

AMERICAN MUSEUM *Novitates*

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK, N.Y. 10024
Number 2842, pp. 1-58, figs. 1-220, tables 1, 2 April 23, 1986

Revision of the Plant Bug Genus *Pseudopsallus* Van Duzee (Heteroptera: Miridae)

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ABSTRACT

The genus *Pseudopsallus* Van Duzee is revised and proposed as the senior synonym of *Bifidungulus* Knight and *Hesperocapsus* Knight. Twenty species are recognized including six that are new: *Pseudopsallus lajuntae*, *Pseudopsallus enceliae*, *Pseudopsallus lattini*, *Pseudopsallus mojaviensis*, *Pseudopsallus occidentalis*, and *Pseudopsallus presidio*. The following taxa, listed by the most recently recognized combination, are transferred to *Pseudopsallus*: *Bifidungulus puberus* (Uhler), *Bifidungulus viridicans* Knight, *Hesperocapsus abroniae* (Knight), *Hesperocapsus anograe* (Knight), *Hesperocapsus artemisicola* (Knight), *Hesperocapsus atriseta* (Van Duzee), *Hesperocapsus demensus* (Van Duzee), *Hesperocapsus hixsoni* Knight, *Hesperocapsus major* Knight, *Hesperocapsus plagiatus* Knight, *Hesperocapsus sericatus* (Uhler), and *Hesperocapsus stitti* Knight. *Oncotylus repertus* Uhler is reinstated as a valid species, removed from synonymy with *Hesperocapsus sericatus* (Uhler), and transferred to *Pseudopsallus*.

The following new synonymies are proposed: *Pseudopsallus atriseta* (Van Duzee) = *Hesperocapsus tanneri* (Knight) and *Hesperocapsus nigricornis* Knight; *Pseudopsallus demensus* (Van Duzee) = *Pseudopsallus nicholi* Knight and *Hesperocapsus gaurae* Knight; *Pseudopsallus repertus* (Uhler) = *Hesperocapsus davisii* (Knight) and *Hesperocapsus utahensis* Knight; *Pseudopsallus stitti* (Knight) = *Hesperocapsus tinctus* Knight. Lectotypes are designated for: *Macrotylus angularis* Uhler, *Oncotylus puberus* Uhler, and *Oncotylus sericatus* Uhler. Illustrations are provided for the male genitalic structures of all species, and scanning electron micrographs are presented for the pretarsus and scale-like setae of representative species. A revised diagnosis and description of *Pseudopsallus* are included. A key to all currently recognized species is given, as well as a detailed diagnosis and a description of the male genitalia for each species, and descriptions of all new species. A phylogenetic analysis of the species is presented,

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using a species in a new genus from Mexico for outgroup comparison. The resulting species classification recognized three species groups. The male genitalia, fine structure of the scale-like setae, and pretarsus of several genera of Orthotylini are surveyed to evaluate the utility of these structures as phylogenetic character systems. Distribution maps are provided for all species, indicating a range for

Pseudopsallus from the Prairie Provinces of Canada south to the central plateau region of Mexico and west to California. Members of the genus occur primarily on herbaceous plants belonging to the families Nyctaginaceae (e.g., *Abronia* Juss.) and Onagraceae (e.g., *Gaura* L., *Oenothera* L.), and on *Artemisia* L. (Asteraceae).

INTRODUCTION

The close similarity of the external male genitalic structures of *Bifidungulus* Knight, *Hesperocapsus* Knight, and *Pseudopsallus* Van Duzee prompted our investigation of the possible monophyly of these genera within the tribe Orthotylini. We have determined that the 20 species contained in these genera are congeneric. We therefore are able to provide a revised diagnosis and description for the genus *Pseudopsallus* Van Duzee, as well as comparative information regarding structural features of closely related taxa. In addition, we provide a key to all currently included species, a diagnosis and a description of the male genitalia for each species, descriptions of new species, a phylogenetic analysis, and a distributional summary.

The organization of this paper is designed to aid in identifying species and understanding their phylogenetic relationships. Information is arranged alphabetically by species. Illustrations of structural features and distribution maps are grouped together at the end of the species descriptions. Most species placed on the same map are members of the same species group as determined by the phylogenetic analysis.

The genus *Pseudopsallus* was proposed by Van Duzee (1916a) to receive two Uhler species, *Macrotylus angularis* and *M. verticalis*, with mixed vestiture consisting of flattened scale-like setae and simple setae. The former species was designated as the type by Van Duzee. He recognized that *angularis*, although it shares a similar habitus to *Plagiognathus*, is not a phylina but an orthotyline, based on the lamelliform, apically converging parempodia. However, Van Duzee also transferred *verticalis* to *Pseudopsallus* even though this species has setiform parempodia,

and he (Van Duzee, 1914) previously had correctly transferred that species to *Plagiognathus*. Carvalho (1958), in his world catalog of the Miridae, placed *verticalis* in *Plagiognathus*, a classification with which we agree.

Pseudopsallus remained essentially monotypic until Knight (1930) described six new species: *P. abroniae*, *P. anograe*, *P. artemisicola*, *P. davisi*, *P. nicholi*, and *P. tanneri*. Knight also transferred *Orthotylus demensus* Van Duzee and *Labopidea sericata* (Uhler) to *Pseudopsallus*. Knight included species in this genus that share a similar type of external male genitalic structure and body vestiture: anterodorsal margin of aperture of male genital capsule bearing chitinous hooks or prongs [tergal processes] and vestiture consisting of densely distributed fine, erect, simple setae intermixed with silvery white sericeous or scale-like setae.

Knight (1930) proposed the genus *Bifidungulus* to receive two species, *B. viridicans* Knight (type species) and *Oncotylus puberulus* Uhler, with a unique pretarsal structure (i.e., claw cleft with protruding, angulate base). However, these species also share the defining characters of the *Pseudopsallus* species, and Knight mentioned that there is a close relationship between these two genera. No other species were subsequently placed in *Bifidungulus*.

Knight (1968) erected the genus *Hesperocapsus* to contain all species previously placed in *Pseudopsallus* except *angularis*, which was excluded because of its grayish-white ground color and extensive dark markings. He added four new species, *Hesperocapsus gaurae*, *H. plagiatus*, *H. stitti*, and *H. utahensis*, and synonymized *Oncotylus repertus* Uhler with *Hesperocapsus sericatus* (Uhler). Knight rec-

ognized members of this genus by their green color, in combination with the previous defining characters of *Pseudopsallus*.

It is apparent that the structure of the external male genitalia and body vestiture of the three genera were recognized as being remarkably similar. In our opinion, the generic diagnoses provided by Knight fail to distinguish three distinct genera, because all of them share the same diagnostic features. There is no cladistic analysis concerning the placement of *Pseudopsallus* (here including *Bifidungulus* and *Hesperocapsus*) within a phylogeny of the tribe Orthotylini and no such analysis will be attempted in this paper. We choose to present character information substantiating the monophyly of *Pseudopsallus* and identify what we believe to be its nearest relatives. We discuss below the diagnostic characters of *Pseudopsallus*; characters that vary within the genus are discussed further in other parts of the paper.

Kelton (1959), studying the vesica of the male genitalia, stated that *Pseudopsallus artemisicola* Knight has "a close affinity to" *Brooksetta* Kelton (as *Melanotrichus* Reuter) and other genera of the Orthotylini possessing two or more spiculae. This is the only published information regarding the relationship of *Pseudopsallus* to other groups of Orthotylini. We have made detailed observations of the male genitalia, as well as the pretarsal structures and fine structure of body setae of representative species of orthotyline genera to obtain a fuller understanding of intergeneric relationships.

Various features of scale-like setae have been used as diagnostic characters for genera and infrageneric groupings of orthotyline Miridae (Kelton, 1979a, 1979b; Knight, 1968; Southwood, 1953; Wagner, 1973). Using SEM examination, Schuh (1984) and Schuh and Schwartz (1985) provided the only information on the fine structure of hemelytral setae in the subfamily Phylinae. At least two basic types of scale-like setae were recognized, suggesting that a number of phylinae genera previously diagnosed by the presence of a particular type of setae are not monophyletic on the basis of setal type alone.

Our examination of the dorsal vestiture of the complex of genera associated with *Pseu-*

dopsallus (*sensu lato*) reveals that structural features of the scale-like setae also are useful for distinguishing groups of orthotyline Miridae. We have examined more than half of the *Pseudopsallus* species and the following taxa: *Brooksetta inconspicua* (Uhler); *Dichaetocoris pinicola* Knight; *Dichaetocoris* n. sp. from Harney County, Oregon; *Dichaetocoris* n. sp. from Cochise County, Arizona; new genus and new species from Oaxaca, Mexico; *Noctuocoris fumidus* (Van Duzee); *Melanotrichus coagulatus* (Uhler), *Parthenicus peregrinus* (Van Duzee), and *Squamocoris latisquamus* Stonedahl and Schuh.

The scale-like setae in the taxa we examined can be divided into two categories: (1) slightly flattened, sericeous setae that are narrowly lanceolate, apically acuminate, and have converging ridges, and (2) strongly flattened, scale-like setae that are moderately to broadly lanceolate or sometimes spatulate, apically truncate or rarely acuminate, and have converging or parallel ridges.

The first setal type occurs in all the examined species of *Dichaetocoris* (figs. 26–28) and the species of the new genus from Mexico (fig. 29). On the basis of the setae alone, these genera seem to form a distinct group within the North American Orthotylini.

The remainder of the species examined possess the second setal type, which is found in a variety of modified forms. In the species we place in *Pseudopsallus*, the scale-like setae have parallel ridges and range from moderately lanceolate and apically acuminate (figs. 11, 12, 23, 24) to broadly lanceolate or spatulate and apically truncate (figs. 13, 17, 21). We found no characteristics of the scale-like setae which support the recognition of *Bifidungulus*, *Hesperocapsus*, and *Pseudopsallus* as distinct genera. Members of the nominal genus *Hesperocapsus* exhibit the full range of structural variation in type 2 scale-like setae, with several species (e.g., *demensus*, *mojavensis*) possessing both narrow and broad, flattened setae on different parts of the body (figs. 15, 16, 19, 20). Furthermore, the broad scale-like setae on the head, pronotum, and propleuron of *Bifidungulus puberis* (fig. 21) are more like those of *H. anograe* (fig. 13) and *H. demensus* (fig. 16) than *B. viridicans* (fig. 25), and *Pseudopsallus angularis* pos-

sesses setae (fig. 12) similar to many species originally described in *Hesperocapsus*.

Two other species which we examined possess scale-like setae that are similar to those found in *Pseudopsallus* (*sensu lato*). *Parthenicus peregrinus* (fig. 30) and *Melanotrichus coagulatus* (fig. 31) both have strongly flattened, parallel-ridged scale-like setae that are moderately lanceolate and apically acuminate or truncate. Characters of the genital parameres of *peregrinus* also suggest a relationship between it and the species of *Pseudopsallus*. Polhemus (1985) removed *peregrinus* from *Dichaetocoris* on the basis of characteristics of the external male genitalia and host plant relationships, and placed it in *Parthenicus*, the previous combination. This action is further supported by the setae of *peregrinus*, which are much broader and more strongly flattened than those of *Dichaetocoris* species. We believe further study of *peregrinus* will remove it from *Parthenicus* as well because it does not possess certain diagnostic characters of that genus, such as the obsolete carina on the vertex, and the enlarged hind femora. The distribution of various types of scale-like setae in *Melanotrichus* and *Parthenicus* requires further investigation and is beyond the scope of this study.

The vestiture of *Brooksetta inconspicua* and *Noctuocoris fumidus* consists in part of flattened scale-like setae with converging ridges (figs. 32, 33), as opposed to the parallel ridges found in all species of *Pseudopsallus* and the previously mentioned taxa. Furthermore, the scale-like setae of these taxa are black, compared to the white or silvery setae of all other species examined.

Kelton (1979b) suggested a relationship between *Brooksetta* Kelton, *Ilnacora* Reuter, and *Ilnacorella* Knight on the basis of the presence of black "scaley" setae. We have not examined specimens of the last two genera and cannot comment on the fine structure of their scale-like setae. However, we examined a *Squamocoris* that possesses broadly flattened black setae with a fine structure unlike that of any other species (fig. 34). Our small sample of taxa indicates that a more extensive study of the fine structure of scale-like setae will prove informative for the classification of Orthotylini genera.

The structure of the male genitalia has been used previously to redefine generic concepts within the Orthotylini. Kelton (1969) partially diagnosed the closely related genera *Scalponotatus* Kelton and *Slaterocoris* Wagner on the form of the spiculae of the vesica. *Melanotrichus* Reuter, as treated by Knight (1968), consists of a heterogeneous mixture of species. Kelton (1979b) divided *Melanotrichus* into two genera, erecting the genus *Brooksetta* to contain all the species of *Melanotrichus* with black scale-like setae. In addition to this setal character, the species of *Brooksetta* possess tergal processes and structurally uniform and unique right parameres and spiculae of the vesica.

Knight (1930, 1968) first recognized the presence of tergal processes on the anterodorsal margin of the aperture of the male genital capsule of *Bifidungulus*, *Hesperocapsus*, and *Pseudopsallus*. Although other orthotyline genera have processes associated with the anterior margin of the genital aperture (see Henry, 1976, p. 62; 1982, p. 3), we believe that the tergal processes of *Pseudopsallus* are sufficiently different in structure and orientation to uniquely define the genus. The genera of Orthotylini examined during the course of this study that contain species bearing tergal processes are *Brooksetta* Kelton, *Dichaetocoris* Knight, *Ilnacora* Reuter, *Lindbergocapsus* Wagner, *Lopidea* Uhler, new genus from Mexico, *Orthotylus* Fieber, and *Reuteria* Puton.

As mentioned previously, our examination of the structure of the male genitalia reveals several characters that substantiate the monophyly of *Pseudopsallus*, as defined herein. The following characters distinguish the male genitalia of *Pseudopsallus* from all other Orthotylini we examined (see generic description and figures).

1. The entire anterodorsal margin of the aperture of the genital capsule is a well-sclerotized plate with the tergal processes originating directly from the margin of the plate. This modification was not found in any of the other species examined. The undescribed genus from Mexico, though very similar to *Pseudopsallus*, has a small process projecting from beneath the margin of the aperture.

2. The processes are located symmetrically on either side of the midline of the aperture (at the 10 through 11 o'clock and 1 through 2 o'clock positions) and often occur in pairs at each location; all the other species examined, except the new genus, had processes at least in part at other locations around the aperture.

3. The processes do not support the rectal tube in any manner as is found in some species of *Lindbergocapsus* and *Lopidea*.

4. The processes are usually flattened over their entire length, in a plane oblique to the curvature of the aperture; some species of *Ilnacora* and *Orthotylus* possess rounded processes that follow the curvature of the aperture.

5. The genital aperture is circular, whereas in species of *Brooksetta* and *Melanotrichus* it is subtriangular.

6. There are no processes projecting either inward or outward from the posteroventral margin of the aperture or near the insertions of the parameres. Several other genera exhibit such modified apertures (e.g., *Squamocoris*).

7. The phallosome is simple, with only a single narrow dorsodistal opening. In some species of *Dichaetocoris* (e.g., *anasazi* Polhemus) the apical portion of the phallosome is ornate, bearing several pointed tusk-like spines. Several species of *Brooksetta*, *Dichaetocoris*, and *Lindbergocapsus* have secondary openings on the right ventral surface of the phallosome through which the secondary gonopore of the vesica protrudes.

8. The vesica has a unique form unlike that of any other genus of Orthotylini we examined; only the new genus has a form approximating it. Both *Pseudopsallus* and the new genus possess dorsal spiculae that are deeply bisected at the base, giving the appearance of separate structures. Vesical spiculae have been illustrated for the following orthotyline genera: *Acaciacoris* (Schaffner, 1977), *Brooksetta* (Kelton, 1979b), *Lindbergocapsus* (Henry, 1982), *Melanotrichus* (Kelton, 1980a), *Orthotylus* (Southwood, 1953; Wagner, 1973), *Reuteria* (Henry, 1976), *Scalponotatus* (Kelton, 1969), *Slaterocoris* (Kelton, 1969), and *Squamocoris* (Stonedahl and Schuh, 1986). In each of these genera, it ap-

pears that the majority of the species adhere (with some minor variation) to a basic "generic" type.

9. Both the left and right parameres are highly autapomorphic. *Parthenicus peregrinus* has a medial interior flange on the right paramere that is quite similar to that of the *Pseudopsallus* species.

When all characters of the male genitalia are considered, the group that seems most closely related to *Pseudopsallus* is the new genus from Mexico. These two genera share the following features: (1) anterodorsal margin of aperture of genital capsule with tergal processes located at 10–11 o'clock and 1–2 o'clock positions, and processes not supporting rectal tube; (2) right paramere subquadrate in lateral view, with well-developed medial interior flange; (3) left paramere with large, broad dorsal lobe usually with prominent spines apically and long distally tapering lateral lobe; and (4) right spicula of vesica bisected at base. Based on the possession of the previous features by *Pseudopsallus* and the new genus from Mexico, we have selected the latter as the outgroup for the phylogenetic analysis of *Pseudopsallus* species.

Genital characters which distinguish *Pseudopsallus* from the new genus are as follows: (1) anterodorsal margin of genital aperture with skirt-like sclerotized plate (figs. 57, 58; SP), with all tergal processes arising from margin of plate; (2) tergal processes strongly flattened, not projecting beyond margins of genital aperture; (3) proximal portion of dorsal lobe of right paramere usually unmodified and without large spine-like processes; and (4) dorsal lobe of left paramere usually tapering distally, not greatly expanded apically as in the new genus. *Pseudopsallus* is further distinguished by the vestiture which is partially composed of moderate to broad scale-like setae with parallel ridges (figs. 11–25). The new genus has narrow scale-like setae with converging ridges (fig. 29). Other external features of *Pseudopsallus* are very similar to those of the new genus.

We are in the process of describing the new genus from Mexico (Schwartz and Stonedahl, 1986), which includes three species distributed in the states of Guerrero, Michoacan, Oaxaca, and Puebla.

ACKNOWLEDGMENTS

We have received assistance with this project from many individuals. For the loan of specimens we are particularly grateful to John D. Lattin and John D. Oswald, Oregon State University, Corvallis; John D. Pinto, University of California, Riverside; Dan A. and John T. Polhemus, Englewood, Colorado; Joseph C. Schaffner, Texas A&M University, College Station; Randall T. Schuh, American Museum of Natural History, New York; Thomas J. Henry, Systematic Entomology Laboratory, USDA, % National Museum of Natural History, Smithsonian Institution, Washington, D.C.; and Leonard A. Kelton, Agriculture Canada, Ottawa. Additional specimens were received from Paul H. Arnaud, Jr. and Norman D. Penny, California Academy of Sciences, San Francisco; Wilford J. Hanson, Utah State University, Logan; Peter D. Ashlock and Alex Slater, University of Kansas, Lawrence; John A. Chemsak, California Insect Survey, University of California, Berkeley; Charles L. Hogue, Los Angeles County Museum of Natural History, California; and Floyd G. Werner, University of Arizona, Tucson.

For assistance with the phylogenetic analysis we are indebted to J. S. Farris, Department of Ecology and Evolution, State University of New York, Stony Brook, who provided access to PHYSYS[®] and assisted with character coding. We also thank Thomas J. Henry for assistance and access to the collection at the National Museum of Natural History.

For assistance with illustration we thank Kathleen Schmidt, former Scientific Assistant, Department of Entomology, American Museum of Natural History, who prepared the two dorsal view illustrations; Lauren Duffy and Joan Whelan, Interdepartmental Laboratory, American Museum of Natural History, who assisted with the preparation of the scanning electron micrographs; and Elyse L. Schwartz for typesetting the tables.

We thank T. J. Henry, J. D. Lattin, J. D. Pinto, J. C. Schaffner, R. T. Schuh, and A. G. Wheeler, Jr. for reading and commenting on the manuscript.

Financial support for the preparation and publication of this manuscript was provided

by the Kalbfleisch Fund for Postdoctoral Research (to GMS), American Museum of Natural History, and the Oregon State University Foundation through a grant supporting the Systematic Entomology Laboratory. Support for field work and technical assistance was received from NSF Grant DEB 81-13401 to Randall T. Schuh, American Museum of Natural History.

The authors acknowledge their equal contribution to all facets of this paper.

ABBREVIATIONS

Museums

- AMNH, American Museum of Natural History, New York
 CAS, California Academy of Sciences, San Francisco
 CNC, Canadian National Collection of Insects, Agriculture Canada, Ottawa
 JTP, Polhemus Collection, Englewood, Colorado
 KU, Snow Entomological Museum, University of Kansas, Lawrence
 LACM, Los Angeles County Museum of Natural History, California
 TAM, Department of Entomology, Texas A&M University, College Station
 UAZ, University of Arizona, Tucson
 UCB, California Insect Survey, University of California, Berkeley
 UCR, Department of Entomology, University of California, Riverside
 USNM, United States National Museum of Natural History, Washington, D.C.
 USU, Department of Entomology, Utah State University, Logan

Male Genitalia

- BP, secondary basal process of dorsal spicula of vesica
 DLL, dorsal lobe of left paramere
 DLR, dorsal lobe of right paramere
 DP, distal portion of dorsal lobe of right paramere
 DS, dorsal spicula of vesica
 LAL, lateral lobe of left paramere
 LL, left lateral tergal process
 LM, left medial tergal process
 LVS, left ventral spicula of vesica
 MIF, medial interior flange of right paramere
 RL, right lateral tergal process
 RM, right medial tergal process
 RP, right tergal process
 RVS, right ventral spicula of vesica
 SP, sclerotized plate on aperture of genital capsule

METHODS AND TERMINOLOGY

Approximately 3000 specimens were examined representing material gathered from 12 institutional and private collections. A listing of these collections and their respective curators is provided in the Acknowledgments. Abbreviations for institutions are found in the previous section.

Dissections of the male genitalia were performed using the technique described in Kelton (1959). With *Pseudopsallus* and other Orthotylini, it is necessary to remove the phallosome from around the vesica in order to conduct a detailed examination of the latter structure. After dissection, the genitalic structures were placed in a plastic microvial containing glycerin and attached to the pin bearing the appropriate specimen.

We have introduced several new terms to describe specific areas and structures of the male genitalia. The structures involved and the terms applied to them are described in the generic description and identified in figures 57–79. Abbreviations are substituted for those terms used repetitively in the text (see previous section). Our terminology for these structures is employed to clarify differences between *Pseudopsallus* species, and does not necessarily apply to other orthotyline genera.

Illustrations were prepared using a Wild M5 stereoscopic microscope and a Wild TYP 181300 camera lucida with a diaphragm coupler. Genitalic structures were illustrated at magnifications of 156×; lateral views of the head at 78×; and dorsal habitus at 10×. Label data in the specimens examined portions of the species treatments (except in the treatments of new species) are abbreviated with dates of collection summarized and collectors omitted. All measurements given in the text are in millimeters.

PSEUDOPSALLUS VAN DUZEE

Pseudopsallus Van Duzee, 1916a, p. 224 (new genus); 1916b, p. 213 (key); 1916c, p. 45 (list); 1917, p. 399 (catalog). Carvalho, 1952, p. 65 (catalog); 1955, p. 71 (key); 1958, p. 128 (catalog). Kelton, 1959, p. 27 (description of male genitalia). Knight, 1968, p. 103 (distribution). Schuh, 1974, p. 278 (tribal placement). Type species *Macrotylus angularis* Uhler (designated by Van Duzee, 1916a, p. 224).

Bifidungulus Knight, 1930, p. 1 (new genus). Car-

valho, 1952, p. 75 (catalog); 1958, p. 40 (catalog). Schuh, 1974, p. 278 (tribal placement). Type species *Bifidungulus viridicans* Knight. NEW SYNONYMY.

Hesperocapsus Knight, 1968, p. 103 (new genus). Kelton, 1980b, p. 249 (description). Type species *Pseudopsallus artemisicola* Knight. NEW SYNONYMY.

DIAGNOSIS: Recognized by the more or less elongate male and brachypterous or submacropterous female of many species; green, greenish yellow, or brownish yellow general coloration, sometimes with limited brown or fuscous markings; short first antennal segment; mixed dorsal vestiture of long, pale, simple setae and recumbent, silvery white scale-like setae with parallel ridges, sometimes also with scattered dark brown or black, erect bristle-like setae. Male genitalia with the following characteristics: anterodorsal margin of aperture of genital capsule with skirt-like sclerotized plate bearing from one to four tergal processes at 10–11 o'clock and 1–2 o'clock positions; tergal processes strongly flattened, not projecting beyond margins of genital aperture, not supporting rectal tube; right paramere quadrate in lateral view, with well-developed medial interior flange; left paramere with large broad dorsal lobe and long distally tapered lateral lobe, dorsal lobe usually with prominent spines apically; dorsal spicula of vesica bisected at base.

DESCRIPTION: Macropterous male (fig. 1). Small to large, elongate orthotylini; length (apex of tylus to apices of hemelytra) 3.55–7.80; width (anteriad of cuneal fracture) 1.25–2.72. **DORSAL ASPECT.** Dusty green, yellowish green, or bright green, sometimes with brown to fuscous markings on head, calli, mesosternum, and venter (green color sometimes fading to yellowish brown on older preserved specimens); dorsal surface smooth, shagreened, or faintly rugulose, sometimes shining; dorsal vestiture composed of scattered long, suberect, silvery white or golden simple setae and moderately to densely distributed recumbent, silvery white, scale-like setae, with parallel ridges (figs. 11–25), some species also with long erect, dark brown or black bristle-like setae. **HEAD.** Subovate in lateral view, with frons weakly to moderately protruding beyond anterior margin of eyes (figs. 5–10), or head subquadrate with frons

strongly protruding beyond anterior margin of eyes (figs. 3, 4); posterior margin of head with weakly elevated carina; vertex transversely flattened or weakly sloping anteriorly, sometimes slightly excavated anterior to carina; antennal fossa contiguous with or slightly removed from anterior margin of eye; antennal segment I short, stout, "coke-bottle" shaped, sometimes slightly narrowed apically, length equal to or less than dorsoventral height of eye, clothed with short reclined simple setae, inner apical region of segment with at least three to five erect bristle-like setae; antennal segments II, III, and IV clothed with reclined, simple setae and sometimes with scattered dark bristle-like setae, especially on segment II; antennal segments III and IV slightly thinner than segment II; antennal segment IV similar to segment I in length. *Subovate head*: Figures 5–10. Eyes large, occupying from two-thirds to five-sixths height of head, posterior margin straight or slightly curved, nearly contiguous with anterior margin of pronotum, anterior margin of eye moderately to strongly emarginate; lower margin of antennal fossa even with or above ventral margin of eye; juga and lora short (except longer for *mojaviensis* and *puberus*); genae narrow, width does not or only slightly exceeds diameter of antennal segment I (except genae much broader for *mojaviensis*); gula obsolete or very narrow; bucculae long, narrow, gradually tapering to posterior margin of head; labium reaching to near apex of mesosternum or beyond, labial segment I extending beyond posterior margin of head (except *enceliae*). *Subquadrate head*: Figures 3, 4. Eyes small, occupying from one-half to two-thirds height of head, posterior margin moderately curved, removed from anterior margin of pronotum, anterior margin of eye slightly to moderately emarginate; lower margin of antennal fossa even with or below ventral margin of eye; juga and lora long, genae broad, width much greater than diameter of antennal segment I; gula well developed; bucculae short, not reaching posterior margin of head, of nearly uniform width; labium reaching procoxae or mesocoxae, but rarely exceeding latter, labial segment I not extending beyond posterior margin of head. **PRONOTUM**. Trapezoidal, without distinct anterior and posterior lobes,

slightly to moderately convex, lateral margins nearly straight or slightly arcuate, posterior margin broadly rounded laterally, shallowly and broadly concave medially, anterior angles indistinct, broadly rounded, anterior margin slightly sinuate; calli weakly differentiated, nearly attaining lateral margins of pronotum, joined anteromedially, bordered posteriorly by shallow depression; mesoscutum narrowly to moderately exposed; scutellum weakly to moderately and evenly arched, anteromedial region sometimes transversely flattened. **HEMELYTRA**. Elongate, parallel-sided, or weakly rounded, broadest just anterior of cuneal fracture, claval and radial veins sometimes weakly elevated, embolium uniformly narrow, cuneal incisure shallow, cuneal fracture distinct, angled anteromedially, cuneus distinctly longer than broad; membrane translucent to moderately infuscated, inner cell elongate, gradually narrowed posteriorly, outer cell obtusely triangular, membranal veins pale green, fading to yellow. **LEGS**. Femora slightly flattened, narrowly rectangular, tapering slightly toward either end, sometimes marked with fuscous spots at least on apical half of segment; tibiae cylindrical; all femora and tibiae with reclining pale simple setae, femora sometimes with recumbent scale-like setae and scattered suberect bristle-like setae, tibiae with several rows of minute spinulae, tibial spines pale to black; metatarsus cylindrical, segment I approximately half as long as segments II and III, claws weakly to strongly curved distally, distinctly broadened basally (figs. 35–46, 51–54—except *plagiatus*, figs. 47, 48), base protruding and angulate in *puberus* (figs. 49, 50) and *viridicans* (figs. 55, 56), pulvilli small, parempodia lamellate, convergent apically (figs. 35–56). **GENITALIA**. Figures 57–79 include identification of structures. *Genital aperture*: Figures 58, 73. Large, anterodorsal margin with one to four variously shaped sclerotized tergal processes (fig. 58); processes always lateral of midline of capsule and not associated with support of rectal opening; processes solitary or paired; ventral posterior margin without any posteriorly directed processes. *Left paramere*: triangular and flattened; dorsal lobe (fig. 59) either long and tapering to narrow point, short and apically truncate, or broadly rounded with

either one or two prominent apical spines that are sometimes secondarily spinose; lateral lobe (fig. 61) long and tapering, apex pointed or blunt, sometimes notched or excavated and notched. *Right paramere*: subquadrate in lateral view, interior surface with prominent medial flange (figs. 62, 63) or trough (medial process of Kelton, 1959) fitting around phallosome in repose; dorsal lobe (figs. 62, 63) slightly or strongly projecting above flange, with or without strongly projecting distal portion (figs. 62, 63) which sometimes possesses weak or strong spinulae. *Phallosome*: laterally compressed, opened on dorsal and distal surfaces, dorsal portion of opening narrow and linear, merging with circular distal portion; without secondary ventral opening for ductus seminis or ornate distal margin. *Vesica*: ductus seminis simple, cylindrical, flexible, not embedded in sclerotization, terminating in horseshoe-shaped secondary gonopore; two long vesical spiculae (figs. 64, 69) attached dorsally and ventrally from middle of ductus seminis, bases of spiculae roughly situated right and left of midline of ductus; right spicula furcate, directed posterodorsally; ventral portion (right ventral spicula, RVS) thick basally, tapering to long narrow shaft, apex spinose, and sometimes expanded; dorsal portion (dorsal spicula, DS) arising from base of ventral portion, thick basally, moderately or greatly compressed medially and distally, dorsal and ventral margins strongly serrate, sometimes with serrations on apical surface and on margin and with secondary process basally (fig. 79); left spicula (left ventral spicula, LVS) simple, directed ventroposteriorly, broad basally, tapering to long narrow shaft, distal fourth straight or recurved with marginal spines, pointed apically.

FEMALE: Macropterous, submacropterous (wing membrane extending to or slightly beyond apex of abdomen), or brachypterous (wing membrane reduced to small flap, figure 2). Similar to male in color, vestiture, and structure except hemelytra usually slightly more rounded laterally and eyes slightly smaller (resulting in relatively greater height of head below eyes and width of vertex).

DISCUSSION: The nominal genera *Bifidungulus* and *Hesperocapsus* are proposed as new synonyms of *Pseudopsallus* based on simi-

larities in fine structure of the scale-like setae, and the unique structure of the male genitalia, particularly the form and orientation of the tergal processes associated with the anterodorsal margin of the aperture of the genital capsule, structure of the parameres, and the deeply bifid dorsal spicula of the vesica (see Introduction and Generic Description for further detail). Species groups within the genus are defined primarily on the basis of the head morphology and the structures of the male genitalia (see Phylogenetic Analysis).

The position of *Pseudopsallus* within the Orthotylini is not well understood. Our preliminary investigation of the North American Orthotylini suggests that *Pseudopsallus* belongs to a complex of genera united by similarities in type and fine structure of setae and the structure of the male genitalia (see Introduction for further discussion of characters and taxa represented).

Most *Pseudopsallus* occur either on composites (e.g., *Artemisia*, *Encelia*, *Chaenactis*), or herbaceous members of the Onagraceae (e.g., *Anogra*, *Camissonia*, *Gaura*, *Oenothera*). In addition, *abroniae* and *stitti* are found on *Abronia* (Nyctaginaceae), *mojavensis* is restricted to *Salvia* (Lamiaceae), and *angularis* is an obligatory associate of *Eriodictyon* (Hydrophyllaceae). Related taxa, as determined by cladistic analysis, sometimes have similar host plant associations. For example, the five species defined by component 31 in our analysis (*atriseta* group) all occur on sagebrush (*Artemisia* spp.), whereas members of the *anograe* group (component 25) are restricted to herbaceous plants in the evening-primrose family (Onagraceae). The host plant relationships of the remaining *Pseudopsallus* species (e.g., *abroniae* group) are less congruent with groupings based on morphological characters.

The distributions of *Pseudopsallus* species are given in figures 211–219. The distribution includes all of western North America from the southern prairie provinces of Canada to the central plateau region of Mexico. The distribution extends east to the Prairie Brushland, Short-grass Prairie, and Tall-grass Prairie provinces (Bailey, 1978) of South Dakota, Nebraska, Kansas, and Oklahoma, and to the Gulf Coast in southern Texas (between 100°W and 95°W longitude). The genus is not rep-

resented west of the Cascade Range and Sierra Nevada Mountains in California, Oregon, and Washington, but several species are distributed in the Chaparral Province (Bailey, 1978) of coastal southwestern California.

KEY TO ADULTS OF
PSEUDOPSALLUS

1. Tarsal claws cleft at base (figs. 49, 50, 55, 56) 2
- 1'. Tarsal claws not cleft at base 3
- 2(1). Pronotum, at least on posterior half, with brown or orange brown cast; male with two tergal processes (figs. 173, 174); body length (tip of tylus to apices of hemelytra) from 4.05 to 5.85
. *puberus* (Uhler)
- 2'. Pronotum with green or yellow green cast; male with three tergal processes (figs. 204, 205), body length from 3.70 to 4.40
. *viridicans* (Knight)
- 3(1'). Head with shiny fuscous markings, especially on vertex and frons
. *angularis* (Uhler)
- 3'. Head sometimes with yellowish brown or reddish brown markings, without shiny fuscous regions on vertex and frons 4
- 4(3'). Head subquadrate, frons strongly protruding and well rounded (figs. 3, 4) (except frons less strongly protruding for *mojaviensis*; fig. 5); lower margin of antennal fossa of male even with or lower than ventral margin of eye; female brachypterous or submacropterous; dorsal surface of body with erect dark brown or black, bristle-like setae (except *atriseta* without, or with only a few dark setae mostly on apical half of corium) 5
- 4'. Head subovate, frons weakly to moderately protruding, and flat or slightly rounded (figs. 6–10); lower margin of antennal fossa of male situated above ventral margin of eye (fig. 7) (except nearly even with ventral margin of eye for *anograe* and *artemisicola*; fig. 6); female macropterous; dorsal surface of body without dark, bristle-like setae (except some specimens of *anograe* and *occidentalis*) 10
- 5(4). Male with three tergal processes on anterodorsal margin of genital aperture; female brachypterous 6
- 5'. Male with four tergal processes; female submacropterous 9
- 6(5). Labium not reaching beyond apex of

- mesosternum; body length, male (tip of tylus to apices of hemelytra) 6.79–7.80, female (tip of tylus to apex abdomen) 5.00–6.15 7
- 6'. Labium reaching to between mesocoxae or beyond; body length, male 4.47–6.65, female 3.37–4.65 8
- 7(6). Lower margin of antennal fossa of female approximately even with ventral margin of eye (fig. 3); dorsal lobe of left paramere short and stout, apex broad, terminating with two prominent spines (fig. 136) *major* (Knight)
- 7'. Lower margin of antennal fossa of female situated well below ventral margin of eye (fig. 4); dorsal lobe of left paramere long and narrow, apex acute (fig. 129)
. *lattini*, new species
- 8(6'). Head and pronotal disk with numerous black bristle-like setae; dorsal lobe of left paramere short and stout, with two large apical spines (fig. 144)
. *mojaviensis*, new species
- 8'. Head and pronotal disk without, or with only a few black bristle-like setae; dorsal lobe of left paramere long and tapered, distal portion recurved, apex truncate with several strong spines (fig. 119)
. *sericatus* (Uhler)
- 9(5'). Hemelytra without or with only a few black bristle-like setae mostly on apical half of corium; second antennal segment dark yellowish brown to nearly black; right tergal processes widely separated, joined only at base (figs. 88, 89)
. *atriseta* (Van Duzee)
- 9'. Hemelytra with many widely distributed black bristle-like setae; second antennal segment pale green or brownish yellow, sometimes darker brown at apex; right tergal processes broadly joined (figs. 181, 182) *repertus* (Uhler)
- 10(4'). Labium reaching to between mesocoxae or beyond 11
- 10'. Labium not or only slightly exceeding apex of mesosternum 15
- 11(10). Tarsal claws weakly curved, without a visible pulvillus (figs. 47, 48); male with two tergal processes (fig. 159)
. *plagiatus* (Knight)
- 11'. Tarsal claws moderately to strongly curved, pulvillus small but visible; male with three tergal processes 12
- 12(11'). Eyes small; lower margin of antennal fossa nearly even with ventral margin of eye (fig. 6); medial interior flange of right paramere with two evenly produced spine-like humps that lack ob-

- vious serrations (figs. 85, 86)
 *artemisicola* Knight
- 12'. Eyes larger; lower margin of antennal fossa above ventral margin of eye (fig. 7); medial interior flange of right paramere without spine-like humps, or if humps somewhat spine-like then at least proximal hump with distinct serrations 13
- 13(12'). Dorsal vestiture with silvery white simple setae; tibial spines pale; right tergal process minute and weakly sclerotized, much smaller than left tergal processes (fig. 120); dorsal lobe of left paramere long and narrow (fig. 122)
 *lajuntae*, new species
- 13'. Dorsal vestiture with golden to brown simple setae; tibial spines yellowish brown or dark brown; right tergal process large and well sclerotized, of similar size or larger than left tergal processes; dorsal lobe of left paramere short and broad 14
- 14(13'). Labium reaching to between mesocoxae, or slightly beyond for some females; left tergal processes without serrations (figs. 196, 197); dorsal lobe of left paramere terminating in one (rarely two) strong spine(s) (figs. 199, 200); left ventral spicula of vesica without serrations (fig. 198) *stitti* (Knight)
- 14'. Labium reaching to between metacoxae; left tergal processes with serrations distally (figs. 57, 58); dorsal lobe of left paramere terminating in two (rarely one) prominent spines (figs. 59, 60); left ventral spicula of vesica with serrations distally (fig. 64)
 *abroniae* Knight
- 15(10'). Male 16
 15'. Female 21
- 16(15). Length of antennal segment II approximately equal to posterior width of pronotum; genital aperture with a single tergal process (figs. 105, 106)
 *enceliae*, new species
- 16'. Length of antennal segment II less than posterior width of pronotum; genital aperture with two to four tergal processes 17
- 17(16'). Genital aperture with two flattened tergal processes, one on either side of midline, left process approximately three times as broad as right process (figs. 110-112) *hixsoni* (Knight)
- 17'. Genital aperture with three or four tergal processes 18
- 18(17'). Genital aperture with three tergal processes, one on right side and two on left side (figs. 96, 167); dorsal lobe of left paramere short and broad, lateral lobe with notched apex (figs. 99-100, 168-169) 19
- 18'. Genital aperture with four tergal processes, two on each side of midline (figs. 73, 151); dorsal lobe of left paramere long and narrow, lateral lobe with rounded, unnotched apex (figs. 75-76, 153, 154) 20
- 19(18). Left medial tergal process ribbon-like, broadest medially, apex narrowly truncate (figs. 166, 167); medial interior flange of right paramere notched, proximal hump broad and rounded, distal hump small and slightly pointed (figs. 170, 171); dorsal spicula of vesica with flattened smooth and apically pointed secondary basal process (fig. 172) ...
 *presidio*, new species
- 19'. Left medial tergal process very broad basally, strongly narrowed beyond middle, apex broadly truncate (figs. 95, 96); medial interior flange of right paramere broadly concave, proximal hump broadly rounded, distal hump obsolete (figs. 101, 102); dorsal spicula of vesica without large secondary basal process (fig. 97) *demensus* (Van Duzee)
- 20(18'). Left medial tergal process spatulate (figs. 148, 149, 151); dorsal lobe of left paramere with three to five strong subapical spines on proximal margin (fig. 153) *occidentalis*, new species
- 20'. Left medial tergal process elongate, gently curved, thickness uniform throughout (figs. 72, 73); dorsal lobe of left paramere without subapical spines, or at most with one to several small spinulae (fig. 75) *anograe* Knight
- 21(15'). First labial segment reaching to posterior margin of head *enceliae*, new species
- 21'. First labial segment reaching beyond posterior margin of head onto xyphus ..
 22
- 22(21'). Ratio of length of antennal segment II to posterior width of pronotum from 0.60:1 to 0.80:1; pronotum and hemelytra usually with long, dark brown or black bristle-like setae intermixed with other types of vestiture 23
- 22'. Ratio of length of antennal segment II to posterior width of pronotum from 0.80:1 to 1.00:1; pronotum and hemelytra without dark bristle-like setae ... 24
- 23(22). Tylus sharply produced basally, junction with frons moderately and narrowly

- depressed (fig. 9); labium reaching apex of mesosternum or nearly so
 *occidentalis*, new species
- 23'. Tylus gradually produced basally, junction with frons indistinct, shallowly and broadly depressed (fig. 8); labium reaching beyond apex of mesosternum, sometimes to between mesocoxae
 *anograe* Knight
- 24(22'). Lower margin of antennal fossa even with ventral margin of eye (fig. 10); body length (tip of tylus to apices of hemelytra) 3.67–3.95
 *presidio*, new species
- 24'. Lower margin of antennal fossa situated slightly above ventral margin of eye; body length 3.80–5.27 25
- 25(24'). Length of antennal segment I equal to or slightly less than dorsoventral height of eye; labium usually not reaching beyond apex of mesosternum
 *demensus* (Van Duzee)
- 25'. Length of antennal segment I distinctly less than dorsoventral height of eye; labium nearly always extending slightly beyond apex of mesosternum
 *hixsoni* (Knight)

Pseudopsallus abroniae Knight

Figures 11, 35, 36, 57–64, 213

Pseudopsallus abroniae Knight, 1930, p. 5, fig. 137 (new species).

Hesperocapsus abroniae: Knight, 1968, p. 107, fig. 137 (new combination).

DIAGNOSIS: Recognized by subovate head with frons moderately protruding and rounded; lower margin of antennal fossa situated above ventral margin of eye; dorsal vestiture with golden to brown simple setae but lacking dark, bristle-like setae; labium reaching between metacoxae or nearly so; and male genitalia with these distinguishing characters: three tergal processes (figs. 57, 58), right process of similar size and shape as left processes; dorsal lobe of left paramere short and broad, terminating in two closely set prominent spines (figs. 59, 60); and proximal hump of medial interior flange of right paramere with strong serrations on interior surface (figs. 62, 63). Females macropterous.

This species is very similar to *stitti* but can be consistently distinguished by the longer labium; left tergal processes usually with

strong serrations distally (figs. 57, 58); and distal portion of the left ventral spicula serrate (fig. 64).

DESCRIPTION OF MALE GENITALIA: Single RP flattened, distal portion expanded, sometimes appearing furcate with variously placed strong serrations, apex pointed; pair of widely separated left tergal processes: LL flattened, ribbon-like, distal portion with serrations, tapering to pointed apex; LM flattened, ribbon-like, distal portion strongly serrate (more so than LL), apex pointed. Right paramere: MIF notched, with two large spine-like humps, interior of proximal hump with strong serrations; DLR projecting above MIF, DP produced and with several strong spines. Left paramere: DLL, short, terminating in two closely set prominent spines, anterior spine larger, each spine with secondary spinulae; LAL long, tapering, and rounded apically. Vesica: DS ribbon-like; RVS tapering to pointed apex, expanded and serrate distally; LVS somewhat expanded medially, tapering, with several strong serrations, without recurved distal portion, apex truncate and spinous.

TYPE: HOLOTYPE ♂: **Colorado**, *Weld Co.*, Hudson, August 25, 1925, *Abronia elliptica* A. Nels., H. H. Knight (USNM).

DISCUSSION: This species is widely distributed east of the Rocky Mountains from Weld Co., Colorado south to Socorro Co., New Mexico and east to Potter Co., Texas (fig. 213). Knight collected this species at Hudson, Weld Co., Colorado on *Abronia elliptica*. No other host plant records are reported.

SPECIMENS EXAMINED: 66 specimens collected from May 2 to August 25. **UNITED STATES:** **Colorado:** *Weld Co.*, Ft. Lupton (USNM); Hudson (USNM, CNC); 10 mi E of Roggen (JTP). *El Paso Co.*, Colorado Sprgs. (USNM). "Colo. 2213, P.R. Uhler Coll." (USNM). **New Mexico:** *Sandoval Co.*, Jemez Sprgs. (USNM). *Socorro Co.*, Socorro (JTP). **Texas:** *Potter Co.*, 1 mi N of Canadian R. on US I-87 (JTP).

Pseudopsallus angularis (Uhler)

Figures 12, 37, 65–71, 211

Macrotylus angularis Uhler, 1894, pp. 272–274 (new species). Van Duzee, 1914, p. 28 (list).

Pseudopsallus angularis: Van Duzee, 1916a, pp.

224–225 (new combination); 1916c, p. 45 (list). Carvalho, 1952, p. 65 (catalog). Knight, 1968, p. 103 (distribution).

DIAGNOSIS: Recognized by the brownish yellow or brownish gray ground color with brown to fuscous markings, particularly on hemelytra, and head with shiny, fuscous markings. Male with two tergal processes, right process small and spine-like (fig. 67); and medial interior flange of right paramere with large, elongate proximal hump (figs. 70, 71). Females macropterous.

DESCRIPTION OF MALE GENITALIA: Single RP, very small (a large secondarily serrate spine); single left tergal process, base somewhat flattened, furcate, terminating in two prominent serrations. Right paramere: MIF with ragged serrate proximal portion, distal portion with a very prominent hump, extreme distal portion of flange with spinous and tuberculate projection above flange; DLR projecting above MIF, DP obsolete and without spines. Left paramere: DLL long and narrow tapering to pointed apex and with three anteriorly directed spines; LAL long, narrow, and tapering to round apex. Vesica: DS flattened, broad medially, ribbon-like distally with serrate margin; RVS long, thickest basally, tapering to strongly clavottruncate and serrate apex; LVS long, very thick basally, tapering medially, distal fourth recurved and strongly serrate, apex pointed.

TYPES: The original description of *angularis* lists the following locality data: one female labeled "Cal. 10," and "fragmentary specimens" taken at "San Bernardino, and at Cape St. Lucas by Mr. John Xanthus." We have found no specimens in either the CAS or USNM collections that agree fully with any of the locality data given by Uhler. However, a female specimen was discovered in the USNM Miridae collection, which we believe could be the one mentioned in Uhler's original description. This specimen, with the following label data, is hereby designated as lectotype: Label 1, "Cal" (handwritten); 2, "PR Uhler Collection"; 3, "*Macrotylus angularis* Uhler. Cal." [handwritten]; 4, "*Macrotylus angularis* Uhler Cal. [handwritten] Det UHLER." We believe this specimen could be Uhler's "Cal 10" female because it has been remounted onto a stronger card point

and the locality label appears trimmed. It is deposited in the USNM collection and bears our lectotype label.

A female of *angularis* with locality data "Sonoma Co. CAL." is retained in the CAS type collection. It has been labeled "lectotype," apparently by E. P. Van Duzee, but this type designation was never published. We do not consider this specimen part of Uhler's original "syntype" series since it does not match any locality data given in the original description.

DISCUSSION: *Pseudopsallus angularis* is widely distributed in the southwestern United States but is uncommon in desert regions. We have examined specimens collected from Baja California Norte, north to Curry and Josephine counties, Oregon, and east to Washington Co., Utah, and Maricopa and Yavapai counties, Arizona (fig. 211). Adults and nymphs have been collected on *Eriodictyon angustifolium* Nutt., *E. californicum* (H. & A.) Torr., *E. crassifolium* Benth., *E. tormentosum* Benth., and *E. trichocalyx* Heller.

SPECIMENS EXAMINED: 424 specimens collected from April 23 to August 19. **MEXICO:** **Baja California Norte:** 13.3 mi W of entrn. to Parque Sierra San Pedro Martir (ca. 37 mi E of Rt. 1), 975 m (AMNH). **UNITED STATES:** **Arizona:** *Gila Co.*, Old CCC Cmpgrd., S of Globe on Pioneer Pass Rd. (AMNH); Tonto Nat'l. For., 8 mi SW of jct. of Rt. 87 & 188 (AMNH). *Maricopa Co.*, mile 11 on Four Pks. Rd. (JTP). *Mohave Co.*, SE of Kingman, T20N R15W, Hualapai Mts. (AMNH). *Yavapai Co.*, Cherry (OSU). **California:** *Calaveras Co.*, Murphys (CAS); 4.8 mi S of West Point (CAS). *Kern Co.*, 7 mi NW of Frazier Park (CAS); *Inyo Co.*, Big Pine Camp (UCR). *Los Angeles Co.*, Mint Cyn. (CAS); Ridge Route (USNM); Tanbark Flat (OSU). *Marin Co.*, Mt. Tamalpais St. Pk. (UCR). *Mendocino Co.*, Cummings (CAS). *Napa Co.*, N side of Howell Mt., 2 mi NNE of Angwin (CAS). *Riverside Co.*, Banning (CAS); Bautista Cyn., 10 km S Hemet (UCR); Cactus Sprg. Trl. btw. Hwy. 74 and Horsethief Crk. (UCR); 0.8 mi N of jct. of Deep Crk. and Horsethief Crk., T7S R6E Sec 6 (UCR); Palm Sprgs. (CAS); Andreas Cyn. (UCR). *Sacramento Co.*, 5 mi N of Folsom (OSU). *San Bernardino Co.*, 2 mi E of, and

Camp Angelus (UCR); Camp Baldy (OSU); Keystone (OSU); Mill Crk. (UCR); Miller Cyn. Camp (UCR); Mt. Home (UCR); Vivian Crk. Trl. (UCR) all San Bernardino Mts. *San Diego Co.*, desert at R. R. stop below Mt. Sprgs. (USNM); Jacumba-Campo (USNM, CNC). *San Luis Obispo Co.*, Huasna Valley, E of Arroyo Grande, 823 m (AMNH). *Siskiyou Co.*, 3 mi E of Bartle (CAS); 3 mi SE of, and Mt. Shasta (OSU); Mt. Shasta City (CAS). *Tulare Co.*, Fairview (CAS); 3.7 mi E of Springville (UCR). *Tuolumne Co.*, Eleanor Lake (OSU). *Ventura Co.*, Ojai, Wheeler Cyn. (OSU); 11 mi E of Camp Ozena (CAS); Sespe Wldlf. Area (OSU). *Yolo Co.*, 5 mi N of Rumsey (OSU). **Nevada:** *Clark Co.*, Charleston Peak (JTP); Kyle Cyn. (UCR). **Oregon:** *Curry Co.*, 39 mi N of Crescent City California (OSU). *Josephine Co.*, 1 mi S of Rough and Ready Botanical Wayside (OSU). **Utah:** *Washington Co.*, Leeds Cyn. (USU); Wipple Trl., Pine Valley (USU); Pintura (USU); Snow Cyn. St. Pk., T41S R16W (AMNH); St. George (USU).

Pseudopsallus anograe Knight

Figures 8, 13, 38, 72–79, 217

Pseudopsallus anograe Knight, 1930, p. 4 (new species).

Hesperocapsus anograe: Knight, 1968, p. 107, fig. 138 (new combination). Kelton, 1980b, pp. 250–251, fig. 128, map 80 (description).

DIAGNOSIS: Recognized by the subovate head with flat or only slightly rounded, weakly protruding frons (fig. 8); length of antennal segment II less than posterior width of pronotum; labium reaching slightly beyond apex of mesosternum, rarely between mesocoxae; and by the structure of the male genitalia: four tergal processes, two on each side of midline, left medial tergal process elongate, gently curved, thickness uniform throughout (figs. 72–74); dorsal lobe of left paramere short, terminating in single strong spine (fig. 75), sometimes with one to several smaller accessory spine(s) on anterior margin. Female macropterous; first labial segment reaching beyond posterior margin of head; and ratio of length of antennal segment II to posterior width of pronotum from 0.60:1 to 0.80:1.

This species closely resembles *occidentalis*, but is distinguished by the labium usually

reaching slightly beyond apex of mesosternum; gradually produced basal region of the tylus with broadly shallow depression at junction with frons (fig. 8); and by the structure of the male genitalia, most notably the elongate left medial tergal process (figs. 72, 73) and dorsal lobe of left paramere without, or at most, with one to several small subapical spine(s) (fig. 75).

DESCRIPTION OF MALE GENITALIA: Two pairs of tergal processes; right processes confluent basally; RL flattened, tapering from base to pointed apex, without marginal serrations; RM flattened, shorter than RL, with strong serrations, apex pointed; LL small, rounded, serrate and pointed apically; LM large, flattened, curved, tapering to pointed apex, distal half with strong serrations. Right paramere: MIF broadly concave, ragged, strongly serrate, without humps; with only DP of DLR projecting above MIF, DP produced and with strong spines. Left paramere: DLL short, terminating in single strong apical spine with smaller accessory spine on anterior margin; LAL narrow and tapering, rounded apically. Vesica: DS with flattened smooth and apically pointed BP; RVS serrate, tapering to pointed apex, not expanded distally; LVS serrate, with recurved distal portion.

TYPE: HOLOTYPE ♂: Colorado, Gunnison Co., Gunnison, August 17, 1925, H. H. Knight (USNM).

DISCUSSION: *Pseudopsallus anograe* is the most widely distributed species of the genus. It has been collected in Riverside and Imperial counties, California, east to Eddy Co., New Mexico, and north to the Prairie Provinces of Canada (fig. 217). The northernmost record for *anograe* in California is 2.8 mi E of Edison in Kern County. Kelton (1980b) recorded this species from southern Alberta and Manitoba; we have examined these specimens. Adult specimens have been collected from the following plants: *Anogra coronopifolius* (Torr. & Gray) Brit., *Ambrosia dumosa* (Gray) Payne, *Oenothera deltoides* Torr. & Frem., and *O. pallida* Lindl. Kelton (1980b) gave *Oenothera caespitosa* Nutt. as a host plant of this species.

SPECIMENS EXAMINED: 76 specimens collected from March 4 to August 26. CANADA: **Alberta:** Brooks; Lethbridge; Manyber-

ries. **Manitoba:** Carberry (all CNC). **UNITED STATES:** **Arizona:** *Maricopa Co.*, Phoenix (USNM). *Pima Co.*, Tucson (CAS). *Yuma Co.*, 5 mi S of Parker (AMNH); *Yuma Co.* (USNM). **California:** *Imperial Co.*, Algodones Dunes, 7 mi W of, and 3.5 mi NW of Glamis; Glamis Dunes, 6 mi NW of Ogilby (UAZ); Niland. *Kern Co.*, 2.8 mi E of Edison, *Riverside Co.*, 22 mi W of Blythe (all UCR). **Colorado:** *Arapahoe Co.*, Cherry Crk. St. Pk. (JTP). *Gunnison Co.*, Gunnison (USNM, CNC). *Larimer Co.*, Ft. Collins (USNM). *Logan Co.*, Sterling (USNM). *Mineral Co.*, Creed (JTP). *Weld Co.*, Hudson (USNM). **New Mexico:** *Eddy Co.*, 32°21.4'N, 103°46.9'W (TAM); *Sandoval Co.*, Jemez Sprgs. (USNM). **Utah:** *San Juan Co.*, Grand Flat, nr. Collins Cyn. (JTP); rim of Moki Cyn. nr. Halls Crossing (JTP).

Pseudopsallus artemisicola Knight

Figures 6, 80–86, 212

Pseudopsallus artemisicola Knight, 1930, pp. 2–3 (new species). Kelton, 1959, p. 28, fig. 58 (description of male genitalia).

Hesperocapsus artemisicola: Knight, 1968, p. 103, fig. 129 (new combination).

DIAGNOSIS: Recognized by the subovate head with frons moderately protruding and rounded, and lower margin of antennal fossa even with ventral margin of eye (fig. 6); dorsal vestiture without dark, bristle-like setae; labium reaching between mesocoxae; and male with medial interior flange of right paramere with two evenly produced spine-like humps that lack obvious serrations (figs. 85, 86). Female macropterous.

DESCRIPTION OF MALE GENITALIA: Single RP rounded, distal portion slightly curved, without serrations, apex pointed; pair of left tergal processes, confluent at base: LM flattened, ribbon-like, curved medially, serrate distally, apex broadly pointed; LL rounded, widest at base, tapering to narrow pointed apex, sometimes with several apical serrations. Right paramere: MIF notched, with two large spine-like humps; DLR projecting above MIF, DP not produced but with weak spines. Left paramere: DLL short, broadly rounded, apex truncate, terminating in two prominent closely set spines; LAL long, narrow, tapering to rounded apex. Vesica: DS

with serrations on both apical surfaces as well as marginally; RVS tapering to pointed apex, expanded and serrate distally; LVS tapering, with recurved distal portion.

TYPE: HOLOTYPE ♂: **Colorado**, *Weld Co.*, Hudson, August 25, 1925, *Artemisia filifolia* Torr., H. H. Knight (USNM).

DISCUSSION: This species is distributed in the Shortgrass Prairie Province of Colorado, Kansas, Nebraska, and New Mexico and the Wyoming basin (see specific localities below) (fig. 212). Knight collected the holotype and a large series of paratypes at Hudson, Weld Co., Colorado on *Artemisia filifolia*.

SPECIMENS EXAMINED: 65 specimens collected from August 5 to September 25. **UNITED STATES:** **Colorado:** *Morgan Co.*, Ft. Morgan (USNM). *Otero Co.*, La Junta (JTP). *Weld Co.*, Hudson (CNC, USNM). "Colo 1630 and 145, P. R. Uhler Coll." (USNM). **Kansas:** *Wichita Co.*, 3300 ft (USNM). **Nebraska:** *Deuel Co.*, Big Sprgs. (USNM). **New Mexico:** *Eddy Co.*, 32°19.8'N, 103°47.3'W (site 7) (TAM). *Valencia Co.*, Los Lunas (USNM). **Wyoming:** *Sweetwater Co.*, by (old) Hwy. 187, 11.5 mi S of Eden (CAS).

Pseudopsallus atriseta (Van Duzee),
new combination

Figures 14, 39, 40, 87–94, 215

Oncotylus repertus: Van Duzee, 1914, p. 29 (list). *Labopidea atriseta* Van Duzee, 1916a, p. 221 (new species).

Hesperocapsus atriseta: Kelton, 1979a, p. 756 (new combination).

Pseudopsallus tanneri Knight, 1930, pp. 5–6 (new species). NEW SYNONYMY.

Hesperocapsus tanneri: (Knight), 1968, p. 103, fig. 134 (new combination).

Hesperocapsus nigricornis Knight, 1969, p. 88, fig. 2 (new species). NEW SYNONYMY.

DIAGNOSIS: This species is recognized by the subquadrate head with frons strongly protruding and rounded; hemelytra without, or with only a few, dark bristle-like setae mostly on apical half of corium; second antennal segment dark yellowish brown to nearly black; and male with four tergal processes, right pair of processes widely separated, joined only at base (fig. 88). Female submacropterous.

This species differs from the closely related *repertus* by the darker antennae, fewer black bristle-like setae on the dorsum, and by the

widely separated right tergal processes (figs. 88, 89).

DESCRIPTION OF MALE GENITALIA: Two pairs of tergal processes, both confluent basally; right tergal processes widely separated, more so than in *repertus*; RL long, not flattened or serrate, with pointed apex; RM shorter than RL, flattened, broad and thick basally, truncate and serrate apically, sometimes with broad pointed apex; margin between right processes sometimes with serrations; LL long, slightly flattened with broad pointed apex; LM flattened, broad, and thick basally, widely truncate apically, strongly serrate, wider than RM. Right paramere: MIF ragged, strongly serrate, distal hump somewhat rounded or pointed, separated from remainder of MIF by variable distance; DLR projecting above MIF, DP obsolete, but with strong serrations on interodorsal surface. Left paramere: DLL short and broad with two large apical spines (anteriormost spine secondarily spinose); LAL long, tapering to blunt apex, distal interior surface with minute spinulae. Vesica: RVS tapering to pointed apex, serrate and expanded distally; LVS thickened basally, set off by short thumb-like projection, tapering to pointed apex, without serrations or recurved distal portion.

TYPES: LECTOTYPE ♀, *Labopidea atriseta* Van Duzee (designated by Kelton, 1979a): California, San Diego Co., April 12, 1914, E. P. Van Duzee (CAS).

TYPES OF SYNONYMS: HOLOTYPE ♂, *Pseudopsallus tanneri* Knight: **Colorado**, *Montezuma Co.*, Mesa Verde Nat'l. Pk., June 1927, V. M. Tanner (USNM). HOLOTYPE ♂, *Hesperocapsus nigricornis* Knight: **Utah**, *Washington Co.*, 3 mi NW of Pine Valley, June 15, 1967, *Artemisia tridentata* Nutt. (USNM). The type locality of *nigricornis* was cited in error in the original description as 4 mi N of Vego, Washington Co., Utah.

DISCUSSION: The species *nigricornis* and *tanneri* are proposed as new junior synonyms of *atriseta* on the basis of the identical genitalic structures of the males and the indistinguishable external appearance of the three taxa. Knight was apparently unfamiliar with Van Duzee's species *atriseta* when he described *tanneri* in 1930. The former species was not recognized as congeneric with *Hesperocapsus* (now *Pseudopsallus*) until Kel-

ton's treatment in 1979. Knight's (1969) only diagnostic characters for *nigricornis* are the black antennae and short labium. After examining many specimens of *atriseta*, we have found the color of the antennae to vary from dark yellowish brown to nearly black. The labial length of specimens identified by Knight as *nigricornis* and *tanneri* is equally as short as that of *atriseta*.

Pseudopsallus atriseta is distributed in northern Baja California, Mexico and southern California, and across southern Nevada and Utah to Montezuma Co., Colorado (fig. 215). The host plant of this species is *Artemisia tridentata* Nutt. Several adults have been collected on *Atriplex* sp., *Chrysothamnus nauseosus* (Pall.) Britton, and *Pinus monophylla* Torr. & Frem., but these appear to be incidental host associations.

SPECIMENS EXAMINED: 167 specimens collected from May 26 to July 11. **MEXICO:** **Baja California Norte:** 38 km E of Rt. 1 towards Parque Sierra San Pedro Martir, 960 m (AMNH). **UNITED STATES:** **California:** *Inyo Co.*, Lone Pine Cyn. (UCR); White Mts., summit of Westgard Pass (AMNH). *Los Angeles Co.*, Mint Cyn. (CAS); Saugus (USNM). *San Diego Co.*, Eisencke (USNM); Jacumba (USNM); Pine Valley (SDNH); San Diego Co. (CNC). *San Luis Obispo Co.*, Oro Grande Wash, 11 mi S of Adelaida (UCR). *Tulare Co.*, 21 mi W of Rt. 395 toward Kennedy Meadows (AMNH). **Colorado:** *Montezuma Co.*, Mesa Verde Nat'l. Pk. (USNM). **Nevada:** *Lyon Co.*, N boundary of Toiyabe Nat'l. For. on Rt. 22 (AMNH). **Utah:** *Kane Co.*, Kanab (CNC, USNM). *San Juan Co.*, Brush Basin Rim Rd. (AMNH); 3 mi W of Clay Hills Crossing Rd. on Rt. 263, T39E R15E, 5600 ft (AMNH); Grand Flat nr. Collins Cyn. (JTP). *Washington Co.*, 3 mi NW of Pine Valley (CNC, USNM); 4 mi N of Vejo (USNM).

Pseudopsallus demensus (Van Duzee)

Figures 15, 16, 41, 42, 95-102, 219

Orthotylus demensus Van Duzee, 1925, pp. 398-399 (new species).

Pseudopsallus demensus: Knight, 1930, p. 8 (new combination).

Hesperocapsus demensus: Knight, 1968, p. 107, fig. 132 (new combination). Kelton, 1980b, pp. 249-250, fig. 197, map 80 (description).

Pseudopsallus nicholi Knight, 1930, pp. 7–8 (new species). NEW SYNONYMY.

Hesperocapsus gaurae Knight, 1968, pp. 107–108, fig. 139 (new species). NEW SYNONYMY.

DIAGNOSIS: Head subovate with flat or only slightly rounded, weakly protruding frons; dorsal vestiture without dark, bristle-like setae. Males are further distinguished by the length of antennal segment II less than posterior width of pronotum; three tergal processes, left medial process very broad basally and strongly narrowed beyond middle (figs. 95, 96); dorsal lobe of left paramere short and broad, terminating in single large spine (fig. 99), lateral lobe with notched apex (fig. 100); medial interior flange of right paramere broadly concave, proximal hump rounded, distal hump obsolete (figs. 101, 102); dorsal spicula of vesica without large basal process (fig. 97). Female macropterous; labium usually not reaching beyond apex of mesosternum; lower margin of antennal fossa situated slightly above ventral margin of eye; length of antennal segment I equal to or slightly less than dorsoventral height of eye; ratio of length of antennal segment II to posterior width of pronotum from 0.80:1 to 1.00:1.

Pseudopsallus demensus closely resembles *presidio* but is usually larger, and the lower margin of the antennal fossa is situated slightly above the ventral margin of the eye. Males are further distinguished by the broad left medial tergal process (figs. 95, 96), dorsal spicula of vesica without secondary basal process (fig. 97), and medial interior flange of right paramere broadly concave in dorsal view (fig. 102). This species is distinguished from *hixsoni* by the shorter rostrum, length of antennal segment I approximately equal to dorsoventral height of eye, and males with three tergal processes.

DESCRIPTION OF MALE GENITALIA: Single RP, flattened, ribbon-like, distal portion slightly expanded, truncate apically with a few strong serrations; pair of left tergal processes, confluent at base; LM broad basally, flattened, strongly narrowed beyond middle, broadly truncate apically with several strong serrations; LL short, rounded, simple, apex pointed, some specimens with two small spinulae in place of full spine. Right paramere: MIF very broadly concave, distal hump small or obsolete, proximal hump broadly round-

ed, margin with minute serrations; DLR projecting above MIF, DP produced, terminating with several spines or sometimes only single spine. Left paramere: DLL short, stout, tapering to apex with single large secondarily spinous spine; LAL short, gradually tapering to excavated and notched apex. Vesica: RVS tapering to pointed apex, unexpanded with serrations apically; LVS thickened basally, with two strong spines medially, distal portion long, not recurved, sinuate with strong serrations, apex pointed.

TYPE: HOLOTYPE ♂, *Orthotylus demensus* Van Duzee: Arizona, Yavapai Co., Prescott, July 8, 1917, C. A. Hill (CAS).

TYPES OF SYNONYMS: HOLOTYPE ♂, *Pseudopsallus nicholi* Knight: Arizona, Cochise Co., Huachuca Mts., 1830 m, June 14, 1928, A. A. Nichol (USNM). HOLOTYPE ♂, *Hesperocapsus gaurae* Knight: South Dakota, Custer Co., Custer, August 19, 1927, H. H. Knight (USNM).

DISCUSSION: *Pseudopsallus nicholi* and *H. gaurae* are proposed as synonyms of *demensus* on the basis of the similar genitalic structures of the males. We have noted minor variation in the shape of the tergal processes and the dorsal lobes of the left and right parameres. However, the observed variation is not correlated with geography or with slight differences in size and coloration. Knight's separations of *gaurae* and *nicholi* from one another, and from *demensus*, were based primarily on these minor differences in the male genitalia. We find no basis for recognizing the former taxa as distinct species, especially since Knight examined very few specimens and did not consider the internal genitalia of the males (i.e., vesica), which display great homogeneity. *Pseudopsallus demensus* shows the greatest variation in size of any species in the genus, ranging from 4.00 to 5.84.

This species is widely distributed in steppe and prairie provinces east of the Rocky Mountains from southern Manitoba, Canada to Cochise Co., Arizona, and across the Upper Gila Mountains Forest Province of Central Arizona (fig. 219). Specimens also have been collected in Presidio, Texas, and the states of Aguascalientes, Coahuila, and Zacatecas of northern and central Mexico. Adults have been collected on *Gaura coccinea* Pursh. Kelton (1980b) reports *Oeno-*

thera serrulata Nutt. as a host plant of *de-mensus*.

SPECIMENS EXAMINED: 275 specimens collected from April 17 to August 21. **CANADA:** **Alberta:** Brooks; Drumheller. **Manitoba:** Carberry; Russell; Virden. **Saskatchewan:** Buffalo Pound; Elbow; Lumsden; Willow Bunch (all CNC). **MEXICO:** **Aguascalientes:** Aguascalientes (USNM). **Coahuila:** 15 mi S of Saltillo (TAM). **Puebla:** 13.8 mi SW of Alchichica (TAM). **Zacatecas:** 28 mi NE of Sierra Viejo (TAM). **UNITED STATES:** **Arizona:** *Cochise Co.*, Huachuca Mts. (CNC, USNM); Portal (CAS, CNC). *Coconino Co.*, Ash Fork (USNM). *Gila Co.*, along E Verde R. in Mazatzal Wilderness (JTP); Globe (USNM); 8 mi SW of jct. of Rts. 87 & 188 (off Rt. 87), Tonto Nat'l. For. (AMNH). *Navajo Co.*, 15–20 mi SW of Show Low (AMNH). *Santa Cruz Co.*, 8 mi E of Sonita (UCR). *Yavapai Co.*, 1 mi S of Page Sprgs. jct. on Rt. 89A (AMNH); 1 mi E of Yarnell (JTP); Prescott (CAS, CNC). **Colorado:** *Arapahoe Co.*, Denver (CAS). *Boulder Co.*, Boulder (USNM). *Douglas Co.*, Hilina and Roxborough Rd., nr. Waterton, and Waterton (JTP). *Jefferson Co.*, Red Rocks Pk. (AMNH, JTP). *Larimer Co.*, Ft. Collins (USNM). "Colo 2213 (CNC, USNM) and 143, P. R. Uhler Coll." (USNM). **South Dakota:** *Custer Co.*, Custer (USNM). *Fall River Co.*, Ardmore (USNM). *Pennington Co.*, Rapid City (USNM). **Texas:** *Presidio Co.*, 10 mi S of Marfa (TAM); 5 mi N of Shafter (JTP). **Wyoming:** *Crook Co.*, Moorecroft (CNC, USNM); Sundance (USNM).

Pseudopsallus enceliae, new species

Figures 103–109, 212

DIAGNOSIS: Recognized by the subovate head with frons moderately protruding and rounded; large eyes; labium not reaching beyond apex of mesosternum; second antennal segment approximately as long as posterior width of the pronotum; males with single, short left tergal process (fig. 105). Females macropterous; first labial segment not reaching beyond posterior margin of head.

DESCRIPTION: Male. Length 5.77; width 2.09. **GENERAL ASPECT.** Pale grayish green with dark green markings on the hemelytra; head, anterior third of pronotum, and cuneus

more yellowish green; mesoscutum fuscous, scutellum testaceous; surface texture slightly shagreened, somewhat shining; dorsal vestiture as in generic description, but lacking dark bristle-like setae. **HEAD.** Width across eyes 0.98, width of vertex 0.47; subovate; frons moderately rounded, tylus strongly produced basally, junction with frons narrowly depressed; eyes large, occupying approximately two-thirds of head height, anterior margin of eye moderately emarginate above antennal insertion, posterior margin of eye nearly straight, narrowly removed from anterior margin of pronotum; posterior margin of head with weakly elevated carina; vertex flattened, slightly excavated anterior to carina; antennal fossa nearly contiguous with anterior margin of eye, lower margin of fossa situated above ventral margin of eye; juga and lora flattened; genae slightly broader than diameter of antennal segment I; gula obsolete; bucculae narrow, gradually tapered posteriorly; length of antennal segment I 0.43, segment II 1.67; antennae segment I pale grayish green, marked with fuscous basally, segment II yellowish brown, segments III and IV dark brown; labium reaching apex of mesosternum. **PRONOTUM.** Posterior width 1.87; lateral margins slightly arcuate, posterior margin weakly and broadly concave medially, broadly rounded laterally; mesoscutum moderately exposed; scutellum weakly convex, anteromedial region transversely flattened; mesosternum fuscous. **HEMELYTRA.** Slightly rounded laterally, membrane translucent. **LEGS.** Testaceous or yellowish green; metafemora with several faint, brownish spots apically; tibiae narrowly fuscous at junction with femora, tibial spines dark brown; tarsi dark brown. **GENITALIA.** RTP obsolete with only sclerotized stub; single left process short, somewhat flattened, with strong serrations. Right paramere: MIF with single large spine-like hump, remainder of flange with minute serrations; DLR not produced or projecting above MIF; DP obsolete. Left paramere: DLL short, blunt without spines; LAL short, rapidly tapering to bluntly pointed, minutely serrate apex. Vesica: DS broad distally; RVS and LVS extremely short (specimen in teneral condition).

FEMALE: Macropterous; length 5.81; width 2.33; width across eyes 1.07, width of vertex

0.56; length of antennal segment I 0.48, segment II 1.79; posterior width of pronotum 1.92. Similar to male in color and vestiture, but differing by fewer dark green markings on dorsum; hemelytra slightly more rounded laterally; eyes slightly smaller; lower margin of antennal fossa even with ventral margin of eye; first labial segment reaching only posterior margin of head.

ETYMOLOGY: Named for the plant genus on which the holotype and paratype were collected.

HOLOTYPE ♂: **California**, *Mono Co.*, 16 mi NE of Bishop, June 15, 1973, ex *Encelia farinosa* Gray, J. D. Pinto, deposited in American Museum of Natural History.

PARATYPE: ♀ same data as holotype, deposited at UCR.

DISCUSSION: Known only from the holotype and single paratype (fig. 212).

Pseudopsallus hixsoni (Knight),
new combination

Figures 17, 43, 110–118, 218

Bifidunglus viridicans: Knight, 1930, pp. 1–2, in part, one ♂ paratype.

Hesperocapsus hixsoni Knight, 1969, pp. 88–89, fig. 3 (new species).

DIAGNOSIS: Recognized by the subovate head with flat or only slightly rounded, weakly protruding frons; dorsal vestiture without dark, bristle-like setae; labium usually reaching slightly beyond apex of mesosternum; length of antennal segment II less than posterior width of pronotum; and males with II, flattened tergal processes one on either side of midline, left process approximately three times as broad as right process (figs. 110–112). Female macropterous; lower margin of antennal fossa situated slightly above ventral margin of eye; length of antennal segment I distinctly less than dorsoventral height of eye; and ratio of length of antennal segment II to posterior width of pronotum from 0.80:1 to 1.00:1.

Pseudopsallus hixsoni is distinguished from the closely related species *demensus* and *presidio* by the longer rostrum, usually reaching slightly beyond apex of mesosternum, and males with only two tergal processes, left process approximately three times as broad as right process (figs. 110–112).

DESCRIPTION OF MALE GENITALIA: Single RTP, flattened, truncate, and strongly serrate apically; single left process, very broadly flattened, truncate, and strongly serrate apically. Right paramere: MIF concave, proximal hump broadly rounded, distal hump obsolete, with minute serrations; DLR broad and projecting above MIF, DP not produced but with several prominent spines. Left paramere: DLL long, tapering to broadly rounded spinous apex; LAL long, gradually tapering to broad excavated notched apex. Vesica: DS not greatly expanded, distal portion narrow, with marginal serrations continuing proximally to form strong basal ridge; RVS curved, not expanded, and serrate distally, apex pointed; LVS thickened basally, with several medial spines at juncture of narrow recurved slightly serrate distal portion.

TYPE: HOLOTYPE ♂. **Oklahoma**, *Tillman Co.*, June 21, 1940, H. Hixson (USNM).

DISCUSSION: One male specimen from Hamilton Co., Kansas in the paratypic series of *viridicans* was misidentified and is actually a specimen of *hixsoni*.

This species is distributed in the Shortgrass Prairie Province from Eddy Co., New Mexico, east to Bosque and Potter counties, Texas, and north to Tillman Co., Oklahoma (fig. 218). The host plant association is not known.

SPECIMENS EXAMINED: 43 specimens collected from April 21 to June 21. UNITED STATES: **Kansas**: *Hamilton Co.* (USNM). **New Mexico**: *Eddy Co.*, 32°23.2'N, 103°46.6'W (site 13) (TAM). **Oklahoma**: *Tillman Co.* (CNC, USNM). **Texas**: *Bosque Co.*, 2 mi W and 3 mi S of Iredell (CNC, TAM). *Burnet Co.*, 6 mi W of Burnet on Rt. 29 (USNM). *Potter Co.*, 1 mi N of Canadian R. on US 87 (JTP). *Wheeler Co.*, McLean (USNM).

Pseudopsallus lajuntae, new species

Figures 119–125, 211

DIAGNOSIS: Recognized by the subovate head with frons moderately protruding and rounded; large eyes; lower margin of antennal fossa situated above ventral margin of eye; dorsal vestiture with silvery white simple setae; labium reaching slightly beyond apices of mesocoxae; pale tibial spines; male with three tergal processes (figs. 119, 120), right

tergal process minute and spine-like, much smaller than left tergal processes; dorsal lobe of left paramere long and narrow (fig. 122); and notch of medial interior flange of right paramere finely serrate (fig. 125).

DESCRIPTION: Male. Length 5.65–6.03; width 2.06–2.32. **GENERAL ASPECT.** Dusky green with head, pronotum, and scutellum usually more yellow or yellowish green; surface texture shagreened; dorsal vestiture mixed, long pale suberect simple setae and densely distributed, recumbent shiny scale-like setae. **HEAD.** Width across eyes 1.02–1.05, width of vertex 0.50–0.55; subovate; frons moderately convex, steeply sloping, junction with tylus shallowly and broadly depressed; tylus moderately produced; eyes large, occupying from two-thirds to three-fourths height of head, anterior margin of eye moderately emarginate above antennal insertion, posterior margin of eye slightly rounded, narrowly removed from anterior margin of pronotum; posterior margin of head with weakly elevated carina; vertex flattened, slightly excavated immediately anterior to carina; sloping slightly near juncture with frons; antennal fossa nearly contiguous with anterior margin of eye, lower margin of fossa situated well above ventral margin of eye; juga weakly protruding; lora flattened; genae slightly narrower than diameter of antennal segment I; gula obsolete; bucculae narrow and of uniform width; length of antennal segment I 0.51–0.52, segment II 1.79–1.83; antennae pale yellowish green to brownish yellow; labium reaching slightly beyond apices of mesocoxae. **PRONOTUM.** Posterior width 1.78–1.93; lateral margins nearly straight, posterior margin broadly rounded laterally and slightly concave medially; mesoscutum yellowish brown, medial triangular region bordering scutellum sometimes narrowly fuscous; scutellum weakly convex, anteromedial region transversely flattened. **HEMELYTRA.** Nearly parallel-sided, membrane smoky. **LEGS.** Yellow or pale yellowish green; hind femora sometimes with scattered, fuscous spots apically; tibial spines pale. **GENITALIA.** Single, minute spine-like RP; pair of serrate and apically pointed left tergal processes, confluent at base and obliquely oriented to long axis of body; LL larger. Right paramere: MIF broadly notched and finely serrate, proximal hump large and pointed;

DLR strongly spinose, with only DP projecting above MIF. Left paramere: DLL long and narrow, with spines distally, apex pointed; LAL long and narrow, with minute spinulae on posterior surface of distal fourth, apex broadly rounded. Vesica: RVS thick basally, thinner and round medially, tapering to flattened lanceolate and serrate apex; LVS with setal-like serrations and recurved distal portion.

FEMALE: Unknown.

ETYMOLOGY: Named for the type locality in Otero County, Colorado.

HOLOTYPE ♂: **Colorado, Otero Co., La Junta, September 4, 1977,** J. T. Polhemus, deposited in National Museum of Natural History.

PARATYPES: **Arizona: Coconino Co.,** ♂ “Kaibab s[outh] r[im] t[rail],” August 25, 1920, A. A. Nichol (USNM); 4♂♂ same data as holotype (JTP).

DISCUSSION: *Pseudopsallus lajuntae* is known only from the type material collected in Otero Co., Colorado and Coconino Co., Arizona (fig. 211). Collection dates are from August 25 to September 4. The host plant association is not known.

Pseudopsallus lattini, new species

Figures 1, 2, 4, 126–132, 216

DIAGNOSIS: Recognized by the large body size; subquadrate head with frons strongly protruding and rounded; small eyes; lower margin of antennal fossa of female situated well below ventral margin of eye (fig. 4); labium reaching middle of mesosternum or slightly beyond; dorsal vestiture with dark bristle-like setae; male with three tergal processes (fig. 127); and dorsal lobe of left paramere long and narrow, with acute apex (fig. 129). Female strongly brachypterous (fig. 2).

This species is most similar to *major* but is easily distinguished by the position of the antennal fossa of the female (fig. 4) and by the long acuminate dorsal lobe of the left paramere (fig. 129).

DESCRIPTION: Male. Length 6.79–7.52; width 2.38–2.72. **GENERAL ASPECT.** Dusty green with head, anterior lobe of pronotum, mesoscutum, scutellum, and lateral margins of hemelytra usually more yellowish green or pale brownish yellow; surface

texture shagreened, pronotum slightly shining; dorsal vestiture as in generic description including dark bristle-like setae. HEAD. Width across eyes 1.09–1.16, width of vertex 0.66–0.69; subquadrate; frons strongly protruding and meeting tylus along narrow, deep depression; tylus sharply produced basally; eyes small, occupying approximately one-half of head height, anterior margin of eye slightly emarginate above antennal insertion, posterior margin of eye slightly curved and well removed from anterior margin of pronotum; posterior margin of head with weakly elevated carina; vertex weakly rounded, slightly excavated anterolaterad of carina; antennal fossa slightly removed from anterior margin of eye, lower margin of fossa even with or slightly below ventral margin of eye; juga and lora long and nearly flat; genae, gula, and bucculae as in generic description; length of antennal segment I 0.53–0.57, segment II 1.70–1.78; antennae brownish yellow, segments I and II with numerous suberect to moderately reclined, dark bristle-like setae, segments III and IV with fewer dark bristle-like setae; labium reaching middle of mesosternum or slightly beyond. PRONOTUM. Posterior width 1.88–2.00; lateral margins nearly straight, posterior margin broadly and shallowly concave, posterolateral angles broadly rounded; mesoscutum moderately exposed; scutellum weakly convex, and sometimes slightly transversely rugose. HEMELYTRA. Slightly rounded laterally; membrane faintly infuscated. LEGS. Yellowish green or pale brownish yellow; apices of tibiae and tarsi sometimes darker yellowish brown; hind femora with scattered fuscous spots and dark bristle-like setae mostly on apical half; tibial spines dark brown or black. GENITALIA. Single RP, broad basally, flattened, and serrate; pair of left tergal processes; LL small, rounded, apex pointed, with single serration; LM broadest medially, flattened, large, and strongly serrate. Right paramere: MIF broadly notched and finely serrate, humps equally large; entire DLR projecting above MIF, DP slightly produced and with small spines. Left paramere: DLL long and narrow, with small spines distally, apex pointed; LAL long and narrow, with notched excavated apex. Vesica: DS broadened medially, narrow and elongate distally; RVS tapering to pointed expanded and serrate apex, apical serrations on

surface as well as marginally; LVS tapering, with thin recurved distal portion.

FEMALE: Brachypterous. Length 5.04–5.19; width 2.68–2.80; width across eyes 1.22–1.26, width of vertex 0.78–0.80; length of antennal segment I 0.54–0.60, segment II 1.76–1.85; posterior width of pronotum 1.66–1.83. Similar to male in color and vestiture but with hemelytra more rounded laterally, slightly smaller eyes, and pronotum and scutellum nearly flat.

ETYMOLOGY: Named for Dr. John D. Lattin, Professor of Entomology and Assistant Dean of Science at Oregon State University, Corvallis, Oregon, who is responsible for acquainting both authors with the Miridae.

HOLOTYPE ♂: Oregon, Klamath Co., 28 mi SE of Jct. U.S. 97 and St. Hwy. 31, 1497 m, June 25, 1979, ex *Artemisia tridentata tridentata* Nuttall, J. D. Lattin; deposited in American Museum of Natural History.

PARATYPES: Oregon: Deschutes Co., ♂ 12 mi SE of Bend, T19S R13E Sec. 14, July 19, 1957, G. F. Kraft (OSU). Klamath Co., 2♂♂, ♀ Lattin (OSU); 2♂♂ M. D. Schwartz (OSU); ♂, ♀ (four nymphs are not paratypes), R. T. Schuh (AMNH), all with same data as for holotype except Schuh specimens read "28 mi SE of La Pine on Rt. 31, 1535 m." Lake Co., 2♂♂ M. D. Schwartz (OSU) and 3♂♂, ♀ G. M. Stonedahl (OSU), 11 mi NW of Silver Lake on St. Hwy. 31, 1372 m, June 25, 1979, ex *Artemisia t. tridentata*.

DISCUSSION: *Pseudopsallus lattini* is known only from the type material collected in eastern Oregon (fig. 216). Collection dates are from June 25 to July 19. The host is *Artemisia t. tridentata*.

Pseudopsallus major (Knight),
new combination

Figures 3, 18, 44, 133–140, 216

Hesperocapsus major Knight, 1969, p. 87, fig. 1
(new species).

DIAGNOSIS: Recognized by the subquadrate head with frons strongly protruding and rounded; dorsal vestiture with erect, black bristle-like setae; labium not extending beyond apex of mesosternum; and male with three tergal processes (figs. 133, 134), and short stout dorsal lobe of left paramere with two prominent spines on broadly rounded

apex (fig. 136). Female brachypterous; lower margin of antennal fossa approximately even with ventral margin of eye (fig. 3).

Distinguished from *lattini* by the short, stout dorsal lobe of the left paramere (fig. 136), and female with lower margin of antennal fossa approximately even with ventral margin of eye (fig. 3).

DESCRIPTION OF MALE GENITALIA: Single RP, short, flattened, with weak serrations distally, apex pointed, some specimens with single strong barb-like basal serration; pair of left tergal processes, confluent at base; LL short, rounded and simple, apex slightly notched and pointed; LM flattened or slightly rounded, slightly or strongly serrate dorso-distally, apex pointed. Right paramere: MIF notched, proximal hump broadly pointed, distal hump truncate, or sometimes somewhat pointed, margin straight and with minute serrations, far distal margin sometimes with single spine; DLR projecting above MIF, DP narrowly produced, and terminating with patch of spines. Left paramere: DLL short, tapering to broadly rounded apex with two prominent spines, anterior spine sometimes secondarily spinous; LAL long, gradually tapering to excavated notched apex. Vesica: DS with strong marginal serrations, sometimes with a few subapical surface serrations; RVS tapering to expanded and serrate pointed apex; LVS short, appearing teneral, not sclerotized on distal half in all specimens examined.

TYPE: HOLOTYPE ♂: **Utah**, *Iron Co.*, 4 mi N of Beryl Junction, June 15, 1967, *Artemisia tridentata* Nutt. (USNM).

DISCUSSION: *Pseudopsallus major* is distributed from Mono Co., California across southern Nevada and Utah to Mesa Co., Colorado (fig. 216). The host plant of this species is *Artemisia tridentata*.

SPECIMENS EXAMINED: 34 specimens collected from June 11 to July 16. UNITED STATES: **California**: *Mono Co.*, N edge of Mono Lk. on Rt. 395 (AMNH). **Colorado**: *Mesa Co.*, John Brown Crk., W of Gateway (JTP). **Nevada**: *Mineral Co.*, 27 mi SW of Hawthorne on Rt. 359, 1 mi NE of Anchorite Summit, 7400 ft (AMNH). *Nye Co.*, 5.5, and 7 mi S of Belmont on St. Hwy. 82 (OSU, AMNH). *White Pine Co.*, 6 mi SW of Ely (UCB). **Utah**: *Grand Co.*, S Beaver Mesa, La

Sal Mts. (JTP). *San Juan Co.*, nr. Brumley Crk. T27S R24E, La Sal Mts. (AMNH). *Sevier Co.*, 2.3 mi S of I-70 on Kanosh Rd. (AMNH, OSU).

***Pseudopsallus mojaviensis*, new species**

Figures 5, 19, 20, 45, 141–147, 214

DIAGNOSIS: Recognized by the subovate head with lower margin of antennal fossa even with ventral margin of eye (fig. 5); labium reaching metacoxae or slightly beyond; head, pronotum, and hemelytra with long, dark bristle-like setae; and male with three tergal processes (figs. 141–142), and short stout dorsal lobe of left paramere terminating in two large, widely separated spines (fig. 144). Female strongly brachypterous.

DESCRIPTION: Male. Length 4.47–5.67; width 1.70–2.22. GENERAL ASPECT. Dusty green with head, anterior lobe and posterior margin of pronotum, mesoscutum, and scutellum usually more yellow or yellowish green, mesosternum and venter fuscous in some specimens; dorsal surface sometimes with fuscous spots at bases of dark bristle-like setae; surface texture shagreened, pronotum slightly shining, hemelytra sometimes faintly roughened; dorsal vestiture as in generic description, including dark bristle-like setae. HEAD. Width across eyes 0.93–1.06, width of vertex 0.51–0.58; subovate; frons moderately protruding and rounded, steeply sloping, tylus prominent, junction with frons shallowly and broadly depressed; eyes occupying nearly two thirds height of head, anterior margin of eye emarginate above antennal insertion, posterior margin of eye nearly straight, narrowly removed from anterior margin of pronotum; posterior margin of head with weakly elevated carina; vertex weakly sloping anteriorly, shallowly excavated adjacent to carina; antennal fossa nearly contiguous with anterior margin of eye, lower margin of fossa even with ventral margin of eye; juga and lora slightly inflated, relatively long for head structure; genae distinctly broader than diameter of antennal segment I; bucculae narrow and of uniform width except tapered posteriorly; gula obsolete; length of antennal segment I 0.36–0.38, segment II 1.14–1.40; antennae yellowish green to brownish yellow, segments III and

IV sometimes yellowish brown or brown; segment I usually with oblique fuscous mark on basoventral aspect, segment II with scattered, dark bristle-like setae; labium reaching metacoxae or slightly beyond. PRONOTUM. Posterior width 1.40–1.73; lateral margins nearly straight, posterior margin broadly and shallowly concave medially, posterolateral angles broadly rounded; mesoscutum narrowly exposed; scutellum weakly convex, usually transversely roughened, anteromedial region transversely flattened. HEMELYTRA. Slightly rounded laterally; membrane translucent to smoky. LEGS. Yellow, brownish yellow, or greenish yellow; femora with large, brown to fuscous spots and scattered, dark bristle-like setae; tibiae with dark spots at bases of spines, tibial spines black. GENITALIA. Single RP, flattened and serrate, apex truncate; pair of left tergal processes; LL flattened, broadest medially with strong serrations; LM short, simple and pointed apically. Right paramere: MIF with ragged serrations; DLR very large and expanded, with sparse minute spinulae on interior surface, entire lobe projecting dorso-laterally from MIF. Left paramere: DLL short, stout with two large, widely set pointed spines, anterior spine secondarily spinose; LAL long and narrow tapering to point, outside surface with minute serrations. Vesica: DS with apical surface as well as margin strongly serrate; RVS tapering to pointed apex, expanded and serrate distally; LVS very large, tapering to recurved strongly serrate apex, all apical surfaces serrate.

FEMALE: Brachypterous. Length 3.37–3.89; width 1.93–2.28; width across eyes 1.02–1.14, width of vertex 0.57–0.69; length of antennal segment I 0.34–0.40, segment II 1.08–1.36; posterior width of pronotum 1.36–1.54. Similar to male in color and vestiture, except dorsal surface sometimes paler yellowish green, lateral margins of hemelytra more rounded, eyes slightly smaller, and pronotum and scutellum more flattened.

ETYMOLOGY: Named for the Mojave Desert in southwestern North America.

HOLOTYPE ♂: **California**, *San Bernardino Co.*, Jct. of Black Canyon and Cedar Canyon Rds., 914 m, May 18, 1982, ex *Salvia dorrii* (Kell.) Abrams., M. D. Schwartz; deposited in American Museum of Natural History.

PARATYPES: **California**: *Los Angeles Co.*, 5♂♂, 4♀♀ 2.5 mi NW of Desert Sprgs. [nr. Phenon off Rt. 138], May 25, 1955, ex *Salvia dorrii* [as *S. pilosa*], Timberlake (UCR). *San Bernardino Co.*, 5♂♂, 4♀♀ same data as holotype (AMNH); ♂ Maranastu Canyon, Apple Valley, May 20, 1941, ex *Salvia dorrii* [as *S. pilosa*], Timberlake (UCR); 2♂♂ Granite Pass, 1160–1315 m, May 26, 1968, ex *Salvia dorrii*, C. Beesley (UCR); ♂ Granite Pass, May 26, 1968, at light, P. A. Rauch (UCR); 5♀♀ Hesperia, April 30, 1939, ex *Salvia dorrii* [as *S. carnosa*], Timberlake (UCR). **Utah**: *Washington Co.*, 5♂♂, 8♀♀ St. Hwy. 15 about 10 mi E of I-15 [west of Zion Nat'l. Pk.], 1095 m, May 18, 1978, ex *Salvia* sp., R. T. Schuh (AMNH).

ADDITIONAL SPECIMENS: **California**: *San Bernardino Co.*, 10♂♂, ♀ Providence Mts. (CAS). DISCUSSION: This species is distributed in the Mojave desert region of eastern California and Washington Co., Utah, where it occurs on *Salvia dorrii* (fig. 214). Collection dates are from April 30 to May 26.

Pseudopsallus occidentalis, new species

Figures 9, 148–157, 217

DIAGNOSIS: Recognized by the subovate head with flat or slightly rounded, weakly protruding frons (fig. 9); long dark bristle-like setae on head, pronotum, and hemelytra; tylus sharply produced basally, junction with frons narrowly depressed (fig. 9); labium nearly reaching apex of mesosternum; ratio of length of antennal segment II to posterior width of pronotum from 0.70:1 to 0.80:1; and male with four tergal processes, left medial process spatulate (figs. 148–152), dorsal lobe of left paramere with three to five strong sub-apical spines on anterior margin (fig. 153). Females macropterous.

This species is very similar to *anograe* but differs by the spatulate left medial tergal process, which bears a row of spiculae on the ventral surface (figs. 148, 149, 151), and dorsal lobe of left paramere with 3–5 strong sub-apical spines on the anterior margin (fig. 153). The female is distinguished from *anograe* by the shorter labium, the more strongly produced basal region of the tylus, and junction of tylus and frons moderately and narrowly depressed (fig. 9).

DESCRIPTION: Male. Length 4.60–5.09; width 1.75–1.82. **GENERAL ASPECT.** Grass green with head, pronotum, and scutellum sometimes more yellow or yellowish green; surface texture somewhat shagreened and slightly shining; vestiture as in generic description including long, dark bristle-like setae. **HEAD.** Width across eyes 0.83–0.85, width of vertex 0.43–0.46; subovate; frons weakly rounded, tylus moderately produced, junction with frons narrowly depressed; eyes large, occupying approximately two-thirds of head height, anterior margin of eye emarginate above antennal insertion, posterior margin of eye slightly rounded; basal carina of head indistinct; vertex weakly sloping, posterior margin very slightly excavated; antennal fossa nearly contiguous with eye, lower margin of fossa situated slightly above ventral margin of eye; juga weakly protruding; lora flat; genae slightly broader than diameter of antennal segment I; length of antennal segment I 0.34–0.36, segment II 0.98–1.09; antennae yellowish green to yellowish brown, segments III and IV sometimes darker brown; labium nearly reaching apex of mesosternum. **PRONOTUM.** Posterior width 1.32–1.36; lateral margins nearly straight, posterior margin nearly straight medially, broadly rounded laterally; mesoscutum moderately exposed; scutellum weakly convex, anteromedial region transversely flattened. **HEMELYTRA.** Slightly rounded laterally, membrane smoky. **LEGS.** Yellow or yellowish green, femora without dark spots, apical fourth with scattered, erect dark bristle-like setae; tibial spines black. **GENITALIA.** Two pairs of tergal processes; right processes confluent basally; RL flattened, long, constricted medially, distal eighth expanded, serrate, apex pointed; RM flattened, shorter than RL, with strong serrations on interior margin, apex pointed; LL rounded, narrow, without serrations except for several weak serrations apically; LM very large, flattened, broadest medially, apex pointed, inner margin serrate distally, ventral surface with short serrate flange. Right paramere: MIF broad, not notched, ragged and strongly serrate; DLR only projecting above MIF distally, DP strongly produced, with patch of strong apical spines. Left paramere: DLL long, tapering, apex pointed, anterior margin with several strong spines; LAL nar-

row, tapering to round apex, distal margin with many minute serrations. Vesica: DS flattened and very strongly serrate, with pointed BP; RVS tapering to serrate and pointed, not expanded apex; LVS with recurved or coiled distal portion.

FEMALE: Macropterous. Length 4.39–4.46; width 1.74–1.81; width across eyes 0.82–0.85, width of vertex 0.49–0.50; length of antennal segment I 0.35–0.37, segment II 1.04–1.06; posterior width of pronotum 1.27–1.36. Similar to male in color and vestiture but differing in somewhat more rounded lateral margins of hemelytra and slightly smaller eyes.

ETYMOLOGY: From the Latin, *occidentalis*, meaning “of the west.”

HOLOTYPE ♂: **California**, *San Luis Obispo Co.*, Pozo, May 1, 1962, Timberlake; deposited in American Museum of Natural History.

PARATYPES: **California:** *Monterey Co.*, ♂ Bryson, April 25, 1917, E. P. Van Duzee (CAS). *San Luis Obispo Co.*, ♂, ♀ same data as for holotype, except May 6, 1962 (UCR); ♀ La Panza Creek, April 29, 1962, ex *Chrysothamnus*, Timberlake (UCR); 2♂♂, 3♀♀ Morro Rd. nr. Atascadero, May 15, 1962, B. P. Bliven (CAS). *Trinity Co.*, 4♂♂, 5♀♀ Van Duzee Rd., June 25, 1944, Bliven (CAS). **Oregon:** *Jackson Co.*, ♂ Sams Valley, June 24, 1971, Oman (OSU). *Wallowa Co.*, ♂ Joseph, July 10, 1969, Oman (OSU).

ADDITIONAL SPECIMEN: **California:** *Lake Co.*, ♀ Clear Lake (USNM).

DISCUSSION: *Pseudopsallus occidentalis* has been collected in Monterey, San Luis Obispo, and Trinity counties, California, and Jackson and Wallowa counties, Oregon (fig. 217). Collection dates range from April 25 to July 10. A single specimen was taken on *Chrysothamnus* sp. in California.

Pseudopsallus plagiatus (Knight),
new combination

Figures 47, 48, 158–165, 212

Hesperocapsus plagiatus Knight, 1968, pp. 103–104, fig. 135 (new species).

DIAGNOSIS: This species is recognized by the subovate head with frons moderately protruding and rounded; dorsal vestiture without dark, bristle-like setae; labium reaching between metacoxae; tarsal claws weakly

curved, without visible pulvillus (figs. 47, 48); males with two tergal processes (figs. 158–160); and macropterous female.

DESCRIPTION OF MALE GENITALIA: Single RP, small, flattened and ribbon-like, truncate and serrate apically; single left tergal process large, flattened, with single basal and medial spine, truncate and serrate apically. Right paramere: MIF with distal hump and slightly curved and sloping proximal portion with many serrations; DLR projecting above MIF, with single spine, DP broadly prominent, rounded, and not spinose. Left paramere: DLL short, truncate, gradually tapering to broad apex, with single large offset spine; LAL short, gradually tapering to blunt apex. Vesica: One teneral specimen. DS small; RVS tapering to pointed apex, expanded and serrate distally, apex notched; LVS tapering, with recurved distal portion.

TYPE: HOLOTYPE ♂: Nevada, Nye Co., Mercury, 19M [Nevada Test Site], June 24, 1925, H. Knight and J. Merino (USNM).

SPECIMENS EXAMINED: Nevada, Nye Co., 2.5 mi NE of Gabbs, off Rt. 844, at Gabbs Rifle Range, 4800 ft, July 2, 1983, ex mercury vapor light, 2♂♂ (AMNH); Mercury, 17M [Nevada Test Site], June 12, 1925, H. Knight and J. Merino, ♀ (USNM).

DISCUSSION: This species is known only from Nye Co., Nevada (fig. 212). Knight (1968) reported that the type material was collected on *Malacothrix glabrata* A. Gray.

Pseudopsallus presidio, new species

Figures 10, 46, 166–172, 217

DIAGNOSIS: Recognized by the small body size, subovate head with flat weakly protruding frons (fig. 10), short labium, and by the male genitalia. Female macropterous, with lower margin of antennal fossa even with ventral margin of eye, and ratio of length of antennal segment II to posterior width of pronotum from 0.80:1 to 1.00:1; males with three tergal processes (figs. 166, 167), left medial process ribbon-like and slightly broadened medially, dorsal lobe of left paramere short and broad (fig. 168), lateral lobe with notched apex (fig. 169), medial interior flange of right paramere with well-developed proximal and distal humps (figs. 170–171), and dorsal spicula of vesica with large secondary basal process (fig. 172).

Pseudopsallus presidio is very similar to *demensus* and *hixsoni* but differs from these species by the distinct humps of the medial interior flange of the right paramere (figs. 170, 171) and by the large secondary basal process on the dorsal spicula of the vesica (fig. 172). Females of *presidio* are distinguished from related species by the small body size and lower margin of the antennal fossa even with the ventral margin of the eye (fig. 10). Males are further distinguished from *hixsoni* by the three tergal processes (figs. 166, 167), and from *demensus* by the ribbon-like left medial tergal process with apex narrowly truncate (figs. 166, 167).

DESCRIPTION: Male. Length 3.55–3.89; width 1.25–1.33. GENERAL ASPECT. Yellowish green or pale grayish green with dark green markings; surface texture shagreened, slightly shining; dorsal vestiture as in generic description, hemelytra sometimes with golden brown simple setae, but lacking dark brown or black bristle-like setae. HEAD. Width across eyes 0.75–0.80, width of vertex 0.39–0.40; subovate; frons weakly protruding, flat or only slightly rounded, frons prominent, junction with tylus narrowly and shallowly depressed; eyes large, occupying from two-thirds to three-fourths height of head, anterior margin of eye emarginate above antennal insertion, posterior margin of eye nearly straight, narrowly removed from anterior margin of pronotum; posterior margin of head with weakly elevated carina; vertex flattened or slightly excavated anterior to carina; weakly sloping anteriorly; antennal fossa nearly contiguous with anterior margin of eye, lower margin of fossa situated slightly above ventral margin of eye; juga and lora nearly flat; genae slightly narrower than diameter of antennal segment I; gula obsolete; length of antennal segment I 0.27–0.29, segment II 0.92–0.96; antennal segment I pale green or yellowish green, segments II through IV brown or yellowish brown; labium reaching apex of mesosternum or nearly so. PRONOTUM. Posterior width 1.07–1.14; lateral margins straight or weakly convex; posterolateral angles broadly rounded; mesoscutum brownish yellow, narrowly exposed; scutellum weakly convex. HEMELYTRA. Slightly rounded laterally, membrane smoky; veins pale. LEGS. Green or yellowish green, without dark

spots; tibial spines golden brown; tarsi green or yellowish green, last segment dark brown apically. **GENITALIA.** Single RP, flattened, distal portion expanded and with several strong serrations, apex pointed; pair of widely separated left tergal processes; LL short, rounded, and simple with pointed apex; LM ribbon-like, flattened, broadest medially, narrowly truncate apically with several strong serrations. Right paramere: MIF notched, proximal hump very broad and rounded, distal hump small and slightly pointed; DLR projecting above MIF, tapering to slightly produced DP, with several strong spines on distal margin, apex with several strong spines. Left paramere: DLL short stout, tapering to large recurved spine with secondarily spinose apex; LAL gradually tapering to excavated and notched apex. Vesica: DS with flattened smooth and apically pointed BP; RVS long, rounded medially, tapered distally, with slightly expanded serrate and pointed apex; LVS thickened basally, with two strong spines medially at juncture of narrow recurved and slightly serrate distal portion, apex pointed.

FEMALE: Macropterous. Length 3.67–3.95; width 1.43–1.54; width across eyes 0.79–0.82, width of vertex 0.44–0.46; length of antennal segment I 0.26–0.31, segment II 0.98–1.06; posterior width of pronotum 1.15–1.21. Similar to male in color, vestiture, and structure but with lateral margins of hemelytra slightly more rounded and lower margin of antennal fossa even with ventral margin of eye.

ETYMOLOGY: Named for the county in Texas where all known specimens were collected.

HOLOTYPE ♂: Texas, *Presidio Co.*, 10 mi N of Shafter, 1370 m, April 30, 1982, D. A. and J. T. Polhemus, collected on *Oenothera* sp., deposited in National Museum of Natural History.

PARATYPES: 11♂♂, 7♀♀ same data as holotype (JTP); ♂ Shafter, 1067 m, April 30, 1982 (JTP); ♂ 11 mi N of Shafter, August 8, 1968, J. E. Hafernik (TAM).

DISCUSSION: This species is known only from the type material collected in *Presidio Co.*, Texas on *Oenothera* sp. (fig. 217).

Pseudopsallus puberis (Uhler),
new combination

Figures 21, 49–50, 173–179, 214

Oncotylus puberis Uhler, 1894, p. 270 (new species). Van Duzee, 1916c, p. 46 (list).

Bifidungulus puberis: Knight, 1930, p. 2 (new combination); 1968, pp. 102–103 (host and distribution). Carvalho, 1958, p. 40 (catalog).

DIAGNOSIS: Recognized by the strongly protruding angulate claw base (figs. 49, 50); dorsal vestiture with broad scale-like setae (fig. 21); pronotum with brown or orange brown cast; and males with two basally confluent ribbon-like left tergal processes (figs. 173, 174). Female macropterous.

DESCRIPTION OF MALE GENITALIA: RP obsolete, with only strongly sclerotized area in position of process; pair of left tergal processes confluent at base; both flattened, ribbon-like, with truncate and strongly serrate apices. Right paramere: MIF notched with strongly produced proximal and distal humps, proximal with strong secondary serrations; DLR strongly projecting above MIF, DP obsolete. Left paramere: DLL short, truncate gradually tapering to rounded apex, apex with strong proximal offset spine; LAL long, tapering to rounded apex. Vesica: DS small, flattened, with strong marginal serrations, apex pointed; RVS long, tapered, not distinctly flattened, distal fourth expanded and faintly serrate, apex pointed; LVS long, broad basally, not flattened, tapering to recurved strongly serrate distal half, apex pointed.

TYPES: According to Uhler's original description, *puberis* was described from "numerous specimens" with label data "Cal. II," deposited in the collection of the CAS. Specimens of *puberis* sent to us by the staff of the CAS contained no examples from the "type" locality, although three female specimens were included with label data "S Bernadino [*sic*] Co. CAL." One of these specimens was labeled "lectotype" and the others "paratypes," apparently by E. P. Van Duzee. However, these specimens cannot be considered syntypes because they were not listed in the original description. Further, the lectotype designation was never published by Van Duzee.

We have found two specimens in undetermined material at the USNM that we believe are from the syntype series of *puberis*. A male specimen in fair condition with label data as follows is hereby designated as lectotype: Label 1, "PR Uhler Collection"; 2, "*Oncotylus puberis* Uhler. Cal." [handwritten]; 3, "*Oncotylus puberis* Uhler Cal. [handwritten] Det UHLER"; 4, "*Bifidungulus puberis* (Uhl)

[handwritten] Det. H. H. Knight." The above specimen was discovered in the Knight Collection and we consider it to be the one referred to by Knight (1930, p. 2) as a "male cotype of *Oncotylus puberulus* Uhler." A female specimen in poor condition is designated paralectotype; label data: "Cal. II," PR Uhler Collection. In the interest of stability we selected the male specimen as lectotype rather than the female. The male is in much better condition, more representative of the habitus of the species, and bears two determination labels in Uhler's script. There is no evidence that Uhler ever examined the female specimen. Both specimens are deposited in the USNM collection and bear our lectotype labels.

DISCUSSION: This species is distributed in southern California from Inyo Co., south to Punta Prieta, Baja California Norte, and east across southern Nevada, Arizona, and Utah to Montezuma Co., Colorado (fig. 214). Adults have been collected on *Baileya* sp., *Camissonia claviformis* (Torr. & Frem) Raven, *C. claviformis* subsp. *peirsonii* (Munz) Raven, *C. claviformis* subsp. *auratiaca* (Munz) Raven, *Oenothera deltoides* Torr. & Frem, *O. brevipes* Gray., *Parafoxia linearis* (Cav.) Lag., and *Phacelia* sp.

SPECIMENS EXAMINED: 246 specimens collected from January 8 to July 26. **MEXICO:** **Baja California Norte:** 13 mi N of, and 22 km N of Punta Prieta (UCR). **UNITED STATES:** **Arizona:** *Coconino Co.*, Marble Cyn. Mon. T7E R39N (AMNH). *Cochise Co.*, Huachuca Mts. (USNM). *Graham Co.*, Stockton Pass, Pinaleno Mts. (AMNH). *Pima Co.*, Ajo Valley, Organ Pipe Cactus Nat'l. Mon. (AMNH, JTP); The Alamo, Ajo Mts. (USNM). *Yuma Co.*, Yuma Mesa (UAZ). **California:** *Imperial Co.*, Algodones Dunes, 3.5 mi NW of Glamis Dunes (UCR); Glamis Dunes (UCR); 2 mi N of, and Plaster City (UCR, CAS); Salton City (UCR); 15 mi W of Westmorland (UCR). *Inyo Co.*, 5 mi E of, 6.5 mi E of, and Big Pine (UCR); Darwin Falls (CAS); SE end of Saline Valley (BLM Survey) (LACM); 2 mi W of Westgard Pass, White Mts. (UCR). *Kern Co.*, Iron Cyn. (CAS). *Riverside Co.*, 18 mi W of Blythe; Box Cyn.; Coyote Crk., Deep Cyn.; Deep Cyn.; 0.8 mi N of jct. of Deep Crk. and Horsethief Crk. (all UCR); Desert Center (CAS); 3 mi E of Mecca; McCoy Sprg.; Thousand Palms (all

UCR). *San Bernardino Co.*, 7.5 mi S of 29 Palms (UCR). *San Diego Co.*, 2 mi E of Borrego Sprgs. (USU); Borrego (UCR). **Colorado:** *Montezuma Co.*, Holly Cyn., Hovenweep Nat'l. Mon. (JTP). **Nevada:** *Clark Co.*, Mesquite (USU). *Nye Co.*, 2.5 mi NE of Gabbs, off of Rt. 844, at Gabbs Rifle Range, 4800 ft, July 2, 1983, ex mercury vapor light (AMNH); Nevada Atomic Test Site, Rock Valley, on Jackass Flats Rd. (AMNH). *Washoe Co.*, Reno (AMNH). **Utah:** *San Juan Co.*, Butler Flat., Canyonlands Nat'l. Pk. (JTP); 1.2 mi W of Jct. of Gooseneck Rd. on Co. Rd. 244, 5000 ft (AMNH); 7.7 mi N of Mexican Hat on Rt. 261, T41 R18E (AMNH).

Pseudopsallus repertus (Uhler),
revised synonymy, new combination
Figures 22, 52, 180-187, 215

Oncotylus repertus Uhler, 1895, p. 49 (new species).
Van Duzee, 1916c, p. 46 (list); 1917, p. 404
(catalog). Carvalho, 1958, p. 81 (catalog). Knight,
1968, p. 105 (as synonym of *sericatus*).

Pseudopsallus davisii Knight, 1930, p. 6 (new
species). NEW SYNONYMY.

Hesperocapsus davisii, Knight, 1968, p. 103, fig.
130 (new combination).

Hesperocapsus utahensis Knight, 1968, p. 105, fig.
133 (new species). NEW SYNONYMY.

DIAGNOSIS: Recognized by the subquadrate head with frons strongly protruding and rounded; hemelytra with many widely distributed black bristle-like setae; second antennal segment pale green or brownish yellow, sometimes darker brown at apex; male with four tergal processes, the right pair broadly joined, giving the appearance of a single process (figs. 181, 182); and female submacropterous.

Pseudopsallus repertus closely resembles *atriseta* but can be distinguished by the widely distributed, black bristle-like setae on the dorsum; pale second antennal segment; and broadly joined right tergal processes of the male genitalia (figs. 181, 182).

DESCRIPTION OF MALE GENITALIA: Two pairs of tergal processes, both pairs confluent basally; right processes usually very broadly confluent, with the appearance of a single process; RL long and flattened, weakly serrate distally, apex serrate and broadly rounded; RM flattened, of variable length but always terminating in broad ragged apex; LL long and flattened, apex broadly rounded, mar-

ginally serrate; LM narrow, flattened, shorter than LL, marginally serrate. Right paramere: MIF with proximal lobe prominent, distal portion of MIF with several strong spines or with small non-spinose hump; DLR projecting above MIF, DP slightly produced and covered with strong spines. Left paramere: DLL short and broad with two large and widely separated apical spines, antermost spine secondarily spinous; LAL long tapering to blunt apex. Vesica as in *atriseta*.

TYPES: This species was described from two females collected in Colorado. Uhler (1895) listed "Steamboat Springs" and "Foot-hills six miles west of Fort Collins" as localities for *repertus*, but there is no conclusive evidence that Uhler examined specimens from these localities (see explanation in *sericatus* types section). Knight (1968, p. 105) designated a type for *repertus*, stating that he had found a specimen from "Steamboat Springs" in the Uhler Collection (USNM) that carried the name label "*repertus*" in Uhler's handwriting. Further, he stated that the type would be recorded in the USNM collection, but no such specimen was found in the type collection at that institution. In our examination of the Knight Collection (USNM), we uncovered a specimen of *repertus* that we consider to be the one Knight designated as the type. It has the following label data: Label 1, "Colo 1686"; 2, "PR Uhler Collection"; 3, "*repertus* Uhler Col." [handwritten]. This specimen also bears a blank red label, probably applied by Knight to designate an important specimen. Thus, it is apparent that Knight never deposited the specimen in the USNM collection but retained it in his personal collection. There is no indication that this specimen is from Steamboat Springs, Colorado, and we have no explanation for why Knight considered it to be from that locality. The Baker number "1686" refers to Bedford, Massachusetts, which we consider to be in error (see *sericatus* types section for further explanation).

We consider Knight's type designation for *repertus* to be valid, and are indicating such by adding a lectotype label to the above specimen with the data, "LECTOTYPE: *Oncotylus repertus* Uhler, det. H. H. Knight, by Stonedahl and Schwartz, 1985."

TYPES OF SYNONYMS: HOLOTYPE ♂, *Pseu-*

dopsallus davisi Knight: **Utah**, Sevier Co., Richfield, July 15, 1929, light trap, E. W. Davis (USNM). HOLOTYPE ♂, *Hesperocapsus utahensis* Knight: **Utah**, Sevier Co., Richfield, May 21, 1930, light trap, E. W. Davis (USNM).

DISCUSSION: Uhler described *repertus* and *sericatus* in the same publication in 1895. Knight (1968, p. 105) synonymized *repertus* with *sericatus* stating that the syntypes of *repertus* were only "brachypterous" females of *sericatus*. We consider Knight's synonymy incorrect, as it is obvious from reading Uhler's description of *repertus* that the specimens had a well-developed membrane with visible venation. Females of *sericatus* are always strongly brachypterous, with the wing membrane reduced to a small flap without veins. Knight's use of the term "brachypterous" in reference to the slightly abbreviated wing condition (submacroptery) of the *repertus* lectotype is misleading. Either he did not recognize a difference between the two wing conditions, or he did not consider the observed difference species specific. In any case, he arrived at the wrong conclusion and the incorrect synonymy. We propose the above synonymy of *repertus*, recognizing it as a valid species and the senior synonym of *davisi* and *utahensis*. The types and other identified specimens of *davisi* and *utahensis* are identical in all respects. Females of these two species are indistinguishable from the lectotype of *repertus*.

This species has been collected in Mono and Modoc counties, California, north to Deschutes and Lake counties, Oregon, and east across northern Nevada and Utah, and southern Idaho to Jefferson Co., Montana and Sweetwater Co., Wyoming (fig. 215). Specimens also have been collected in the central and southern highlands of Utah. The host plant of this species is *Artemisia tridentata* Nutt.

SPECIMENS EXAMINED: 301 specimens collected from May 21 to August 4. **UNITED STATES:** **California:** Modoc Co., 2.5 mi S of Rt. 139 towards Lookout (AMNH). Mono Co., Crooked Crk., White Mts. (UCB). **Colorado:** "Colo. 1419, Coll. C.F. Baker" (USNM). **Idaho:** Butte Co., Craters of the Moon Nat'l. Mon. (USNM). Minidoka Co., Burley (USNM). Oneida Co., Holbrook; Rock

Crk. (both OSU). *Owyhee Co.*, Silver City (OSU). *Twin Falls Co.*, Hollister (USNM). **Montana:** *Jefferson Co.*, Butte (USNM). **Nevada:** *Eureka Co.*, 12 mi N of Rt. 50 on Rt. 278, 5800 ft (AMNH); 28 mi W of Eureka on Rt. 50, 6000 ft (AMNH). *Humboldt Co.*, 0.5 mi S of jct. of Rt. 8A and 34A, Sheldon Nat'l. Antelope Range (AMNH, USNM); 9 mi SW of and Winnemucca (USNM). *Lander Co.*, Battle Mt. (CAS); 50 mi S of Battle Mt. on road to Austin (USNM); Smith Crk. Valley, 9.5 mi S of Rt. 2, T15N R39E, 6300 ft (AMNH); 1.5 mi S of Rt. 50 on Rt. 376, T18N R45E, 6000 ft (AMNH); 11 mi S of Rt. 50 on Rt. 376, T17N R44E, 5800 ft (AMNH). *Nye Co.*, 11 mi N of Belmont, T10N R46E Sec26, 7200 ft (AMNH); Mercury 19M, Nevada Atomic Test Site (CNC). *Pershing Co.*, 7 mi E of Oreana (OSU). *Washoe Co.*, 7 mi W of Vya towards Cedarville (AMNH); 6.2 mi W of jct. of Rt. 8A and 34A (AMNH). **Oregon:** *Deschutes Co.*, 8 mi SE of Brothers; 0.5 and 1.0 mi S of Millican on Pine Mt. Rd.; sand dunes 3 mi W of Millican (all OSU). *Lake Co.*, 11 mi NW of Silver Lake on St. Hwy. 31 (OSU); nr. Fort Rock St. Mon., T25S R14E Sec 17 (OSU); Warner Mt. Pass, 5.7 mi E of jct. of Rts. 395 and 140 (AMNH). **Utah:** *Box Elder Co.*, Curlew Valley, 17 mi SW of Snowville (CNC); Snowville (USNM). *Iron Co.*, 7 mi S of Beryl Jct. (USNM). *Millard Co.*, Longridge Reservoir cutoff on Rt. 6/50, 4500 ft (AMNH). *Sevier Co.*, 1.3 mi E of St. Hwy. 25 on Mytoge Mt. Rd. (OSU); Richfield (USNM). *Uintah Co.*, Bonanza at White R. Oil Shale Project Trailers and riparian site R2, T9S R24E Secs 17 and 23 (AMNH). *Washington Co.*, 3 mi W of Enterprise (CNC). **Wyoming:** *Sweetwater Co.*, 30 mi E of Rock Sprgs. nr. Point of Rocks (CNC, USNM). Yellowstone Nat'l. Pk. (USNM).

Pseudopsallus sericatus (Uhler)

Figures 23, 51, 188–195, 216

Oncotylus sericatus Uhler, 1895, pp. 49–50 (new species). Tucker, 1907, p. 58 (list). Reuter, 1909, p. 69 (note).

Labopidea sericata: Van Duzee, 1916a, pp. 220–221 (new combination, description, and key); 1916c, p. 45 (list); 1917, p. 400 (catalog).

Pseudopsallus sericatus: Knight, 1930, pp. 3–4 (new combination and note).

Hesperocapsus sericatus: Knight, 1968, p. 105, fig. 131 (new combination). Kelton, 1980b, p. 251, fig. 199, map 80 (description).

DIAGNOSIS: This species is distinguished by the subquadrate head with frons strongly protruding and rounded; labium reaching between mesocoxae or slightly beyond; head and pronotal disk without, or with only a few dark bristle-like setae; males with three tergal processes (figs. 188, 189) and dorsal lobe of left paramere long and tapered with distal portion recurved (fig. 191); and strongly brachypterous female.

DESCRIPTION OF MALE GENITALIA: Single RP, flattened and ribbon-like, with several distinct medial serrations, tapering to pointed apex; pair of left tergal processes, confluent basally; LL short, slightly flattened, apex truncate and notched; LM flattened, much broader than LL, with weak serrations distally, tapering to either truncate and serrate, or pointed apex. Right paramere: MIF broadly notched with many minute serrations, proximal hump large with blunt apex, distal hump small, with sharp apex; DLR slightly projecting above MIF, DP strongly produced, with several spines apically. Left paramere: DLL long, tapering to recurved distal portion, apex truncate with several strong spines; LAL long, tapering to broadly expanded notched apex. Vesica: RVS tapering to pointed apex, slightly expanded and serrate distally; LVS tapering, with serrate recurved distal portion, in some specimens recurved portion set off by several small serrations.

TYPE: In the original description of *sericatus*, Uhler (1895) stated that several specimens were sent to him from "Colorado, where the species appears to be rather common." No specific locality data were provided by Uhler. Below Uhler's description, Gillette and Baker list "Steamboat Springs, July 12 on *Artemisia tridentata* (Baker)" and "Colorado Springs in July by E. S. Tucker" as localities for this bug in Colorado. However, there is no conclusive evidence that Uhler examined specimens from either of these localities when he described *sericatus*.

Knight (1968, p. 105) declared a specimen from the "Steamboat Springs" locality as a type for *sericatus*, but we have been unable to find this specimen or any others from the

localities given by Uhler (1895). From Knight's discussion, it appears that he may have attempted to designate a type for this species without having actually seen specimens from the type series. Since Knight's type designation is in doubt, we hereby designate as lectotype a male specimen with the following label data: Label 1, "Colo 1682"; 2, "PR Uhler Collection"; 3, "*Oncotylus sericatus* Uhler. Col." [handwritten]; 4, "*Oncotylus sericatus* Uhler Col. [handwritten] Det UHLER." This particular specimen was selected because it bears Uhler's handwritten determination labels, it was part of the Uhler Collection (USNM) and, as indicated by the locality label, it was collected in Colorado, probably by Gillette and/or Baker. It has been established that these workers sent numbered specimens from Colorado to Uhler for identification. Uhler in turn sent names and descriptions of new species back to Gillette and Baker for inclusion in their publication (Uhler, 1895), but apparently retained many of the specimens, which subsequently ended up in the USNM general collection. It is probable that Uhler examined the above designated lectotype when he described *sericatus*. The number "1682" on the locality label of this specimen is recorded in Baker's field notes on record at the USNM as being collected in Bedford, Massachusetts. Since "Colo[rado]" is typed on an accompanying label and *Pseudopsallus* does not occur east of the Mississippi River, we can conclude only that an error was made in the labeling or recording of Baker's field notes.

DISCUSSION: *Pseudopsallus sericatus* is distributed along the eastern slopes of the Rocky Mountains and in the Shortgrass Prairie Province from central Colorado, east to Haakon Co., South Dakota, and north to southern Alberta and Saskatchewan, Canada (fig. 216). The only host record for this species is from specimens collected in Saskatchewan on *Artemisia frigida* Willd.

SPECIMENS EXAMINED: 285 specimens collected from June 12 to August 19. **CANADA:** **Alberta:** Drumheller; Elkwater Pk.; Medicine Hat. **Saskatchewan:** Elbow (all CNC). **UNITED STATES:** **Colorado:** *Arapahoe Co.*, Denver (CAS, USNM). *Boulder Co.*, Boulder (CAS, CNC); *Nederland*, Science Lodge (CNC); *Sunset* (CAS, USNM). *Clear Creek*

Co., Doolittle Ranch, Mt. Evans (CNC). *Douglas Co.*, Head of Highline Canal (JTP); Pinecliffe (KU). *Elbert Co.*, 3 mi E of Kiowa, 6500 ft (AMNH). *El Paso Co.*, Pikes Peak (USNM). *Jefferson Co.*, Red Rocks Pk. (AMNH, JTP). *Larimer Co.*, Dixons Cyn., Ft. Collins (CNC, USNM); Estes Pk. (CNC); Ft. Collins (USNM). *Mineral Co.*, Creede (coll. Loc. 860) (CAS, JTP, USNM). *Park Co.*, 3 mi S of Guffey (JTP). *Routt Co.*, Steamboat Sprgs. (USNM). *Teller Co.*, Green Mt. Falls (USNM). "Colo. 1580, P.R. Uhler Coll." (CAS). Rist Cyn. (USNM). **Montana:** *Gallatin Co.*, Willow Crk. (CNC). **South Dakota:** *Haakon Co.*, Philip (CNC, USNM). *Pennington Co.*, Rapid City (USNM).

Pseudopsallus stitti (Knight),
new combination

Figures 7, 24, 53, 54, 196–203, 213

Pseudopsallus abroniae, Knight, 1930, p. 5, in part, one ♂ paratype.

Hesperocapsus stitti Knight, 1968, pp. 106–107, fig. 136 (new species).

Hesperocapsus tinctus Knight, 1969, p. 89, fig. 4 (new species). **NEW SYNONYMY.**

DIAGNOSIS: Recognized by the subovate head with frons moderately protruding and rounded, lower margin of antennal fossa situated well above ventral margin of eye (fig. 7); dorsal vestiture with golden to brown simple setae but lacking dark, bristle-like setae; labium reaching between mesocoxae, or slightly beyond for some females; and female macropterous. Males with three tergal processes, left processes usually much smaller than right process and without serrations (figs. 196, 197); proximal hump of medial interior flange of right paramere larger than distal hump and bearing several strong serrations (figs. 202, 203); dorsal lobe of left paramere short and broad, terminating in one (rarely two) strong spine(s) (figs. 199, 200); and left ventral spicula of vesica without serrations (fig. 198). Females macropterous.

Pseudopsallus stitti closely resembles *abroniae* but is distinguished by the shorter labium, and males without serrations on the left tergal processes (figs. 196, 197) or left ventral spicula of the vesica (fig. 198).

DESCRIPTION OF MALE GENITALIA: Single RP, narrow and slightly flattened, distal por-

tion slightly expanded with several serrations, apex pointed; pair of narrowly separated left tergal processes, either slightly or strongly confluent basally, both short, simple, and sharply pointed, some specimens with very small LM. Right paramere: MIF broadly notched, proximal hump large with a few serrations on interior margin, distal hump smaller; DLR projecting above MIF, DP obsolete or slightly produced, with several spines. Left paramere: DLL short, broad distally, terminating in one or two prominent spine(s) with several accessory spinulae; LAL long tapering to broadly and rounded apex. Vesica: DS with margin and both surfaces of distal fourth covered with fine serrations; RVS tapering to pointed apex, expanded and serrate distally, apex pointed; LVS tapering to very thin, sometimes recurved, simple distal portion; both RVS and LVS appeared teneral in all specimens examined.

TYPE: HOLOTYPE ♂, *Hesperocapsus stitti* Knight: Arizona, Yuma Co., Mohawk, April 14, 1940, L. L. Stitt (USNM).

TYPE OF SYNONYM: HOLOTYPE ♂, *Hesperocapsus tinctus* Knight: Arizona, Maricopa Co., Tempe, April 20, 1937, L. L. Stitt (USNM).

DISCUSSION: The proposed synonymy of *tinctus* with *stitti* is based on the identical genitalic structures of the males. Knight (1969) distinguished *tinctus* from *stitti* by the "broader vertex, longer rostrum, light brownish color with reddish tint, and venter with some red in the hypodermis." We can see no consistent differences in these characters for the two nominal species. One male specimen of the paratypic series of *abroniae* from Phoenix, Arizona, was misidentified and is actually a specimen of *stitti*.

This species is distributed in the Sonoran Desert region of southeastern California and western Arizona (fig. 213). A single specimen also is known from Albuquerque, New Mexico. We have examined several specimens that were collected on *Chaenactis*, and Knight (1968) reported the type and paratypes of *stitti* from the same host. Knight (1969) gave *Abronia* sp. as the host plant of the type and paratypes of *tinctus*.

SPECIMENS EXAMINED: 77 specimens collected from March 24 to June 1. UNITED STATES: Arizona: Coconino Co., Bright An-

gel Crk., Grand Cyn. Nat'l. Pk. Maricopa Co., Gila Bend; Phoenix; Tempe. Pima Co., Ajo; The Alamo, Ajo Mts. (all USNM); Tucson (CAS). Yuma Co., Dome (UCR); Mohawk (USNM); Yuma Co. (CNC, USNM). California: Imperial Co., 10.7 mi W of Glamis (UCR). Kern Co., Red Rock Cyn. (CAS). Los Angeles Co., (USNM). Riverside Co., P. L. Boyd Desert Research Center, 3.5 mi S of Palm Desert, Coyote Crk (UCR); Deep Cyn. (UCR). San Bernardino Co., 14 mi S of Amboy (UCB); Amboy lava flow (CAS). Nevada: Nye Co., Nevada Atomic Test Site, Rock Valley on Jackass Flats Rd. (A25), 3300 ft (AMNH). New Mexico: Bernalillo Co., Albuquerque (USNM).

Pseudopsallus viridicans (Knight),
new combination

Figures 25, 55, 56, 204–210, 218

Bifidunglus viridicans Knight, 1930, pp. 1–2 (new species). Carvalho, 1952, p. 75; 1958, p. 40 (catalog).

DIAGNOSIS: This species is recognized by its small size (length: males, 3.70–4.30; females, 3.80–4.40); green or yellowish green cast on the pronotal disk; strongly curved tarsal claw with large, angulate base (figs. 55, 56); and males with three tergal processes (figs. 204, 205). Female macropterous.

DESCRIPTION OF MALE GENITALIA: Single RP short and smooth, rounded and with pointed apex; pair of left tergal processes, confluent at base; LL flattened, uniformly thick, distal fourth strongly serrate and tapering to pointed apex; LM thickest basally, tapering distally to recurved, slightly expanded and serrate apex. Right paramere: MIF deeply notched with strongly serrate proximal and dorsal humps; proximal hump giving rise to dorsally directed, strongly serrate ridge with dorsal height equal to that of DP; DLR projecting above MIF; DP both strongly produced and serrate. Left paramere: DLL cone-shaped with strongly protruding recurved serrate apex; LAL broad basally, rapidly tapering to narrow, minutely serrate distal portion, with bluntly rounded and slightly notched apex. Vesica. DS small, flattened with strong marginal serrations, pointed apex; RVS long, narrow, flattened, and strongly serrate distally; LVS long and

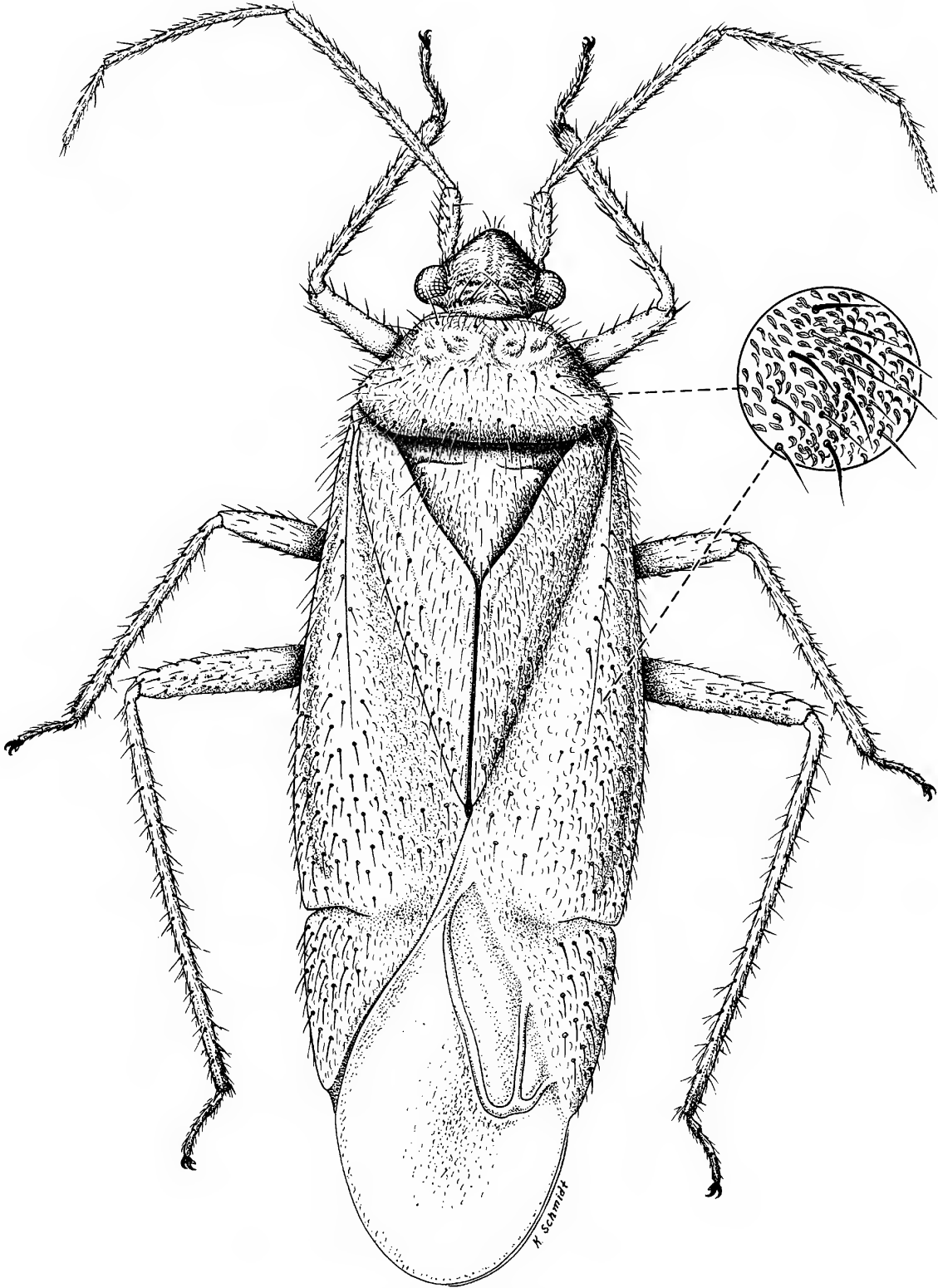


Fig. 1. *Pseudopsallus lattini*, dorsal habitus ♂.

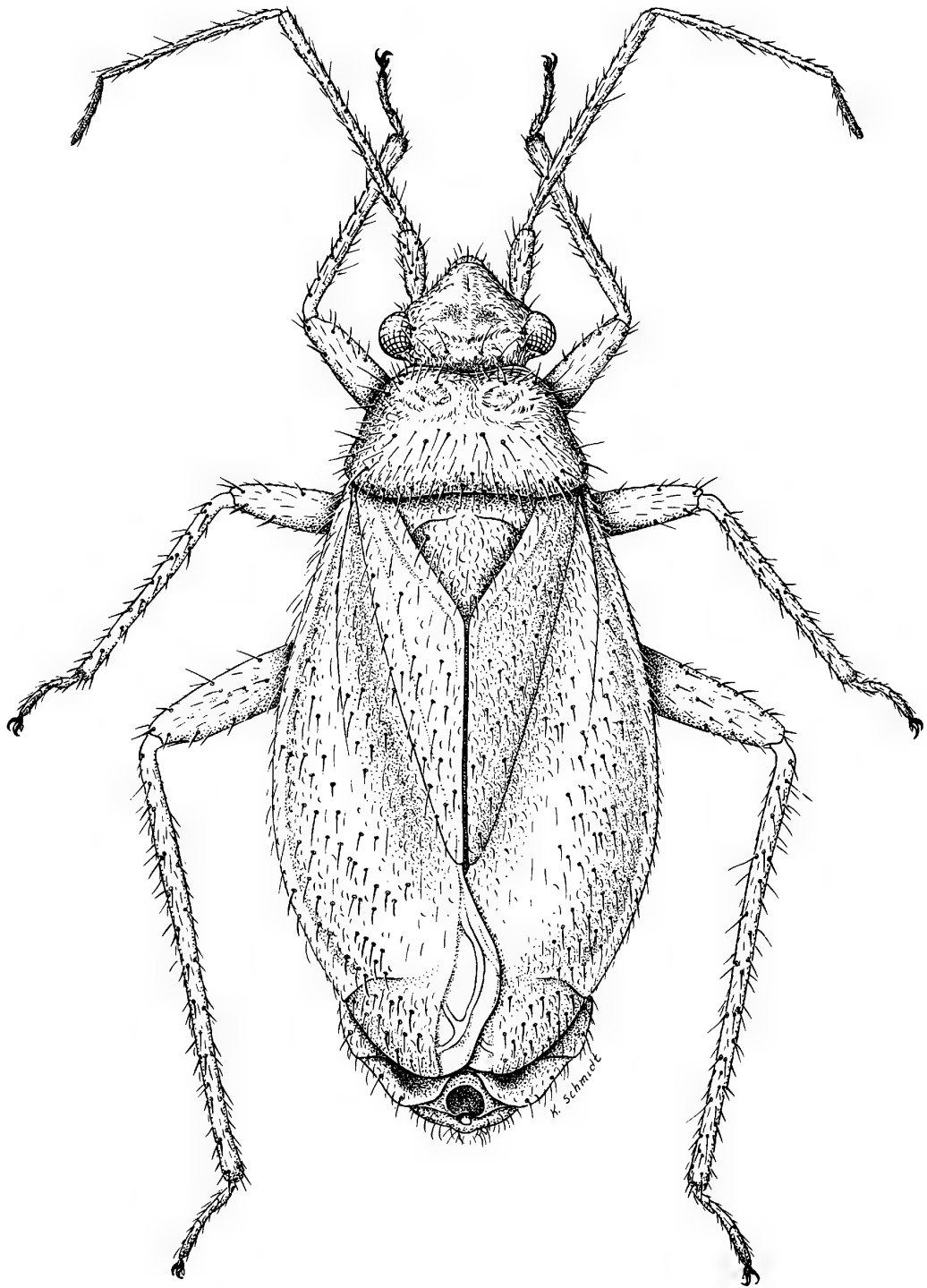
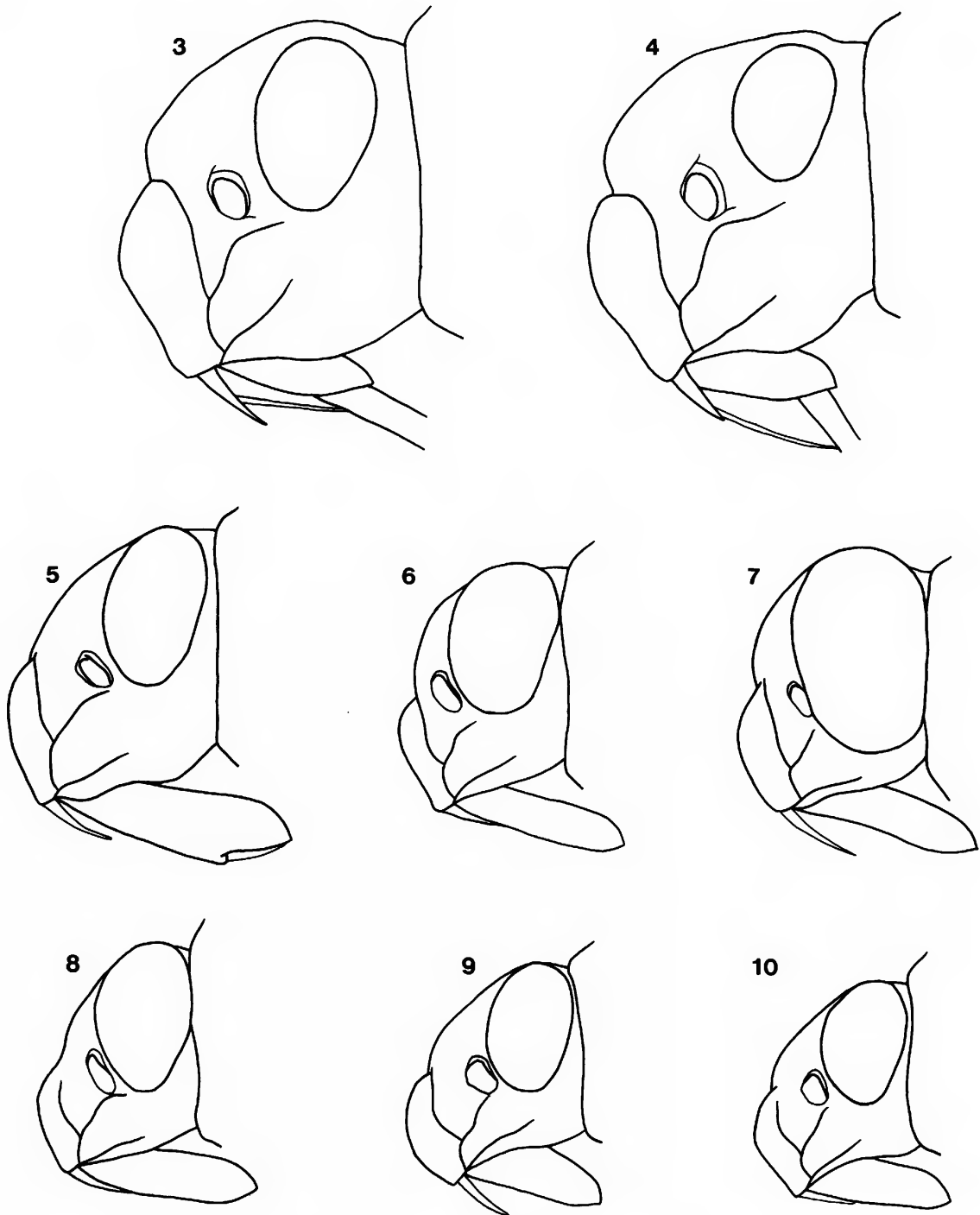
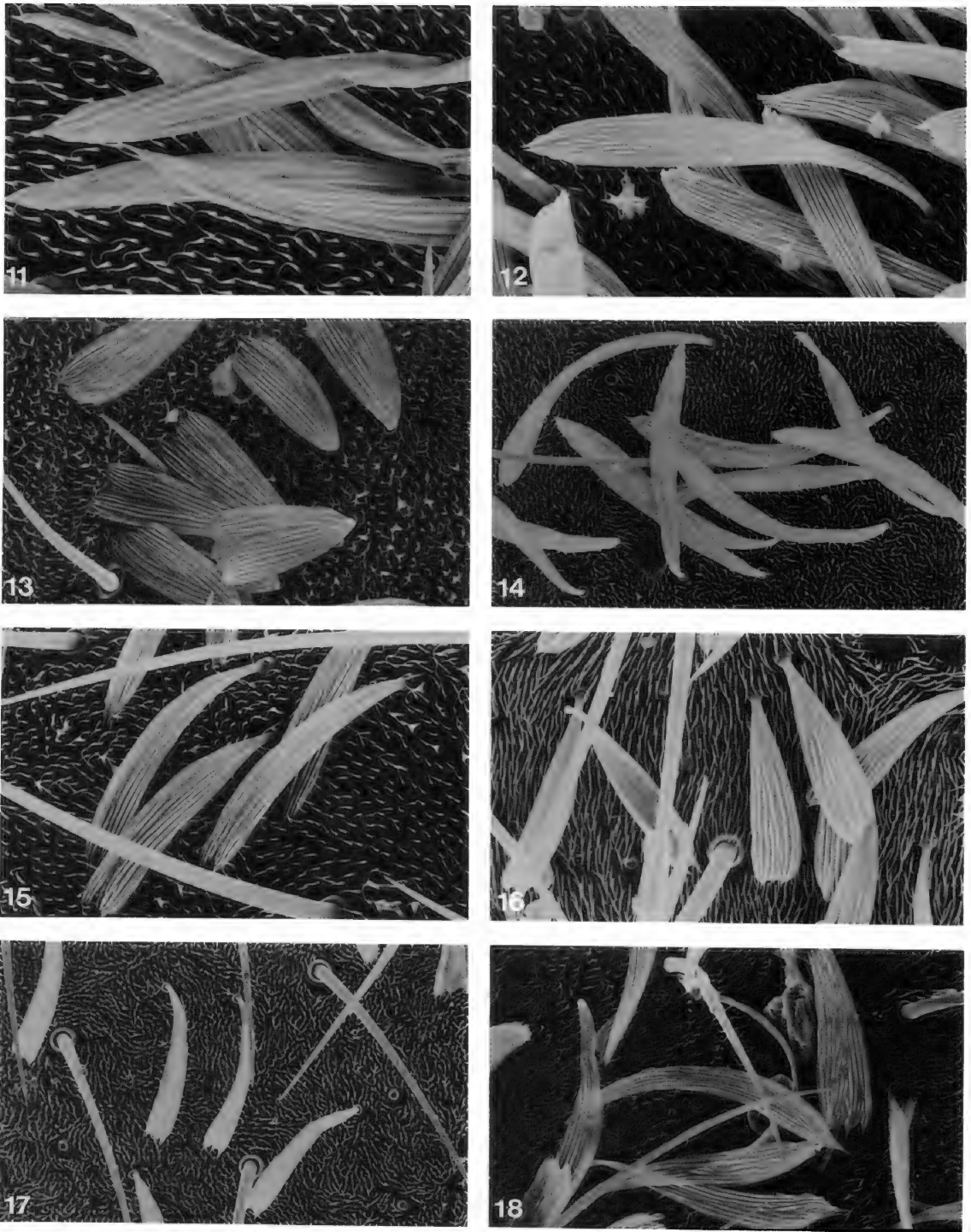


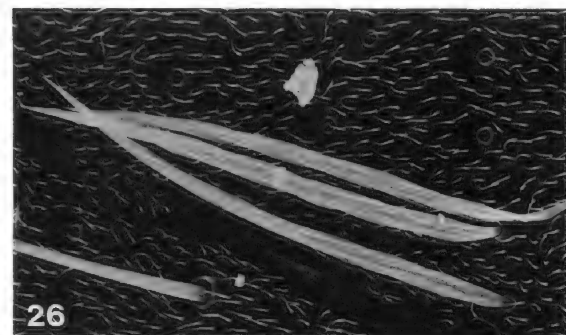
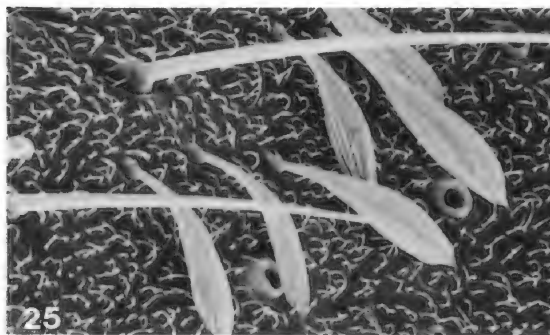
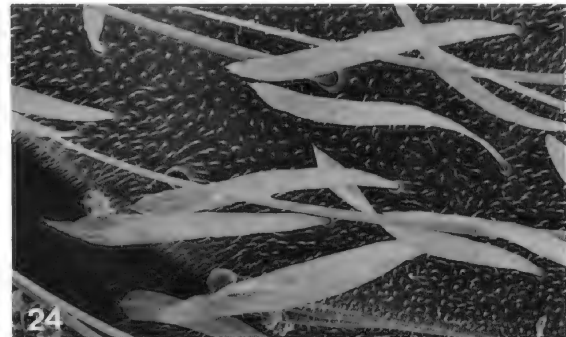
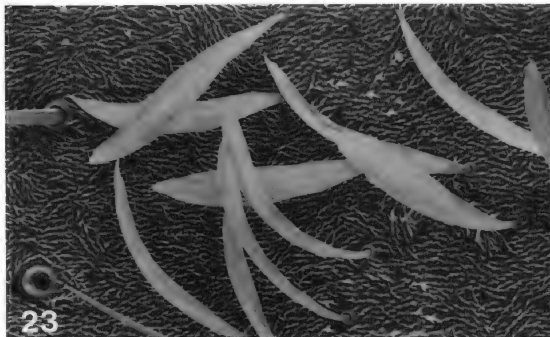
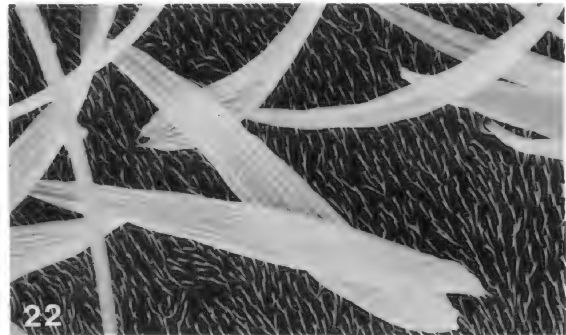
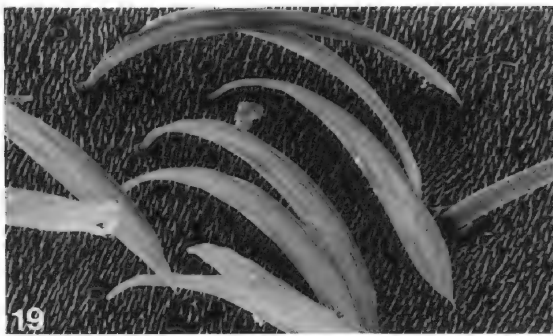
Fig. 2. *Pseudopsallus lattini*, dorsal habitus ♀.



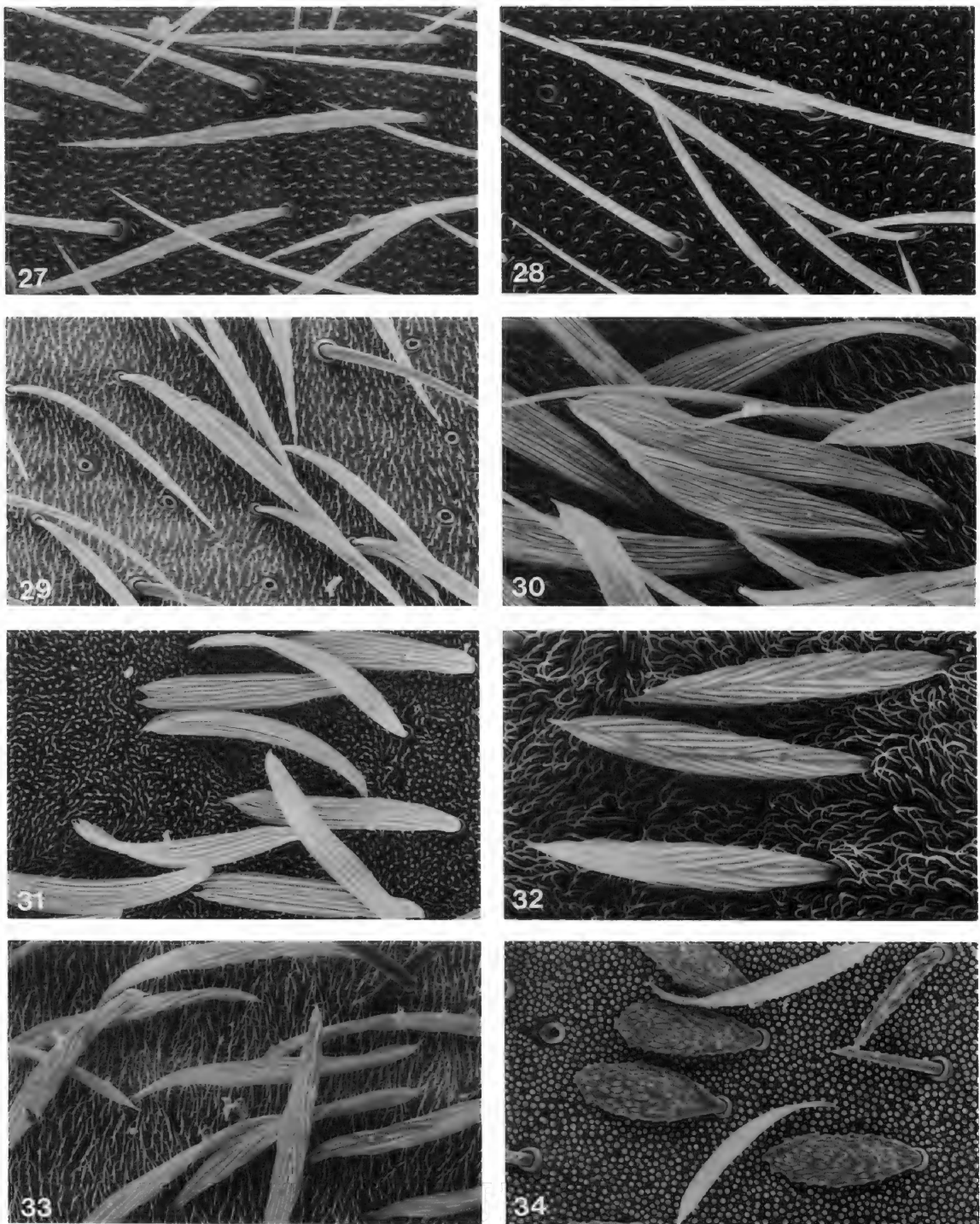
Figs. 3-10. Lateral view of head of *Pseudopsallus* species. 3. *major* ♀. 4. *lattini* ♀. 5. *mojaviensis* ♂. 6. *artemiscicola* ♂. 7. *stitti* ♂. 8. *anograe* ♀. 9. *occidentalis* ♀. 10. *presidio* ♀.



Figs. 11–18. Scale-like setae of *Pseudopsallus* species. 11. *abroniae*. 12. *angularis*. 13. *anograe*. 14. *atriseta*. 15. *demensus* (narrow from hemelytra). 16. *demensus* (broad from pronotum). 17. *hixsoni*. 18. *major*.



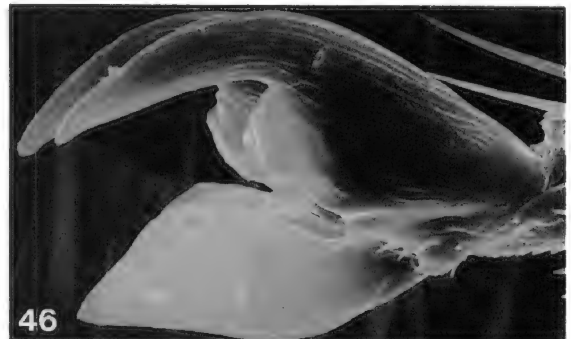
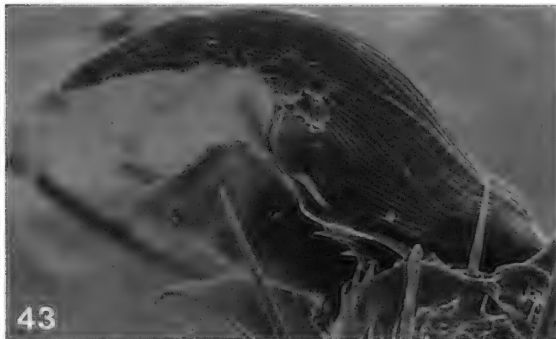
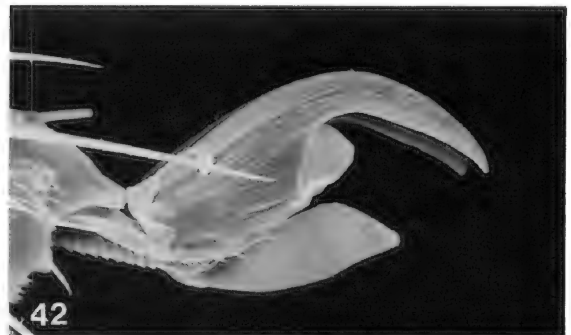
Figs. 19–26. Scale-like setae. 19–25. *Pseudopsallus* species. 19. *mojaviensis* (narrow from hemelytra). 20. *mojaviensis* (broad from pronotum). 21. *puberus*. 22. *repertus*. 23. *sericatus*. 24. *stitti*. 25. *viridicans*. 26. *Dichaetocoris pinicola*.



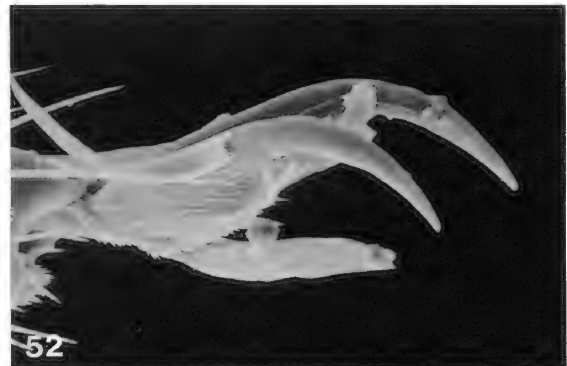
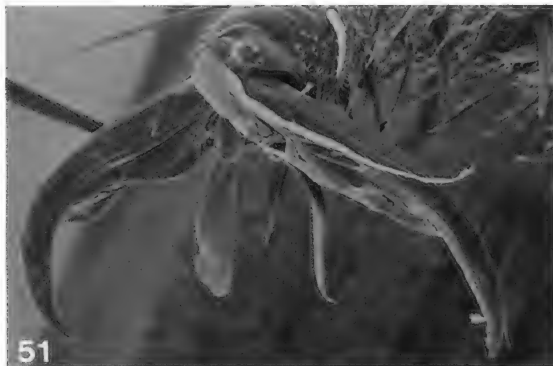
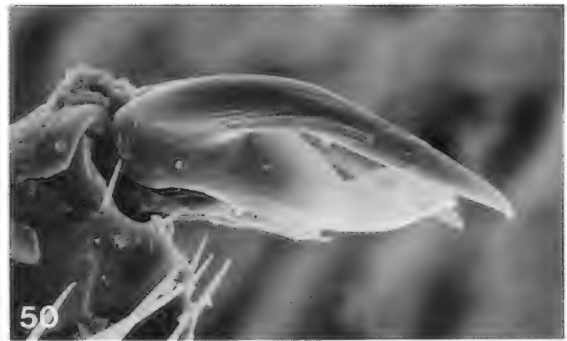
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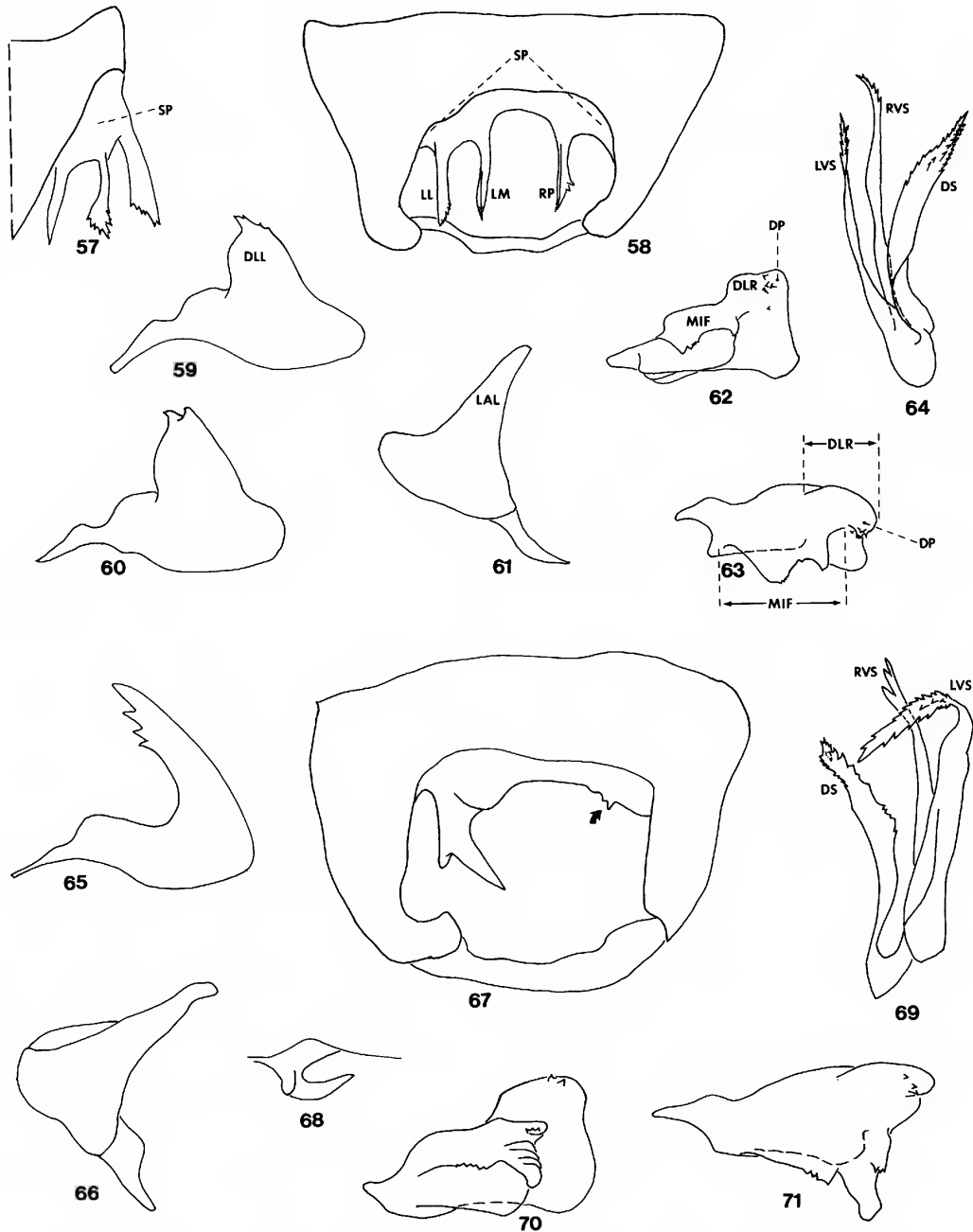
Figs. 35–40. Pretarsal structures of *Pseudopsallus* species. 35, 36. *abroniae*. 37. *angularis*. 38. *anograe*. 39, 40. *atriseta*.



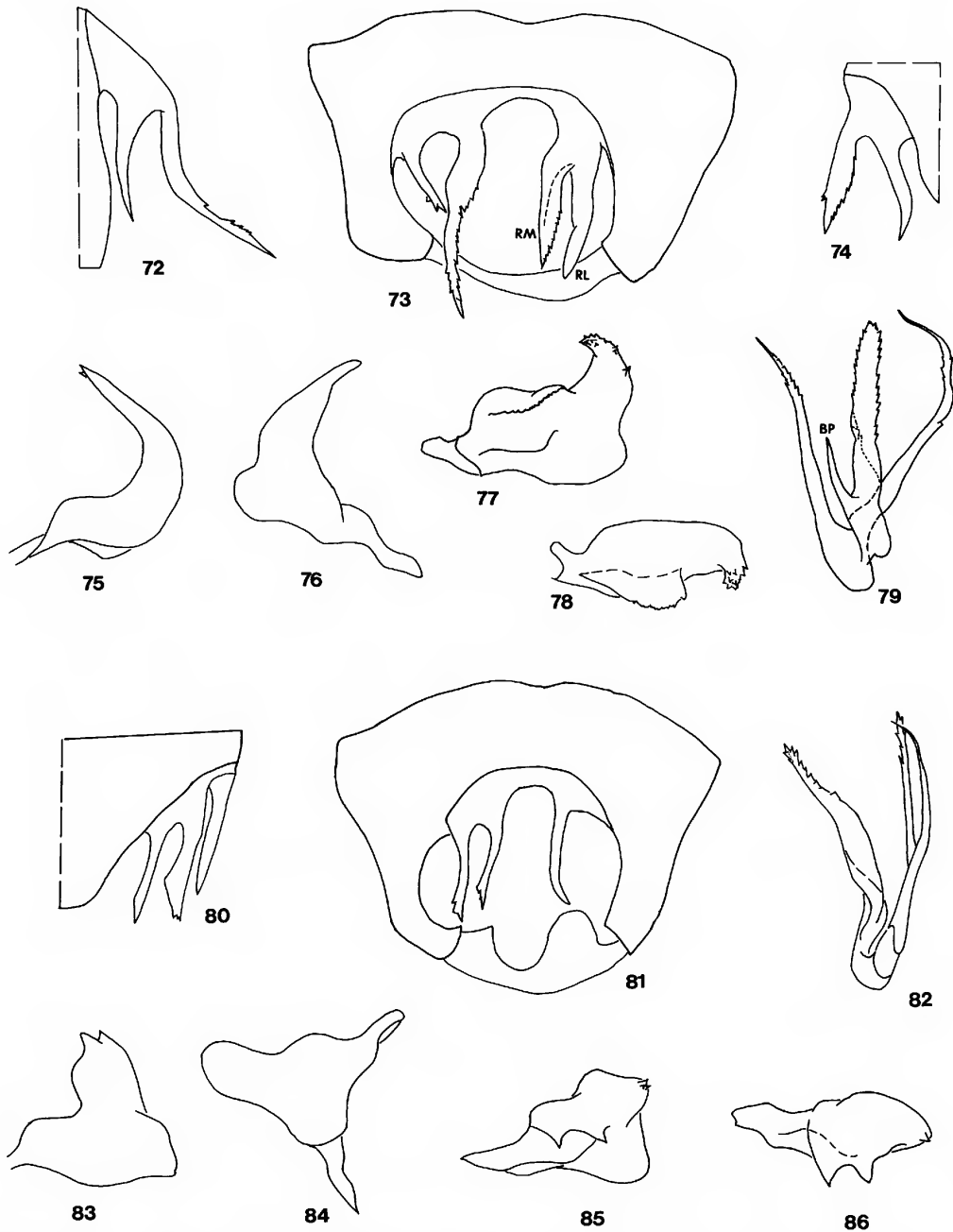
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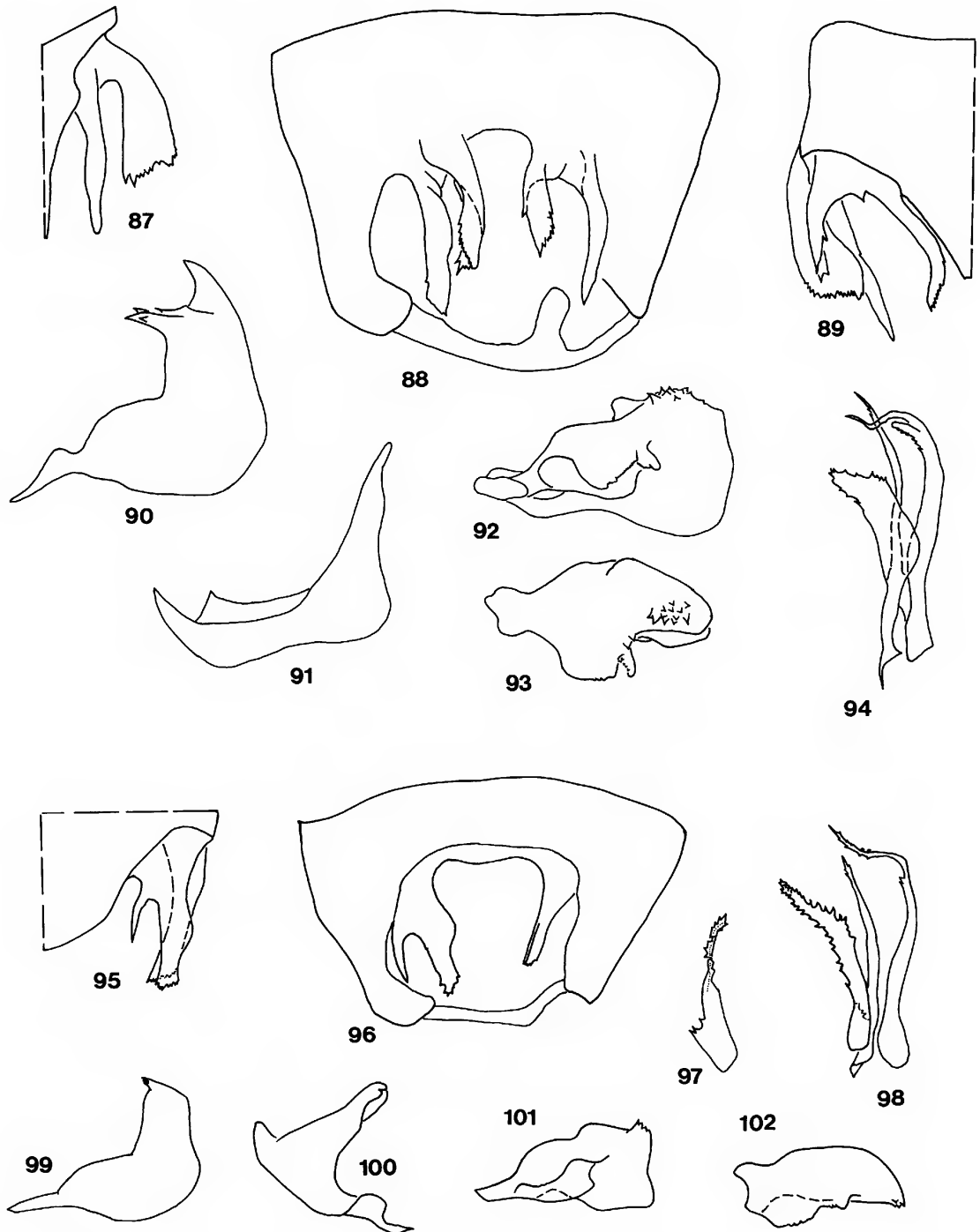
Figs. 49–56. Pretarsal structures of *Pseudopsallus* species. 49, 50. *puberus*. 51. *sericatus*. 52. *repertus*. 53, 54. *stitti*. 55, 56. *viridicans*.



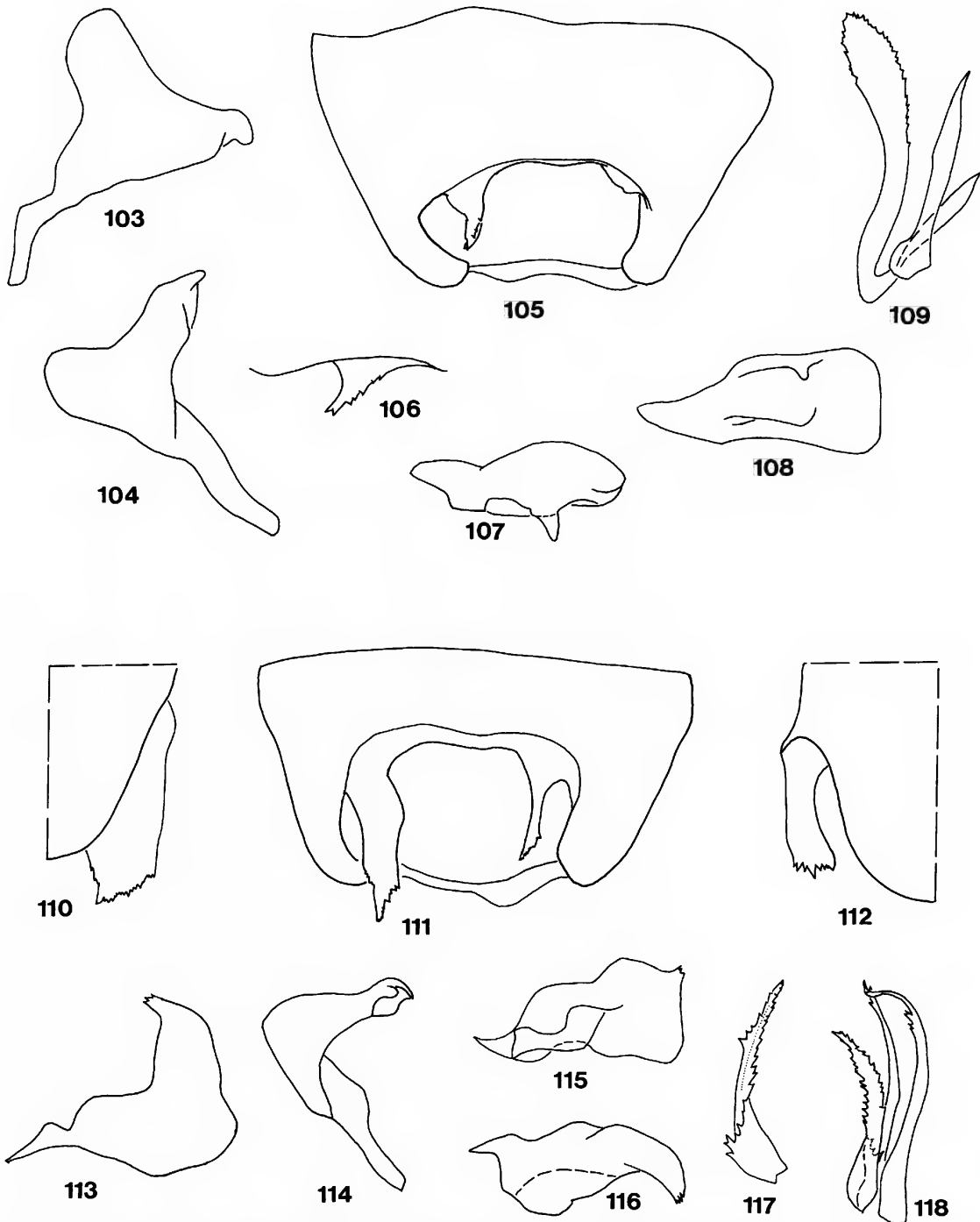
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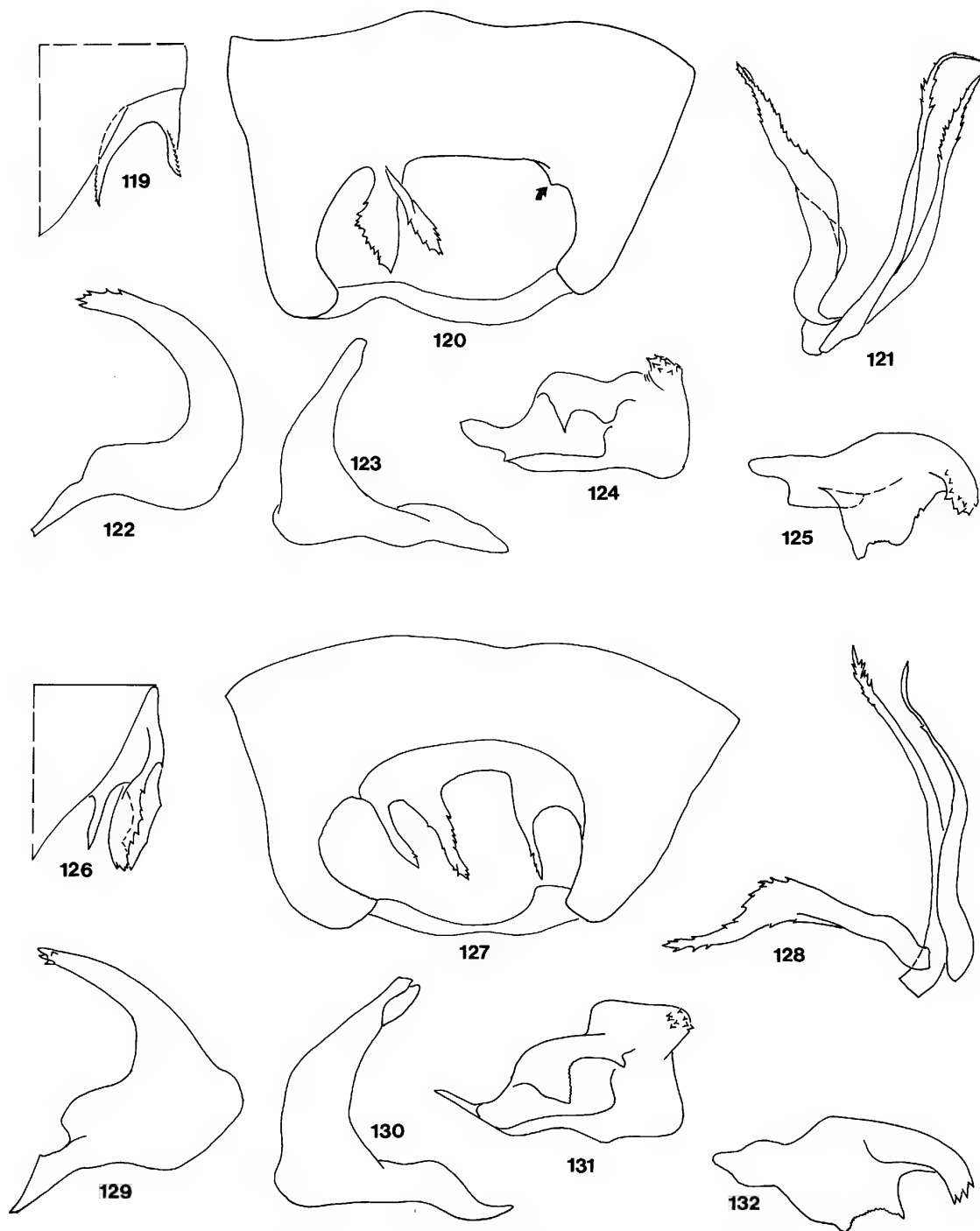
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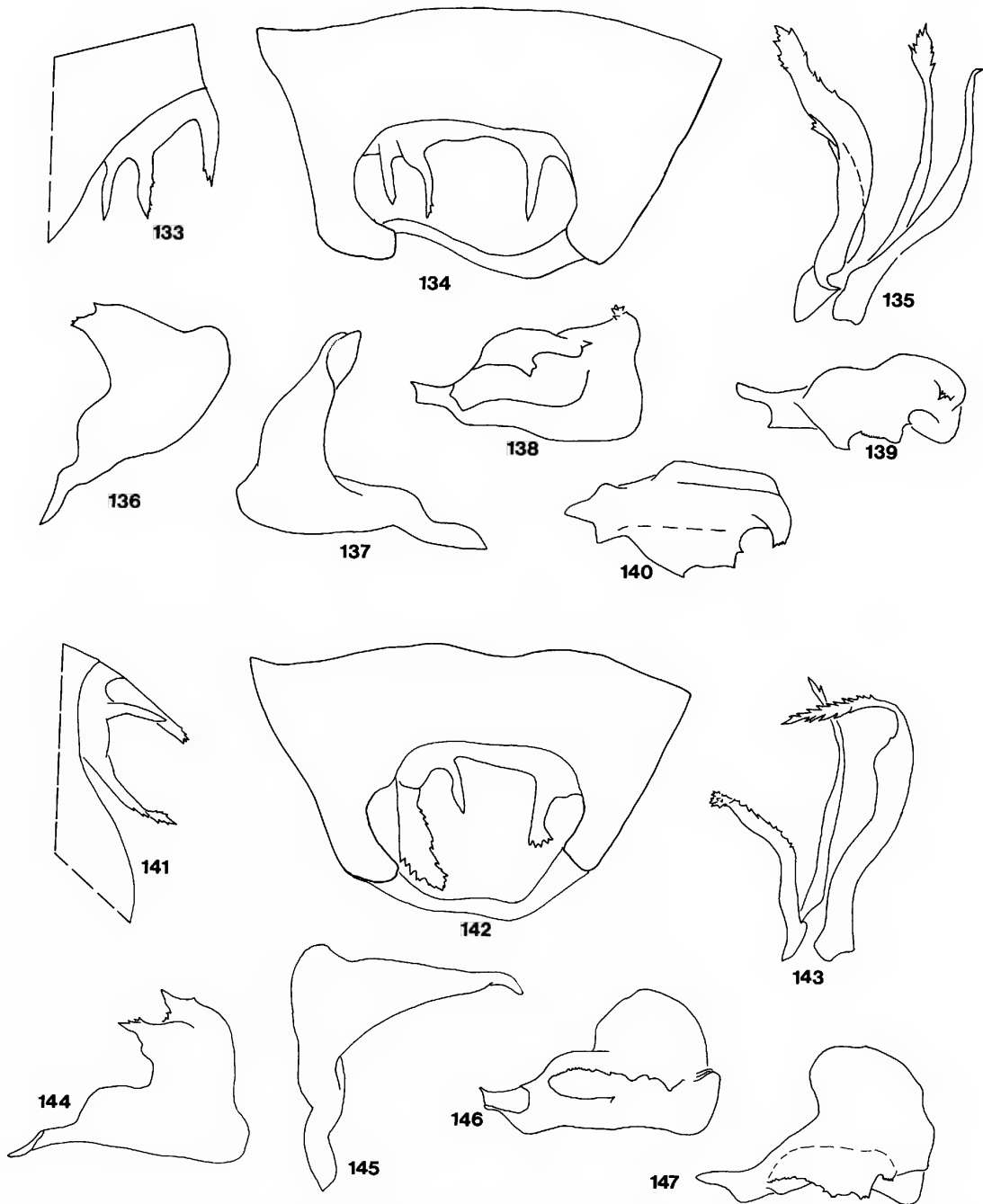
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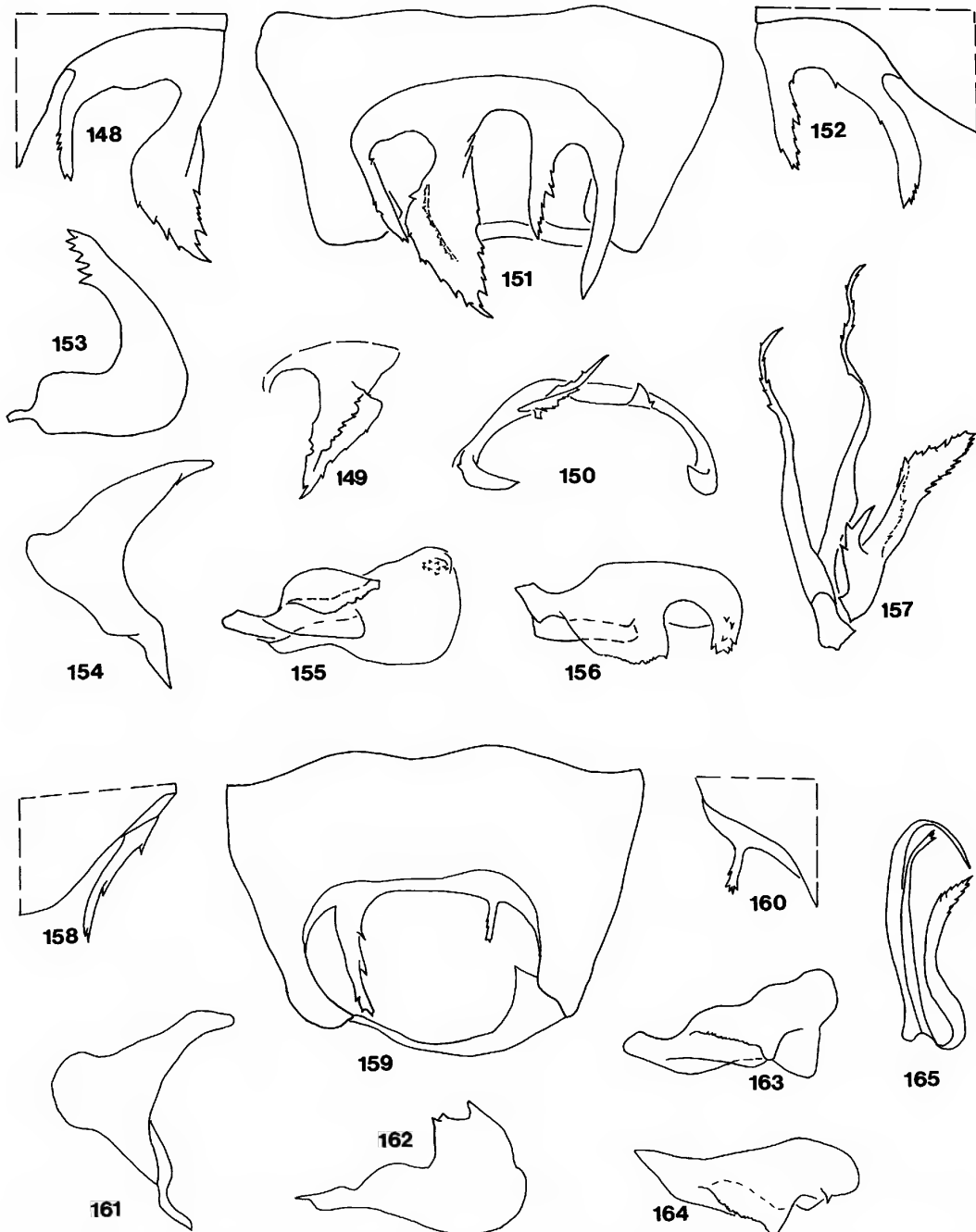
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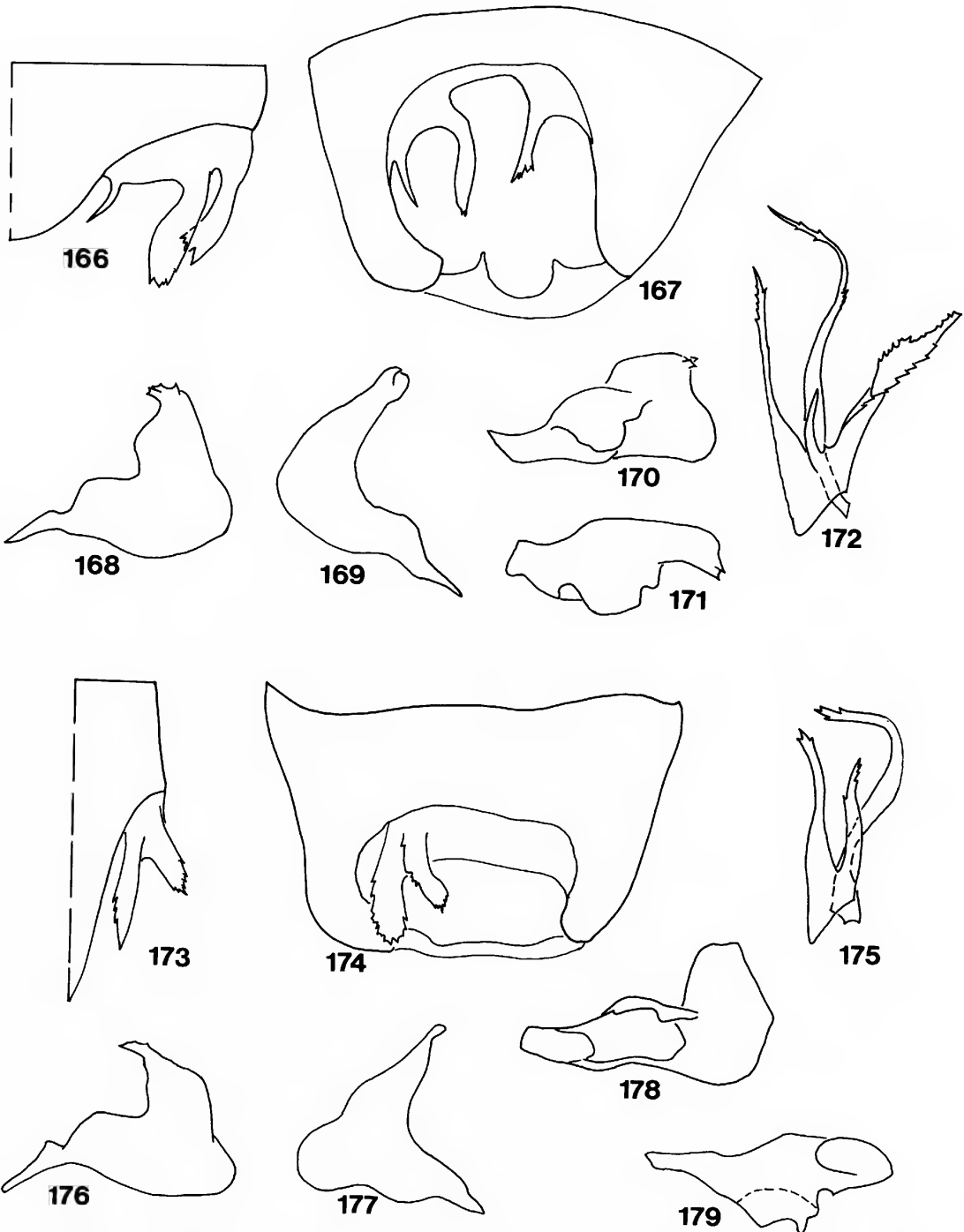
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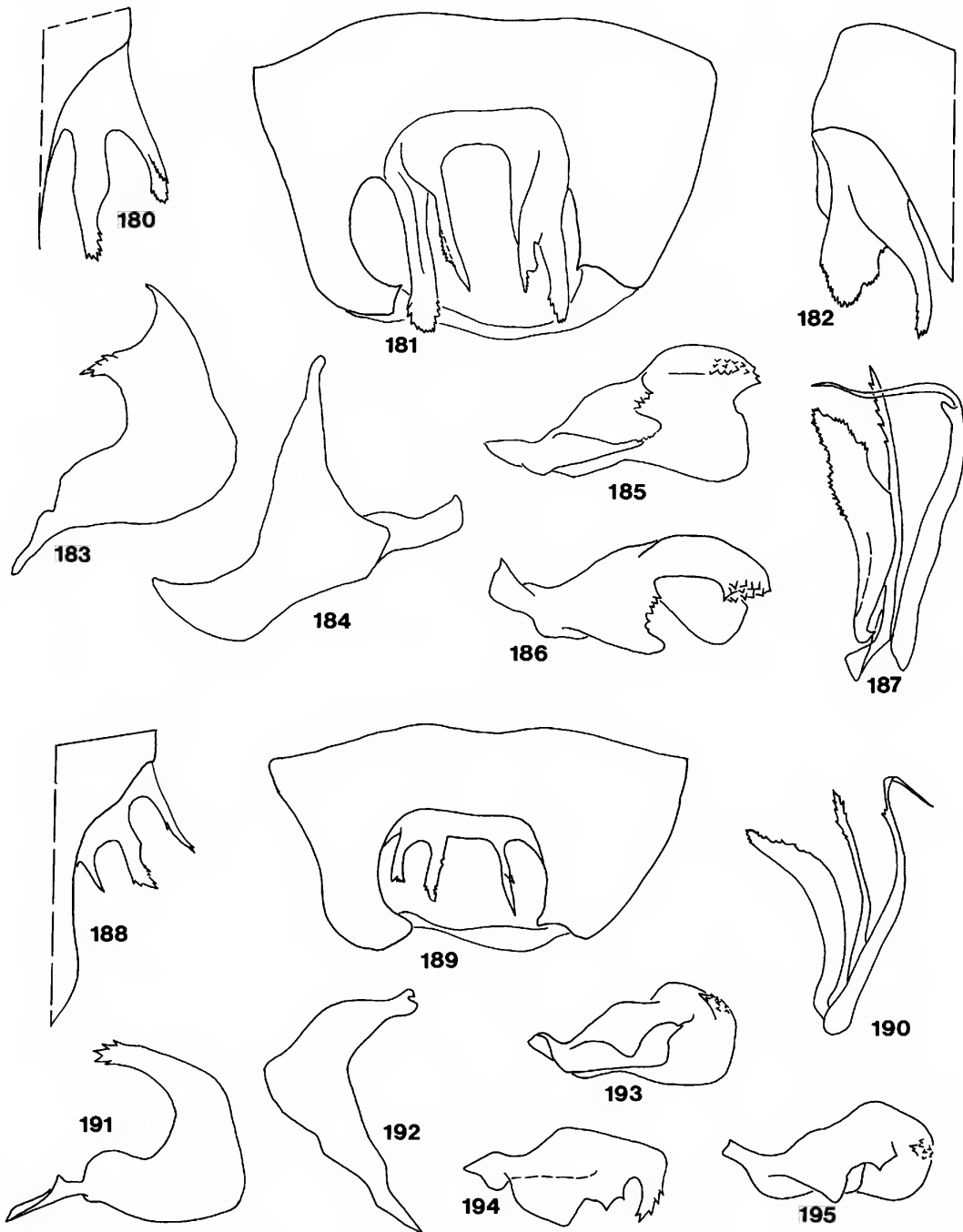
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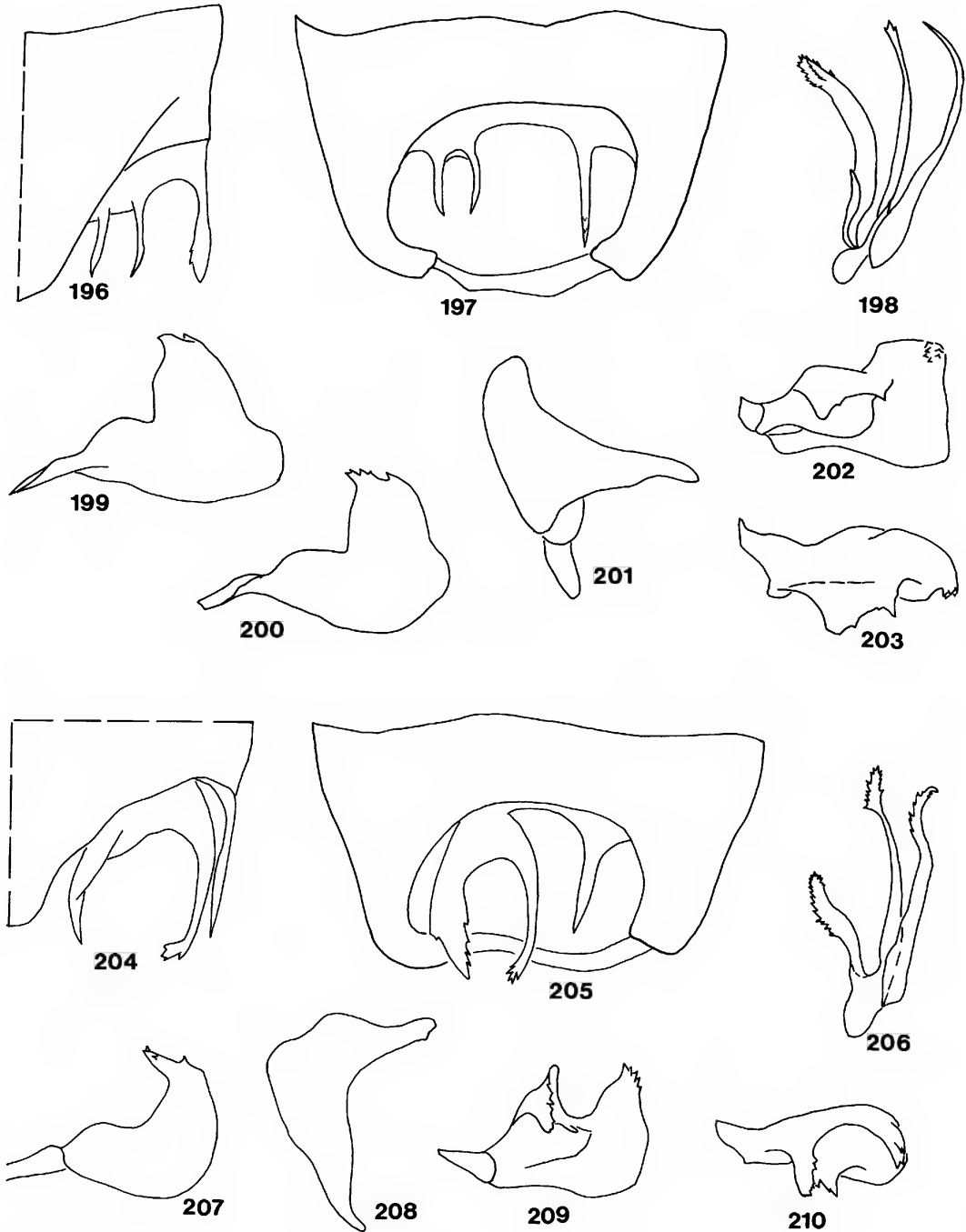
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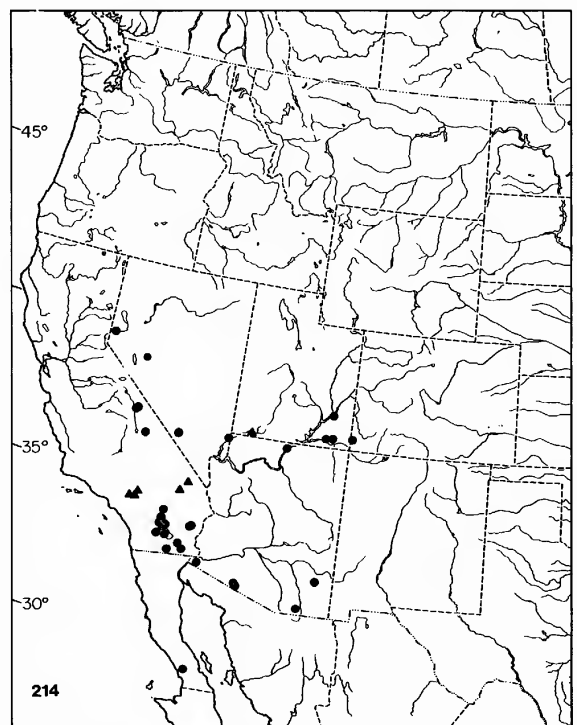
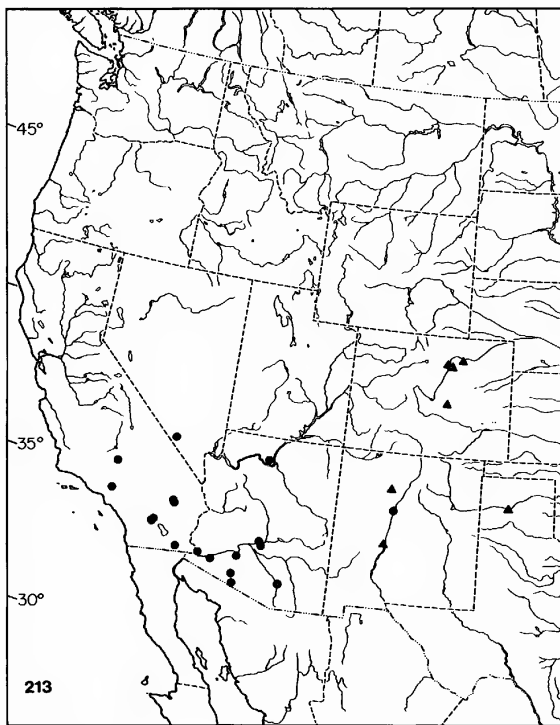
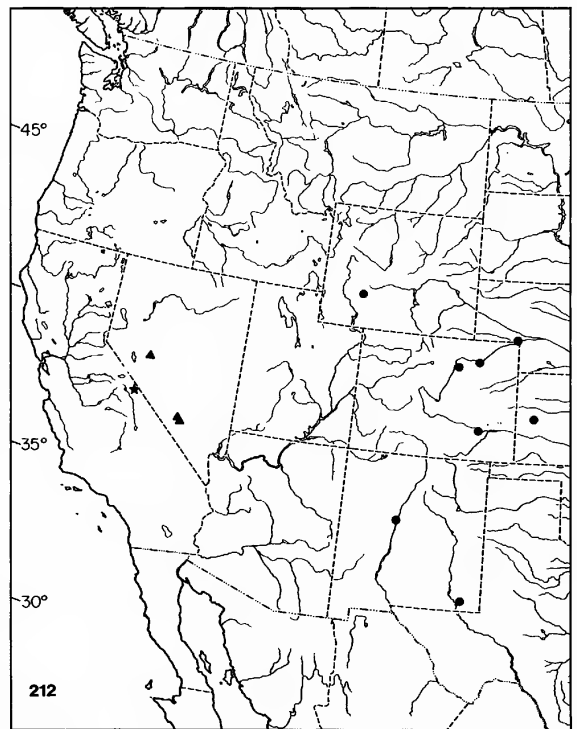
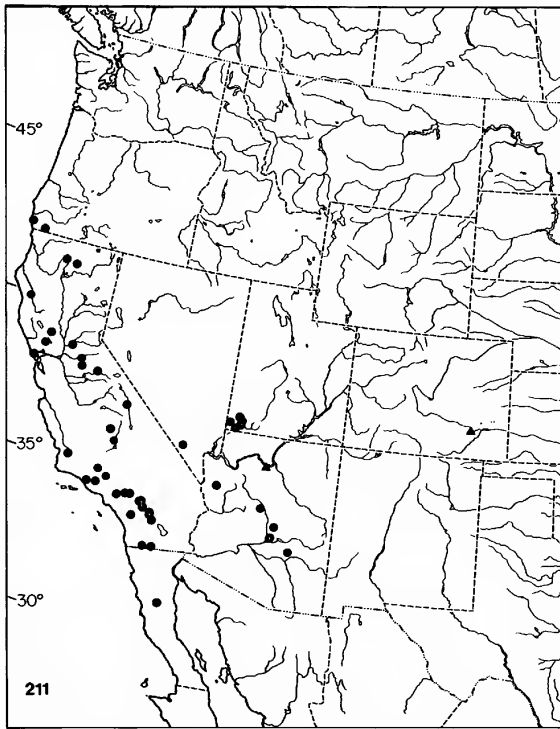
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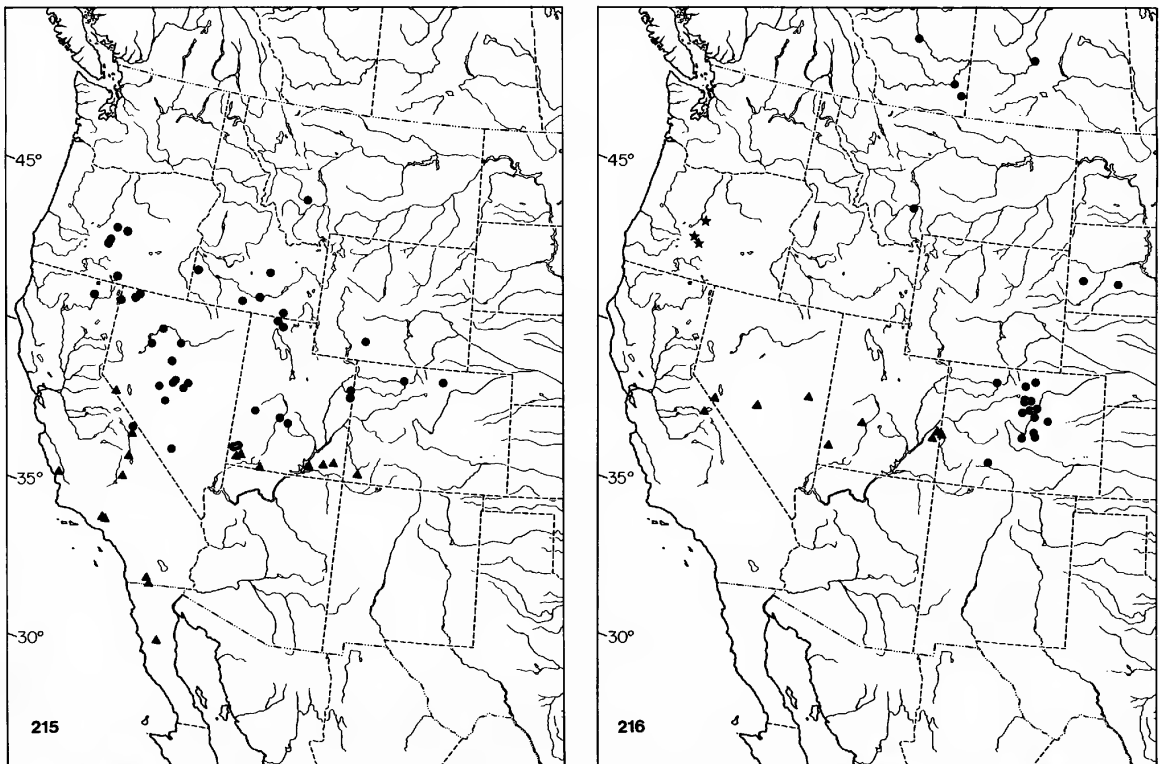
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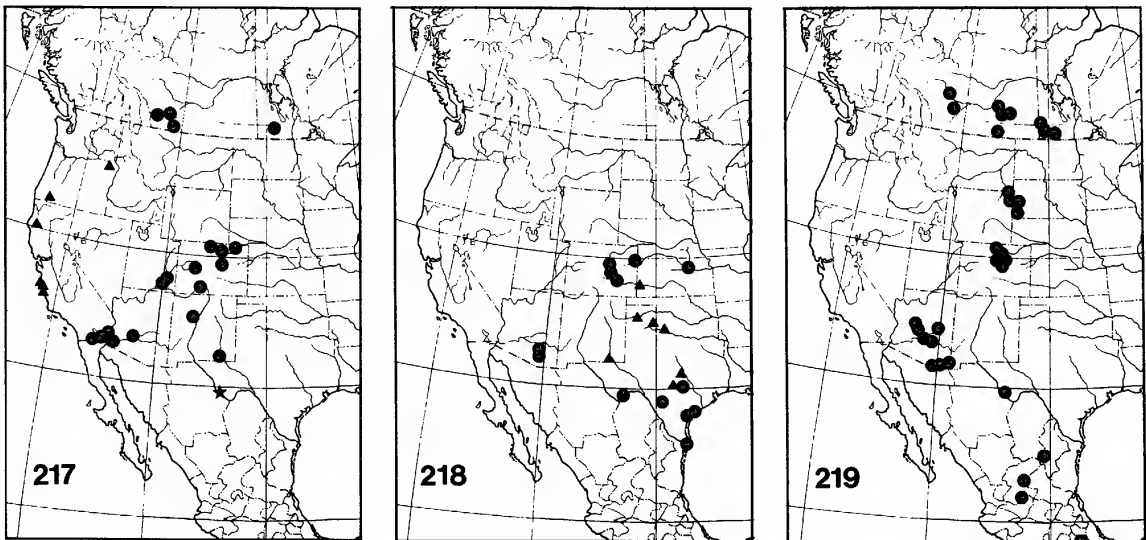
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Figs. 211–214. Distribution of nine *Pseudopsallus* species. 211. ● *angularis*. ▲ *lajuntae*. 212. ● *artemisicola*. ★ *enceliae*. ▲ *plagiatus*. 213. ▲ *abroniae*. ● *stitti*. 214. ▲ *mojaviensis*. ● *puberulus*.



Figs. 215–216. Distribution of five *Pseudopsallus* species. 215. ▲ *atriseta*. ● *repertus*. 216. ★ *lattini*. ▲ *major*. ● *sericatus*.



Figs. 217–219. Distribution of six *Pseudopsallus* species. 217. ● *anograe*. ★ *presidio*. ▲ *occidentalis*. 218. ▲ *hixsoni*. ● *viridicans*. 219. ● *demensus*.

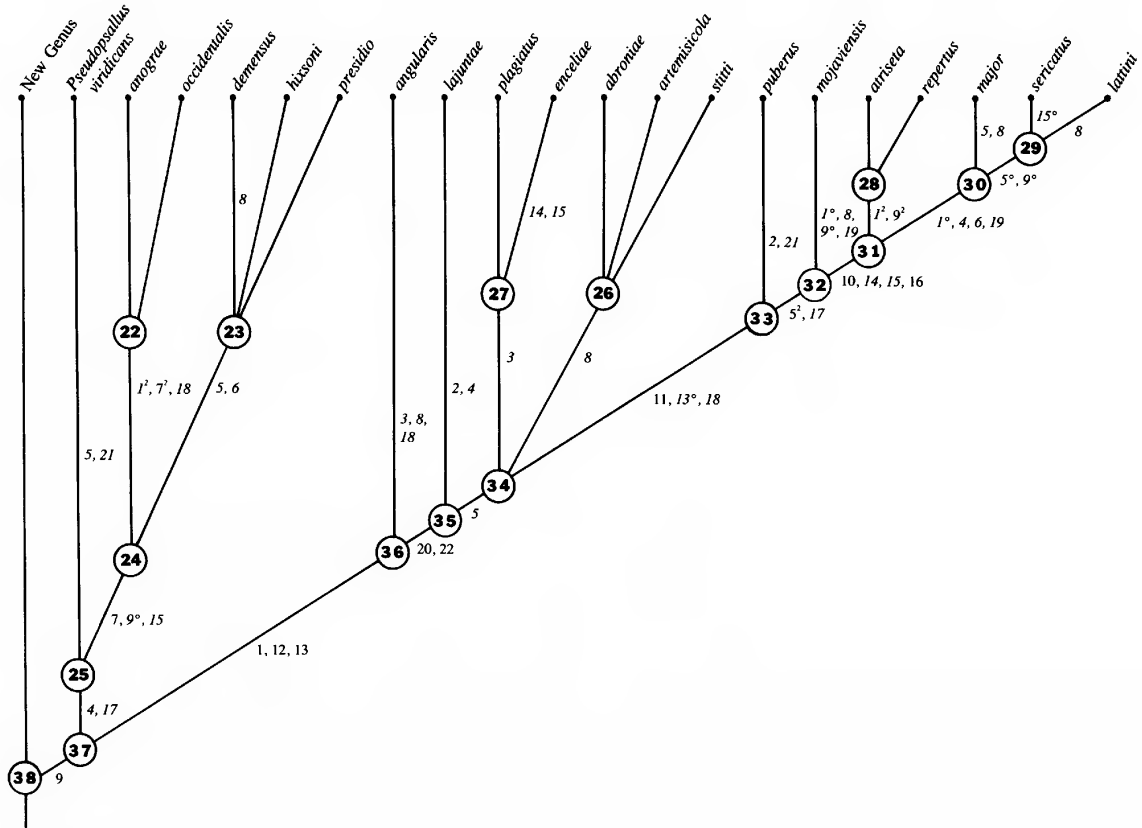


Fig. 220. Cladogram of *Pseudopsallus* species based on table 1. Nodes denoted by bold numbers; consistent characters in roman numbers, homoplasious characters in italics (parallelism) and italics with degree symbol (reversal).

narrow, distal third flattened and curved with strong marginal serrations on convex portion of curve.

TYPE: HOLOTYPE ♂: **Colorado**, Yuma Co., Wray, August 4, 1925, H. H. Knight (USNM).

DISCUSSION: *Pseudopsallus viridicans* is distributed in prairie regions east of the Rocky Mountains from central Colorado, east to Riley Co., Kansas, and Calhoun Co., Texas, and south to Matamoros, on the Gulf Coast of Mexico; a disjunct population occurs in Pima Co., Arizona (fig. 218). Knight (1930) reported this species from Port Lavaca, Texas on *Gaura parviflora* Dougl.

SPECIMENS EXAMINED: 142 specimens collected from April 22 to August 18. MEXICO: **Tamaulipas**: Matamoros (USNM). UNITED STATES: **Arizona**: Pima Co., Arivaca Crk., Arivaca (CAS); Tucson (AMNH). **Colorado**: Douglas Co., Chatfield St. Pk., (cl. 854). *El*

Paso Co., Security at I-25. *Pueblo Co.*, Pueblo, (cl. 862) (all JTP). **Yuma Co.**, Wray. **Kansas**: Riley Co., Riley. **Texas**: Brewster Co., Castolon, Big Bend Nat'l Pk. Calhoun Co., Port Lavaca. San Patricio Co., 1 mi W of Sinton on Rt. 77 (all USNM). Uvalde Co., 4 mi E Knippa (TAM). Williamson Co., Taylor (USNM).

PHYLOGENETIC ANALYSIS

Our analysis was performed using the cladistic computer package PHYSYS[®] which allowed us to investigate the consistency of characters and determine the most parsimonious classification for the data. The data set used to determine the species phylogeny contains these characters: male genitalia—tergal processes (3 characters), right paramere (1 character), left paramere (2 characters), vesica (3 characters); head (6 characters); ves-

TABLE 1
Description of Characters¹

TERGAL PROCESSES	HEAD
1. 0(3), 2. 0(1), 3. 0(1)—three tergal processes; one right, two left (lateral with length greater than length of medial).	10. 0(1)—subovate in lateral view. 1(1)—subquadrate in lateral view.
1. 1(1), 2. 0(1), 3. 0(1)—three tergal processes; one right, two left (lateral and medial of equal length).	11. 0(1)—gula and lora narrow. 1(1)—gula and lora wide.
1. 1(1), 2. 0(1), 3. 1(2)—two tergal processes (one left, one right).	12. 0(1)—frons flat or weakly convex. 1(1)—frons moderately to strongly convex and rounded.
1. 1(1), 2. 1(2), 3. 0(1)—two tergal processes (two left confluent and oblique to long axis of body).	13. 0(2)—head, anterior of eye, long (height of head less than or equal to length of head). 1(1)—head, anterior of eye, short (height of head greater than length of head).
1. 2(2), 2. 0(1), 3. 0(1)—four tergal processes (two left, two right).	14. 0(1)—labial segment one reaching beyond posterior margin of head. 1(2)—labial segment one reaching to posterior margin of head only.
RIGHT PARAMERE	15. 0(2)—labium reaching to between mesocoxae or beyond. 1(3)—labium reaching to apex of mesosternum or slightly beyond.
4. 0(1)—distal portion of dorsal lobe, in dorsal view, small not projecting beyond body of paramere. 1(3)—distal portion of dorsal lobe, in dorsal view, large projecting beyond body of paramere.	VESTITURE
LEFT PARAMERE	16. 0(1)—dorsum with one type of simple setae (pale or dark, fine or bristle-like). 1(1)—dorsum with two types of simple setae (1, dark bristle-like; 2, pale fine).
5. 0(2)—dorsal lobe long, tapering with several apical or subapical spines. 1(4)—dorsal lobe short, with one or two small apical spines. 2(1)—dorsal lobe short, with two large spines, one apical and one subapical.	17. 0(1)—simple setae short. 1(2)—simple setae long.
6. 0(1)—apical portion of lateral lobe evenly rounded or slightly flattened. 1(2)—apical portion of lateral lobe excavated and notched.	18. 0(1)—simple setae—pale to golden brown. 1(3)—simple setae—dark brown to black, (bristle-like).
VESICA	FEMALE WING CONDITION
7. 0(1)—dorsal spicula with simple non-serrate flange on interior marginal surface only, or without marginal interior flange. 1(1)—dorsal spicula with small serrations on basal portion of interior marginal flange. 2(1)—dorsal spicula with large spine on basal portion of interior marginal flange.	19. 0(1)—macropterous or submacropterous. 1(2)—brachypterous.
8. 0(1)—only apical margin of dorsal spicula with small serrations. 1(6)—apical surfaces as well as margin of dorsal spicula with small serrations.	PRETARSUS
9. 0(4)—base of recurved distal portion of left ventral spicula differentiated with small accessory spines. 1(1)—base of recurved distal portion of left ventral spicula undifferentiated, without accessory spines. 2(1)—base of recurved distal portion of left ventral spicula differentiated, with large accessory spines.	20. 0(1)—claws short and strongly curved, (broad distally). 1(1)—claws long and weakly to moderately curved, (narrow distally). 21. 0(1)—claw base slightly to moderately produced. 1(2)—claw base greatly produced, claw appearing deeply cleft. 22. 0(1)—parempodia broad basally and usually broad throughout entire length. 1(1)—parempodia narrow basally and usually narrow throughout entire length.

¹Numbers in bold are coded characters (top row of table 2); following numbers are character states (in body of table 2); numbers in parentheses indicate number of origins of the character state on the cladogram.

titure (3 characters); female wing condition (1 character); pretarsus (3 characters). Descriptions of the characters are presented in table 1; the number in parentheses after the

character state indicates the number of origins on the cladogram. The reason for using a species of the new genus from Mexico as the outgroup to establish the polarity of the char-

TABLE 2
Character Matrix for *Pseudopsallus* Processed by PHYSYS®

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
<i>abroniae</i>	1	0	0	0	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	1	0	1
<i>angularis</i>	1	0	1	0	0	0	0	1	1	0	0	1	1	0	0	0	0	1	0	0	0	0
<i>anograe</i>	2	0	0	1	0	0	2	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0
<i>artemisicola</i>	1	0	0	0	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	1	0	1
<i>atriseta</i>	2	0	0	0	2	0	0	0	2	1	1	1	0	1	1	1	1	1	0	1	0	1
<i>demensus</i>	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0
<i>enceliae</i>	1	0	1	0	1	0	0	0	1	0	0	1	1	1	1	0	0	0	0	1	0	1
<i>hixsoni</i>	0	0	0	1	1	1	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
<i>lajuntae</i>	1	1	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	0	1
<i>lattini</i>	0	0	0	1	0	1	0	1	0	1	1	1	0	1	1	1	1	1	1	1	0	1
<i>major</i>	0	0	0	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1
<i>mojaviensis</i>	0	0	0	0	2	0	0	1	0	0	1	1	0	0	0	0	1	1	1	1	0	1
<i>occidentalis</i>	2	0	0	1	0	0	2	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0
<i>plagiatus</i>	1	0	1	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	1	0	1
<i>presidio</i>	0	0	0	1	1	1	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
<i>puberus</i>	1	1	0	0	1	0	0	0	1	0	1	1	0	0	0	0	0	1	0	1	1	1
<i>repertus</i>	2	0	0	0	2	0	0	0	2	1	1	1	0	1	1	1	1	1	0	1	0	1
<i>sericatus</i>	0	0	0	1	0	1	0	0	0	1	1	1	0	1	0	1	1	1	1	1	0	1
<i>stitti</i>	1	0	0	0	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	1	0	1
<i>viridicans</i>	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0
New Genus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

acters in the phylogeny of *Pseudopsallus* is based on our determination that the two genera form a monophyletic group sharing apomorphic characters (see Introduction). However, because the relationships within the Orthotylini are poorly known and our preliminary investigation of these relationships was limited in scope, we did not feel that extending the search for character polarity beyond the immediate monophyletic group was justified. Thus, the condition of each character as found in the new genus was arbitrarily assumed to be the '0' state, and those species of *Pseudopsallus* with a similar condition were also coded as '0'. Species of *Pseudopsallus* with an alternate condition from that found in the new genus were coded as the '1' state (or '1' and '2' for multistate characters). The character coding of the five types of tergal processes is a combination of multistate and binary codes and in the analysis yields a tree length of 10 steps for the characters 1 and 3 combined. This is the same length that would result from coding the tergal process types as five presence/absence

characters. We chose the former method of coding on the basis of outgroup comparison with the new genus from Mexico, which has three tergal processes (with one right, two left with the lateral longer than the medial, or the plesiomorphic condition of 1-0, 2-0, 3-0). The analysis of the characters in table 2 revealed one minimal length tree of 57 steps with a consistency index of 47.37 (fig. 220).

As discussed in the Introduction, the synonymy between the nominal genera *Bifidungulus*, *Hesperocapsus*, and *Pseudopsallus* is supported by the form of the male genitalia and fine structure of the scale-like setae on the dorsum. The results of the phylogenetic analysis (fig. 220), based on characters presented in tables 1 and 2, demonstrate that the species of the three genera are more parsimoniously contained within a single genus. *Pseudopsallus* is represented by component 37 on the cladogram and is defined by the undifferentiated distal portion of the left ventral spicula. This component is further supported by the presence of scale-like setae, with parallel ridges. We did not include this char-

acter as a synapomorphy for the genus *Pseudopsallus* because its distribution in other orthotyline is not well known. Our investigation of setal types suggests that it defines a group larger than *Pseudopsallus*. Structural features of scale-like setae such as width and apex type (e.g., acuminate, truncate) were omitted from the analysis because they exhibited extreme intra-specimen variation in several taxa, and thus have little value in an analysis of species interrelationships.

Bifidungulus, as originally diagnosed, is polyphyletic with its included species *viridicans* and *puberus* each more closely related to different species groups of the nominal genus *Hesperocapsus* than they are to each other. The type species, *Bifidungulus viridicans*, is the sister species of component 24 or what we call the *anograe* group. These two sister groups form component 25, which is defined by two characters: right paramere with the distal portion (in dorsal view) large and projecting beyond the body of the paramere, and dorsum with long, simple setae. The other species originally included in *Bifidungulus*, *puberus*, is the sister species of component 32 or the *atriseta* group. Together, *puberus* and the *atriseta* group form component 33, which is defined by a unique head structure with the gula and lora wide, the anterior portion of the head long, and the dorsum with dark brown to black simple setae. Although *viridicans* and *puberus* share a similar autapomorphic claw structure (character 21), they are not sister species in our classification and cannot be maintained in a separate genus as originally conceived.

Pseudopsallus angularis, the type species of the nominal genus *Pseudopsallus*, is the sister species of component 35 (containing the *abroniae* and *atriseta* groups). Both *angularis* and component 35 are contained within component 36 and are defined by a head structure with the frons moderately to strongly convex and rounded, and the anterior portion of the head short (the latter feature, character 13, is reversed at component 33). Thus, *angularis* is imbedded in the phylogeny, recognized only by homoplasious characters 3, 8, and 18 and not strongly differentiated, except by coloration, from the other species placed by Knight in *Hesperocapsus*.

We choose to recognize two components as species groups because of their strong character congruence. Component 24, the *anograe* group (containing *anograe*, *demensus*, *hixsoni*, *occidentalis*, and *presidio*), is defined by dorsal spicula with small serrations on the basal portion of the interior marginal flange, left ventral spicula with differentiated small accessory spines, and labium reaching the apex of the mesosternum or slightly beyond. Component 32, the *atriseta* group (containing *atriseta*, *lattini*, *major*, *mojaviensis*, *reperitus*, and *sericatus*), is defined by the short dorsal lobe of the left paramere with a large apical and subapical spine, and dorsum with long, simple setae.

Component 26 is characterized by the presence of small serrations on the apical surfaces and margin of the dorsal spicula. We provisionally call this component the *abroniae* species group (containing *abroniae*, *artemisicola*, and *stitti*). However, character 8 originates five times in our classification and its strength as a defining character for a species group is tenuous.

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