columbia Natural Wildlife Refuge (5 km S O'Sullivan Dam, Crab Creek; 47°01.2′N, 119°19.3′W), 20 Jun 1975, N. E. Woodley (1♀; WSU); Coulee City (47°36.7′N, 119°17.5′W), 3 Sep 1920, A. L. Melander (1♀; USNM); O'Sullivan Dam (46°59′N, 119°17.5′W), 23 May 1954, M. T. James (4♀; USNM, WSU); Trinidad (10 km NW; 47°14′N, 120°01′W), 30 May 1957, E. F. Dailey (1♂, 5♀; WSU); Winchester (47°14.9′N, 119°43.2′W), 5 Jul 1950, D. Malcolm (1♂; WSU). **Grays Harbor:** Westport (46°53.4′N, 124°06.2′W), 28 Jun 1988, D. Mathis, W. N. Mathis (4♂, 2♀; USNM). **Jefferson:** Brinnon (47°40.8′N, 122°53.9′W; Duckabush Creek), 3 Aug 1972, W. J. Turner (1♀; WSU); Fort Worden, near Port Townsend (48°07′N, 122°45.6′W), 15 Jun 1971, D. N. Ferro, J. A. Novak (7♂, 10♀; WSU); Hoh (47°45′N, 124°24.6′W), 4 Aug 1972, W. J. Turner, W. B. Garnett (1♀; WSU); Port Townsend (48°07′N, 122°45.6′W), 16 Jun 1971, W. Wiebers (1♂, 6♀; WSU); Quilcene (47°49.3′N, 122°52.6′W), 16 Aug 1910, A. L. Melander (2♀; USNM). **Kittitas:** Cle Elum (47°11.7′N, 120°56.3′W), 17 Jul 1972, W. B. Garnett (1♂, 1♀; USNM); Ellensburg (11 km S; 46°58′N, 120°32′W), 18 Jul 1957, E. F. Dailey (1♂; WSU); Hudson Creek (46°56′N, 120°50.5′W), 29 Jun 1924, A. L. Melander (1♂; USNM); Liberty (47°15.2N, 120°39.9′W; Williams Creek), 17 Jun 1972, W. B. Garnett, W. J. Turner (1♂, 4♀; WSU); Swauk Meadow (47°19.5N, 120°34.8′W), 17 Jun 1972, W. B. Garnett, W. J. Turner (1♀; WSU). **Klickitat:** Bickleton (45°59.9′N, 120°18′W), 26 Jun 1917, A. L. Melander (1♀; USNM); Goldendale (45°49.2′N, 120°49.3′W), 23 Jul 1921, A. L. Melander (9♂, 1♀; USNM); Goldendale (27 km ENE; 45°50′N, 120°48′W), 17 Apr 1991, R. S. Zack (1♀; WSU); Husum (45°48′N, 121°29.2′W), 28 Jun 1917, A. L. Melander (2♀; USNM); Klickitat River, Glenwood Road (45°41.8′N, 121°17.5′W), 23 Jul 1921, A. L. Melander (1♂; USNM). **Mason:** Shelton, Walkers Park (47°17′N, 122°55.5′W), 21 Jul 1917, A. L. Melander (1♀; USNM). **Okanogan:** Carlton (8 km SE; 48°14.9′N, 120°07′W; Malaise trap with dry ice), 19 Jul 1972, W. J. Turner (1♂, 4♀; WSU); Conconully (14.5 km NW, Salmon Meadows; 48°39.3′N, 119°50.3′W; Malaise trap with dry ice, 1372 m), 23–26 Jul 1975, W. J. Turner (2♀; WSU); Little Goose Lake (11.5 km SE Okanogan; 48°16′N, 119°29′W), 22 Jul 1983, R. D. Akre, R. S. Zack (1♀; WSU); Okanogan (48°21.2′N, 119°35′W), 20 May 1924, A. L. Melander (2♀; USNM); Omak (48°24.7′N, 119°31.7′W), 19 May 1916, A. L. Melander (1♂; USNM); Oroville (48°56.4′N, 119°26.1′W), 1 May 1912, A. L. Melander (2♀; USNM); Sweat Creek Campground (48°40.9′N, 118°54.4′W), 7 Jul 1972, W. J. Turner (2♂; WSU); Twisp (6.5 km E; Route 20; 48°29.8′N, 120°07.3′W; Malaise trap CO2), 19 Jul 1972, W. J. Turner, W. B. Garnett (2♀; WSU); Okanogan National Park Highway 30, 28 Jul 1973, W. J. Turner (2♀; WSU); Wauconda (8 km E; 48°43.6′N, 118°58′W; Route 30), 7 Jul 1972, W. J. Turner (1♂, 2♀; WSU); Winthrop (22.5 km N, near Chewack Campground; 48°51.5′N, 120°01.5′W), 19 Jul 1972, W. B. Garnett, W. J. Turner (1♂, 4♀; WSU). **Pacific:** Fort Canby State Park (46°17.5′N, 124°04.3′W), 11–29 Jun 1971, 1988, D. Mathis, W. N. Mathis, W. J. Turner (2♂, 1♀; USNM, WSU); Francis (46°32.5′N, 123°30′W), 21 Jun 1989, R. S. Zack (1♂; WSU); Seaview (upper beach; 46°20′N, 124°03.3′W), 21 Jun 1989, R. S. Zack (3♂, 2♀; WSU). **Pierce:** Tacoma (47°15.2′N, 122°26.7′W), 29 Jul 1917, A. L. Melander (1♂, 3♀; USNM); Tahoma Creek, Mount Rainer (46°44.2′N, 121°54.3′W), 25 Jul 1922, A. L. Melander (1♀; USNM). **San Juan:** Friday Harbor (48°32′N, 123°01′W), 11 Jul 1966, W. Baker (1♀; WSU). **Skagit:** Rockport State Park (12 km E Concrete; 48°29.3′N, 121°36.9′W), 16–17 Jun 1971, J. A. Novak (1♂, 4♀; WSU). **Spokane:** Dartford (47°47.1′N, 117°25′W), 22 Jun–22 Aug 1970, R. D. Gray (5♀; WSU); Mt. Spokane State Park, Burbling Creek on Day-Spokane Road (47°55.5′N, 117°07′W; 1143 m), 26 Jun 1978, W. J. Turner (1♂; WSU); Mica (47°33.4′N, 117°12.7′W), 14 Jul 1918, A. L. Melander (1♂; USNM); Valleyford (47°31.2′N, 117°16.2′W), 19 Jun 1919, A. L. Melander (1♂; USNM). **Stevens:** Chewelah (1.6 km W, Rt. 395; 48°16.6′N, 117°42.9′W; Malaise trap with dry ice), 6 Jul 1972, W. B. Garnett, J. Turner (2♂, 4♀; WSU); Chewelah (11 km SE, Cottonwood Creek; 48°13.7′N, 117°42.4′W; Malaise trap with dry ice), 6 Jun 1972, W. B. Garnett, J. Turner (6♂, 10♀; WSU); Colville (48°32.8′N, 117°54.3′W), 21 Jun 1920, R. C. Shannon (10♂; WSU); Colville (6.5 km S, Route 395; Colville River; 48°34.4′N, 118°06.4′W; Malaise trap with dry ice), 6 Jul 1972, W. B. Garnett, W. J. Turner (2♂; WSU); Deer Lake (8 km NE; 48°06.8′N, 117°35.4′W; Malaise trap with dry ice; 975 m), 11–13 Jul 1975, W. J. Turner (1♂, 2♀; WSU); Deer Lake (3.2 km SE; 48°06′N, 117°35′W; Malaise trap), 27–28 Jul 1973, W. J.

Tuner, D. Corredor (3♀; WSU); Kettle Falls (48°36.7′N, 118°03.4′W), 3 May 1912, A. L. Melander (1♀; USNM). **Thurston:** Puget (47°08.8′N, 122°47.6′W), 4 Jul 1925, A. L. Melander (1♀; USNM). **Walla Walla:** Burbank (6.2 km S; 46°11′N, 119°01′W), 14 Apr 1973, W. J. Turner (2♂; WSU); Lowden (46°03.4′N, 118°35.1′W), 23 Jun 1921, A. L. Melander (1♀; USNM); Touchet (5 km E; 46°02.4′N, 118°40′W), 4 Jun 1957, E. F. Dailey (1♂; WSU); Walla Walla, Mill Creek (46°02.3′N, 118°28.7′W), 2–6 Jul 1922, A. L. Melander (1♂, 4♀; USNM). **Whatcom:** Mt. Baker, Nooksack River (48°55.7′N, 122°19.3′W), 11 Aug 1925, A. L. Melander (1♀; USNM); Silver Fir Campground (48°54.2′N, 121°42.1′W; dry ice Malaise trap), 8–11 Aug 1974, W. J. Turner (1♂; WSU). **Whitman:** Albion (46°47.6′N, 117°15′W), 12 Jul 1948, M. T. James (1♂; WSU); Almota (46°42.2′N, 117°28.2′W), 14 Jun 1980, A. L. Melander, G. C. Steyskal (4♂, 7♀; USNM, WSU); "Big" Almota Canyon (46°42.1′N, 117°28′W; Malaise trap with dry ice), 25 Jul 1973, D. Corredor, S. Berkencamp (2♂, 5♀; WSU); Clarkston (46°27.5′N, 117°06.1′W), 15 May–24 Jun 1912, 1924, 1949, J. M. Aldrich, C. C. Esselbaugh, A. L. Melander (6♂, 6♀; USNM, WSU); Colfax (8 km SE; 46°52′N, 117°29′W), 25 May 1989, R. S. Zack (18♂; 4♀; WSU); Colton (46°34.1′N, 117°07.7′W), 9 Jun 1948, C. C. Shelton (31♂, 60♀; WSU); Colton (16 km SW; Steptoe Canyon; 46°27.1′N, 117°12.4′W; 275 m), 29 Jul–3 Aug 1974, 1975, W. J. Turner (3♂; 1♀; WSU); Colton (13 km SW, Steptoe Canyon; 46°27.1′N, 117°12.2′W; Malaise trap with dry ice), 26 Jul 1973, D. Corredor (4♂, 6♀; WSU); Colton (46°34.1′N, 117°07.7′W; Virgin Prairie Population Study Project), 9 Jun 1948, C. C. Shelton (42♂, 57♀; WSU); Kamiak Butte (46°51.8′N, 117°10′W), 13 Jul 1912 (2♂; USNM); LaCrosse (5 km E; 46°48.9′N, 117°52.9′W), 13 Jun 1989, R. S. Zack (8♂, 29♀; WSU); Lyle Creek (13 km SW Pullman; 46°42.2′N, 117°28.2′W), 22–29 May 1973, W. J. Turner (24♂, 35♀; WSU); Lyle Grove (13 km SW Pullman; 46°42.2′N, 117°28.2′W), 4 Jun 1994, R. S. Hanley (1♀; WSU); Pullman (46°43.9′N, 117°10.8′W), 11 Jul 1988, D. Mathis, W. N. Mathis (1♀; USNM); Pullman (46°43.9′N, 117°10.8′W), 26 May–10 Aug 1908, 1911, 1912, 1921, 1922, 1924, 1955, 1956, V. Argo, C. F. Baker, M. Coffey, G. D. Gill, W. M. Mann, A. L. Melander, W. J. Turner (27♂, 67♀; USNM, WSU); Pullman (2 km E; 46°43.9′N, 117°10′W; 740 m), 12 Aug 1994, R. S. Hanley (1♂, 3♀; WSU); Pullman, near SCS Pond (46°43.9′N, 117°10.8′W; Malaise trap), 5 Jun 1972, J. F. MacDonald (1♂; WSU); Pullman (7 km ESE on Wilber Gulch Road; 46°42′N, 117°09′W; 750 m), 13 Jul 1994, R. S. Hanley (4♂; WSU); Rosalia (47°14.2′N, 117°22.3′W; on cow excrement), 13 Jun 1956, M. Coffey (1♂; WSU); Steptoe Butte (6.5 km NE Steptoe; 47°02′N, 117°17.8′W), 11 Jun 1989, R. S. Zack (2♂, 3♀; WSU); Union Flat (46°49.6′N, 117°59.9′W), 16 Jun–19 Jul 1916, A. L. Melander (3♀; USNM); Uniontown (46°32.2′N, 117°05.2′W), 26 Jun 1932, J. M. Aldrich (1♂, 2♀; USNM); Wawawai (46°38.2′N, 117°22.8′W), 7 May–28 Jul 1911, 1915, 1956, 1957, R. H. Alvarado, G. D. Gill, A. L. Melander (85♂, 154♀; USNM, WSU); Whelan (46°47′N, 117°07′W), 29 Jun 1998, R. Sanders (1♂, 1♀; WSU). **Yakima:** American River (46°58.5′N, 121°09.7′W; Malaise trap; 1036 m), 24 Jul–24 Aug 1976, W. J. Turner (1♂, 1♀; WSU); Grandview (46°15′N, 119°54.1′W), 29 Jun 1950, D. Malcolm (2♂; WSU); Mount Adams (46°12.2′N, 121°29.4′W), 15 Apr–24 Jul 1918, 1921, A. L. Melander, A. L. Mota (6♂, 7♀; USNM); North Yakima (46°36.6′N, 120°23.3′W), 14 May 1903, E. Jenne (1♀; USNM); Prosser (8 km W, Route 2; 46°42.1′N, 119°48′W), 14 Jun 1989, R. S. Zack (1♀; WSU); Tieton Ranger Station (13 km SW; 46°39.4′N, 121°07.8′W; Malaise trap with CO2), 24 Jun–16 Jul 1972, 1974, W. J. Turner (2♂, 2♀; WSU); Yakima (46°36.1′N, 120°30.4′W), 22 May–18 Jul 1917, 1920, A. L. Melander (3♂, 2♀; USNM); Zillah (46°24.1′N, 120°15.7′W), 3 Jun 1957, E. F. Dailey (1♂; WSU).

Wyoming. **Teton:** Pilgrim Creek (9.5 km N Jackson Lake Junction; 43°52′N, 110°33.2′W, 2225 m), 18–19 Jul 1994, E. M. Fisher (1♀; CSCA). **Uinta:** Mountain View (8.5 km E; 41°16.1′N, 110°20′W; 2075 m), S. Peck, J. Peck (1♀; DEBU).

Distribution (Figure 126). Nearctic: Canada (Alberta, British Columbia), Mexico (Baja California, *Baja California Sur*), United States (Arizona, California, Colorado, Idaho, Maryland, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, Wyoming).

Remarks. Hackman (1970) examined and commented on Fallén's type material at the Riksmuseum, Stockholm. On the basis of his key, comments, and illustrations, it is clear that the North American specimens identified by Melander and others as *T. frontalis* (Fallén) are not conspecific with that examined by Hackman. Hackman (p. 129) noted that in males the "Foretibia [is] dark except at base, fore basitarsus yellow, third basitarsus dark and moderately swollen." Among specimens we have examined, there is variation in the coloration of the fore tibia and fore basitarsus, ranging from black to yellow, while the hind basitarsus in always yellow and is slightly to moderately swollen. The drawings of the male terminalia only vaguely resemble the terminalia of our specimens especially in the configuration of the complex aedeagus and

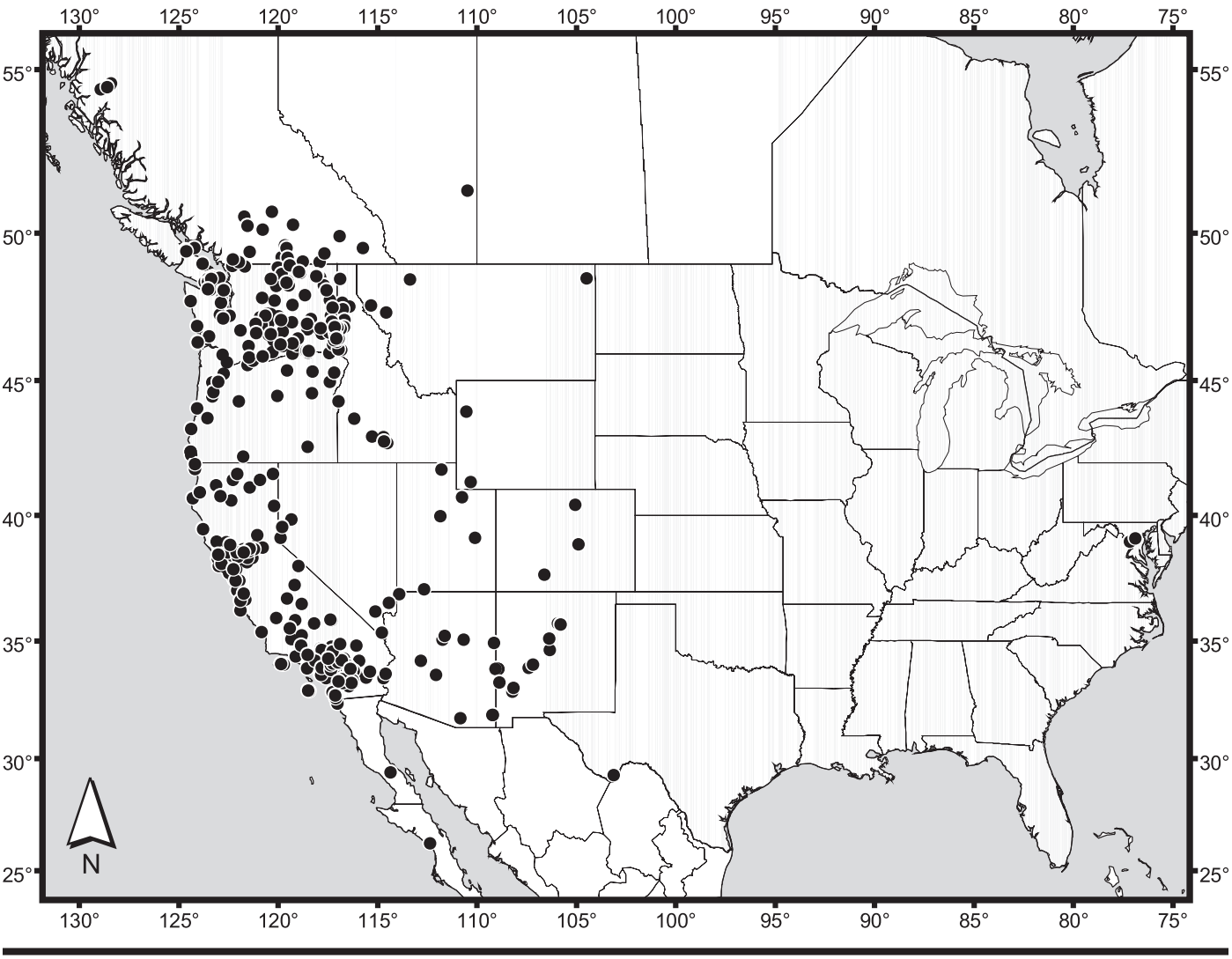


FIGURE 126. Distribution map for *Trixoscelis flavida* Melander.

the surstylus. His drawing of the aedeagus (his figure 17) clearly shows the presence of several dark, thick spicules on the mid-dorsal surface similar to those found on the aedeagus of *T. plebs*. This completely rules out *T. frontalis* as being the identity of the North American specimens because they do not have this distinctive feature. We have examined a specimen from Switzerland (Valais) that closely fits Hackman's comments and illustration of *T. frontalis* and this further convinces us that the North American species is not the true *T. frontalis* described by Fallén. Further, we have examined specimens from Norway that seem to be near the true *T. frontalis* but do not match the North American material. Until an extensive study of Palearctic material can be performed, especially type specimens, the only valid name for the Nearctic material would seem to be Melander's *T. flavida* based on structures of the male terminalia.

The color of the basal flagellomere exhibits sexual dimorphism in this species. Females have a brown area in the center while males show an entirely yellow basal flagellomere. Additional variation can be observed in the general habitus of specimens of this species and rarely the fore femur of some males may be entirely yellow. Some specimens can be quite pale and fragile while others are quite robust with full coloration as described above. It seems that Melander mistook pale and fragile specimens

as a separate species from his "*T. frontalis*" and named them *T. flavida*.

Trixoscelis lagunaensis Foster and Mathis, new species

FIGURES 63, 127–128

DIAGNOSIS. Body gray; thorax with two brown vittae between dorsocentral setae and along postprotonal and notopleural line, 4 rows of acrostichal setae; wing hyaline, not smoky and without infuscations; antenna mostly yellow, slightly brownish tint in center of basal flagellomere; vertex yellowish to light gray microtomentose; gena short, gena-to-eye ratio only 0.19–0.22; epandrium small and indistinct in relation to remainder of abdomen in undissected specimens.

DESCRIPTION. Body length 1.90–2.33 mm.

Head: Eye higher than wide; ocellar triangle light gray microtomentose; frons bare, yellow becoming darker dorsally, parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput gray microtomentose with 1–2 rows of short dorsoclinate setulae; antenna mostly yellow except brown on dorsal half of basal flagellomere; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.19–0.22, white microtomentose, bearing 1 row of 2–3 short ventroclinate setae along ventral edge in addition to a pair of stronger convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum uniformly gray microtomentose with two indistinct brown vittae between dorsocentral setae and along postprotonal and notopleural line, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 somewhat irregular rows; apical scutellar setae about twice length of scutellum. Anepisternum with brownish coloration along dorsal half or so, mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing hyaline with brown veins. Halter white. Forecoxa grayish, fore femur dark brown to black, slightly swollen; all other femora, tibiae and tarsi yellow except fifth tarsomere darker, male hind basitarsus slightly swollen; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces

Abdomen: Uniformly dark gray microtomentose except extreme posterior edges of sternites lighter; evenly setose. Male terminalia (Figures 127, 128): Epandrium small and indistinct in relation to remainder of abdomen in undissected specimens; surstylus (Figure 127) short, robust, with dorsal curvature, rounded distally, with few long, rather weak setae on dorsal surface, pre- and postgonites (Figures 127, 128) fused into one boot-shaped structure, spatulate ventrally with row of short but strong setae along ventral margin; aedeagus complex (Figure 127) sclerotized. Female terminalia: Seventh tergite and sternite forming strong, tight ring; spermathecae square-cylindrical; eighth sternite with setaceous lateral lobes; hypoproct bare; epiproct with two weak setulae.

TYPE MATERIAL. The holotype male is labeled "Laguna Beach [CAL]IFORNIA 28 Mar 35 ALMelander/ ALMelander Collection 1961 [green stippling on right side]/HOLOTYPE ♂ *Trixoscelis lagunaensis* USNM Foster & Mathis [red]/USNM ENT 00118087 [plastic bar code label]." The holotype is double mounted (pinned from ventral side with a minuten mounted in a cardboard square), is in excellent condition (abdomen removed and dissected; structures in an attached microvial), and is deposited in the USNM. Paratypes are as follows:

MEXICO. *Baja California Sur.* Arroyo San Gregorio (13 km WNW of La Purísima; 26°13.6′N, 112°21.8′W), 24 Apr 1983, M. S. Wasbauer (2♂; CSCA). Rancho Tablon, Guillermo Prieto (21 km SW; 27°50′N, 113°19′W), 14–17 Apr 1983, M. S. Wasbauer (1♂, 2♀; CSCA).

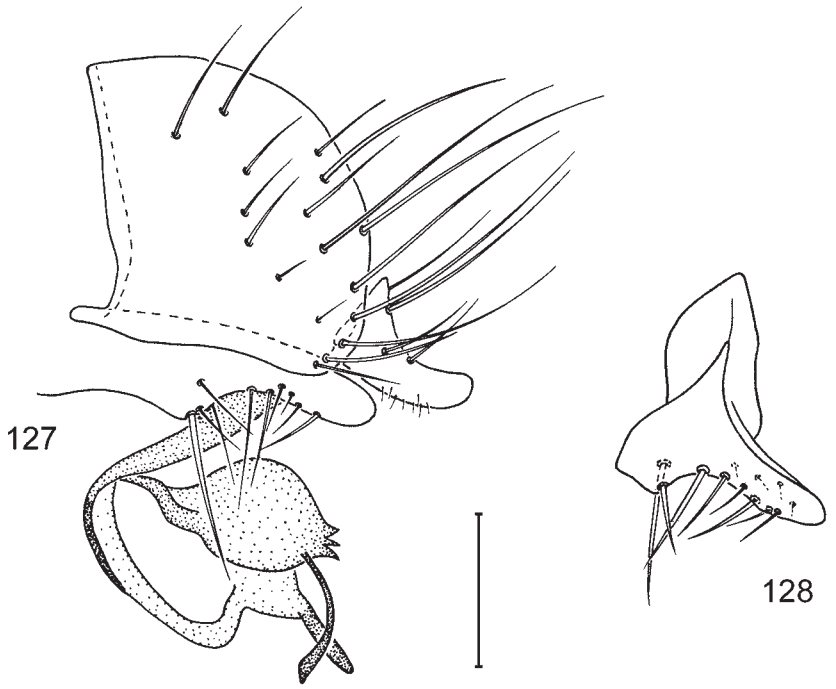
UNITED STATES. *California*. **Orange:** Corona del Mar (33°35.9′N, 117°52.4′W), 28 Dec 1944, A. L. Melander (2♂; USNM); Laguna Beach (33°32.5′N, 117°47′W), 28 Mar 1935, A. L. Melander (1♂, 1♀; USNM). **San Diego:** La Jolla (32°50.8′N, 117°16.5′W), 29 Dec 1934, A. L. Melander (1♂; USNM; a syntype, now a paralectotype of *T. sagulata*).

TYPE LOCALITY. United States. California. Orange: Laguna Beach (33°32.5′N, 117°47′W).

DISTRIBUTION (FIGURE 63). Nearctic: Mexico (*Baja California Sur*), United States (California).

ETYMOLOGY. The species epithet, *lagunaensis*, is of Latin derivation and refers to the type locality: Laguna Beach, California.

REMARKS. Like *T. barberi*, this species is very closely allied to *T. claripennis* but shows distinctive differences in the male terminalia, particularly the surstyli, fused gonites, and aedeagus.



FIGURES 127–128. Structures of male terminalia of *Trixoscelis lagunaensis* Foster and Mathis: (127) epandrium, surstylus, gonites, and aedeagus, lateral aspect (California. San Diego: La Jolla); (128) gonites, lateral aspect (California. Orange: Laguna Beach). Scale = 0.1 mm.

Trixoscelis nitidiventris Melander

FIGURES 129–132

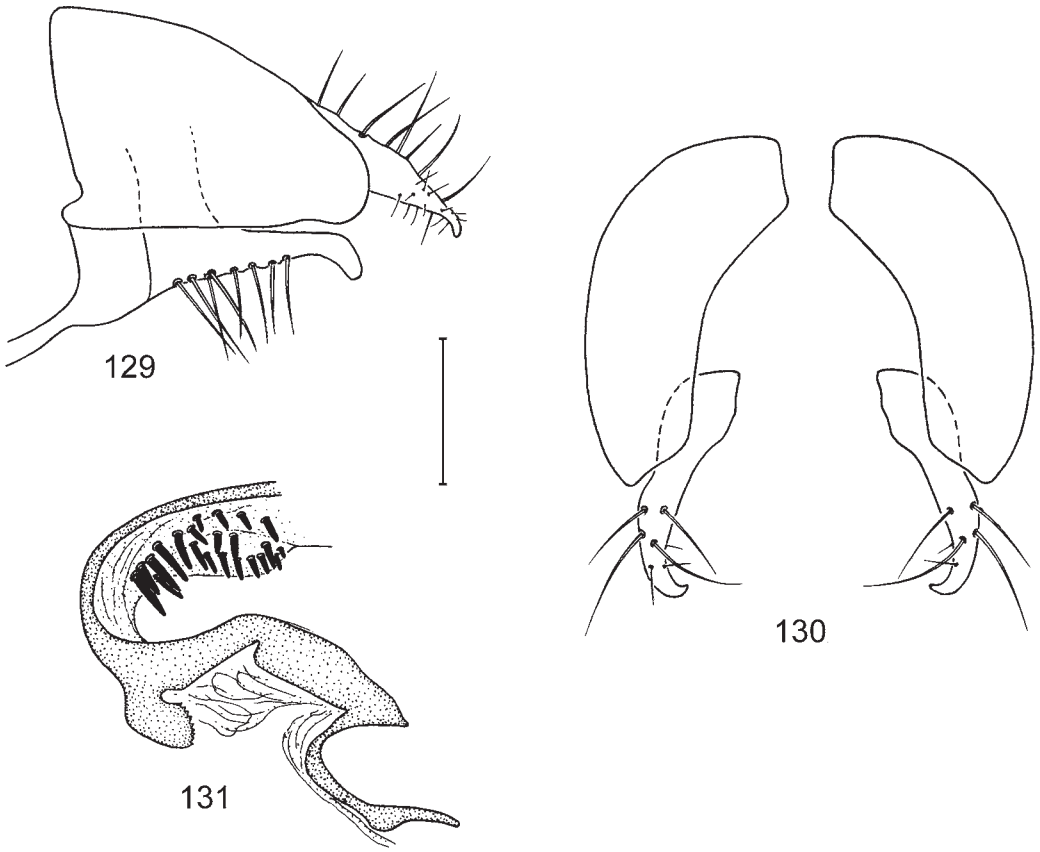
Trixoscelis nitidiventris Melander, 1952:47. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis].

DIAGNOSIS. Thorax gray with indistinctly darker stripes along dorsocentral and inner two rows of acrostichal setae, 4 irregular rows of acrostichal setae; wing hyaline; antenna mostly yellow except outer 0.66 of basal flagellomere brown; vertex brown microtomentose; gena short, gena-to-eye ratio 0.15; abdomen brown, shiny; male epandrium in undissected specimens black, shiny, concolorous with abdomen.

DESCRIPTION. Body length 2.38–2.64 mm.

Head: Eye slightly higher than wide, nearly round; ocellar triangle light gray microtomentose; frons bare, yellow becoming brown laterad of ocellar triangle; parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput quite narrow, gray microtomentose with 1 even row of short dorsoclinate setulae in addition to several scattered setae dorsally and ventrally; antenna mostly yellow except outer 0.66 of basal flagellomere brown; arista brown, with sparse hairs. Gena short, gena-to-eye ratio 0.15, white microtomentose, bearing a neat row of setulae along ventral margin only; face white, palpus yellow, clypeus small indistinct, brown.

Thorax: Mesonotum light brown with darker indistinct stripes along dorsocentral setae and inner 2 rows of acrostichal setae, sparsely covered with setae much shorter than the dorsocentral setae. Pleural area black, shiny. Dorsocentral setae 5(2+3); acrostichal setae in 4 rows; apical scutellar setae about twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer



FIGURES 129–131. Structures of male terminalia of *Trixoscelis nitidiventris* Melander (Oregon. Lake: 16 km NE Christmas Valley): (129) epandrium, surstylus, and gonites, lateral aspect; (130) epandrium and surstyli, posterior aspect; (131) distiphallus, lateral aspect. Scale = 0.1 mm.

setae and several very short setulae along the posterodorsal edge. Wing hyaline, without distinct markings. Halter white. All coxae and femora shiny brown to black, fore tibia and tarsi black, mid and hind tibiae and tarsi yellow, fore femur with a row of longer setae along posterodorsal and posteroventral surfaces

Abdomen: Brown, shiny, evenly setulose. Male terminalia (Figures 129–131): Epandrium in undissected specimens concolorous with remainder of abdomen; surstylus (Figures 129, 130) narrow, curving into blunt hook and narrowing distally, slightly curved anteriorly in lateral view, somewhat long triangular in posterior view (Figure 130); pre- and postgonites (Figure 129) fused, oblong, with row of ventrally directed setae along ventral margin; distiphallus with complex sclerotization and series of short, blunt spicules on the medial dorsal surface. Female terminalia: Seventh tergite and sternite forming strong, tight ring; spermathecae squared-cynlindrical; eighth sternite with distinctly rounded lobes bearing several weak setae; hypoproct with several weak setae; epiproct with 2 weak setulae.

TYPE MATERIAL. Melander described *nitidiventris* from three females from which we herein designate one as lectotype. The lectotype female is labeled "Beaumont CAL[IFORNIA] 25/4/44 [25 Apr 1944] A. L. Melander"/HOLOTYPE *Trixoscelis nitidiventris* Melander [red]/Trixoscelis nitidiventris Melander [handwritten]/ LECTOTYPE ♀ Trixoscelis nitidiventris Melander Foster & Mathis USNM/USNM ENT 00118085 [plastic bar code label]." The lectotype is double mounted (pinned from ventral side with a minuten that is mounted in a cardboard square), is in excellent condition, and is deposited in the USNM. Paralectotypes are as follows:

UNITED STATES. California. **Riverside:** Beaumont (33°55.8′N, 116°58.6′W), 25 April 1944, A. L. Melander

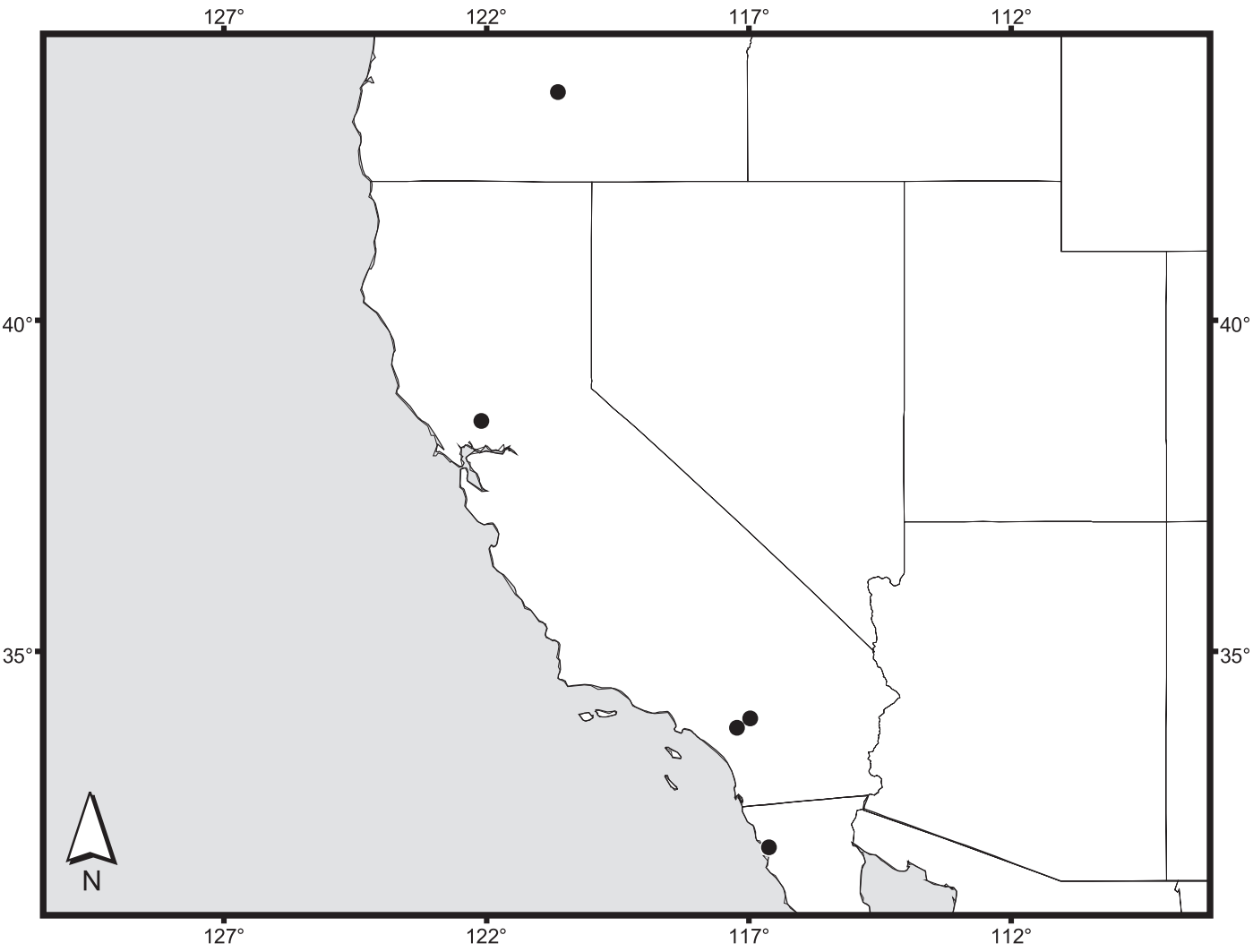


FIGURE 132. Distribution map for *Trixoscelis nitidiventris* Melander.

(1♀; USNM); Perris (33°47′N, 117°13.7′W), 10 May 1945, A. L. Melander (1♀; USNM).

Type Locality. United States. California. Riverside: Beaumont (33°47′N, 117°13.7′W).

Other Specimens Examined. MEXICO. *Baja California:* Ensenada (32 km N; 31°52.5′N, 116°37′W), 1 Apr 1931, A. H. Sturtevant (1♀; USNM).

UNITED STATES. *California:* **Solano:** Stebbins Cold Canyon (38°30′N, 122°06′W), 250 m, 17 Apr 2005, K. A. Williams (1♀; CSCA).

Oregon: **Lake:** Christmas Valley (16 km NE; 43°14.3′N, 120°38.2′W), 3 Jul 1971, G. C. Steyskal (4♂; 3♀; USNM).

Distribution (Figure 132). Nearctic: Mexico (Baja California), United States (California, Oregon).

Remarks. The status of this species was uncertain, not having an associated male with the three female syntypes. However, we have discovered a mixed series of males and females in the USNM collection and now are able to clearly establish this species' identity. The brown to black, shiny anepisternum and abdomen and almost entirely black legs are distinguishing characters for this species. The distiphallus of the male indicates an affinity with *T. plebs* in having a series of short, blunt, thick spicules on the medial dorsal surface (Figure 131). There are close

similarities in the form of the surstyli and gonites as well. The very black, shiny abdomen and mesonotal sclerites along with the nearly entirely dark legs of *T. nitidiventris* clearly distinguish it from *T. nuda*, which is entirely gray microtomentose with yellow legs.

Trixoscelis plebs Melander

FIGURES 133–136, 142–143

Trixoscelis plebs Melander, 1952:48. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis].

DIAGNOSIS. Body uniformly gray microtomentose; 4 irregular rows of very minute, weak acrostichal setae becoming only 2 rows posteriorly; wing hyaline; antenna entirely bright yellow in male, basal flagellomere darker in center in female; gena very short, gena-to-eye ratio 0.12; male epandrium in undissected specimens shiny black, sometimes partially extended and with surstyli evident.

DESCRIPTION. Body length 1.75–2.20 mm.

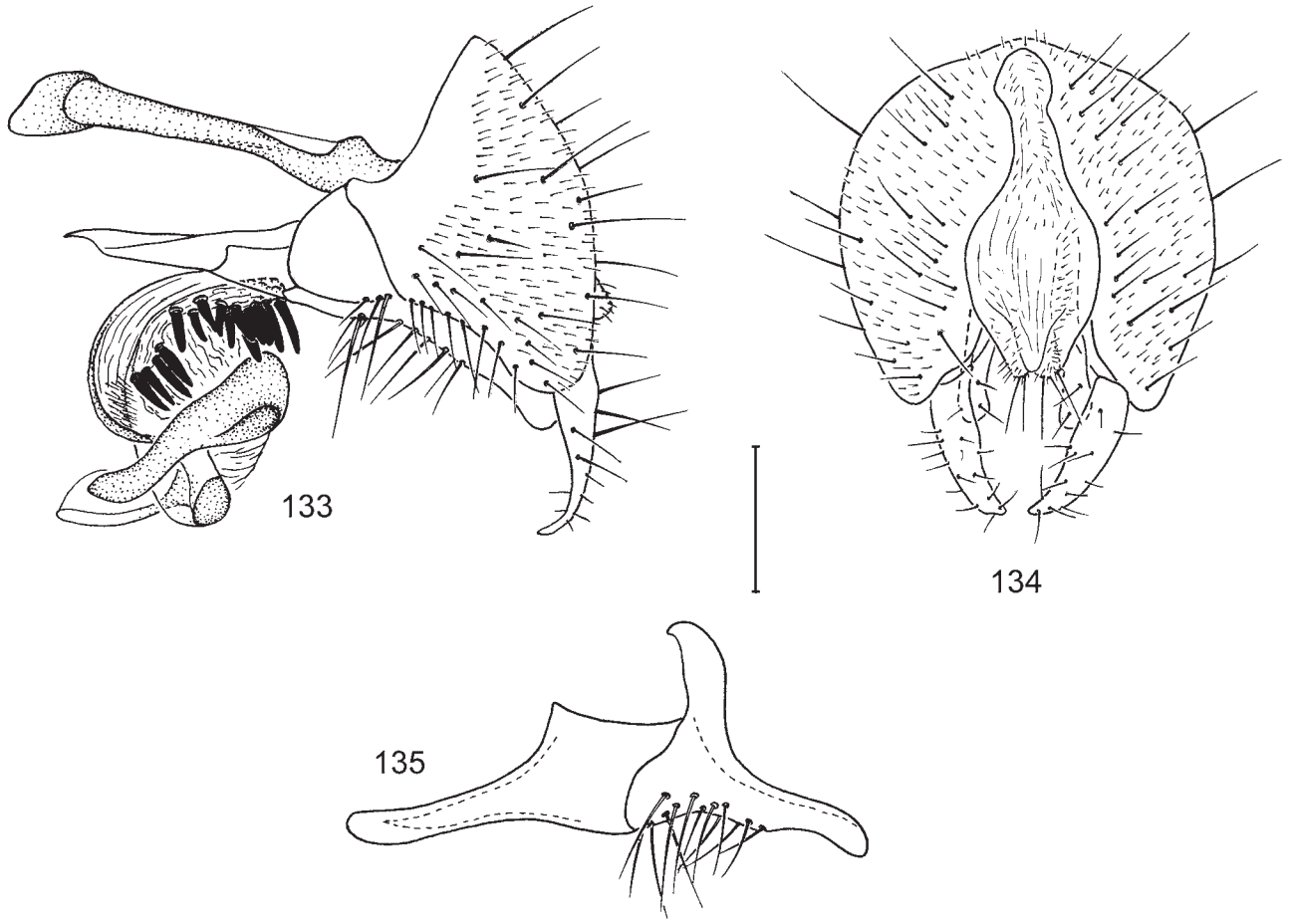
Head (Figures 142, 143): Eye nearly round, only slightly higher than wide; ocellar triangle light gray microtomentose; frons bare, bright yellow becoming only barely brownish laterad of ocellar triangle; parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput narrow, gray microtomentose with one row of short dorsoclinate setulae in addition to several scattered setae dorsally and ventrally; antenna entirely bright yellow in male, female with a dark area at base and middle of basal flagellomere, arista yellow at extreme base otherwise black, with sparse hairs. Gena very short, gena-to-eye ratio 0.12, white or bright yellow microtomentose, a row of weak, small sometimes indistinct setulae along the ventral margin in addition to a pair of stronger convergent oral vibrissae; face white, palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum uniformly gray microtomentose, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae very minute and weak, in 4 scattered rows becoming only 2 rows posteriorly; apical scutellar setae only about twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing hyaline. Halter white. Mid and hind leg entirely yellow, fore femur may be darker on apical 1/2 in females or only slightly silvery gray, foreleg of male entirely yellow, fore tarsus of female also dark, except for distal most segment; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces, otherwise legs evenly setulose except for preapical tibial seta on all tibiae; male hind basitarsus slightly enlarged.

Abdomen: Uniformly gray to brownish microtomentose, evenly setulose. Male terminalia (Figures 133–135): Epandrium in undissected specimens distinctly shiny black or gray, sometimes partially extended and with surstyli evident; surstylus (Figure 133, 134) long, narrowly triangular, pointed; pre- and postgonites fused, spatulate, simple with a row of long setae ventrally (Figure 135); distiphallus (Figure 133) dark, complex, with series of thick spicules on dorsum of midshaft that are longer than the width of the shaft. Female terminalia: Seventh sternite and tergite strongly fused; spermathecae square spherical; eighth sternite with distinct somewhat rectangular setaceous lobes; hypoproct with many weak setae; epiproct with two weak setae.

TYPE MATERIAL. Melander described *T. plebs* from three females and three males from which we herein designate one male as lectotype to stabilize the usage of this name. Melander (1952) stated that he had two males and three females from Travertine Rock, California, and one female from Indio, but our examination of the type series reveals that the Indio, California, specimen is a male as well. The lectotype specimen is labeled "Travertine CAL[IFORNIA] 2 May 45 A. L. Melander"/PARATYPE *Trixoscelis plebs* Melander [yellow]/ A. L. Melander Collection 1961 [white label with green stippling on right side]/LECTOTYPE ♂ Trixoscelis plebs Melander Foster & Mathis USNM/USNM ENT 00118084 [plastic bar code label]." The specimen is double mounted (pinned from ventral side with a minuten mounted in a cardboard square), is in good condition (missing some dorsocentral and parafrontal setae), and is deposited in the USNM. Paralectotypes are as follows:

UNITED STATES. *California.* **Riverside:** Indio (33°43.2′N, 116°12.9′W), 2 May 1945, A. L. Melander (1♂; USNM). **San Diego:** Travertine Palms (33°24.1′N, 116°05.9′W), 2 May 1945, A. L. Melander (1♂, 3♀; USNM).



FIGURES 133–135. Structures of male terminalia of *Trixoscelis plebs* Melander (Nevada. Clark: Las Vegas Wash): (133) epandrium, surstylus, hypandrium, aedeagus, and aedeagal apodeme, lateral aspect; (134) epandrium and surstyli, posterior aspect; (135) s, lateral aspect. Scale = 0.1 mm.

TYPE LOCALITY. United States. California. San Diego: Travertine Palms (33°24.1′N, 116°05.9′W).

OTHER SPECIMENS EXAMINED. CANADA. *Saskatchewan:* Val Marie (49°14.4′N, 107°43.9′W), 5 Jun 1955, J. R. Vockeroth (1♂; CNC).

UNITED STATES. *California*. **San Diego:** Borrego, Palm Canyon (33°13.2′N, 116°20.1′W), 2 May 1945, A. L. Melander (1♂; USNM).

Colorado. **Rio Grande:** South Fork (37°40.2′N, 106°38.4′W; 2500 m), 20 Jun 1972, W. W. Wirth (1♂; USNM).

Nevada. **Clark:** Las Vegas Wash (36°05.4′N, 114°58.7′W), 11 Apr 2005, D. Mathis, W. N. Mathis (8♂, 1♀; USNM); Red Rock Canyon (36°08.7′N, 115°25′W), 11 May 2001, D. Mathis, W. N. Mathis (1♂; USNM). **Lincoln:** Alamo (6.5 km S; 37°19′N, 115°10′W), 17 May 2004, D. Mathis (1♂; USNM).

DISTRIBUTION (FIGURE 136). Nearctic: Canada (Saskatchewan), United States (California, Colorado, Nevada).

REMARKS. This species exhibits sexual dimorphism in the foreleg, hind basitarsus, and antenna. Females consistently have a darker distal 1/2–2/3 of the fore femur and the basal four tarsomeres of the foreleg are dark as well. Also, the basal flagellomere of the female has a dark area in the middle and at the base. The male hind basitarsus is slightly swollen. The gena of this species is one of the shortest of the genus. The male terminalia tend to be somewhat enlarged and shiny black or gray, and many specimens have a strong, rather pointed surstylus

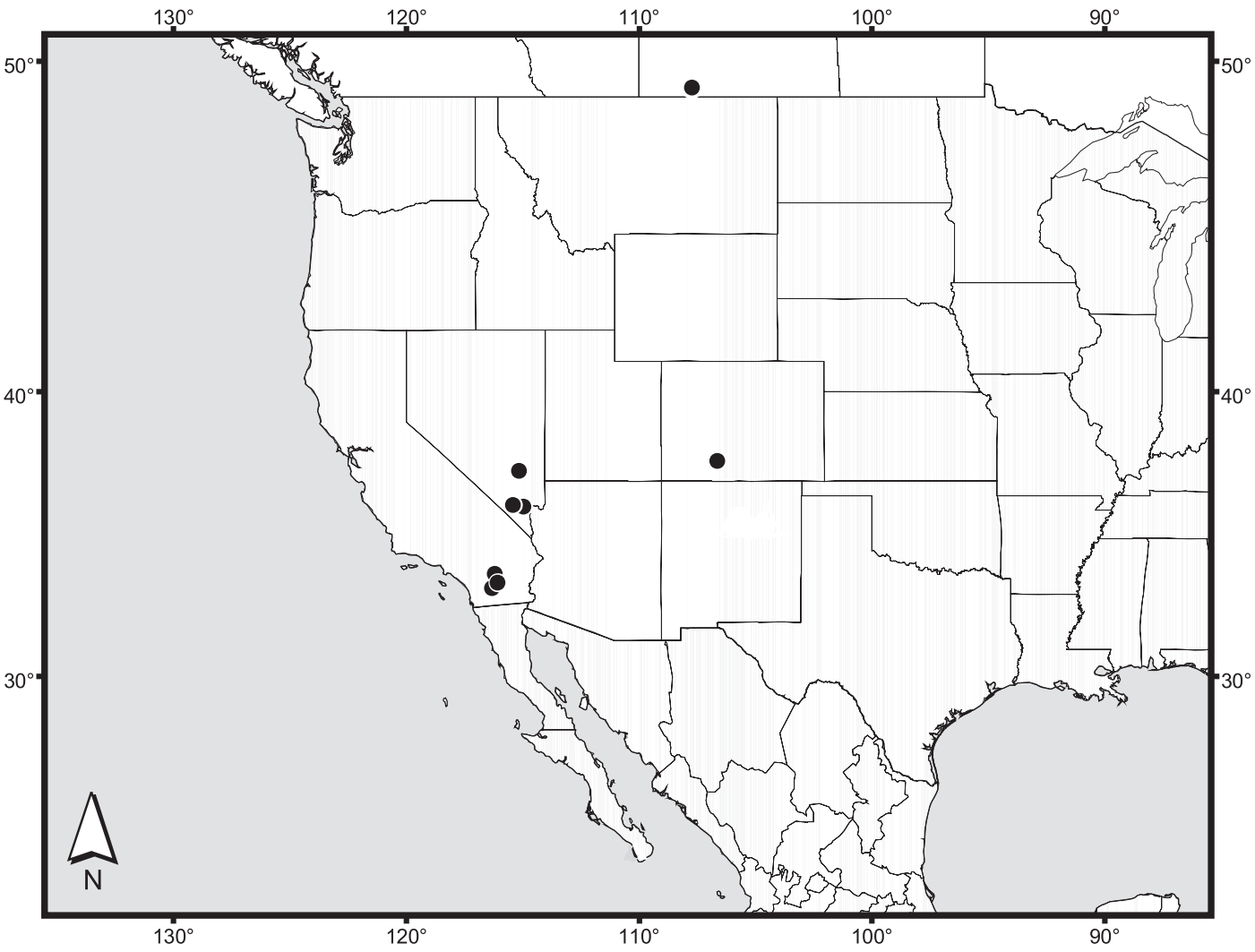


FIGURE 136. Distribution map for *Trixoscelis plebs* Melander.

that is clearly evident. The aedeagus shows a distinctive set of long, strong spicules on the midshaft.

Trixoscelis signifera Melander

FIGURES 93–94, 137

Trixoscelis signifera Melander, 1952:49. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis].

DIAGNOSIS. Thorax gray microtomentose with indistinct brown vittae along dorsocentral line and with a more distinct brown line on the dorsal half of the proepisternum, anepisternum, and the extreme ventral portion of the postpronotal lobe, 4 irregular rows of acrostichal setae; wing darkened anterior to vein R_{2+3}, only slightly darkened along tips of vein R_{4+5} and M, crossvein dm–cu distinctly darkened, vein M distinctly darkened between crossveins; antenna with scape and pedicel yellowish, basal flagellomere mostly brown to very light brown; gena short, gena-to-eye ratio 0.15; male epandrium in undissected specimens small, blackish.

DESCRIPTION. Body length 2.05–2.93 mm.

Head: Eye only 2.0 higher than wide; ocellar triangle light gray microtomentose; frons bare, orange becoming dark brown or blackish laterad of ocellar triangle; parafrons silvery microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or

anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput short, gray microtomentose with one row of short dorsoclinate setulae in addition to several evenly scattered setae dorsally and ventrally; antenna with scape and pedicel yellow, basal flagellomere brown or light brown, arista dark brown with sparse hairs. Gena short, gena-to-eye ratio 0.15, white microtomentose, a row of setulae along the ventral margin in addition to a pair of stronger convergent oral vibrissae; face white, palpus yellow, clypeus small indistinct, brown.

Thorax: Mesonotum gray microtomentose with indistinct brown vittae along dorsocentral line and with a more distinct brown line on the dorsal half of the proepisternum, anepisternum, and the extreme ventral portion of the postpronotal lobe. Dorsocentral setae 5(2+3); acrostichal setae weak in 4 irregular rows; apical scutellar setae only about twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing (Figures 93, 94) darkened anterior to vein R_{2+3}, only slightly darkened along tips of vein R_{4+5} and vein M, crossvein dm–cu distinctly darkened, vein M distinctly darkened between crossveins. Halter white. Forelegs with femur and tarsi brown, tibia yellow, remaining legs entirely yellow; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces hind basitarsus of male slightly to moderately swollen.

Abdomen: Uniformly brownish microtomentose, evenly setulose. Male terminalia (identical to *T. flavida*, see Figures 122–125): Epandrium uniformly gray microtomentose, details as in Figures 122–123; surstylus small, somewhat teardrop shaped, endowed with many long setae along margin; pre- and postgonites (as in Figures 122, 124–125) fused, oblong, with 2 rows of short setae along ventral margin; aedeagus (as in Figure 122, 124) complex, appearing trilobed, partially sclerotized. Female terminalia: Seventh sternite and tergite strongly fused; spermathecae square spherical; eighth sternite with reduced but distinct setaceous lobes; hypoproct with many weak setae; epiproct with two weak setae.

Type Material. Melander described *T. signifera* from six specimens (1♂, 5♀). He wrote that the type is from "Ortega Highway, El Cariso Camp, May 15, 1946." This holotype specimen is a female and is labeled "Ortega Hi[gh]way El Cariso [33°39.5′N, 117°24.6′W] CAL[IFORNIA. **Riverside:**] 15/5/46 A. L. Melander"/ HOLOTYPE *Trixoscelis signifera* Melander [red]/A. L. Melander Collection 1961 [white label with green stippling on right side]/Trixoscelis signifera Melander [handwritten white label]." The specimen is double mounted (pinned from ventral side with a minuten mounted in a cardboard square) and is in excellent condition. Paratypes are as follows:

UNITED STATES. *California*. **Monterey:** Big Sur (36°16.2′N, 121°48.5′W), 17 Jun 1947, A. L. Melander (1♀; USNM). **Orange:** Laguna Beach (33°32.5′N, 117°47′W), 28 Mar 1935, A. L. Melander (1♀; USNM); San Juan Camp (33°35.9′N, 117°26.7′W), 26 May 1944, A. L. Melander (1♀; USNM). **San Francisco:** San Francisco (37°46.5′N, 122°25.2′W), 1 Aug 1915, A. L. Melander (1♀; USNM). **Santa Clara:** Palo Alto (37°26.7′N, 122°09.6′W), 2 Aug 1891 (1♂; USNM).

Type Locality. United States. California. Riverside: Ortega Highway, El Cariso (33°39.5′N, 117°24.6′W).

Other Specimens Examined. MEXICO. *Baja California*. Arroyo San Gregorio (13 km WNW of La Purísima; 26°13.6′N, 112°21.8′W), 24–24 Apr 1983, M. S. Wasbauer (2♀; CSCA). Rancho San Ignacio (26 km E Rosarito; 32°20.9′N, 117°02.5′W; Malaise trap), 26–27 Mar 1982, J. Slansky, M. S. Wasbauer (1♀; CSCA).

UNITED STATES. *California*. **Los Angeles:** Altadena (34°11.4′N, 118°07.9′W), 14 Jun 1979, Little (1♀; CSCA); La Crescenta, base of Eagle Canyon (34°23.5′N, 118°23.3′W; 750–850 m), 26 Apr 2002, 29 Jun 1994, S. D. Gaimari (10♂, 14♀; CSCA); La Crescenta, Eagle Canyon (South Base Mount Lukens; 34°15′N, 118°15′W; 600 m), 30 Jun 1994, S. D. Gaimari (1♀; CSCA); Pasadena (34°08.9′N, 118°08.7′W), 21 May 1957, J. Hodge (2♀; CSCA). **Marin:** Alpine Lake (37°56.4′N, 122°38.3′W; Lily Pond; 460 m), Jun–Jul 1970, D. D. Munroe (1♀; CNC). **Monterey:** Pacific Grove (36°37.1′N, 121°55′W), 13 Jul–27 Aug 1920, A. H. Sturtevant (2♀; USNM). **Orange:** Lower San Juan Campground (33°35.9′N, 117°27.7′W), 29 May 1981, E. M. Fisher (2♀; CSCA); Olive (33°50.2′N, 117°50.8′W), 24 Jun 1960, C. Johnson (1♂, 1♀; CSCA); Ortega Highway, Placentia (33°52.5′N, 117°52.1′W), 17 Jul 1964, C. Johnson (2♀; CSCA). **San Bernardino:** Bloomington (34°04.2′N, 117°23.8′W), 23 Apr 1951 (2♀; CSCA); Rialto (34°06.7′N, 117°22.9′W), 24 Apr, no further date or collector given (1♂; CSCA). **San Diego:** Bonsall (33°17.3′N, 117°13.5′W), 19 Jul 1960, C. Johnson (1♀; CSCA); El Cajon (32°47.7′N, 116°57.8′W; pupae *Harrisina brillians*), H. H. Keifer (2♀; USNM). **San Francisco:**

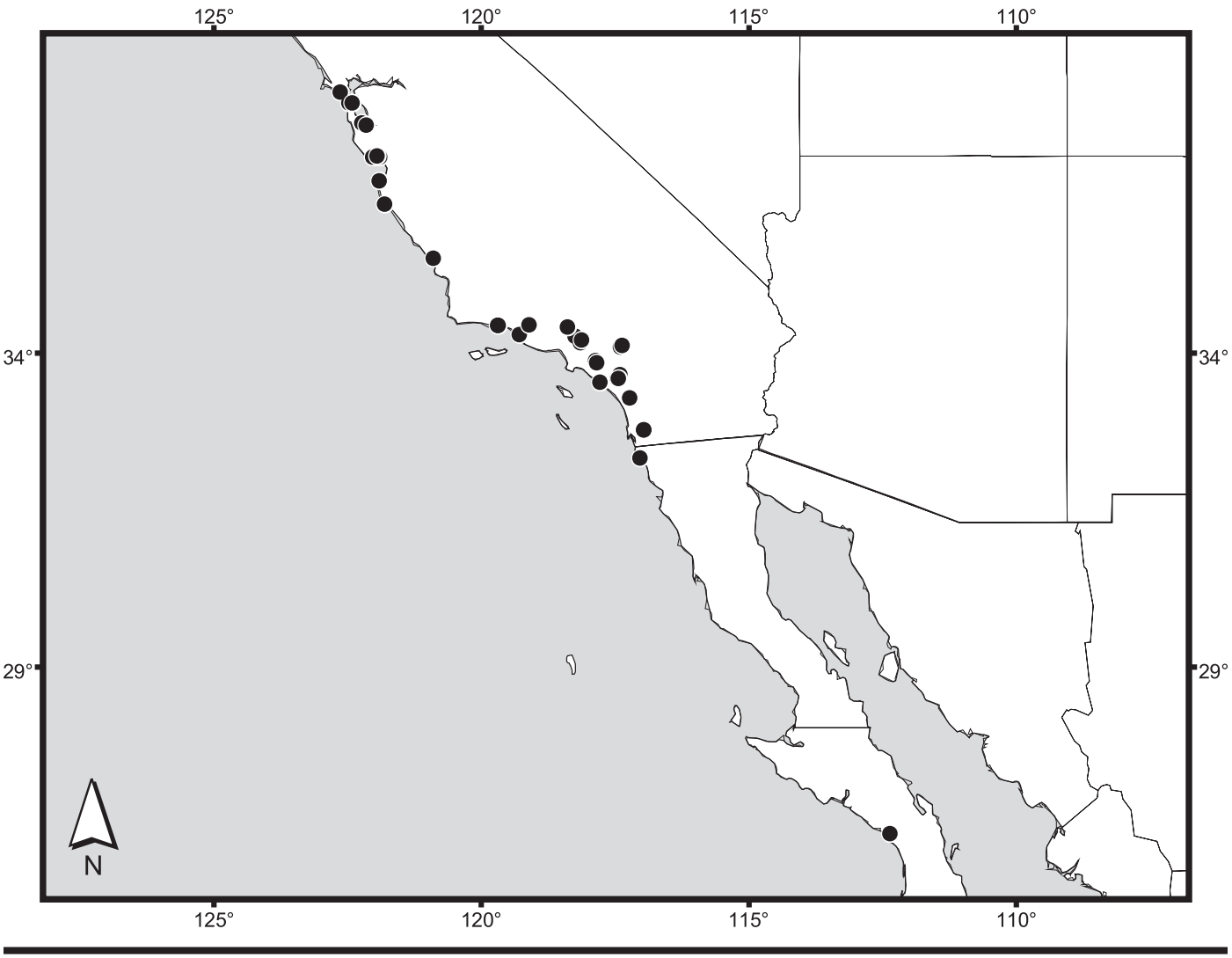


FIGURE 137. Distribution map for *Trixoscelis signifera* Melander.

Golden Gate Park (37°46.6′N, 122°28.8′W), 21–22 Jun 1960, P. H. Arnaud, Jr. (6♂; 4♀; USNM); San Francisco (37°46.5′N, 122°25.2′W), 26–27 Aug 1930, 1959, T. R. Haig, H. H. Keifer (2♀; CSCA). **San Luis Obispo:** Cayucas (35°27′N, 120°54.2′W), 15 Jul 1950 (1♀; CSCA). **San Mateo:** Redwood City (37°29.1′N, 122°14.2′W), 1 Jun 1960, P. H. Arnaud, Jr. (1♀; USNM) **Santa Barbara:** Santa Barbara, 16 Jun 1953, A. L. Melander (1♂; USNM). **Santa Clara:** Palo Alto (37°26.7′N, 122°09.6′W), 20–31 May 1921, A. H. Sturtevant (3♀; USNM), 10 Jun 1921, A. H. Sturtevant (2♂; USNM). **Santa Cruz:** Brownlee (Trout Gulch Creek Road; 36°58.5′N, 121°54.1′W), 26 Jun 1951 (1♀; CSCA); Santa Cruz (36°58.5′N, 122°01.9′W), 17 Jul 1951 (1♀; USNM); Soquel (36°59.3′N, 121°57.4′W), 29 Jul 1948, Rebuffo (1♂; CSCA). **Ventura:** Sisar Creek (34°25.7′N, 119°06.8′W), 16 Jun 1948, W. W. Wirth (1♂; USNM); Ventura (34°16.7′N, 119°17.6′W), 1 Jul 1951 (1♀; USNM).

Distribution (Figure 137). Nearctic: Mexico (Baja California), United States (California).

Remarks. The terminalia of male specimens we examined are identical to those of *T. flavida*. All specimens of *T. signifera,* however, have distinct markings on the wings. The wing markings of *T. signifera* do not show any appreciable variation, and among the hundreds of specimens of *T. flavida* only clear, hyaline wings were expressed. The only other difference we can detect is that *T. signifera* has indistinct brown vittae along the dorsocentral line of setae. Because of the wing markings, which we consider to be of significance, we continue to recognize the species

status of *T. signifera*. On the basis of the male terminalia the two species are clearly very closely allied. Molecular data may be necessary to determine if this is one species with variation in wing markings or two separate species.

Key to Nearctic Species of the *T. nuda* Species Group

1. All setae and setulae yellow 2
   All setae and setulae black 4
2. Gena 0.65–0.85 eye height (*rarely* 0.33) [Figures 166, 167], female basal flagellomere black; male terminalia as in Figure 162 . . . . . ***T. flava*** (Coquillett)
   Gena 0.33–0.45 eye height, female basal flagellomere yellow; male terminalia not as above 3
3. Male abdomen usually light gray, ocellar triangle gray, male distiphallus complex, bulbous, scoop-like [Figures 156, 157] . . . . . ***T. coloradensis,*** new species
   Male abdomen yellow, ocellar triangle yellow, male distiphallus simple, strap-like . . . . . ***T. flavicornis*** (Melander)
4. Basal flagellomere black [Figures 146, 147] . . . . . ***T. cinerea*** (Coquillett)
   Basal flagellomere yellow 5
5. Scutellum often partially or entirely yellow in male, wing yellowish with yellow veins . . . . . ***T. melanderi*** Vockeroth
   Scutellum uniformly gray, wing and veins not yellowish 6
6. Distiphallus wide, triangular; postgonite curved anteriorly [Figures 185, 186] . . . . . ***T. nuda*** (Coquillett)
   Distiphallus narrower; postgonite not sharply curved 7
7. Postgonite bi-lobed [Figures 148, 150] . . . . . ***T. arnaudi,*** new species
   Postgonite not bi-lobed 8
8. Postgonite rather boot-shaped [Figures 140, 158] 9
   Postgonite lengthened, nearly straight or shallowly recurved 10
9. Postgonite rather long, boot shaped to vermiform [Figure 140] . . . . . ***T. annetteae,*** new species
   Postgonite like a short boot [Figure 158] . . . . . ***T. crepida,*** new species
10. Postgonite long and thin; pregonite with very strong setae directed ventrally, apex blunt [Figure 172] . . . . . ***T. kernensis,*** new species
    Postgonite stouter; pregonite gently curved, pointed [Figure 177] . . . . . ***T. litorea*** (Aldrich)

The *nuda* Species Group

DIAGNOSIS. The *nuda* species group is distinguished from the other species groups by the following combination of characters.

Head: Gena moderately short to very high, gena-to-eye ratio 0.26–0.85.

Thorax: Wing hyaline.

Abdomen: Male terminalia: Epandrium small and indistinct in relation to remainder of abdomen in undissected specimens. Aedeagus (except in *T. coloradensis*) a simple sclerotized ribbon with basiphallus not distinct; pre- and postgonites separate but quite simple and with strong setulae on the pregonite.

REMARKS. Dissection and analysis of the male terminalia of over 100 specimens of "*T. nuda*" have revealed subtle but consistent differences in structures of the inner copulatory apparatus and distiphallus of six of the species in the *T. nuda* group (*T. annetteae, T. arnaudi, T. crepida, T. kernensis, T. litorea,* and *T. nuda)*. Thus far we can distinguish and identify these six species only by examination of these structures, which require dissection. We have also discovered that study and comparison of these structures requires the same exact orientation. It may also be necessary to gently separate the epandrium from the inner copulatory apparatus to see these parts clearly. A further complicating factor in the identification of these species is that there may be some minor variation in the exact shape of the pre- and postgonites. However, our study of a large number of specimens has not revealed any great variation or morphological overlap between species. Both *T. melanderi* and *T. cinerea* also seem to be part of the *T. nuda* complex based on the high gena; simple, strap-like distiphallus; and simple, lobe-like, unfused gonites with strong setulae on the pregonite.

The monophyly of this species group is well supported, based on the phylogenies we obtained. The reduced but separate gonites and distinctive ribbon-like aedeagus are unique in the subfamily. So far as known, this species group only occurs in North America. The differences between some species are comparatively small but consistent, perhaps indicating recent speciation. The two species formerly placed in *Zagonia* are included in this species group.

Trixoscelis annetteae Foster and Mathis, new species

FIGURES 138–141, 144–145

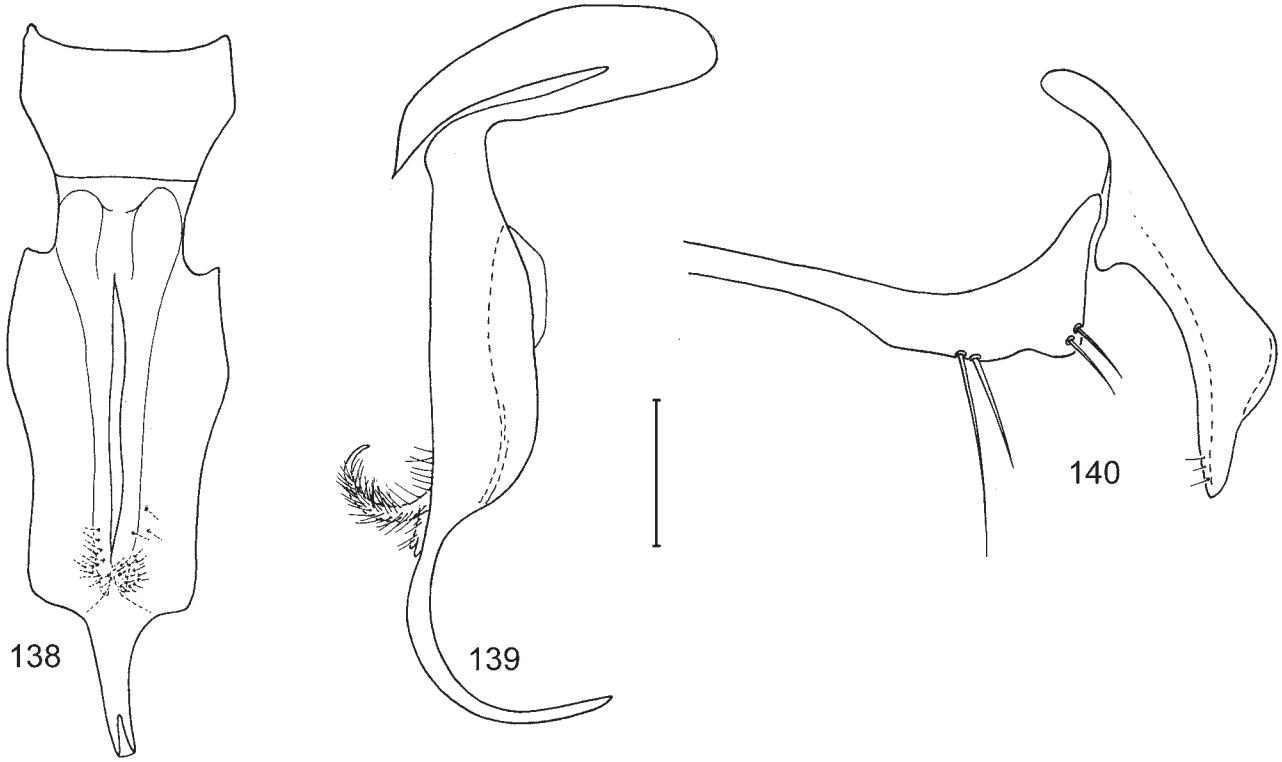
DIAGNOSIS. Thorax uniformly gray microtomentose, subshiny, 2 irregular rows of acrostichal setae; wing hyaline; antenna yellow; gena moderately high, gena-to-eye ratio 0.33–0.43 or higher; abdomen gray to brownish; male epandrium in undissected specimens concolorous with abdomen.

DESCRIPTION. Body length 2.07–2.70 mm.

Head (Figures 144, 145): Eye distinctly higher than wide; ocellar triangle light gray microtomentose; frons bare, yellow becoming brown laterad of ocellar triangle; parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput quite wide, gray microtomentose with 2–3 variable length rows of short dorsoclinate setulae in addition to several scattered setae dorsally and ventrally; antenna entirely yellow, arista brown, with sparse hairs. Gena moderately high, 0.33–0.43, yellow microtomentose, many scattered, short setulae in addition to a pair of strong convergent oral vibrissae; face yellow, palpus yellow, clypeus small indistinct, brown.

Thorax: Mesonotum uniformly gray microtomentose, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 2 rows; apical scutellar setae clearly more than twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing hyaline. Halter pale yellow to white. Legs entirely yellow, apical tarsomeres slightly darker; fore femur with a row of longer setae along posterodorsal and posteroventral edges.

Abdomen: Uniformly gray to brownish microtomentose, evenly setulose. Male terminalia (Figures 138–140): Epandrium in undissected specimens concolorous with remainder of abdomen; surstylus reduced small lobe



FIGURES 138–140. Structures of male terminalia of *Trixoscelis annetteae* Foster and Mathis (California. San Diego: Palm Canyon): (138) aedeagus, ventral aspect; (139) same, lateral aspect; (140) gonites, lateral aspect. Scale = 0.1 mm.

partially fused to epandrium, barely discernible in some specimens; pregonite simple, somewhat triangular lobe with several medium-strength setae on the ventral margin; postgonite (Figure 140) simple, bare, long, boot-shaped to vermiform lobe with a few minute setulae near tip; distiphallus (Figure 138, 139) broad rectangular, bare, with weakly sclerotized flanges laterally becoming thin with posteriorly curved strap distally. Female terminalia: Seventh tergite and sternite weakly fused; spermathecae spherical; eighth sternite without lateral lobes; hypoproct with two strong setae; epiproct with two weak setae.

Type Material. The holotype male is labeled "PalmCanyon. 27 Feb [19]35 ALMelander/ALMelander Collection 1961 [green stippling on right side]/HOLOTYPE ♂ *Trixoscelis annetteae* Foster & Mathis USNM [red]/USNM ENT 00118079 [plastic bar code label]." The holotype is double mounted (pinned vertically from the venter on a minuten attached to a cardboard square), is in excellent condition (abdomen removed and dissected; structures in an attached microvial), and is deposited in the USNM.

Type Locality. United States. California. San Diego: Palm Canyon (33°13.2′N, 116°20.1′W). Paratypes are as follows:

UNITED STATES. *Arizona*. **Coconino:** Tuba City (36°08.1′N, 111°14.4′W; 1432 m; desert grass, shrub, carrion traps), 22–25 Jul 1979, S. Peck, J. Peck (1♂; DEBU).

California. **Contra Costa:** Lafayette (37°53.1′N, 122°07.1′W), 6 Apr 1968, D. D. Munroe (1♂; CNC). **Del Norte:** Jedediah Smith Redwoods State Park, Crescent Beach (41°43.6′N, 124°09.2′W; swept from mowed grass on sand), 2 Jun 2009, K. N. Barber (6♀; DEBU); Jedediah Smith Redwoods State Park, Enderts Beach (41°42.2′N, 124°08.5′W; swept from grass on high bluff), 4 Jun 2009, K. N. Barber (3♂, 1♀; DEBU). **Kern:** Bakersfield (32 km NE, Cow Flat Creek; 35°30.1′N, 118°41.6′W; 500 m), 25 Apr 2002, S. D. Gaimari (3♂; CSCA); Lost Hills (24 km W; 35°37′N, 119°55′W), 23 Mar 1947, P. H. Arnaud, Jr. (2♂; USNM). **Los Angeles:** Claremont (34°05.8′N, 117°43.2′W), no date given, Essig (1♂; USNM); Covina (34°05.4′N, 117°53.4′W), 7 Jun 1949, Myers (3♂, 4♀; CSCA); Mount Lowe (34°13.9′N, 118°06.4′W), 3 Jul 1917, J. M. Aldrich (1♂; USNM); La Crescenta, base of Eagle Canyon (34°23.5′N, 118°23.3′W; 750–850 m), 26 Apr 2002, S. D. Gaimari (4♂; CSCA); Lancaster (32 km W; 34°41.9′N, 118°17′W), 26 Mar 1947, A. L. Melander (1♂; USNM); Palmdale (34°34.8′N, 118°07′W), 27 Mar 1947, A. L. Melander (2♂, 3♀; USNM). **Mendocino:** Fort Bragg (39°26.8′N, 123°48.3′W), 2 Jul 1973, J. R. Vockeroth (1♂; CNC). **Merced:** Hillmar (37°24.5′N, 120°51′W; ex. fruitless mulberry), 13 Apr 1962, N. Hill (10♂, 5♀; CSCA). **Orange:** Santa Ana Canyon (33°51.4′N, 117°49.1′W), 29 Mar 1950, A. L. Melander (1♂; USNM). **Riverside:** Big Bear Lake (34°14.6′N, 116°54.7′W), 6 Jul 1942, A. L. Melander (5♂, 1♀; USNM); Cajon (34°17.9′N, 117°27.4′W), 21 Apr 1949, A. L. Melander (1♂; USNM); Cherry Valley (33°58.4′N, 116°58.6′W), 18 May 1938, Christenson (1♂, 2♀; USNM); Desert Hot Springs (33°57.7′N, 116°30.1′W), 4 Apr 1945, A. L. Melander (2♂, 2♀; USNM); Garnet (33°54.1′N, 116°32.7′W), 4 Apr 1945, A. L. Melander (1♂; USNM); Lake Mathews (33°50.6′N, 117°27.7′W), 25 Mar 1958, A. L. Melander (1♂; USNM); Morongo Valley (33°57.6′N, 116°31.5′W), 19–20 Apr 1944, A. L. Melander (14♂, 5♀; USNM); Morongo Valley (33°57.6′N, 116°31.5′W; 915 m), 19 Apr 1955, W. R. M. Mason (1♂, 2♀; CNC); Palm Desert (33°43.3′N, 116°22.5′W; yucca flowers), 19 Mar 1955, W. R. M. Mason (11♂, 10♀; CNC); Palm Springs (8 km W; 33°49.8′N, 116°32.9′W), 6 Apr 1949, A. L. Melander (5♂, 1♀; USNM); Pinyon Flat (25.75 km SW of Palm Desert; 33°36.2′N, 116°27.6′W; flowers of *Yucca whipplei*; 1220 m), 30 Apr 1967, D. Davis (1♂; USNM); Riverside (33°58.8′N, 117°22.4′W), 10 Mar 1935, A. L. Melander (1♂, 1♀; USNM); Snow Creek, White Water (33°55.5′N, 116°38.3′W; 460 m), 29 Apr 1955, W. R. M. Mason, W. R. Richards (24♂, 26♀; CNC); Thousand Palms (33°48.7′N, 116°22.6′W), 12 Apr 1960, A. L. Melander (1♂; USNM); Thousand Palms (33°48.7′N, 116°22.6′W), 27 Apr 1955, W. R. Richards (1♂, 2♀; CNC). **San Bernardino:** Apple Valley (34°30′N, 116°32.2′W), 4–17 May 1955, W. R. M. Mason, W. R. Richards (5♂, 23♀; CNC); Boron, Kramer Hills (34°55.3′N, 117°28.1′W), 10 May 1955, W. R. M. Mason (2♂, 2♀; CNC); Lucerne Valley (34°26.6′N, 116°58.1′W), 17 May 1960, A. L. Melander (2♂, 2♀; USNM); Joshua Tree (24 km NW; 34°16′N, 116°23.6′W), 14 Apr 1969, R. R. Pinger (5♂, 5♀; USNM); Phelan (11.2 km E Baldy Mesa Road; 34°25.6′N, 117°34.3′W; pan traps), 15 May–30 Jun 1982, J. T. Huber (22♂, 27♀; CNC, DEBU); Pioneertown (1.6 km NW; 34°09.4′N, 116°29.8′W; in Yucca flowers), 5 May 1981, E. Fisher (8♂, 1♀; CSCA); Victorville (34°32.2′N, 117°17.5′W), 16–24 May 1955, W. R. M. Mason, W. R. Richards (38♂, 55♀; CNC); Yucca (34°06.8′N, 116°25.9′W), 16 Mar 1960, A. L. Melander (6♂, 2♀; USNM). **San Diego:** Escondido (20 km N; 33°08′N, 117°05.2′W), 29 Mar 1960, M. S. Wasbauer (2♂, 6♀; CSCA); Palm Canyon (33°13.2′N, 116°20.1′W), 27 Feb 1935, A. L. Melander (2♂, 3♀; USNM). **Santa Barbara:** Lompoc (34°39.7′N, 120°28.3′W), 3 Jun 1950 (1♂; CSCA). **Santa Clara:** Coyote (37°13′N, 121°44.4′W), 9 Mar 1947, P. H. Arnaud,

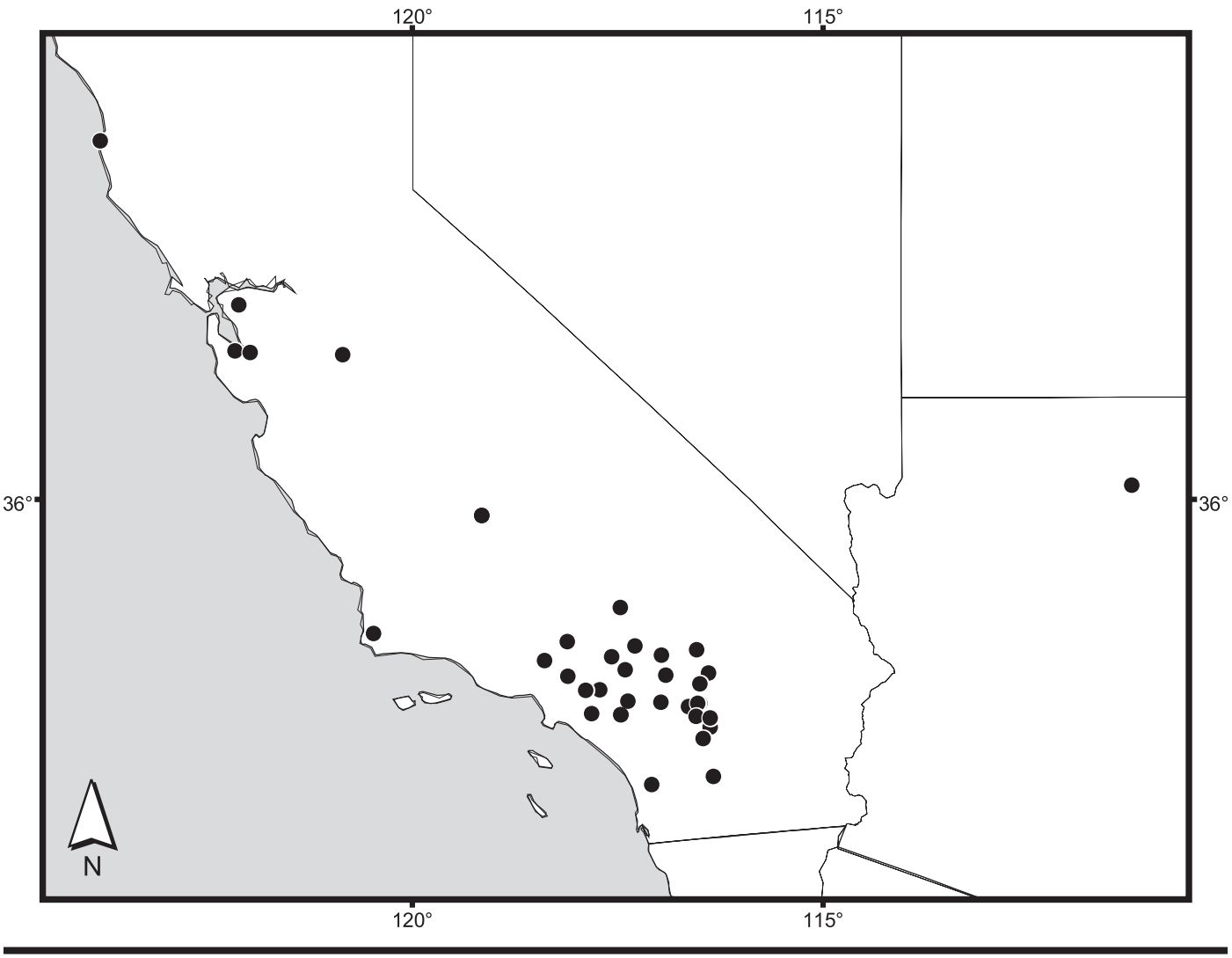


FIGURE 141. Distribution map for *Trixoscelis annetteae* Foster and Mathis.

Jr. (3♂; USNM); Palo Alto (37°26.7′N, 122°09.6′W), 17 Apr–10 Jun 1921, A. H. Sturtevant (7♂, 4♀; USNM).

Distribution (Figure 141). Nearctic: United States (Arizona, California).

Etymology. The species epithet, *annetteae*, is a genitive Latin patronym to recognize the enthusiastic support and encouragement of Ms. Annette Foster, wife of the first author. Annette was especially supportive of the research and fieldwork that contributed directly to this revision on the Nearctic species of *Trixoscelis*.

Remarks. Structures of the male terminalia distinguish this species from the others in the *T. nuda* complex. The anterior portion of the hypandrium is quite long and drawn out, and the distiphallus is bare and has basal flanges that vary in the strength of the sclerotization. The postgonites are quite distinctive as well.

Trixoscelis arnaudi Foster and Mathis, new species

FIGURES 148–152

Diagnosis. Thorax uniformly gray microtomentose, subshiny, 2 irregular rows of acrostichal setae; wing hyaline; antenna yellow; gena moderately short, gena-to-eye ratio 0.26; abdomen gray to brownish; male epandrium in undissected specimens concolorous with abdomen.

FIGURES 142–147. Photographs of heads: (142) *Trixoscelis plebs*, anterior aspect; (143) same, lateral aspect; (144) *T. annetteae*, anterior aspect; (145) same, lateral aspect; (146) *T. cinerea*, anterior aspect; (147) same, lateral aspect.

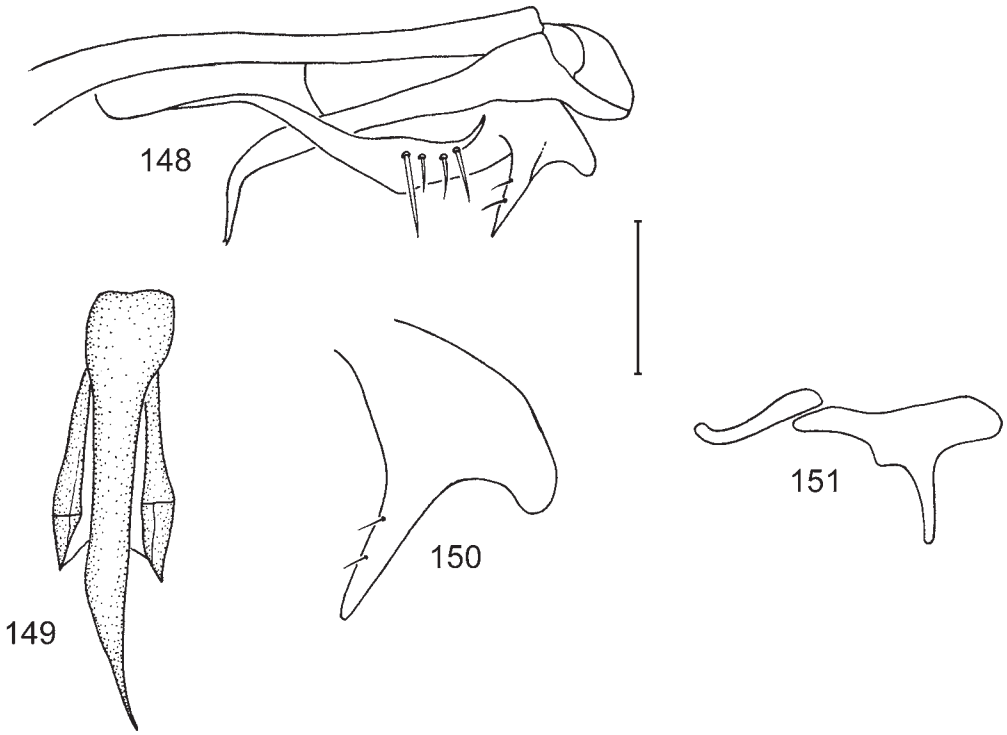
DESCRIPTION. Body length 2.22–2.44 mm.

Head: Eye distinctly higher than wide; ocellar triangle light gray microtomentose; frons bare, yellow becoming gray laterad of ocellar triangle; parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput quite wide, gray microtomentose with 2–3 variable length rows of short dorsoclinate setulae in addition to several scattered setae dorsally and ventrally; antenna entirely yellow, arista brown, with sparse hairs. Gena moderately short, gena-to-eye ratio 0.26, yellow microtomentose, many scattered, short setulae in addition to a pair of strong convergent oral vibrissae; face yellow, palpus yellow, clypeus small indistinct, brown.

Thorax: Mesonotum uniformly gray microtomentose, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 2 rows; apical scutellar setae clearly more than twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing hyaline. Halter white. Legs entirely yellow, except fore femur and apical tarsomeres slightly darker; fore femur with a row of longer setae along posterodorsal and posteroventral edges.

Abdomen: Uniformly gray to brownish microtomentose, evenly setulose. Male terminalia (Figures 148–151): Epandrium in undissected specimens concolorous with remainder of abdomen; surstylus stronger then *T. nuda* but still reduced sparsely setose lobe partially fused to epandrium; pregonite simple extension of the hypandrium, with several medium-strength setae on ventral margin; postgonite (Figures 148, 150, 151) bilobed with ventral lobe drawn down to sharp point, may vary somewhat; distiphallus (Figure 149) narrow strap tapering to a sharp point apically with weakly sclerotized flanges. Female terminalia: Seventh tergite and sternite separate, not fused; spermathecae spherical; eighth sternite without lateral lobes; hypoproct with two strong setae; epiproct with two weak setae.

TYPE MATERIAL. The holotype male is labeled "OREGON Lake Co VII_3_1971 10mi NE Christmas



FIGURES 148–151. Structures of male terminalia of *Trixoscelis arnaudi* Foster and Mathis: (148) aedeagus, aedeagal apodeme, and gonites, lateral aspect; (149) distiphallus, ventral aspect; (150) postgonite, oblique aspect; (151) postgonite, lateral aspect. Scale = 0.1 mm.

Valley George Steyskal/HOLOTYPE ♂ *Trixoscelis arnaudi* Foster & Mathis USNM [red]/USNM ENT 00118078 [plastic bar code label]." The holotype is double mounted (pinned from right side with a minuten mounted in a plastic cube), is in excellent condition (abdomen removed and dissected; structures in an attached microvial), and is deposited in the USNM. Paratypes are as follows:

UNITED STATES. *California*. **Kern:** Bakersfield (32 km NE, Cow Flat Creek; 35°30.1′N, 118°41.6′W; 500 m), 25 Apr 2002, S. D. Gaimari (3♂; CSCA); **Los Angeles:** La Crescenta, base of Eagle Canyon (34°23.5′N, 118°23.3′W; 750–850 m), 26 Apr 2002, S. D. Gaimari (4♂; CSCA); Whitewater Canyon (34°21.4′N, 118°21.2′W), 6 Apr 1949, W. W. Wirth (1♂; USNM). **Monterey:** Castroville (36°45.9′N, 121°45.5′W; ex. *Achillea* sp), 20 Jun 1979, B. Oliver (9♂, 3♀; CSCA). **Riverside:** Riverside (33°58.8′N, 117°22.4′W), 24 Feb 1935, A. L. Melander (1♂, 1♀; USNM). **San Diego:** Anza-Borrego State Park (2.4 km SE of Scissors Crossing; 33°05.5′N, 116°27.3′W; 685 m), 18 Apr 2003, S. D. Gaimari, E. M. Fisher (2♂, 4♀; CSCA). **San Luis Obispo:** Morro Bay (35°20.1′N, 120°51.1′W), 16 Jun 1947, A. L. Melander (2♂; USNM). **Santa Clara:** Stanford University (37°25.6′N, 122°10.2′W), 23 Apr 1961, P. H. Arnaud, Jr. (1♂; USNM). **Tulare:** Ash Mountain (1 km SE, Sequoia National Park Headquarters; 36°29.9′N, 118°50′W; flume debris trap), 25 Apr 1984, R. D. Haines (1♂; CSCA).

Oregon. **Lake:** Christmas Valley (16 km NE; 43°14.2′N, 120°38.2′W), 3 Jul 1971, G. C. Steyskal (3♂, 1♀; USNM).

Washington. **Franklin:** Eltopia (16.6 km N; 46°28′N, 119°07.7′W), 29 May 1957, E. F. Dailey (1♂; WSU); Pasco (46°14.4′N, 119°06′W; Russian Thistle), 29 May 1957, E. F. Dailey (1♂; WSU). **Grant:** Ephrata (47°19′N, 119°33.2′W), 17 Jun 1918, A. C. Burrill (1♂; WSU).

Type Locality. United States. Oregon. Lake: Christmas Valley (16 km NE; 43°14.2′N, 120°38.2′W).

Distribution (Figure 152). Nearctic: United States (California, Oregon, Washington).

Etymology. The species epithet, *arnaudi*, is a genitive Latin patronym to recognize and honor Dr. Paul H. Arnaud, Jr., who collected one of the paratypes of this species and who has generally supported our research on Diptera. Paul is an inveterate and enthusiastic collector of Diptera, much to our benefit, and his knowledge of localities in the West, especially the sometimes cryptically named sites visited by A. L. Melander, has helped us immeasurably.

Remarks. Structures of the male terminalia distinguish this species from congeners in the *T. nuda* complex. Specimens of this species are rather diminutive compared to the other *T. nuda* complex species.

Trixoscelis cinerea (Coquillett)

FIGURES 95, 146–147, 153–155

Parodinia cinerea Coquillett, 1902:186. —Melander, 1913a:169 [comment on synonymy with *T. prima*]. —Malloch, 1913b:275 [discussion, key].

Trixoscelis cinerea Melander, 1913b:296 [key to Nearctic species of *Trixoscelis*]. —Aldrich, 1929:34 [formal synonymy with *T. prima*]. —Melander, 1952:43 [revision]. —Vockeroth, 1965:817 [Nearctic catalog]. —Cole, 1969:433 [distribution, diagnosis].

Trixoscelis prima of authors, not Hendel 1911 [misidentification]. —Melander, 1913a:169 [comment on synonymy].

Diagnosis. Body gray; 4 rows of acrostichal setae, proepimeral seta present; wing hyaline, not smoky and without infuscations; basal flagellomere black, vertex yellowish to light gray microtomentose; gena moderately high, gena-to-eye ratio at least 0.37; male epandrium in undissected specimens gray, concolorous with abdomen.

Description. Body length 2.00–3.66 mm.

Head (Figures 146, 147): Eye higher than wide; ocellar triangle light gray microtomentose; frons bare, yellow, parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput gray microtomentose with 1–2 rows of short dorsoclinate setulae; antenna with basal flagellomere black, scape and pedicel orange; arista with sparse hairs. Gena moderately high, gena-to-eye ratio 0.37, yellowish microtomentose, bearing 2–3 rows of short dorsoclinate setae along ventral edge in addition to a pair of strong convergent oral vibrissae; face yellow (rarely black); palpus yellow or brown, clypeus small indistinct, yellow.

Thorax: Mesonotum uniformly gray microtomentose, evenly covered with numerous setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 4 irregular rows; apical scutellar setae 3× length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a short vertical row with the larger seta; katepisternum with 2 longer setae and one shorter one between them in a row along the posterodorsal edge. Wing hyaline with yellowish veins. Halter white to yellow. Coxae, femora and tibiae yellow, tarsi darker; fore femur with a

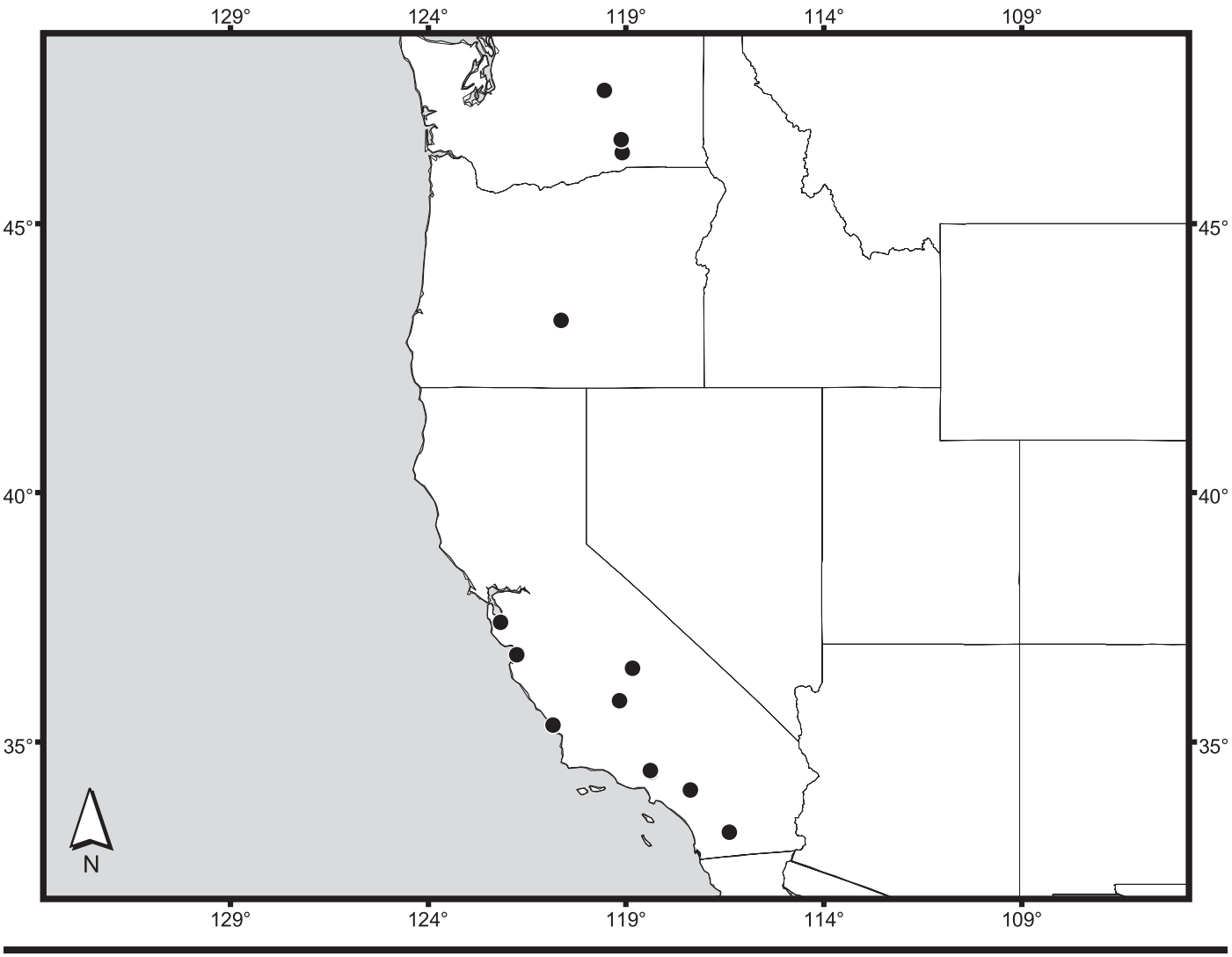
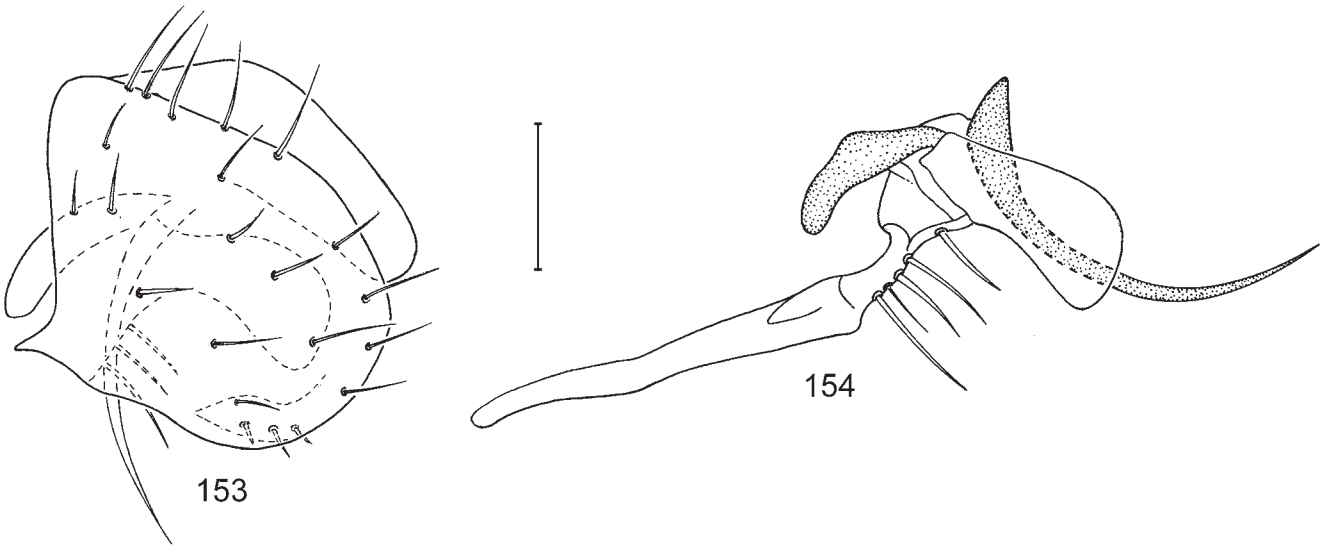


FIGURE 152. Distribution map for *Trixoscelis arnaudi* Foster and Mathis.

row of longer setae along posterodorsal and posteroventral surfaces; otherwise, legs are evenly setulose except for preapical tibial setae on all tibiae.

Abdomen: Uniformly gray microtomentose except posterior edges of sternites lighter, evenly setose. Male terminalia (Figures 153, 154): Epandrium gray, concolorous with abdomen, small capsulate; surstylus small, spatulate, completely fused to internal surface of epandrium, only evident by an outline and series of setulae (Figure 153); hypandrium small, simple; pregonite apparently fused to hypandrium, anterior ventral margin with several strong setae; postgonite (Figure 154) distinct with large posterior spatulate lobe which is bare; aedeagus with no apparent basiphallus, distiphallus darkly sclerotized, simple, thin ribbon-like, evenly tapered to point distally. Female terminalia: Eighth sternite lacking small setaceous lobes; spermathecae spherical; hypoproct divided, with two strong setae; epiproct with two moderately strong setae, longer than hypoproct setae.

TYPE MATERIAL. Coquillett described *T. cinerea* from three specimens (1♂, 2♀,) that were collected in Los Angeles, California, but he did not designate a holotype. We herein designate the male specimen as the lectotype. The lectotype male of *Parodinia cinerea* Coquillett is labeled "Los Angeles Co. CAL[IFORNIA]/Coquillett Collector/Paratype No. 6650 U.S.N.M.[red]/LECTOTYPE ♂ Trixoscelis cinerea (Coquillett) Foster & Mathis USNM/USNM ENT 00118077 [plastic bar code label]." The lectotype is double mounted (glued to a paper triangle), is slightly damaged (missing the left antenna, the posterior two dorsocentral setae, all four scutellar setae, both mid



FIGURES 153–154. Structures of male terminalia of *Trixoscelis cinerea* (Coquillett) (California. Dan Diego: Cardiff-by-the-Sea): (153) epandrium, aedeagus, and aedeagal apodeme, lateral aspect; (154) aedeagus, aedeagal apodeme, gonites, and hypandrium, lateral aspect. Scale = 0.1 mm.

legs and one hind leg, and the left wing has been detached and re-glued to the paper triangle; the abdomen has been removed, dissected and the structures are in an attached microvial), and is deposited in the USNM. Paralectotypes bear the same label data as the lectotype.

TYPE LOCALITY. United States. California. Los Angeles: Los Angeles (33°49′N, 118°17′W).

OTHER SPECIMENS EXAMINED. UNITED STATES. *California*. **Kern:** Kelso Valley (12.8 km S of Weldon; 35°21.1′N, 118°13.2′W; 1220 m; flowers of *Yucca brevifolia*), 15–17 Apr 1967, D. Davis (1♀; USNM). **Los Angeles:** Bob's Gap Road (NW of Mile High; 34°26 52′N, 117°43 47′W; 1239 m), 27 May 2003, J. Skevington (3♂, 5♀; CSCA); Elizabeth Lake Canyon (34°33.2′N, 118°34.7′W), 29 Apr 1952 (1♂; USNM); Tanbark Flats (34°12.2′N, 117°45.6′W), 18 Jun 1956, H. W. Michalk (1♀; CSCA). **Modoc:** Fort Bidwell (41°51.6′N, 120°09.1′W), 24 Apr 1974, T. Haig (1♀; CSCA). **Riverside:** Gavilan Hills (33°47.1′N, 117°22.2′W), 4 Nov 1954, A. L. Melander (22♂, 33♀; USNM); Morongo Valley (33°57.6′N, 116°31.5′W), 18–20 Apr 1944, 1955, W. R. M. Mason, A. L. Melander, W. R. Richards (3♂, 1♀; CNC, USNM); Palm Desert (33°43.3′N, 116°22.5′W; *Yucca* flowers), 19 Mar 1955, W. R. M. Mason (1♂, 3♀; CNC); Pinon Flat (26 km SW of Palm Desert; 33°36.2′N, 116°27.6′W; flowers of *Yucca whipplei;* 1220 m), 30 Apr 1967, D. Davis (3♂, 2♀; USNM); White Water (33°55.5′N, 116°38.3′W), 19 Mar–29 Apr 1955, W. R. Richards (5♂, 7♀; CNC). **San Bernardino:** Hidden Valley (34°55.6′N, 116°21.2′W), 5 May 1958, A. L. Melander (1♀; USNM); Lytle Creek (34°15.5′N, 117°30′W), 10 May 1953, A. L. Melander (♂;USNM); Mentone (34°04.2′N, 117°08.1′W), 13 May 1947, A. L. Melander (2♂, 1♀; USNM); Phelan (3.2 km S; 34°25.2′N, 117°34.3′W), 28 Jun 1945, A. L. Melander (1♀; USNM), 24 May 1945, A. L. Melander (2♂, 1♀; USNM); Pioneer town (1.6 km NW; 34°09.4′N, 116°29.8′W; in *Yucca* flowers), 5 May 1981, E. Fisher (1♂; CSCA); San Bernadine (34°06.5′N, 117°17.4′W; 1100 m), 19 Apr 1967, D. Davis (2♀; USNM); Sheep Creek Canyon near Phelan (34°25′N, 117°36.4′W), 24 May 1945, A. L. Melander (2♂, 1♀; USNM); Verdemont (34°11.6′N, 117°22.1′W), 9–19 May 1944, 1953, A. L. Melander (5♂, 2♀; USNM). **San Diego:** Cardiff-by-the-Sea (33°01.3′N, 117°16.9′W), 21–26 Apr 1967, D. Davis (12♂, 10♀; USNM); Dripping Springs (33°26.3′N, 116°58.4′W), 4 Apr 1958, A. L. Melander (1♂, 3♀; USNM); Tecate (32°34.6′N, 116°37.7′W), 2 May 1966, R. Duke (3♂, 3♀; USNM).

Nevada. **Lyon:** Wellington (7 km NW; 38°45.5′N, 119°22.6′W), 28 May 1974, M. S. Wasbauer, J. Slansky (3♀; CSCA).

DISTRIBUTION (FIGURE 155). Nearctic: United States (California, Nevada).

REMARKS. Aldrich (1929) formally transferred *Parodinia cinerea* to *Trixoscelis* and stated that one of Coquillett's syntypes (now the paralectotype) of *Leria nuda* from Santa Fe, New Mexico, is also conspecific with

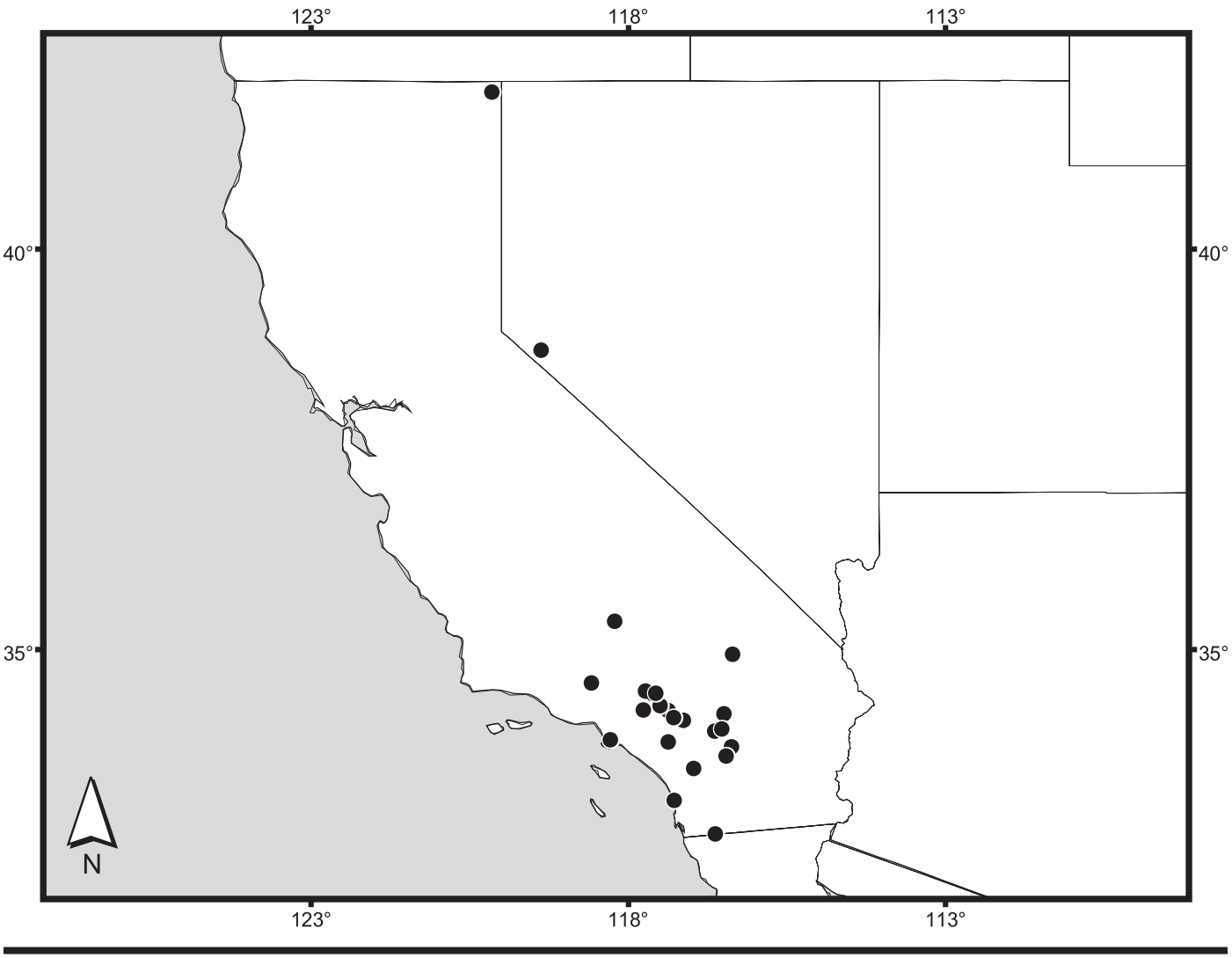


FIGURE 155. Distribution map for *Trixoscelis cinerea* (Coquillett).

T. cinerea. Coquillett's specimen from Santa Fe is labeled "Ckll. 3800 StaFe. July [handwritten]/U.S.N.M. Acc. 30623./Paratype 13100 U.S.N.M.[red label]/Paratype of *nuda* Coq [handwritten]." Our examination of this syntype, however, reveals that it is not *T. cinerea*, having the antenna and thorax yellow. This syntypic specimen keys to *T. flavens*. The second syntype of *L. nuda* is discussed in our treatment of *T. nuda*.

Aldrich further stated in his treatment of *T. cinerea* that it was "necessary to designate a "cotype" of *T. cinerea* as the type." This seems to be a typographical error because he is clearly referring to the cotypes of *T. nuda*. He further wrote that he will designate the specimen from Claremont, California, as the type of *T. nuda* (this caused Hendel's *T. prima* to become a synonym of *T. nuda* because he observes that it is conspecific with specimens on which Hendel based *T. prima*). The syntypes of *T. cinerea* are all from Los Angeles, and the only syntype [of the two species?] from Claremont is that of *T. nuda*.

Aldrich disagreed with Melander's synonymy of Hendel's *T. prima* with *T. cinerea* in the same paragraph, suggesting, instead, that *T. prima* is a synonym of *T. nuda*. We have examined a specimen that is labeled "Claremont Cal[ifornia]. Baker/ Cotype (printed) Trixoscelis prima Hendel (handwritten) (red label)/ALMelander Collection 1961 (white label with green stippling on right half)." We cannot be certain that it is one of Hendel's syntypes, but from our examination of it we concur with Aldrich's conclusion that *T. prima* is a synonym of *T. nuda* and not with Melander's commentary that *T. prima* is a synonym of *T. cinerea*. Melander's designation therefore is actually a misidentification.

This species is distinguished by having most of the head and all of the thorax and abdomen light gray microtomentose. The black basal flagellomere, yellowish gena, and relatively wide occiput are distinguishing characters of *T. cinerea*. The male terminalia are unusual in lacking a surstylus, and the postgonite is large, smooth, and lacks setulae. An unusual variation in the color of the face, black versus yellow, was observed in three specimens from Morongo Valley, California.

Trixoscelis coloradensis Foster and Mathis, new species

FIGURES 13, 156, 157

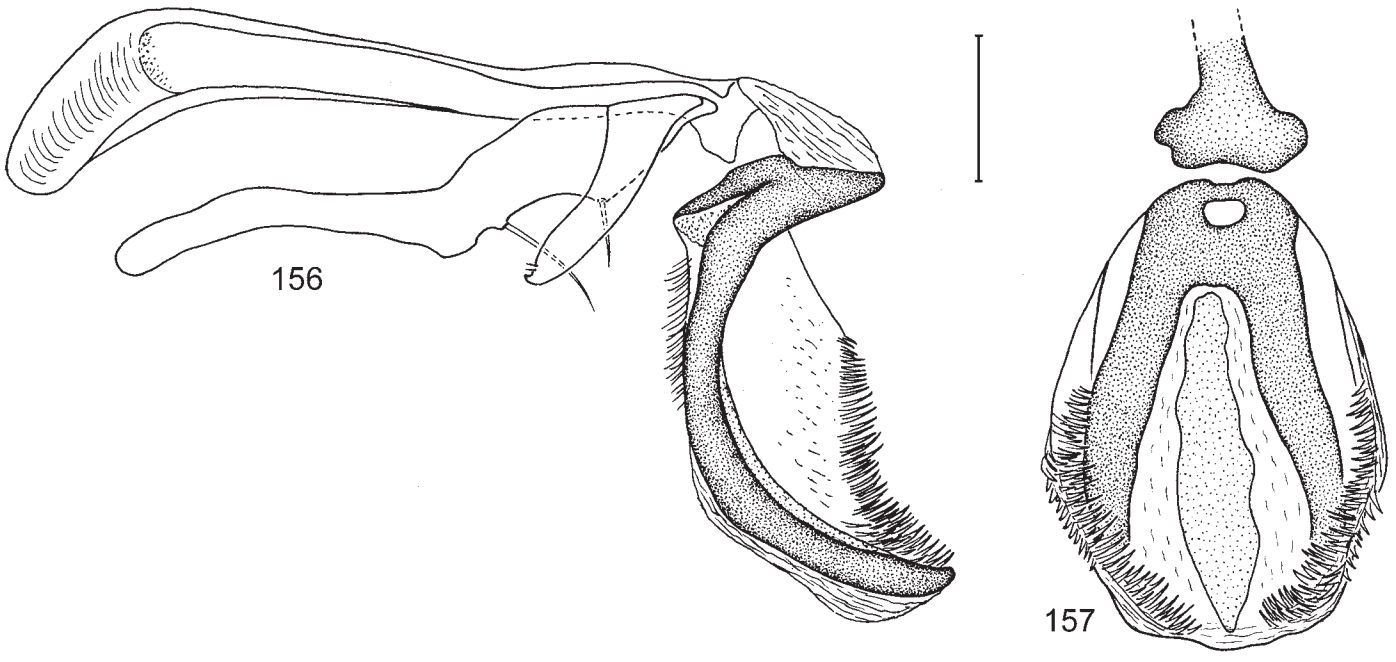
DIAGNOSIS. Nearly entirely yellow species except abdomen gray in male and ocellar triangle gray in both sexes; 2 scattered rows of acrostichal setae, proepimeral seta present; wing hyaline, yellowish; antenna yellow, vertex yellow; gena high, gena-to-eye ratio 0.45; abdomen gray; male epandrium in undissected specimens gray.

DESCRIPTION. Body length 2.06–2.70 mm.

Head: Eye slightly higher than wide; ocellar triangle usually gray microtomentose; frons bare, yellow, parafrons yellow; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput narrow, yellow, with 1–2 rows of short dorsoclinate setulae; antenna yellow; arista yellow. Gena high, gena-to-eye ratio 0.45, yellow, bearing 1 row of 4–5 short ventroclinate setae along ventral edge in addition to a pair of strong convergent oral vibrissae; face yellow; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum entirely yellow. Dorsocentral setae 5(2+3); acrostichal setae in 2 irregular rows; apical scutellar setae only twice length of scutellum. Mesonotum sparsely covered with minute setae. Anepisternum gray, mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing hyaline, yellowish. Halter yellow. Legs entirely yellow; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces,

Abdomen: Uniformly light gray microtomentose in male, yellow dorsally in female, evenly setose. Male terminalia (Figures 156, 157): Epandrium in undissected specimens



FIGURES 156–157. Structures of male terminalia of *Trixoscelis coloradensis* Foster and Mathis (Colorado. Gunnison: Almont): (156) aedeagus, aedeagal apodeme, and pre- and postgonites, lateral aspect; (157) distiphallus, posterior aspect. Scale = 0.1 mm.

gray; surstylus reduced to setulose patch on the proximal surface of the epandrium; pre- and postgonites separate (Figure 156) postgonite narrow, with minute "hook" at the distal tip and two minute setulae, pregonite (Figure 156) simple, ventral margin with two rather weak setulae; distiphallus with three narrow sclerotized bands, heavily setulose distally (Figures 156, 157). Female terminalia: Seventh tergite and sternite weakly fused; spermathecae spherical with ducts partly sclerotized; eighth sternite without lateral lobes; hypoproct without short, strong setae; epiproct with only weak setulae.

TYPE MATERIAL. The holotype male is labeled "Almont Colo[rado] 8200ft AHSturtevant Aug[ust] 9 1957 ["Aug 9" handwritten]/A. H. Sturtevant Collection, 1970/HOLOTYPE ♂ *Trixoscelis coloradensis* Foster & Mathis USNM [red]/USNM ENT 00118092 [plastic bar code label]." The holotype is double mounted (glued to a cardboard triangle and lying on its left side), is in good condition, and is deposited in the USNM. Paratypes are as follows:

UNITED STATES. *Colorado*. **Gunnison:** Almont (38°39.9′N, 106°50.8′W; 2445 m), 9 Aug 1957, A. H. Sturtevant (3♂, 4♀; USNM).

TYPE LOCALITY. United States: Colorado. Gunnison: Almont (38°39.9′N, 106°50.8′W; 2445 m).

DISTRIBUTION (FIGURE 13). Nearctic: United States (Colorado).

ETYMOLOGY. The species epithet, *coloradensis*, is of Latin derivation and refers to the type locality in Colorado.

REMARKS. This species is closely related to the other two species that were previously placed in *Zagonia*, namely *T. flava* and *T. flavicornis*. It differs from them in having a gray abdomen in the male and a generally gray ocellar triangle. Otherwise, it is completely yellow as the other two species. The large scoop-like distiphallus is quite unique and unusual for the genus.

Trixoscelis crepida Foster and Mathis, new species

FIGURES 158–161

DIAGNOSIS. Thorax uniformly gray microtomentose, subshiny; 2 irregular rows of acrostichal setae, proepimeral seta present; wing hyaline; antenna yellow; gena moderately high, gena-to-eye ratio 0.33–0.43 or higher; male epandrium in undissected specimens concolorous with abdomen.

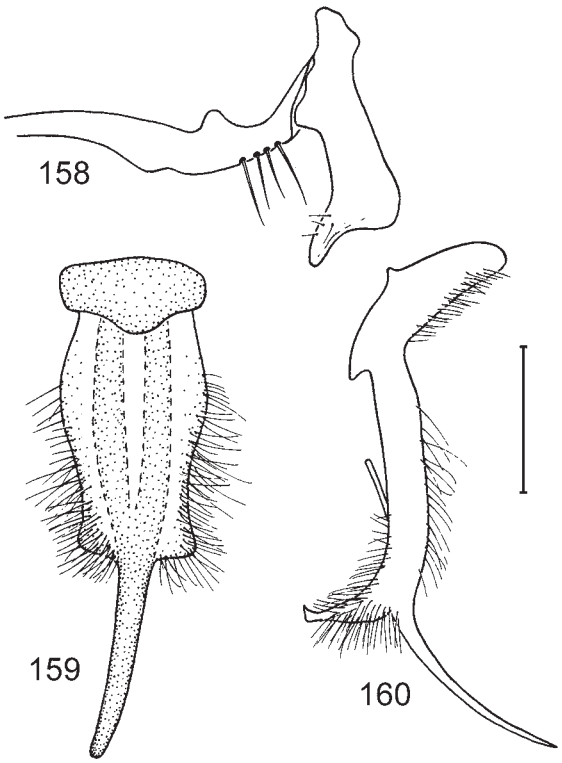
DESCRIPTION. Body length 2.22–2.54 mm.

Head: Eye distinctly higher than wide; ocellar triangle light gray microtomentose; frons bare, yellow becoming brown laterad of ocellar triangle; parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput quite wide, gray microtomentose with 2–3 variable length rows of short dorsoclinate setulae in addition to several scattered setae dorsally and ventrally; antenna entirely yellow, arista brown, with sparse hairs. Gena moderately high, gena-to-eye ratio 0.33–0.43, yellow microtomentose, many scattered, short setulae in addition to a pair of strong convergent oral vibrissae; face yellow, palpus yellow, clypeus small indistinct, brown.

Thorax: Mesonotum uniformly gray microtomentose, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 2 rows; apical scutellar setae clearly more than twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing hyaline. Halter pale yellow to white. Legs entirely yellow, apical tarsomeres slightly darker; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces

Abdomen: Uniformly gray to brownish microtomentose, evenly setulose. Male terminalia (Figures 158–160): Epandrium in undissected specimens concolorous with remainder of abdomen; surstylus reduced to a small lobe partially fused to epandrium, barely discernible in some specimens; pregonite simple, ventral margin with several weak setae, postgonite (Figure 158) simple, bare, short boot-shaped lobe with a few minute setulae near tip; distiphallus (Figures 159, 160) broad rectangular, adorned with many weak setulae along lateral edges, becoming thin posteriorly curved strap distally. Female terminalia: Seventh tergite and sternite weakly fused; spermathecae spherical; eighth sternite without lateral lobes; hypoproct with two strong setae; epiproct with two weak setae.

TYPE MATERIAL. The holotype male is labeled "Husum, Wash[ington]. June 28, 1917[,] A.L. Melander/ALMelander Collection 1961 [green stippling on right side]/HOLOTYPE ♂ *Trixoscelis crepida* Foster & Mathis USNM [red]/USNM ENT 00118076 [plastic bar code label]." The holotype is double mounted (pinned



FIGURES 158–160. Structures of male terminalia of *Trixoscelis crepida* Foster and Mathis (California. San Diego: Palomar Mountain): (158) gonites and hypandrium, lateral aspect; (159) aedeagus, ventral aspect; (160) same, lateral aspect. Scale = 0.1 mm.

vertically on a minuten mounted in a cardboard square), is in excellent condition (abdomen removed and dissected; structures in an attached microvial), and is deposited in the USNM. Paratypes are as follows:

UNITED STATES. *California*. **San Bernardino:** Barton Flat (34°10.4′N, 116°51.8′W), 12 Jun 1954, A. L. Melander (1♂; USNM); Crestline (34°14.5′N, 117°17.1′W), 4 Jul 1942, A. L. Melander (1♂; USNM). **San Diego:** Palomar Mountain (33°19.4′N, 116°52.7′W), 14 Jun 1948, A. L. Melander (3♂, 1♀; USNM). **Santa Clara:** Stanford University (37°25.6′N, 122°10.2′W), 23 Apr 1961, P. H. Arnaud, Jr. (1♂; USNM).

TYPE LOCALITY. United States. Washington. Klickitat: Husum (45°48′N, 121°29.2′W).

DISTRIBUTION (FIGURE 161). Nearctic: United States (California, Washington).

ETYMOLOGY. The species epithet, *crepida*, is of Latin derivation and means boot or sandal, referring to the boot-shaped postgonite of this species.

REMARKS. This species is remarkably similar to *T. annetteae* in the general shape of the distiphallus. There are small but consistent differences, however, in the shape of the pre- and postgonites and the distiphallus, which is bare in *T. annetteae* and setulose in *T. crepida*. It also shares the much reduced surstylus with *T. annetteae*. The surstylus of *T. nuda* is reduced compared to many other species of *Trixoscelis*, but in these two species it is nearly indistinguishable.

Trixoscelis flava (Coquillett), new combination

FIGURES 162–163, 166–167

Zagonia flava Coquillett in Baker, 1904:27. —Melander, 1913b:297 [diagnosis, distribution]. —Curran, 1934:372 [in key to genera of Chyromyidae]. —Melander, 1952:39 [diagnosis, key]. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:433 [distribution, diagnosis].

Siligo oregona Aldrich, in Aldrich and Darlington, 1908:99. —Melander, 1913b:297 [diagnosis, distribution, synonymy with *Z. flava*].

DIAGNOSIS. Body entirely yellow except abdomen may be variable light gray, all setae and setulae yellow; 2 rows of acrostichal setae; wing hyaline, slightly yellowish; antenna entirely yellow in males, basal flagellomere black in females; gena usually very high, gena-to-eye ratio 0.65–0.85; male epandrium in undissected specimens concolorous with abdomen.

DESCRIPTION. Body length 3.00–3.80 mm.

Head (Figures 166, 167): Eye round; ocellar triangle yellow; frons bare, yellow, parafrons yellow; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput narrow, yellow, with 1 row of short dorsoclinate setulae; antenna entirely yellow in males, basal flagellomere black in females; arista yellow, with sparse hairs. Gena variable but usually very high, gena-to-eye ratio 0.65–0.85 (rarely 0.33), entirely yellow, bearing 1 row of short ventroclinate setae along ventral edge in addition to a pair of stronger convergent oral vibrissae; face yellow; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum entirely yellow, all setae and setulae yellow. Dorsocentral setae 5(2+3); acrostichal setae in 2 somewhat irregular rows; apical scutellar setae about twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along

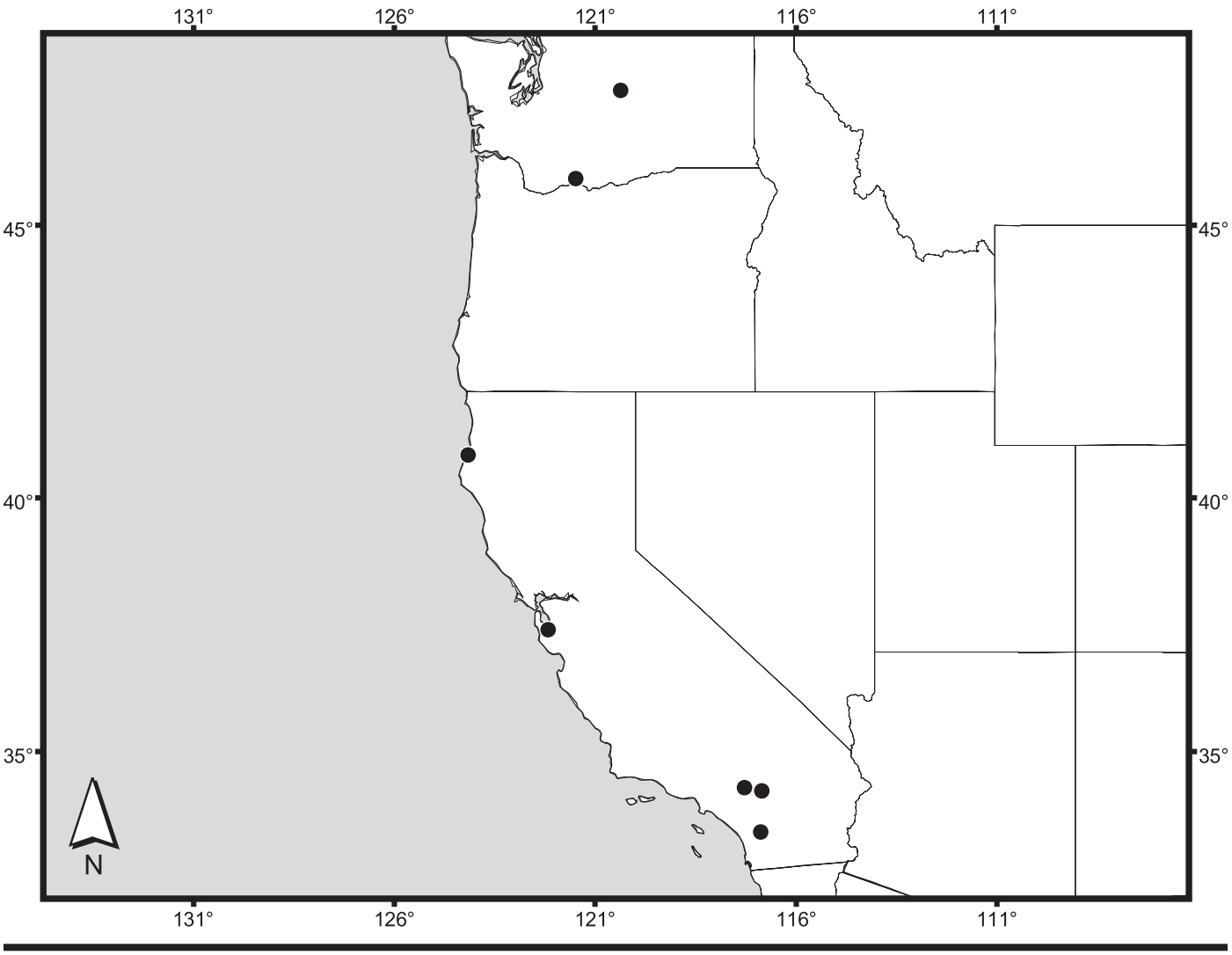


FIGURE 161. Distribution map for *Trixoscelis crepida* Foster and Mathis.

the posterodorsal edge. Wing hyaline to slightly yellowish. Halter yellow. Legs entirely yellow; male hind basitarsus slightly swollen; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces

Abdomen: Entirely yellow or variable light gray in males, all setulae yellow, evenly setose. Male terminalia (Figure 162): Epandrium in undissected specimens concolorous with abdomen; surstylus absent, reduced to small, oval, setaceous patch on the proximal surface of the epandrium, pre- and postgonites separate (Figure 162), pregonite with a ventral knob of several strong setae, postgonite with one strong distal seta, distiphallus rather simple, pointed strap (Figure 162). Female terminalia: Seventh tergite and sternite weakly fused; spermathecae long, narrow over 7× longer than wide, without spherical head; eighth sternite without lateral lobes; hypoproct with 2 short, strong setae; epiproct with only weak setae.

TYPE MATERIAL. Coquillett described this species on the basis of a single female that is labeled "Santa Clara Co[unty]. Cal[ifornia] Baker/Type 7680 U.S.N.M. [red typewritten label, the number is handwritten]/ Zagonia flava Coq [white handwritten label with black border]. The holotype is pinned directly, is in excellent condition (verdigris on pin above and below specimen), and is deposited in the USNM (7680).

Aldrich and Darlington (1908) described *Siligo oregona* from five specimens (3♂, 2♀; USNM) that he stated were collected at Hood River, Oregon, in July. We have located four male syntypes. These specimens comprise the type series even though the date of collection

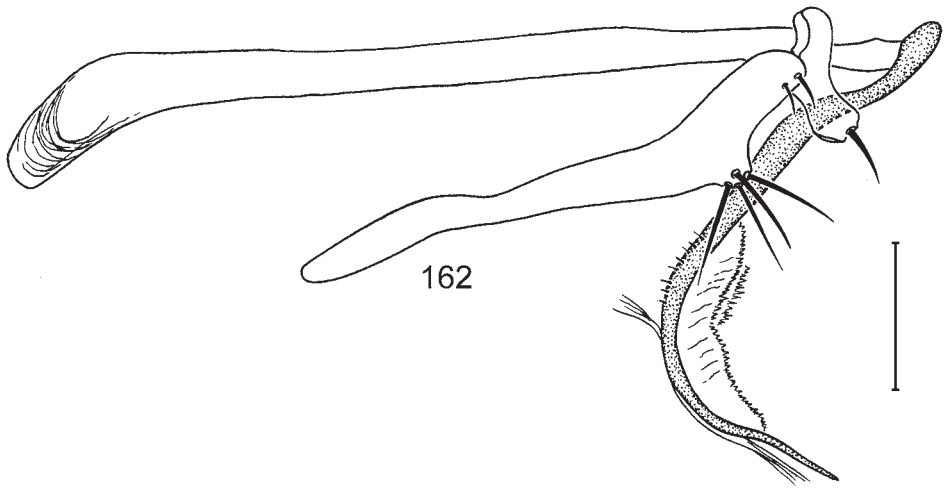


FIGURE 162. Structures of male terminalia of *Trixoscelis flava* (Coquillett): pre- and postgonites, aedeagus, and aedeagal apodeme, lateral aspect. Scale = 0.1 mm.

is incorrect (August rather than July) in the publication and all specimens available to us are males. We have not located the fifth syntype. As a holotype was not designated, we here designate one of the males as the lectotype. The lectotype male is labeled "Hood R[iver] Ore[gon] Aug[ust] 7. 02 [handwritten]/Siligo oregona Type [white; handwritten]/J. M. Aldrich coll/Cotype 44834 U.S.N.M. [red; number handwritten]/LECTOTYPE ♂ *Siligo oregona* Coquillett Foster & Mathis USNM [red]/USNM ENT 00118073 [plastic bar code label]." The lectotype is directly pinned, is in excellent condition, and is deposited in the USNM. The other three males are here designated as paralectotypes. One male has had the abdomen removed and dissected and the parts are in an attached microvial.

Type Locality. United States. California. Santa Clara County (37°14′N, 121°46′W).

Other Specimens Examined. UNITED STATES. *California*. **Fresno:** Sanger (36°42.5′N, 119°33.4′W), 25 Apr 1949, R. E. Ryckman (1♂, 2♀; USNM). **Los Angeles:** Elizabeth Lake Canyon (34°33.2′N, 118°34.7′W), 3 Apr 1952, D. Shepherd (1♂; USNM); Fish Canyon (34°09.4′N, 117°55.4′W), 24 Apr, A. H. Sturtevant (1♀; USNM); Mojave Desert, Big Rock Wash (34°40′N, 117°52.3′W), 12 May 1944, A. L. Melander (1♀; USNM); Pasadena (34°08.9′N, 118°08.7′W), 17 Apr 1929, A. H. Sturtevant (1♂, 1♀; USNM). **Mariposa:** Yosemite Valley (37°43′N, 119°39.9′W), 22 May 1908, E. T. Cresson, Jr. (1♂, 3♀; USNM). **Mono:** Mono Lake (38°01′N, 119°0.6′W), 11 Aug 1951, E. L. Kessel (1♂; USNM). **Riverside:** Palm Springs (33°49.8′N, 116°32.7′W), 2 Apr 1945, A. L. Melander (1♂; USNM); Riverside (33°58.5′N, 117°19.7′W), 5–19 May 1935, A. L. Melander (4♂, 4♀; USNM). **San Bernardino:** Victorville (34°32.2′N, 117°17.5′W), 10–22 May 1945, 1952, A. L. Melander, A. H. Sturtevant (1♂, 2♀; USNM). **Santa Clara:** San Jose (37°19′N, 121°53.3′W; light trap), 5 Jun 1933, L. W. Saylor (1♀; USNM). **Toulumne:** Pinecrest (38°11.3′N, 119°59.5′W), 12 Jul 1948, P. H. Arnaud, Jr. (1♀; USNM). **Tulare:** Kern Canyon (36°17.9′N, 118°24.3′W), 1 Apr 1950, A. H. Sturtevant (1♂, 1♀; USNM).

Oregon. **Benton:** Corvallis (44°33.9′N, 123°15.7′W), 6 May–21 Jun 1925, 1950, R. W. Lauderdale, A. L. Melander (1♂, 3♀; USNM). **Sherman:** The Dalles (15 km E; 45°35.7′N, 121°08′W; 122 m, sand dunes along Columbia River), 26 Jun 1975, W. J. Turner (10♂, 19♀; WSU).

Utah. **Rich:** Garden City (41°56.8′N, 111°23.6′W), 15 Jul 1951, F. C. Harmston, (1♂; USNM).

Washington. **Asotin:** Grande Ronde (Snake River; 46°04.8′N, 116°58.8′W), 9 May 1925, A. L. Melander (1♂, 2♀; USNM). **Benton:** Prosser (46°12.4′N, 119°48′W), 4 May 1919, A. L. Melander (1♂; USNM); Richland (46°17.3′N, 119°17.5′W), 7 Jun 1974, N. E. Woodley, (6♀; WAS). **Clallam:** Dungeness (48°08.8′N, 123°07.4′W), 24 Aug 1910 (1♀; USNM). **Whitman:** Almota (46°42.2′N, 117°28.2′W), 24 Jun 1911, Baker, J. M. Aldrich (19♂, 17♀; USNM); Alpowa (46°25.2′N, 117°11.8′W), 16 Jun 1923, A. L. Melander (1♀; USNM); Wawawai (46°38.2′N, 117°22.8′W), 20 May 1911, 7 May 1915, A. L. Melander (1♂, 7♀; USNM).

Distribution (Figure 163). Nearctic: United States (California, Oregon, Utah, Washington)

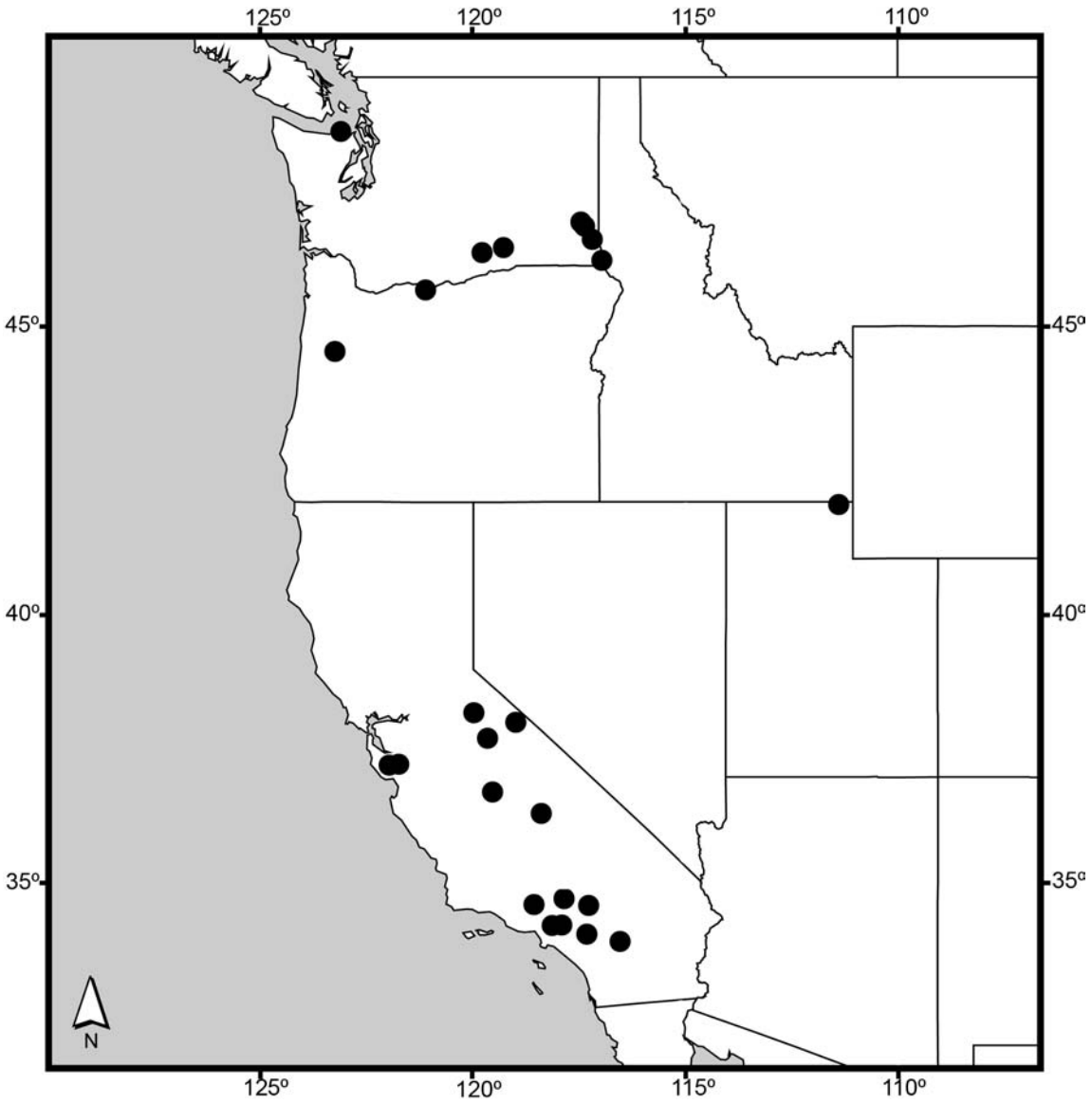


FIGURE 163. Distribution map for *Trixoscelis flava* (Coquillett).

REMARKS. This species is clearly a part of the *T. nuda* species complex. The absent surstylus, reduced gonites and strap-like distiphallus are characters shared with the other members of the group. It is clearly distinguished from the others, except *T. flavicornis,* by the entirely yellow setae, setulae and body. Both it and *T. flavicornis* were once placed in a separate genus, *Zagonia*. We have noted some variation in the color of the abdomen with some specimens exhibiting a grayish color. The distiphallus of *T. flava* is narrower than that of *T. flavicornis*. The most obvious genitalic difference is in the form of the gonites. The genal height of *T. flava* is much greater than *T. flavicornis* as well.

Trixoscelis flavicornis (Melander), new combination

FIGURES 164–165, 168–169

Zagonia flavicornis Melander, 1952:39. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:433 [distribution, diagnosis].

DIAGNOSIS. Body entirely yellow, all setae and setulae yellow; 2 rows of acrostichal setae; wing hyaline, slightly yellowish; antenna entirely yellow; gena moderately high, gena-to-eye ratio 0.33–0.45; epandrium in undissected specimens concolorous with abdomen.

DESCRIPTION. Body length 2.54–2.86 mm.

Head (Figures 168, 169): Eye round; ocellar triangle yellow; frons bare, yellow, parafrons yellow; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput narrow, yellow, with 1 row of short dorsoclinate setulae; antenna entirely yellow; arista yellow, with sparse hairs. Gena moderately high but variable, gena-to-eye ratio usually 0.33–0.45, entirely yellow, bearing 1 row of short ventroclinate setae along ventral edge in addition to a pair of stronger convergent oral vibrissae; face yellow; palpus yellow, clypeus small indistinct, yellow.

Thorax: Mesonotum entirely yellow, all setae and setulae yellow. Dorsocentral setae 5(2+3); acrostichal setae in 2 somewhat irregular rows; apical scutellar setae about twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing hyaline, slightly yellowish. Halter yellow. Legs entirely yellow; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces

Abdomen: Entirely yellow, all setulae yellow, evenly setose. Male terminalia (Figure 164): Epandrium in undissected specimens concolorous with abdomen; surstylus absent, reduced to small, oval, setaceous patch on the proximal surface of the epandrium, pre- and postgonites separate (Figure 164), pregonite simple, with two strong setae on ventral margin, postgonite (Figure 164) long, narrow, lacking strong distal seta; distiphallus rather simple, pointed strap. Female terminalia: Seventh tergite and sternite weakly fused; spermathecae spherical, spermathecal ducts as strongly sclerotized as the spermathecae; eighth sternite without lateral lobes; hypoproct with 2 short setae; hypoproct with weak setae.

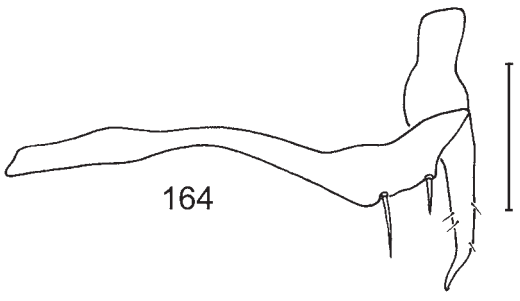


FIGURE 164. Structures of male terminalia of *Trixoscelis flavicornis* (Melander): pre- and postgonites, lateral aspect. Scale = 0.1 mm.

TYPE MATERIAL. *Trixoscelis flavicornis* was described from 16 specimens from Omak and Pullman, Washington, according to Melander (1952). We have found 13 specimens (1♂, 9♀, 3 with missing abdomens) from Omak (19 May 1916 *not* 29 May) and one from Pullman (♀) with type labels. Additionally, we have found one specimen from North Yakima with a paratype label, but this specimen has no type status because Melander did not include it. Because Melander did not designate a holotype, we herein designate one of the female specimens as lectotype (the male being in poor shape). The lectotype is labeled "Omak Wash[ington] 19 May [19]16 ALMelander/ALLOTYPE *Zagonia flavicornis* Melander [red]/A. L. Melander Collection 1961 [white label with green stippling on right side]/LECTOTYPE ♀ *Zagonia flavicornis* Melander Foster & Mathis USNM [red]/USNM ENT 00118089 [plastic bar code label]." It is double mounted (minuten pinned ventrally and glued in a cardboard square), is in excellent condition, and is deposited in the USNM. Paralectotypes are as follows:

UNITED STATES. *Washington*. **Okanogan:** Omak (48°24.7′N, 119°31.7′W), 19 May 1919 (1♂, 9♀, 3 unknown sex; USNM). **Whitman:** Pullman (46°43.9′N, 117°10.8′W), 4 Jun 1922 (1♀; USNM).

TYPE LOCALITY. United States. Washington. Okanogan: Omak (48°24.7′N, 119°31.7′W).

OTHER SPECIMENS EXAMINED. UNITED STATES. *California*. **Inyo:** North Lake Campground (32 km W Bishop; 37°13.7′N, 118°37.6′W; 2744 m), 27 Jul 1963, I. Savage (1♀; CSCA). **Mono:** Mono Lake (38°01′N, 119°0.6′W), 22 Jul 1911, J. M. Aldrich (14♀; USNM).

Washington. **Okanogan:** Conconully, Salmon Meadows (48°32.8′N, 119°44.9′W; 1372 m; Malaise trap with dry ice), 23–23 Jul 1975, W. J. Turner (1♀; WAS); Wauconda (11.5 km SE; 48°43.6′N, 118°58′W; Route 30), 28 Jul 1973, W. J. Turner (1♂; WAS). **Whitman:** Wawawai (46°38.2′N, 117°22.8′W), 13 May 1956, G. D. Gill (1♀; WAS). **Yakima:** North Yakima (46°36.6′N, 120°23.3′W), 8 May 1903, E. Jenne (1♀; USNM).

DISTRIBUTION (FIGURE 165). Nearctic: United States (California, Washington).

REMARKS. This species is very close to *T. flava*. The most obvious differences are that the females of *T. flavicornis* exhibit a yellow basal flagellomere as compared to the black basal flagellomere of *T. flava*, the gena is slightly shorter as compared to the eye height in *T. flavicornis*, and they are smaller in size. The male terminalia show

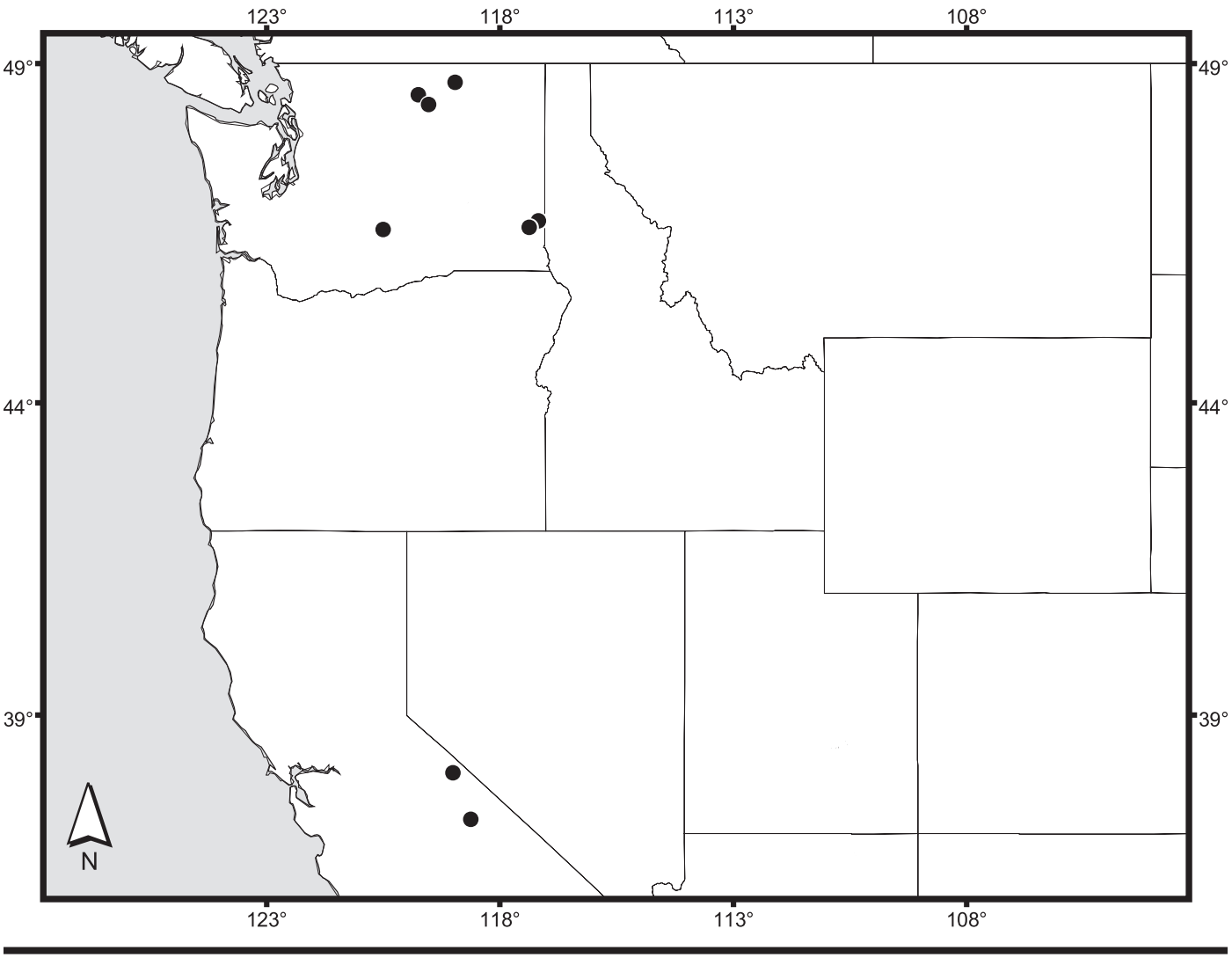


FIGURE 165. Distribution map for *Trixoscelis flavicornis* (Melander).

substantial differences in the postgonite (Figures 162, 164). The distiphallus is slightly wider than in *T. flava* but still is a rather thin strap-like structure. We have chosen to only illustrate the gonite complex because the other differences in the male terminalia are slight.

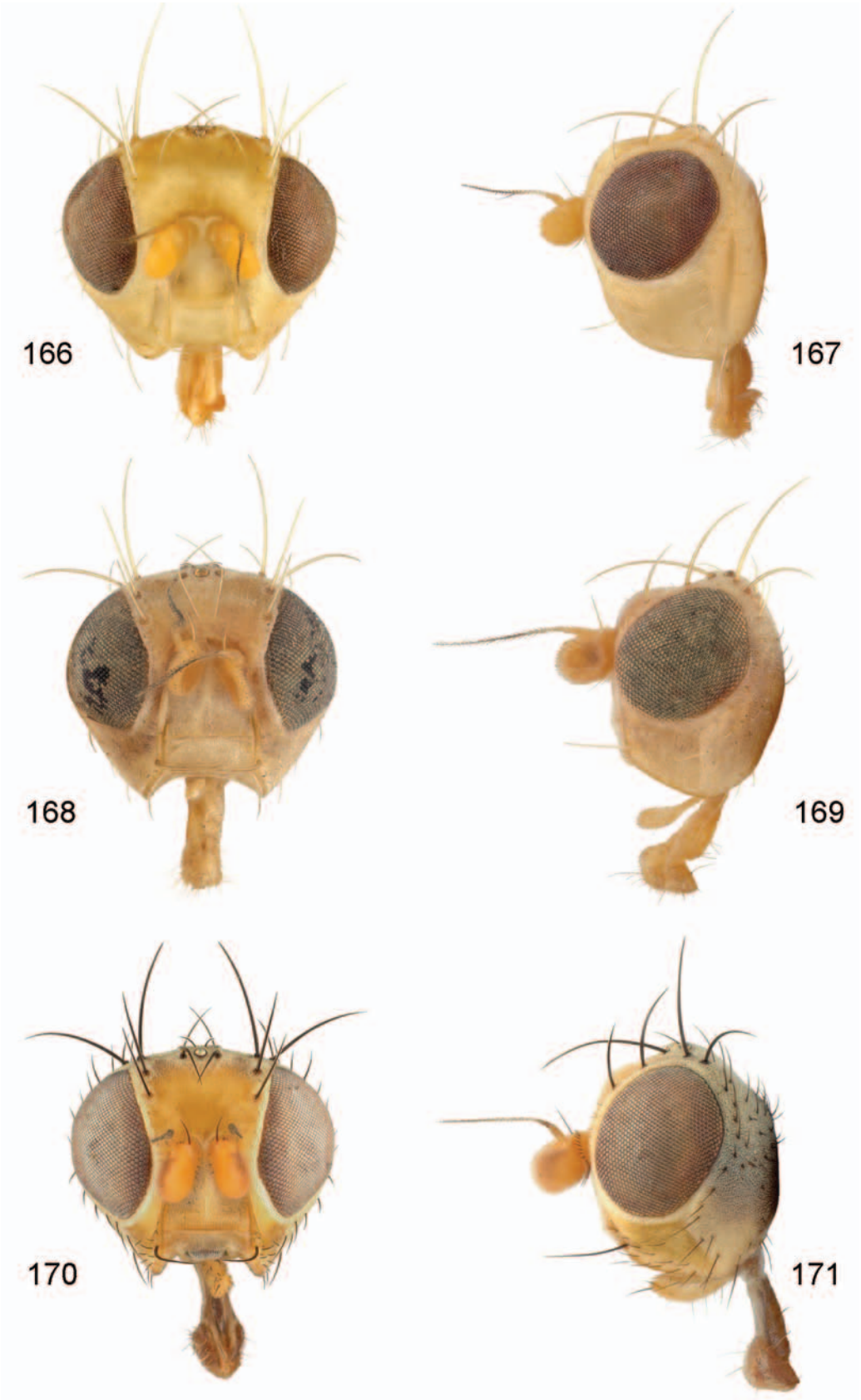
Trixoscelis kernensis Foster and Mathis, new species

FIGURES 172–174

DIAGNOSIS. Thorax uniformly gray microtomentose, subshiny; 2 irregular rows of acrostichal setae; wing hyaline; antenna yellow gena moderately high, gena-to-eye ratio at least 0.33–0.43; male epandrium in undissected specimens concolorous with abdomen.

DESCRIPTION. Body length 2.44–3.71 mm.

Head: Eye distinctly higher than wide; ocellar triangle light gray microtomentose; frons bare, yellow becoming brown laterad of ocellar triangle; parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput quite wide, gray microtomentose with 2–3 variable length rows of short dorsoclinate setulae in addition to several



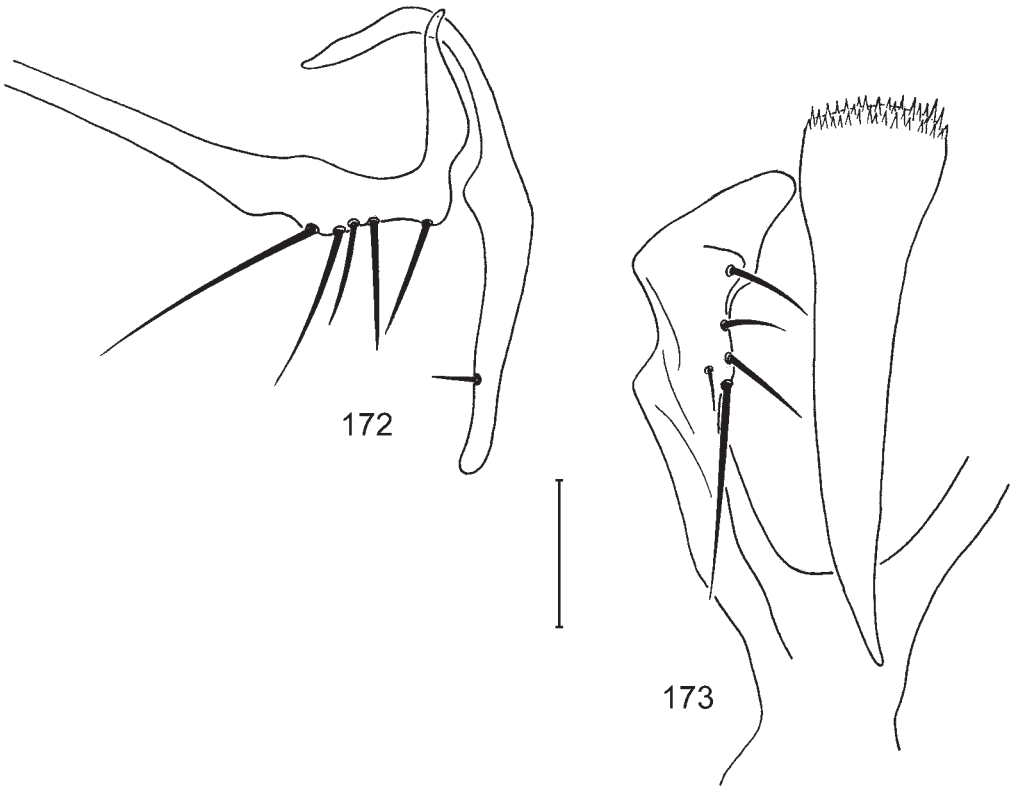
FIGURES 166–171. Photographs of heads: (166) *Trixoscelis flava*, anterior aspect; (167) same, lateral aspect; (168) *T. flavicornis*, anterior aspect; (169) same, lateral aspect; (170) *T. nuda*, anterior aspect; (171) same, lateral aspect.

scattered setae dorsally and ventrally; antenna entirely yellow, arista brown, with sparse hairs. Gena moderately high, gena-to-eye ratio 0.33–0.43, yellow microtomentose, many scattered, short setulae in addition to a pair of strong convergent oral vibrissae; face yellow, palpus yellow, clypeus small indistinct, brown.

Thorax: Mesonotum uniformly gray microtomentose, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 2 rows; apical scutellar setae clearly more than twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing hyaline. Halter pale yellow to white. Legs entirely yellow, apical tarsomeres slightly darker; fore femur with a row of longer setae along posterodorsal and posteroventral edges.

Abdomen: Uniformly gray to brownish microtomentose, evenly setulose. Male terminalia (Figure 172, 173): Epandrium in undissected specimens concolorous with remainder of abdomen; surstylus as in *T. nuda*; pregonite simple, with several rather strong setae on the ventral margin; postgonite (Figure 172) simple, thin, long, somewhat curved lobe with single weak subapical seta; distiphallus (Figure 173) long triangular, nearly bare. Female terminalia: Seventh tergite and sternite weakly fused; spermathecae spherical; eighth sternite without lateral lobes; hypoproct with two strong setae; epiproct with two weak but long setae.

Type Material. The holotype male is labeled "KernCo.CALIF[ORNIA] Kelso Valley 8mi. S.Weldon Apr. 15–17, 1967 D. Davis 4000′/From Flowers Yucca Brevifolia/HOLOTYPE ♂ *Trixoscelis kernensis* Foster & Mathis USNM [red]/USNM ENT 00118075 [plastic bar code label]." The holotype is double mounted (glued on right side to a paper triangle), is in excellent condition (abdomen removed and dissected; structures in an attached



FIGURES 172–173. Structures of male terminalia of *Trixoscelis kernensis* Foster and Mathis (California. Kern: Kelso Valley, Weldon): (172) gonites, lateral aspect; (173) hypandrium, gonites and distiphallus, ventral aspect. Scale = 0.1 mm.

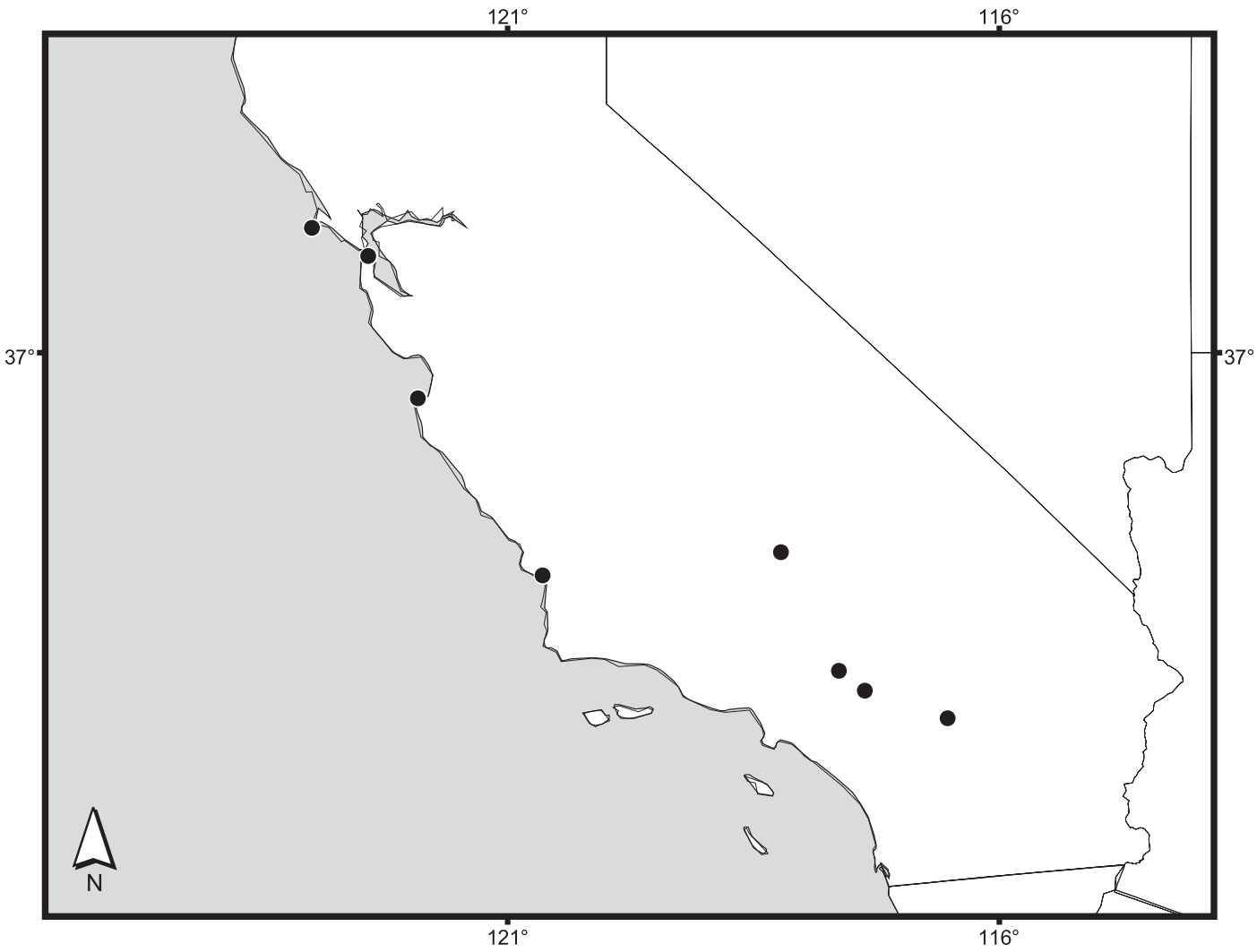


FIGURE 174. Distribution map for *Trixoscelis kernensis* Foster and Mathis.

microvial), and is deposited in the USNM. Paratypes are as follows:

UNITED STATES. *California*. **Kern:** Kelso Valley (13 km S of Weldon; 35°21.1′N, 118°13.2′W; 1220 m; flowers of *Yucca brevifolia*), 15–17 Apr 1967, D. Davis (19♂, 13♀; USNM). **Marin:** Point Reyes (38°0.1′N, 122°59.8′W), 19 Apr 1980, S. A. Marshall (1♂; DEBU). **Monterey:** Pacific Grove (36°37.1′N, 121°55′W), 27 Aug 1920, A. H. Sturtevant (2♂; USNM). **Riverside:** Morongo, between Morongo and Yucca Valleys (33°57.6′N, 116°31.5′W), 28 Apr 1932, S. O. McKelvey (3♂, 1♀; USNM). **San Bernardino:** Verdemont (34°11.6′N, 117°22.1′W), 18 Feb 1958, A. L. Melander (1♂; USNM); Wrightwood (34°21.6′N, 117°38′W), 22 May 1954, A. L. Melander (3♂, 1♀; USNM). **San Francisco:** San Francisco (37°46.5′N, 122°25.2′W; *Lupinus arboreus*), 11 Jul–8 Aug 1929, 1933, H. H. Keifer (5♂, 1♀; CSCA). **San Luis Obispo:** Pismo Beach (35°09.6′N, 120°38.7′W; Lupine, sand), 2 Jul 1954, M. T. James (2♂, 2♀; WSU).

TYPE LOCALITY. United States. California. Kern: Kelso Valley (13 km S of Weldon; 35°21.1′N, 118°13.2′W; 1220 m).

DISTRIBUTION (FIGURE 174). Nearctic: United States (California).

ETYMOLOGY. The species epithet, *kernensis*, refers to the type locality in Kern County, California.

REMARKS. This species shares a larger, more obvious surstylus with *T. nuda*. The postgonite is unusually long and narrow and shows slight variation in the extent of its curvature.

Trixoscelis litorea (Aldrich)

FIGURES 175–178

Siligo litorea Aldrich, in Aldrich and Darlington, 1908:100.

Trixoscelis litorea. —Melander, 1913b:296 [generic combination; key to Nearctic species of *Trixoscelis*]. —Melander, 1952:42, 47 [in key and compared briefly to *T. nitidiventris*, revision]. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:434 [distribution, diagnosis].

DIAGNOSIS. Thorax and abdomen gray, subshiny, 2 rows of acrostichal setae; wing hyaline; antenna mostly yellow outer surface of flagellomere darker; vertex light gray microtomentose; gena moderately short, gena-to-eye ratio 0.26 (rarely 0.43); male epandrium in undissected specimens slightly lighter gray or concolorous than abdomen.

DESCRIPTION. Body length 2.20–3.71 mm.

Head: Eye slightly to distinctly higher than wide, rarely nearly round; ocellar triangle light gray microtomentose; frons bare, yellow becoming brown laterad of ocellar triangle; parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput wide, gray microtomentose with 2–3 variable length rows of short dorsoclinate setulae in addition to several scattered setae dorsally and ventrally; antenna mostly yellow, outer surface of flagellomere rarely darker; arista brown, with sparse hairs. Gena moderately high, gena-to-eye ratio 0.26 (rarely 0.43), yellow microtomentose, bearing several scattered setulae in addition to a pair of strong convergent oral vibrissae; face usually yellow, rarely somewhat darker; palpus yellow, clypeus small indistinct, brown.

Thorax: Mesonotum uniformly gray microtomentose, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 2 rows; apical scutellar setae about twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge. Wing hyaline. Halter pale yellow to white. Femora rarely light brown usually entirely yellow, tibiae very light brown to yellow, tarsi yellow except for apical two segments brownish; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces

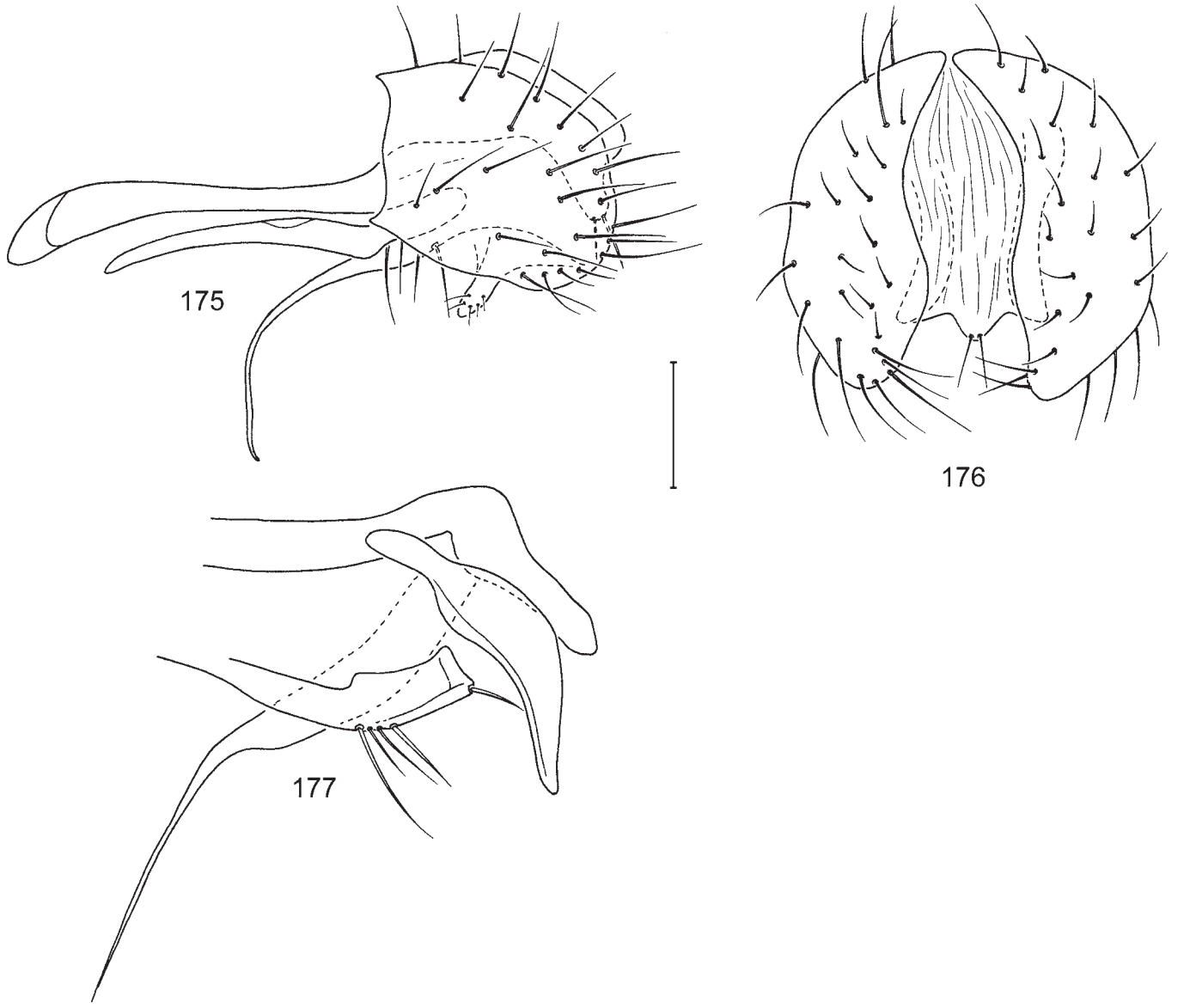
Abdomen: Uniformly gray to brownish microtomentose, evenly setulose. Male terminalia (Figures 175–177): Epandrium (Figures 175, 176) in undissected specimens concolorous with remainder of abdomen; surstylus as in *T. nuda*; pregonite simple, with several rather strong setae on ventral margin in addition to weak seta on posterior edge; postgonite (Figure 177) simple, thin, long, somewhat curved, bare lobe; distiphallus (Figures 175, 177) long, rectangular basally, extended as long curved narrow strap distally, nearly bare. Female terminalia: Seventh sternite and tergite weakly fused; spermathecae spherical; eighth sternite lacking setaceous lobes; hypoproct with two short but strong setae; epiproct with pair of moderately strong setae.

TYPE MATERIAL. The holotype male of *Siligo litorea* Aldrich is labeled "Pacific Grove [36°37.1′N, 121°55′W] Cal[ifornia. **Monterey:**], May 8.06 [handwritten]/Upper Beach (Zone 2) [handwritten]/Siligo litorea Type Ald. [handwritten]/Type No. 44823 U.S.N.M.[red]/ Trixoscelis litorea Ald. [handwritten]." The specimen is double mounted (pinned ventrally with a minuten inserted in a small cardboard square), is in good condition, and is deposited in the USNM (44823).

TYPE LOCALITY. United States. California. Monterey: Pacific Grove (36°37.1′N, 121°55′W).

OTHER SPECIMENS EXAMINED. UNITED STATES. *California*. **Los Angeles:** Los Angeles (33°49′N, 118°17′W), 25 Apr–7 May 1928, 1950, H. M. Armitage (2♂, 2♀; USNM); Mojave Desert, Piute Butte (34°39.5′N, 117°51′W), 12 May 1944, A. L. Melander (3♂, 1♀; USNM); Temecula (33°29.6′N, 117°08.9′W), 10 Mar 1950, A. H. Sturtevant (1♂; USNM). **Merced:** Hillmar (37°24.5′N, 120°51′W; ex. fruitless mulberry), 13 Apr 1962, N. Hill (3♂; USNM). **Orange:** Santa Ana Canyon (33°51.4′N, 117°49.1′W), 29 Mar 1950, A. L. Melander (1♂; USNM). **Riverside:** Cajon (34°17.9′N, 117°27.4′W), 25 Mar 1947, A. L. Melander (1♂; USNM); Riverside (33°58.8′N, 117°22.4′W), 22 Feb–19 May 1935, 1946, A. L. Melander (20♂; 3♀; USNM); Riverside (33°58.8′N, 117°22.4′W), 18 May 1950, A. L. Melander (1♂; USNM). **San Bernardino:** Victorville (34°32.2′N, 117°17.5′W), 2–10 May 1952, 1953, G. A. Marsh, R. O. Schuster, A. H. Sturtevant Collection (12♂, 17♀; USNM). **San Diego:** Escondido (33°07.5′N, 117°04.8′W), 26 Mar 1955, A. H. Sturtevant (3♂, 1♀; USNM); Oak Grove (33°23.1′N, 116°47.4′W), 8–9 May 1945, A. L. Melander (5♂; 2♀; USNM). **Ventura:** Santa Paula (34°21.3′N, 119°03.6′W), 5 May 1949, H. H. Keifer (1♂, 1♀; USNM).

DISTRIBUTION (FIGURE 178). Nearctic: United States (California).



FIGURES 175–177. Structures of male terminalia of *Trixoscelis litorea* (Aldrich) (California. Merced: Hilmar): (175) epandrium, surstylus, aedeagus, aedeagal apodeme, and hypandrium, lateral aspect; (176) epandrium, posterior aspect; (177) aedeagus, aedeagal apodeme and gonites, lateral aspect. Scale = 0.1 mm.

Remarks. Fortunately, the aedeagus and one postgonite are visible on the type specimen, easily matching the type with a number of specimens collected later by Melander and others in California. The type specimen is unusual in exhibiting a slightly darker aspect than more recent specimens and it has a darker face. This species is clearly a member of the *T. nuda* species complex based on the diminutive surstylus and the morphology of the gonites and aedeagus.

Melander collected this species and *T. nuda* at the same locality and date (Riverside, 24 Feb 1935) in one instance. It is unknown if they actually were collected together at the same site or if Melander moved around the Riverside area and collected them in different habitats. These species appear identical externally, but the differences in the male terminalia are substantial and reliable, particularly in the shape of the aedeagus and the pre- and postgonites. There is some minor difference in the shape of the anterior

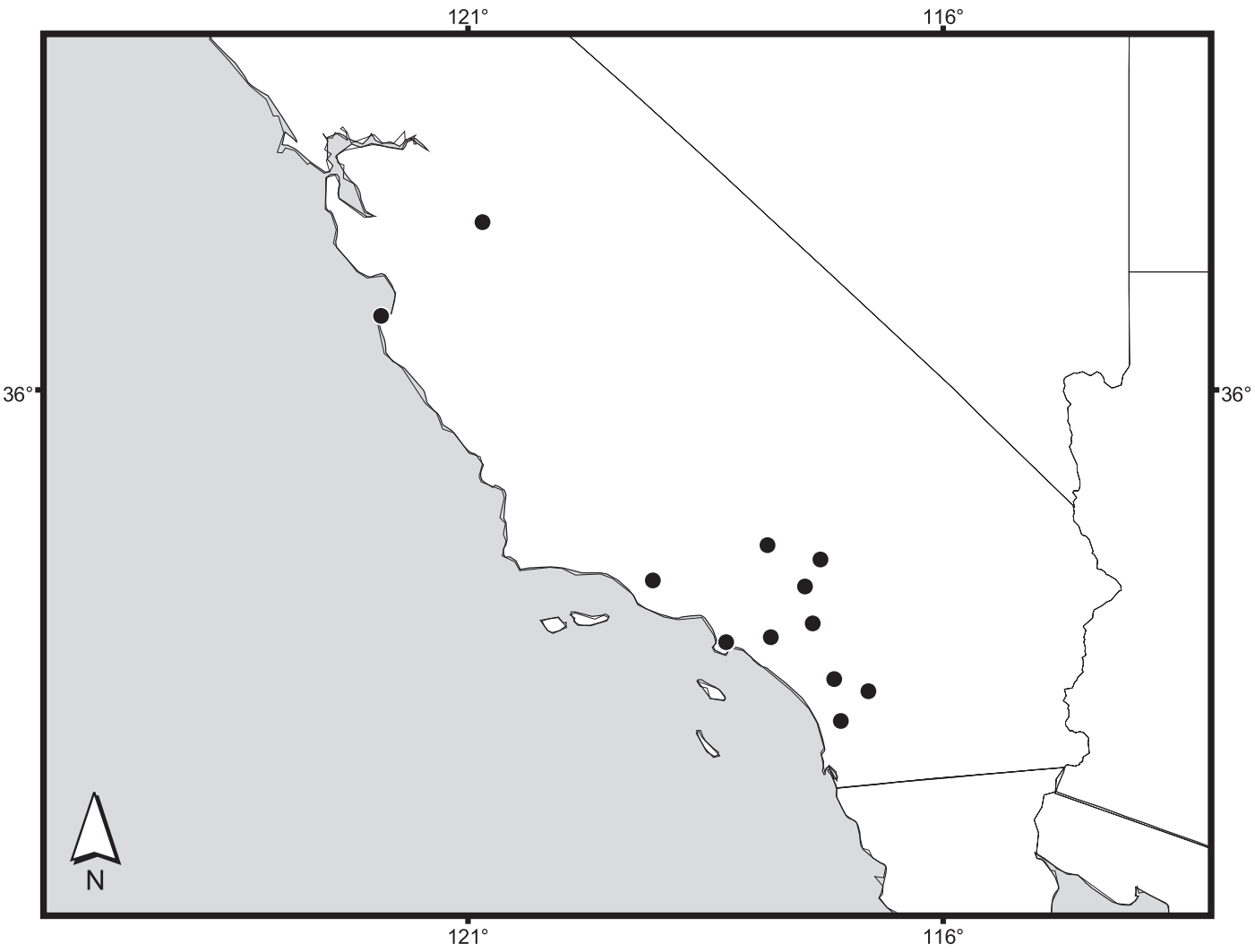


FIGURE 178. Distribution map for *Trixoscelis litorea* (Aldrich).

portion of the hypandrium as well. *T. nuda* exhibits a slightly longer hypandrium anteriorly than *T. litorea*.

Trixoscelis melanderi Vockeroth

FIGURES 179–182

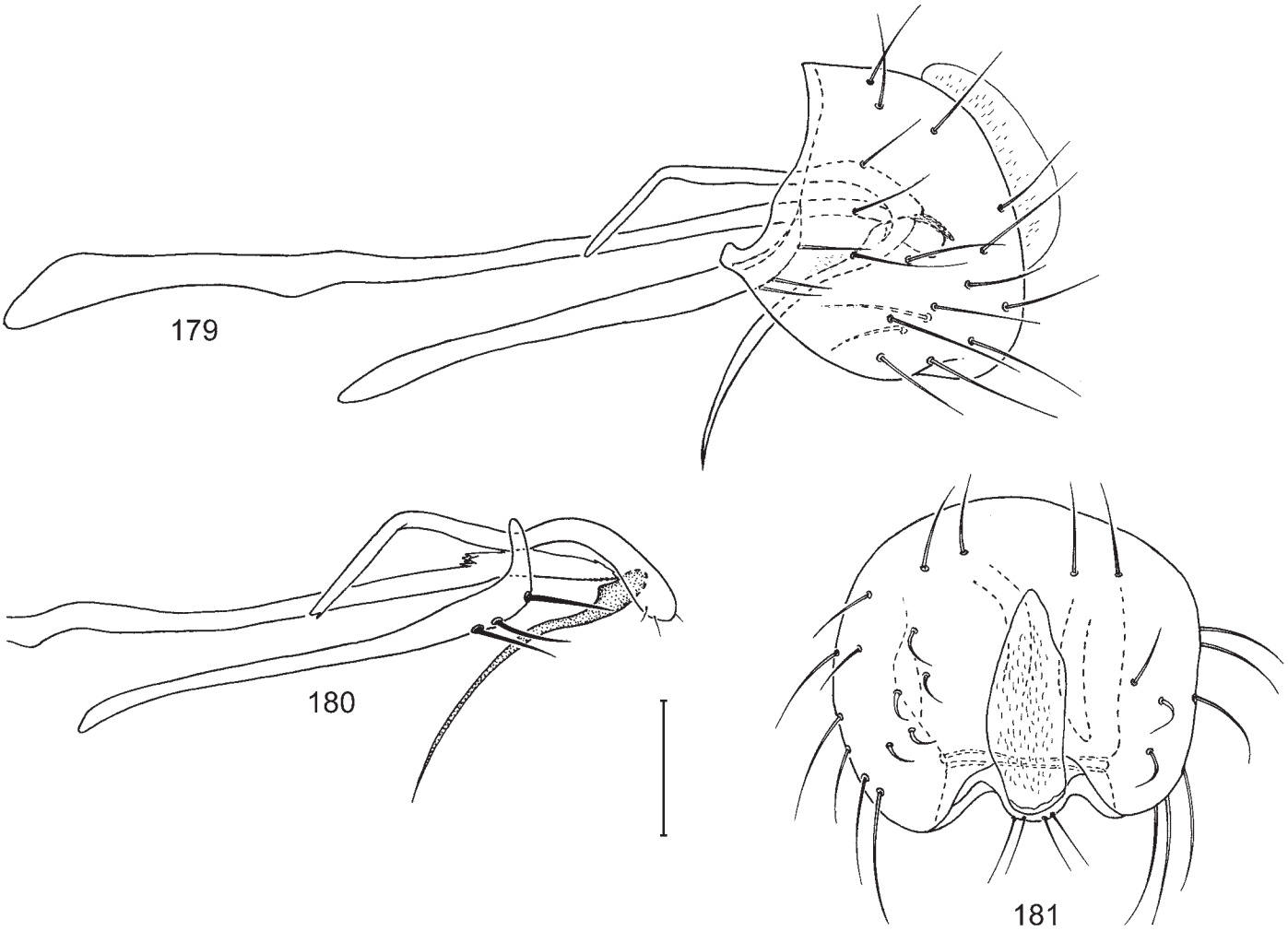
Trixoscelis dimidiata Melander, 1952:45 [preoccupied, Hendel (1913:617)]. —Vockeroth, 1965:818 [Nearctic catalog]. —Cole, 1969:433 [distribution, diagnosis].

Trixoscelis melanderi Vockeroth, 1965:818 [new name for *dimidiata* preoccupied by Hendel (1913)].

DIAGNOSIS. Thorax uniformly gray microtomentose, scutellum often yellowish medially, 2 rows of acrostichal setae; wing yellowish hyaline with darker yellow veins; antenna completely yellow; vertex yellowish orange; gena high, gena-to-eye ratio 0.53; male epandrium in undissected specimens gray with yellow highlights.

DESCRIPTION. Body length 2.20–2.75 mm.

Head: Head higher than wide. Eye slightly higher than wide; ocellar triangle light gray microtomentose; frons bare, uniformly orange; parafrons silvery-orange microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent; occiput rather wide, gray microtomentose, with 1 row of short dorsoclinate



FIGURES 179–181. Structures of male terminalia of *Trixoscelis melanderi* Vockeroth: (179) epandrium, gonites, aedeagus, aedeagal apodeme, and hypandrium, lateral aspect; (180) aedeagus, aedeagal apodeme, gonites, and hypandrium, lateral aspect; (181) epandrium, posterior aspect. Scale = 0.1 mm.

setulae in addition to several scattered setulae dorsally and ventrally, occiput extends below eye encroaching on genal area; antenna completely yellow; arista brown, with sparse hairs. Gena high, gena-to-eye ratio 0.53, orange microtomentose, bearing many scattered setulae in addition to a pair of strong convergent oral vibrissae; face white; palpus yellow, clypeus small indistinct, gray.

Thorax: Mesonotum uniformly gray microtomentose, covered with many short setae, scutellum often yellowish medially. Acrostichal setae in 2 straight rows; apical scutellar setae more than twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and 1–2 very short setulae along the posterodorsal edge. Wing yellowish hyaline with darker yellow veins. Halter white to yellow. Legs entirely yellow; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces

Abdomen: Uniformly yellow microtomentose in female and uniformly gray or yellow microtomentose in male, evenly setulose. Male terminalia (Figures 179–181): Epandrium (Figures 179, 181) in undissected specimens yellow; phallapodeme extremely long; surstylus (Figures 179, 181) nearly entirely fused with epandrium, only a pair of very long setae remain on the medial surface of epandrium indicating where surstyli are as follows: pregonite (Figure 180) fused with posterior hypandrium and with 3 posteriorly directed setae; postgonite (Figure 180) simple, long

lobe with several weak setulae distally; aedeagus extremely narrow simple pointed strap (Figures 179, 180). Female terminalia: Seventh tergite and sternite not completely fused; spermathecae spherical; eighth sternite lacking distinct lobes; hypoproct with two strong setae; epiproct lacking distinct pair of setae.

TYPE MATERIAL. Melander described *T. dimidiata* from four females, of which one is here designated as the lectotype. The lectotype female is labeled "Riverside [33°58.8′N, 117°22.4′W] CAL[IFORNIA. **Riverside:**], 5 May 1935, A. L. Melander/PARATYPE Trixoscelis dimidiata Melander [red]/A. L. Melander Collection 1961 [white label with green stippling on right side]/Trixoscelis dimidiata Melander [white; handwritten]/LECTOTYPE ♀ Trixoscelis dimidiata Melander Foster & Mathis USNM [red]/USNM ENT 00118074 [plastic bar code label]." The lectotype is double mounted (pinned upright on a minuten glued in a brown cardboard square), is in excellent condition, and is deposited in the USNM. Paralectotypes are as follows:

UNITED STATES. *California*. **Monterey:** Lucia (near; 36°01.2′N, 121°30′W), 17 Jun 1947, A. L. Melander (1♀; USNM). **San Luis Obispo:** Morro Bay (35°20.1′N, 120°51.1′W), 27 July 1940, A. L. Melander (2♀; USNM).

TYPE LOCALITY. United States. California. Riverside: Riverside (33°58.8′N, 117°22.4′W).

OTHER SPECIMENS EXAMINED. UNITED STATES. *California*. **Los Angeles:** Covina (34°05.4′N, 117°53.4′W; on citrus), 7 Jun 1949, P. C. Ting (1♂; USNM); Santa Monica Mountains (34°12.6′N, 118°52.2′W), 3 Jul 1950 (4♂; USNM). **Monterey:** Kirk Creek (35°59.3′N, 121°29.8′W), 11 Aug 1969, B. Hocking (1♀; CNC). **San Francisco:** Lake Merced (37°43.3′N, 122°29.8′W), 3 May 1968, P. H. Arnaud, Jr. (2♀; USNM); San Francisco Golden Gate Park (37°46.6′N, 122°28.8′W; Strybling Arboretum (Native Plants Area), 23 Sep 1980, P. H. Arnaud, Jr. (24♂; USNM). **Ventura:** Santa Paula (34°21.3′N, 119°03.6′W; on walnuts), 5 May 1949, H. H. Keifer, Schall (3♂, 4♀; CSCA, USNM).

DISTRIBUTION (FIGURE 182). Nearctic: United States (California).

REMARKS. The four male specimens from the Santa Monica Mountains are virtually identical to the lectotype in having a yellowish scutellum, and our concept of the species is based on these males and the lectotype. The other three female paralectotypes show a uniformly gray scutellum but match the lectotype in every other feature. The uniformly gray thorax with an often yellowish scutellum seems to be unique for the genus. The phallapodeme is unusually long for the genus and the anterior margin of the hypandrium is also unusually long. Last, the yellowish wings with even yellower veins are distinctive for this species as well.

Trixoscelis nuda (Coquillett)

FIGURES 170–171, 183–187

Leria nuda Coquillett, 1910:130.

Trixoscelis nuda. Aldrich, 1929:34 [generic combination; lectotype designation, discussion]. —Melander, 1952:48 [revision]. —Vockeroth, 1965:818 [Nearctic catalog]. —Gill, 1968:7 [Neotropical catalog, distribution]. —Cole, 1969:434 [distribution, diagnosis].

Trixoscelis prima Hendel, 1911:43. —Melander, 1913b:296 [key to Nearctic species of *Trixoscelis*]. —Aldrich, 1929:34 [synonymy with *T. nuda*].

DIAGNOSIS. Thorax uniformly gray microtomentose, subshiny, 2 irregular rows of acrostichal setae; wing hyaline; antenna yellow; gena moderately high, gena-to-eye ratio at least 0.33–0.43; male epandrium in undissected specimens concolorous with abdomen.

DESCRIPTION. Body length 2.20–3.66 mm.

Head (Figures 170, 171): Eye distinctly higher than wide; ocellar triangle light gray microtomentose; frons bare, yellow becoming brown laterad of ocellar triangle; parafrons whitish microtomentose; 2 strong, reclinate parafrontal setae; ocellar setae 1 strong pair, positioned at level of or anterior to anterior ocellus, 1 additional posterior pair of shorter, weaker ocellar setae; 1 short cruciate postocellar seta; medial vertical seta strong, widely separated and convergent; lateral vertical seta long, strong and divergent;occiput quite wide, gray microtomentose with 2–3 variable length rows of short dorsoclinate setulae in addition to several scattered setae dorsally and ventrally; antenna entirely yellow, arista brown, with sparse hairs. Gena moderately high, gena-to-eye ratio 0.33–0.43, yellow microtomentose, many scattered, short setulae in addition to a pair of strong convergent oral vibrissae; face yellow, palpus yellow, clypeus small indistinct, brown.

Thorax: Mesonotum uniformly gray microtomentose, sparsely covered with setae much shorter than the dorsocentral setae. Dorsocentral setae 5(2+3); acrostichal setae in 2 rows; apical scutellar setae clearly more than twice length of scutellum. Anepisternum mostly bare except for one strong seta on posterodorsal corner along with only 3–4 much smaller setulae in a cluster; katepisternum with 2 longer setae and several very short setulae along the posterodorsal edge in addition to a row of short setulae just anterior to the midline of the sclerite. Wing hyaline. Halter pale yellow to white. Legs entirely yellow, apical tarsomeres

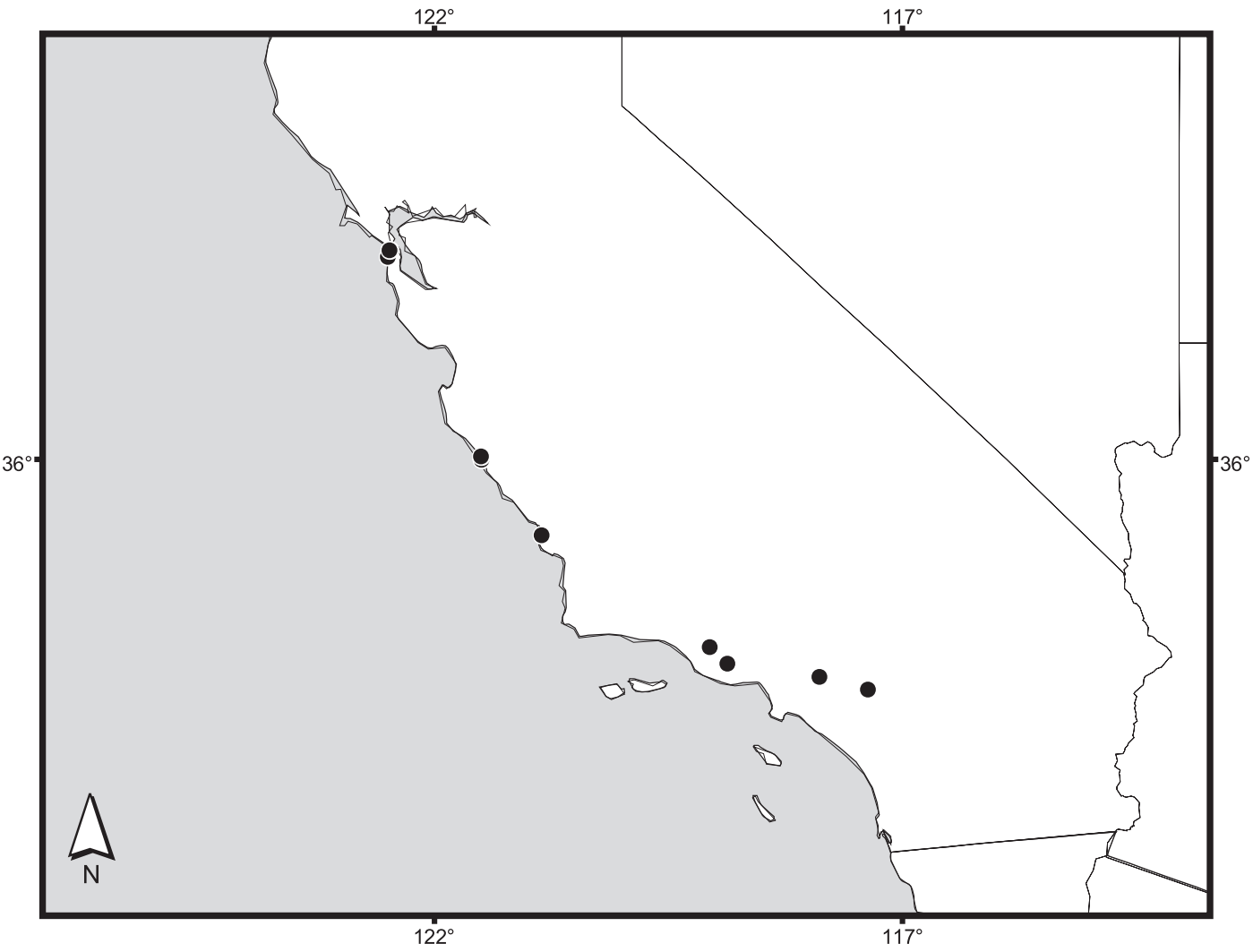
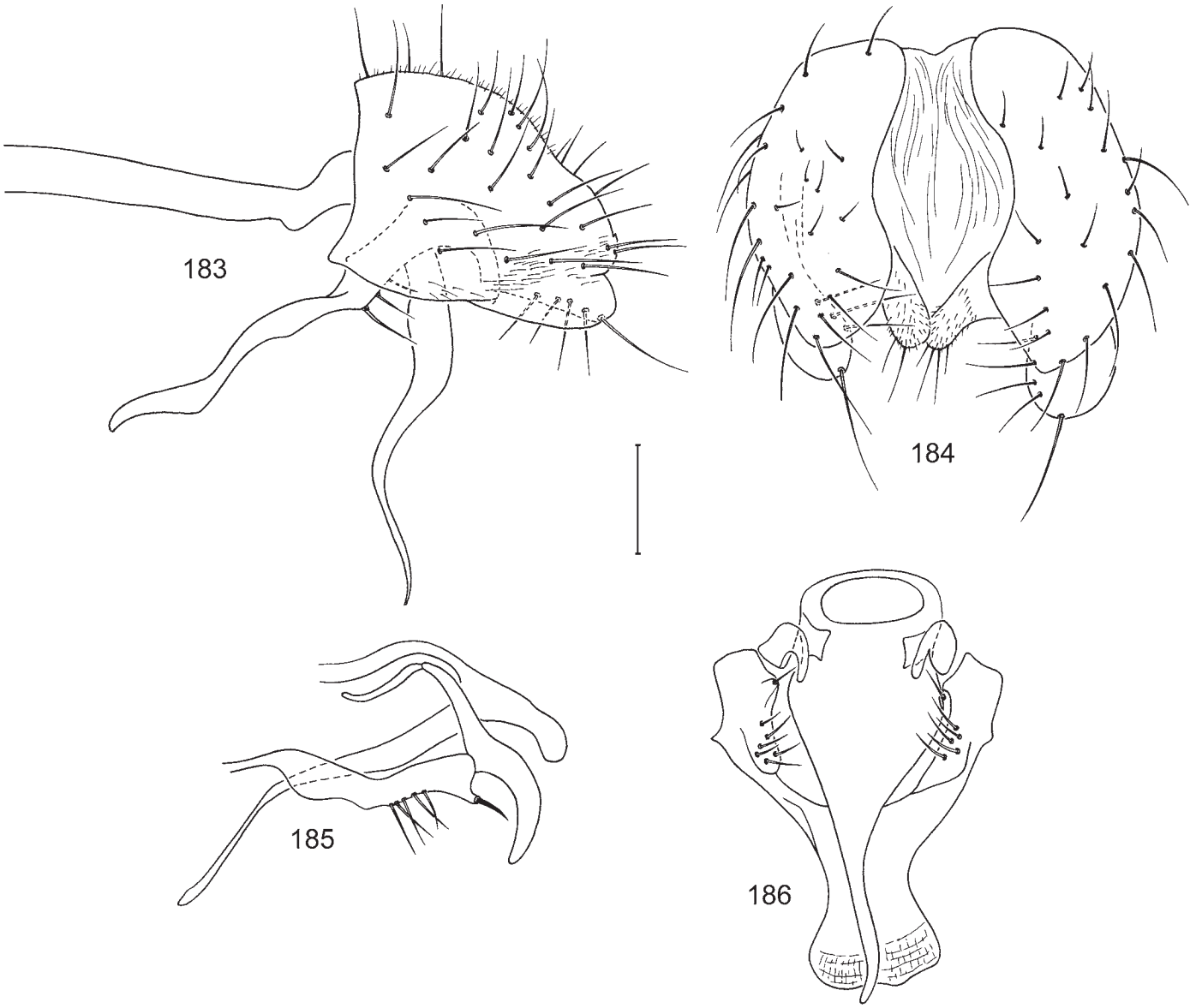


FIGURE 182. Distribution map for *Trixoscelis melanderi* Vockeroth.

slightly darker; fore femur with a row of longer setae along posterodorsal and posteroventral surfaces

Abdomen: Uniformly gray to brownish microtomentose, evenly setulose. Male terminalia (Figures 183–186): Epandrium (Figures 183, 184) in undissected specimens concolorous with remainder of abdomen; surstylus (Figure 183, 184) simple, lobate, partially fused to epandrium, appearing absent in some specimens; pregonite simple, with a posteriorly directed seta distally on ventral corner, with row of 4–5 weak posteroventrally directed setae along ventral margin; postgonite (Figures 185, 186) long, narrow anteriorly curved, bare lobe; distiphallus wide (Figures 183, 185, 186) and strongly sclerotized (sclerotization not depicted in illustration), triangular basally, extended in a long, narrow pointed strap distally. Female terminalia: Seventh tergite and sternite weakly fused; spermathecae conical; eighth sternite lacking distinct lobes; hypoproct with two strong setae; epiproct with a weak but distinct pair of setae.

Type Material. Coquillett described *L. nuda* from a type series of two females: one female from Claremont, California, and a second female from Santa Fe, New Mexico. Aldrich (1929) designated the syntype from Claremont as the "type" (= lectotype) and further stated that the syntype from New Mexico is conspecific with *T. cinerea*. An examination of the Santa Fe syntype shows that it is likely *T. flavens* but clearly is not *T. cinerea*. Because it is a female we are unable to determine its exact identification however. We also examined 37 (11♂, 26♀) other specimens from Claremont with identical labels as



FIGURES 183–186. Structures of male terminalia of *Trixoscelis nuda* (Coquillett) (California. Los Angeles: Claremont): (183) epandrium, surstylus, gonites, aedeagus, aedeagal apodeme, and hypandrium, lateral aspect; (184) epandrium and surstyli, posterior aspect; (185) gonites and hypandrium, lateral aspect; (186) hypandrium, aedeagus and gonites, ventral aspect. Scale = 0.1 mm.

the lectotype. We have dissected both a male and female and are confident of the identity of this species. The lectotype that was designated by Aldrich is a female and is labeled "Claremont Cal[ifornia] Baker/TypeNo. 13100, U.S.N.M." [red, "13100" handwritten]/Leria nuda Coq. [handwritten on white paper label with black border and folded into thirds]/Trixoscelis nuda A. Coq. [handwritten on white paper label with black border]/LECTOTYPE ♂ Leria nuda Coquillett Des. Aldrich USNM [red]." The lectotype is pinned directly, is in good condition (missing the apex of the left wing and a small piece of the right wing; there is some green verdigris-like material on the dorsal and ventral portions where the pin pierces the specimen), and is deposited in the USNM (13100). The paralectotype is labeled "Ckll 3800 Sta F. July" [handwritten on white paper label]/"U.S.N.M. Acc 30623" [small white label with the number handwritten]/Paratype 13100 U.S.N.M. [red "13100" handwritten]/Paratype of nuda

Coq. [handwritten on white label]." According to Coquillett (1910), the locality data are interpreted as Santa Fe, New Mexico, and the collector is T. D. A. Cockerell.

Hendel (1911) described *T. prima* from a male and a female. Both specimens were collected in Claremont, California, which was incorrectly cited as "New-Hampshire" by Hendel. Although we have not examined these specimens, we are certain that they are from the same series as the 37 other specimens in the USNM that are also labeled "Claremont Cal[ifornia] Baker." All 37 specimens are clearly *T. nuda,* and it is on this basis that we conclude that Hendel's *T. prima* is a synonym of *T. nuda,* which was described earlier.

Type Locality. United States. California. Los Angeles: Claremont (34°05.8′N, 117°43.2′W).

Other Specimens Examined. MEXICO. *Baja California*. Rancho San Ignacio (26 km E Rosarito; 32°20.9′N, 117°02.5′W), 26–27 Mar 1982, J. Slansky, M. S. Wasbauer (1♂; CSCA).

UNITED STATES. *California*. **Kern:** Bakersfield (32 km NE, Cow Flat Creek; 35°30.1′N, 118°41.6′W; 500 m), 25 Apr 2002, S. D. Gaimari (1♂; CSCA). **Los Angeles:** Catalina Island (33°23′N, 118°25′W), 18 Apr 1936, A. H. Sturtevant (1♂; USNM); Claremont (34°05.8′N, 117°43.2′W), 25–29 Mar 1955, 1958, C. F. Baker, J. C. Hall, A. L. Melander, Metz (14♂, 25♀; USNM); Gorman (8 km SE; 34°47.5′N, 118°51.1′W), 30 Mar 1968, M. S. Wasbauer (1♂, 3♀; CSCA); Lancaster (34°41.9′N, 118°08.2′W), 14 Mar 1935, A. L. Melander (1♂; USNM); Long Beach (33°46′N, 118°11.4′W), 29 Mar 1950, A. L. Melander (2♂; USNM); Mint Canyon (34°25.8′N, 118°26.5′W), 28 Apr 1955, W. R. Richards (1♂, 4♀; CNC); Pacific Palisades (34°02.9′N, 118°31.6′W), 30 Apr 1952 (1♂; USNM); Pasadena (34°08.9′N, 118°08.7′W), 20 Feb 1929, A. H. Sturtevant (1♂; USNM); San Pedro (33°49.2′N, 118°17.5′W; string beans), 3 Apr 1944, C. G. Anderson (2♂, 1♀; CSCA, USNM); Solamint (Santa Clarita; 34°23.5′N, 118°32.5′W), 28 Apr 1955, W. R. M. Mason (15♂, 20♀; CNC); Tanbark Flats (34°12.2′N, 117°45.6′W), 18 Jun 1956, H. W. Michalk (1♂; CSCA); Westwood Hills (34°02.8′N, 118°26.1′W), 5 May 1947 (1♂, 3♀; USNM). **Orange:** Buena Park (33°52.1′N, 117°59.9′W), 13 Apr 1961, D. H. Byers (1♂; CSCA); San Clemente (33°25.6′N, 117°36.7′W), 4 Feb 1947, A. L. Melander (1♂; USNM). **Riverside:** Andreas Canyon (33°45.7′N, 116°32.2′W), 26 Mar–10 Apr 1955, W. R. Richards (7♂; CNC); Aguanga (33°26.6′N, 116°51.9′W), 6 Apr 1967, D. M. Wood (4♂, 2♀; CNC); Cabazon (33°55.1′N, 116°47.2′W), 31 Mar 1945, A. L. Melander (2♂, 1♀; USNM); Gavilan Hills (33°47.1′N, 117°22.2′W), 11 Apr 1954, A. L. Melander (10♂, 13♀; USNM); Lake Mathews (33°50.6′N, 117°27.7′W), 9 Apr 1957, A. L. Melander (14♂, 9♀; USNM); Magnesium Spring Canyon (near Indio; 33°43.2′N, 116°13′W), A. L. Melander (1♂, 2♀; USNM); Menifee Valley (hills on west end;39°39′N, 117°13′W; 550 m), 9–28 Mar 1982, J. D. Pinto (28♂, 22♀; DEBU); Palm Desert (33°43.3′N, 116°22.5′W), 4 Apr 1955, W. R. Richards (3♂, 2♀; CNC); Palm Springs (33°49.8′N, 116°32.7′W), 15–26 Mar 1955, 1960, A. L. Melander, M. S. Wasbauer (2♂; CSCA, USNM); Pedley (33°58.5′N, 117°28.5′W), 25 Mar 1952, G. H. Sperry, J. L. Sperry (1♂; USNM); Rancho Mirage (33°44.4′N, 116°24.8′W), 6 Apr 1955, W. R. M. Mason (8♂, 9♀; CNC); Riverside (33°58.8′N, 117°22.4′W; ex. oats), 19 Mar 2002, E. Drake (6♂, 9♀; CSCA); Riverside (33°58.8′N, 117°22.4′W), 09 Feb–11 Apr 1935, 1944, 1945, 1946, 2002, E. Drake, A. L. Melander (18♂, 16♀; USNM); Riverside (33°58.8′N, 117°22.4′W), 11 Apr 1951, A. L. Melander (1♂; USNM), 15 Feb 1950 (2♂; USNM), 19 Mar 1950 (2♂; USNM); Sheep Creek Canyon near Phelan (34°25′N, 117°36.4′W), 1 May 1946, A. L. Melander (1♂; USNM); Snow Creek, White Water (33°55.5′N, 116°38.3′W; 460 m), 6–22 Apr 1955, W. R. Richards, W. R. M. Mason (4♂, 6♀; CNC); Tecate (32°34.6′N, 116°37.7′W), 2 May 1966, R. Duke (4♂, 3♀; USNM); Temecula (33°29.6′N, 117°08.9′W), 29 Mar 1960, M. S. Wasbauer (3♂, 10♀; CSCA); Thermal (33°38.4′N, 116°08.4′W), 8 Mar 1955, W. R. Richards (3♂, 1♀; CNC); Thousand Palms (33°48.7′N, 116°22.6′W), 12 Mar–27 Apr 1955, W. R. Richards, W. R. M. Mason, J. E. H. Martin (24♂, 29♀; CNC); Thousand Palms, Willis Palms Oasis (33°49′N, 116°23.6′W), 25 Mar–5 Apr 1955, W. R. Richards, W. R. M. Mason (5♂, 4♀; CNC); White Water (33°55.5′N, 116°38.3′W), 17 Mar 1955, W. R. Richards (1♂, 3♀; CNC). **Sacramento:** Courtland (38°19.9′N, 121°34.1′W; ex. alfalfa mustard), 4 May 1932, S. Lockwood (1♂; CSCA); Sacramento River Levee (38°36.3′N, 121°33.3′W), 27 Mar 1969, R. R. Pinger, M. S. Wasbauer (2♂, 1♀; CSCA, USNM). **San Bernardino:** Adelanto (34°35′N, 117°24.6′W), 28 Apr 1949, A. L. Melander (1♂; USNM); Loma Linda (34°02.9′N, 117°15.7′W), 25 Apr 1949, R. E. Ryckman (2♂, 1♀; USNM); Twenty-Nine Palms (32 km NE; 34°10′N, 115°57.3′W), 3 Apr 1969, R. R. Pinger (1♂; USNM); Verdemont (34°11.6′N, 117°22.1′W), 18 Feb 1958, A. L. Melander (2♂; USNM). **Santa Barbara:** Santa Cruz Island, between head of Alamos Canyon and Centinela (34°01′N, 119°48.5′W; sweeps of low vegetation near pines), 21 Mar 1982, J. T. Huber (20♂, 14♀; DEBU); Santa Cruz Island, Christi Beach (34°01.5′N, 119°52.5′W; pan traps), 10 Mar 1971,

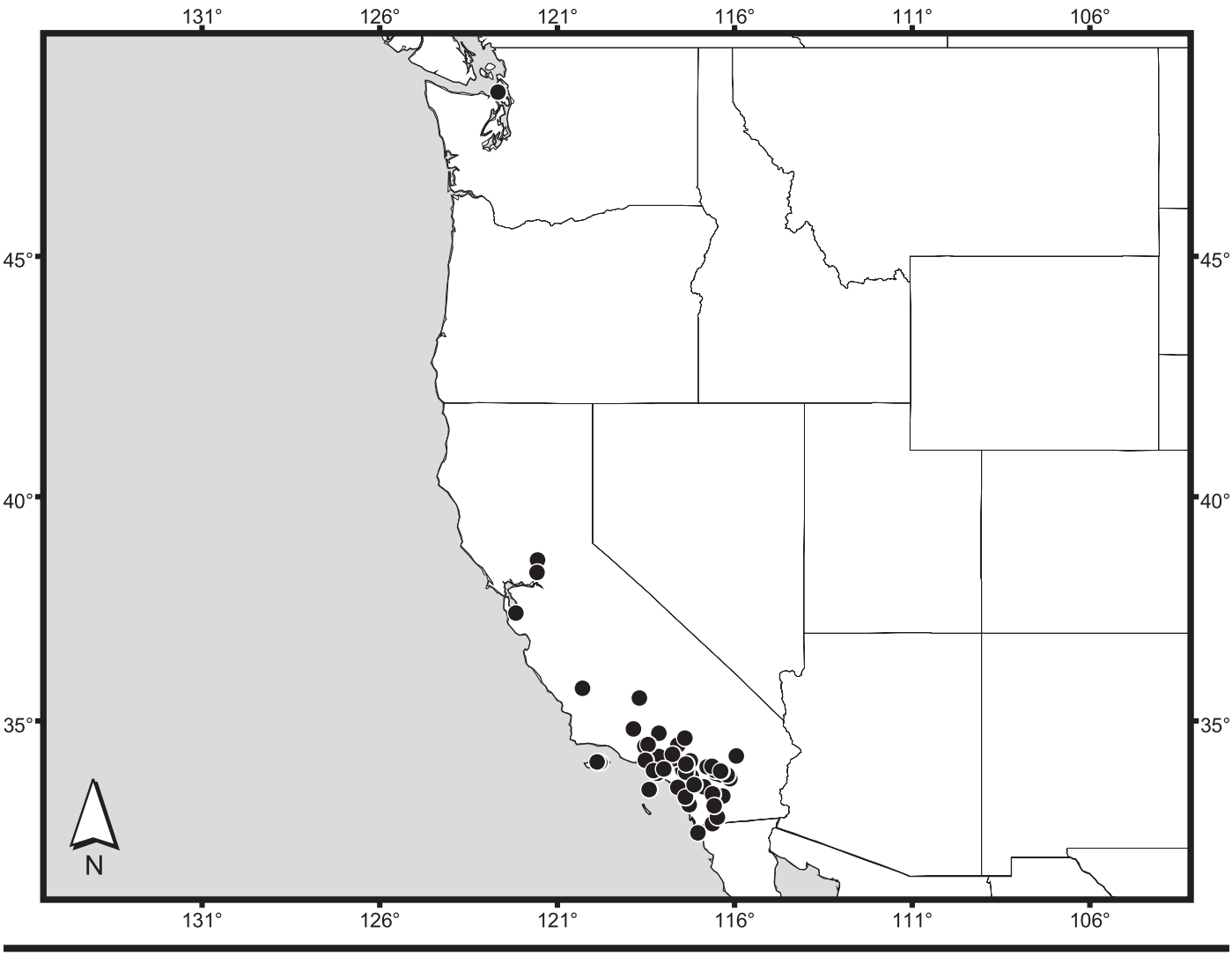


FIGURE 187. Distribution map for *Trixoscelis nuda* (Coquillett).

D. S. Horning (1♂, 1♀; CSCA); Santa Cruz Island, Christy Beach and Canyon (34°01.5′N, 119°52.4′W), 22 Mar 1982, J. T. Huber (7♂, 15♀; DEBU). **Santa Clara:** Stanford University (37°25.6′N, 122°10.2′W), 23 May 1956, P. H. Arnaud, Jr. (6♂, 6♀; USNM). **San Diego:** Borrego, Tub Canyon (33°13.3′N, 116°20.1′W), 19 Apr 1949, G. H. Sperry, J. L. Sperry (1♂; USNM); Cardiff-by-the-Sea (33°01.3′N, 117°16.9′W), 21–26 Apr 1967, D. Davis (2♂, 1♀; USNM); Cleveland National Forest, Boulder Oaks Camp (32°43.9′N, 116°29.1′W; 915 m), 3 Apr 1967, D. M. Wood (1♂; CNC); Cuyamaca Lake (32°59.4′N, 116°35.2′W; 1400 m), 21 Apr 1955, W. R. Richards (1♂, 2♀; CNC); Oceanside (33°12.4′N, 117°23.2′W; river margin), 13 Mar–4 Apr 1953, 2005, C. Gammon, W. N. Mathis, D. Mathis (2♂, 1♀; CSCA, USNM); Warner Springs (10 km SE; 33°16.9′N, 116°38′W; ex. *Ranunculus*), 27 Mar 1967, A. R. Gittens (5♂, 4♀; DEBU). **San Luis Obispo:** Cholame (35°43.4′N, 120°17.8′W), 23 Mar 1947, P. H. Arnaud, Jr. (2♂; USNM); Nipomo (33°12.4′N, 117°23.2′W; ex. pole peas), 28 Apr 1938, S. Lockwood (1♂; CSCA).

Washington. **Island:** Fort Casey (near; 48°09.8′N, 122°40.7′W), 24 Jun 1944, P. D. Shenefelt (1♂; WSU).

Distribution (Figure 187). Nearctic: Mexico (Baja California), United States (California, Washington).

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