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OCCASIONAL PAPERS
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California Academy of Sciences

No. 109, 36 pages, 6 figures

A REVISION OF THE GENUS *ANCYLANDRENA*
(Hymenoptera:Andrenidae)

By
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ABSTRACT: *Ancylandrena* is a genus of rarely collected, vernal, andrenine bees found in the southwestern United States and northwestern Mexico. It comprises four species, *A. atoposoma* (Cockerell, 1934), *A. larreae* (Timberlake, 1951), *A. koebeleri* (Timberlake, 1951), and *A. timberlakei* Zavortink, new species. Detailed descriptions of the genus and all four species are given; keys to the species are presented; the face, right mandible, pygidial plate, distal sterna, and genitalia of the male of each species are illustrated; the variation, biology, and distribution of the species are summarized; and the collection data for the 391 specimens examined are given.

INTRODUCTION

Ancylandrena is a small genus of rarely collected bees found in the extreme southwestern United States and northwestern Mexico. The group is poorly known: there is no complete description or diagnosis of the genus; there is no key to the species; there are no illustrations of the male genitalia or associated sterna of any species; and there is no summary of the biology or distribution of the genus or any of the included species. The primary purpose of the present study, based on the examination of 391 specimens (170 males, 221 females), is to provide as much of this information as possible.

Cockerell (1930, pp. 5-6) originally described *Ancylandrena* as a subgenus of *Andrena* and later (Cockerell, 1941, p. 347) raised it to generic rank. Michener (1944, pp. 241-243) treated *Ancylandrena* as a distinct genus and placed it with *Andrena* and *Megandrena* in the subfamily Andreninae of the Andrenidae. He implied a close relationship between *Ancylandrena* and *Megandrena* by stating that they were "genera of doubtful distinctness." Lanham (1949, p. 192) subsequently reduced *Ancylandrena* to subgeneric rank under *Megandrena*. Although this interpretation has been followed by some (e.g. Timberlake, 1951, pp. 411-414; Rozen, 1971, p. 2), its acceptance has not been universal and *Ancylandrena* has been considered a separate genus by others (e.g. Stephen, Bohart, and Torchio, 1969, pp. 70, 125; Zavortink, 1972, pp. 66-68).

During the present study I examined numerous genera of short-tongued bees in an attempt to determine the affinities of *Ancylandrena*. Although I found many similarities, particularly in the male genitalia and distal sterna, between *Ancylandrena* and genera presently placed in the subfamilies Melittinae and Macropidinae of the Melittidae and the subfamily Dufoureae of the Halictidae, I do not believe I have discovered sufficient evidence to change the existing placement of *Ancylandrena* at this time, and I am leaving it in the subfamily Andreninae. I am, however, removing *Megandrena* from the Andreninae and placing it in the subfamily Panurginae of the Andrenidae, where it is related to the complex of genera including *Calliopsis*, *Hypomacrotera*, and *Nomadopsis*. The evidence for this change will be presented separately.

The morphological terminology used in the present study follows Michener (1944). The male genitalia and distal sterna were studied in glycerol at a magnification of 200 diameters with a compound microscope. The plants collected by me have been determined by using *A California Flora* (Munz and Keck, 1959) and *Supplement to a California Flora* (Munz, 1968). With one exception the names of plants recorded on the labels of specimens not collected by me are given unaltered in the lists of flower records and lists of specimens examined even though some of the species referred to are currently synonymized or otherwise known by different names. The one exception is in the genus *Larrea*, where the

names *Larrea*, *Larrea divaricata*, *Larrea glutinosa*, and creosote bush have all been emended to *Larrea tridentata*. Except as noted under *Ancylandrena koebelei*, I have not analyzed the pollen loads of females. The abbreviations used for the depositories of the specimens are indicated in the acknowledgments.

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For loans of specimens or permission to study material in their care, I am indebted to: P. H. Arnaud, Jr., California Academy of Sciences (CAS); G. C. Eickwort, Cornell University (CU); P. D. Hurd, Jr., National Museum of Natural History (USNM); W. E. LaBerge, Illinois Natural History Survey, who subloaned material from the Academy of Natural Sciences, Philadelphia (ANSP), Cornell University (CU), Texas A & M University (TAM), the University of Arizona (UA), the University of California at Berkeley (UCB), the University of Kansas (UK), and the Wild Bee Pollination Investigations, USDA, Logan, Utah (UTAH); U. N. Lanham (UNL); E. G. Linsley, University of California at Berkeley (UCB); C. D. Michener, University of Kansas (UK); J. G. Rozen, Jr., American Museum of Natural History (AMNH); R. R. Snelling, Natural History Museum of Los Angeles County (LACM); Gerald I. Stage (GIS); R. W. Thorp, University of California at Davis (UCD); P. H. Timberlake, University of California at Riverside (UCR); P. F. Torchio, Wild Bee Pollination Investigations, USDA, Logan, Utah (UTAH); and F. G. Werner, University of Arizona (UA).

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TAXONOMIC TREATMENT

ANCYLANDRENA COCKERELL

Andrena (*Ancylandrena*) Cockerell, 1930, pp. 5-6; 1934, p. 82. *Ancylandrena* of Cockerell, 1941, p. 347; Michener, 1944, pp. 242-243; Linsley, 1951, p. 1086; Mitchell, 1960,

p. 86; Stephen, Bohart, and Torchio, 1969, pp. 70, 125; Zavortink, 1972, pp. 66-68.

Megandrena (Ancylandrena) of Lanham, 1949, pp. 192, 193; Timberlake, 1951, pp. 411-414; Krombein, 1958, p. 216.

TYPE SPECIES. *Andrena (Ancylandrena) heterodoxa* Cockerell, 1930; monobasic.

BOTH SEXES. Medium sized species; length, exclusive of antenna, 8.0-14.7 mm.

Head. Eye with scattered short hair. Ocelli normal or enlarged; in frontal view distance from lateral ocellus to summit of vertex less than or subequal to diameter of lateral ocellus. Ocellar triangle broad, distance between lateral ocelli subequal to or greater than distance from lateral ocellus to eye. Frontal line elevated below, usually impressed above, and extending dorsad to or nearly to median ocellus. Subantennal area more or less trapezoidal to somewhat triangular, about as broad as length of inner subantennal suture. Clypeus moderately to strongly protuberant; disk flattened; with slightly to prominently elevated median longitudinal ridge or impunctate line; with moderately strong to very strong preapical, transverse, setaceous groove that is slightly to conspicuously curved or angled away from apex laterally. Malar space very short. Genal area subequal to or narrower than eye, without carina. Paramandibular carina without specialized setae. Pubescence abundant to very abundant, loose, especially dense and/or long on face and lower portion of gena; whitish to silver-white except sometimes on upper part of face and vertex. Punctation fine and close to very fine and very close in center of face, becoming sparser in lower paraocular area, and sparser and slightly to distinctly coarser in upper portion of face; area dorsolaterad of lateral ocellus impunctate or nearly so. Integument between punctures smooth or roughened.

Antenna. Scape, pedicel, flagellar segment 1, and dorsal surface of flagellar segments 2 to 10 or 11 dark brown to black, ventral surface of flagellar segments 2 to 10 or 11 tan or ferruginous to brown. Scape with long, entirely or predominantly white pubescence on inner, outer, and lower surfaces; pedicel with short, light hair. *Mouthparts.* Labrum subrectangular, width about 1.5-2.0 length; median basal portion slightly to strongly elevated and more or less emarginate around tuft of setae arising from depression; additional setae in lateral submedian group; black or slightly reddened. Mandible similar in both sexes; with or without basal blister; with subapical tooth on inner margin; moderately long, apices overlapping when closed. Proboscis without specialized bristles. Galea 0.6-0.8 length of prementum. Maxillary palpus extending beyond apex of galea; segments not markedly or constantly differentiated in length, segment 5 and sometimes segments 2 and 3 slightly shorter than others; segments 4-6 more slender than basal segments. Labial palpus shorter than maxillary palpus; segment 1 slightly elongate, segments 2 and 3

frequently shortened; segments 1-3 slightly flattened, segment 4 cylindrical and more slender than basal segments; apex of segments 2 and 3 produced beyond base of following segment laterally. Glossa acute; 0.3-0.4 length of prementum.

Mesosoma. Pronotum with relatively strong suture extending cephalodorsad from midportion of anterior margin of posterior pronotal lobe. Dorsolateral angle of pronotum scarcely produced. Metanotum slightly to moderately swollen. Metapseudosternal area longer than broad, rather narrow, the ventral hind coxal articulations closely approximated. Propodeal enclosure not bordered by carina; basal portion of enclosure with weak transverse striations, distal portion (on posterior surface of propodeum) smooth or minutely tessellate. Integument nonmetallic, entirely black or suffused with red or brown laterally. Pubescence very abundant, loose, usually somewhat shortened on mesoscutum. Punctation predominantly moderately fine and moderately close to very fine and close in anterior portion of mesoscutum and moderately fine to very fine but more widely spaced on disk of scutellum, becoming finer and closer in lateral portion of mesoscutum, in lateral and posterior portions of scutellum, and on metanotum. Integument smooth to slightly roughened on anterior portion of mesoscutum and disk of scutellum. Posterior center of mesoscutum more sparsely punctate and smoother than rest. Tegula elongate, cephalolateral margin usually concave; light brown or reddish brown to black; pubescent except caudolaterally.

Legs. Hind coxa shortened. Tibiae not expanded. Malus of fore tibia and posterior spur of hind tibia not modified. Hind tarsus 0.9-1.0 length of mid tarsus. Basitarsi about 0.5-0.6 length of entire tarsus of corresponding leg. Distitarsi slightly enlarged. Claws normal, bifid. Arolia cleft dorsally, U- or V-shaped.

Wings. Fore wing with pterostigma short, about 0.40-0.52 as long as distance from its apex to apex of marginal cell, narrow, about as broad as or slightly broader than distance from inner edge of prestigma to costal margin; apex of pterostigma considerably distad of base of vein r. Apex of marginal cell slightly bent away from costal margin, not or but minutely appendiculate. Three submarginal cells; second longer than broad, trapezoidal; third slightly shorter than or subequal to first along posterior margin. First recurrent vein ending in distal 0.4 of posterior margin of second submarginal cell. Basal vein nearly interstitial with cu-v or arising distinctly distad of it. Pterostigma black to brown; wing veins black and brown, R and C darkest; wing membrane colorless or nearly so. Hind wing with jugal lobe broad, separated from vannal lobe by deep incision.

Metasoma. Slightly to moderately flattened. Broad to near base in dorsal aspect. Anterior face of first tergum longer than dorsal face; concave. Integument nonmetallic, brown to black, sometimes suffused with red; apical margin of terga colorless to amber. Punctation of terga moderately

fine to very fine, moderately close to close. Integument of terga roughened basally, roughened or smooth distally.

MALE. Head. Facial quadrangle longer than broad. Eyes subparallel to convergent ventrally. Facial fovea poorly defined, the entire upper paraocular area slightly to moderately depressed. Clypeus not or slightly protruberant beyond level of supraclypeal area. Anterior mandibular articulation in front of lower anterior eye margin. Integument of head nonmetallic, black except for cream colored to yellow mark in lower paraocular area and sometimes on clypeus. Pubescence more abundant and longer than in female; clypeus moderately to very densely pubescent. Clypeus more sparsely and sometimes more coarsely punctate toward apex, impunctate and polished near apex.

Antenna. Longer than in female. Flagellar segment 1 shorter than combined length of segments 2 and 3; segment 2 shorter than segments 1 or 3; segments 3-11 longer than broad. *Mouthparts.* Labrum with lateral submedian hair not arising from groove or depression.

Mesosoma. Propodeum long to short, the basal portion moderately declivous to nearly vertical in profile. Pubescence whitish to silver-white except on dorsum where it is usually partially pigmented. *Legs.* Fore trochanter without spine. Basitibial plate moderate in size, oblong, its upper surface concave and with short appressed hair. Tarsi not unusually shortened; fore tarsus 1.4-1.5 length of fore tibia; mid tarsus 1.5-1.6 mid tibia; hind tarsus 1.1 hind tibia. Hind basitarsus slightly broadened. Legs dark brown or black basally, slightly lighter distally. Tibial spurs testaceous yellow. Pubescence abundant, loose, some hair elongate; predominantly white to silver-white.

Wings. Fore wing sparsely to moderately pubescent basally.

Metasoma. Less flattened than in female. Slightly to conspicuously curled under. Terga II-V moderately to conspicuously swollen cephalad of apical depression. Apical depressions punctured. Tergum VII with large, distinct, pointed pygidial plate with elevated edge and narrow, weakly to moderately developed median keel. Pubescence very abundant, loose; terga with hair predominantly long and erect, entirely silver-white to white or some pigmented; apical margin of terga II-V sometimes with weakly to moderately well developed white or silver-white fascia or fringe; sterna with hair predominantly erect, elongate on at least sternum I and lateral or apicolateral portion of sterna II-V, predominantly silver-white to white or some weakly pigmented. *Distal sterna and genitalia.* Sternum VI with broad, deep emargination in caudal margin; gradulus present, conspicuously bowed cephalad medially, not conspicuously bent caudad laterally; lobes at side of emargination with simple, thick setae with swollen bases and often blunt tips. Sternum VII with long, diverging anterior arms and with very strongly sclerotized, thick, distinctly Y-shaped median caudal process with lateral membranous hairy flap. Sternum VIII with large, more or less quadrangular internal portion

with undulate surface, each caudal angle upturned and bearing a strong apodeme, the midbasal portion strongly deflexed; without spiculum; with moderately long, strongly sclerotized, median caudal process that has a flat-topped, glabrous basal plate with a strong longitudinal keel and a very strong longitudinal supporting apodeme. Gonobase large; dorsal surface very long; with deeply invaginated, thin, middorsal longitudinal apodeme; foramen of gonobase large, opening ventrally, its margin smooth, nearly oval or circular in outline in ventral aspect; apodeme surrounding foramen narrow. Gonocoxal apodeme very large ventrally, partly occluding foramen of gonobase, narrowing laterally, nearly absent dorsally; weakly sclerotized and without supporting ridges. Gonoforceps large, long, nearly straight in dorsal aspect; with single massive apical projection directed mesad and curved ventrad distally and with ventral or ventrolateral rounded, subapical angle; contiguous for 0.25-0.30 of length at base dorsally, then excavated around aedeagus; deeply inflected at base dorsally, the resulting apodeme immovably attached to base of aedeagus; ventral surface membranous where it overlies volsella. Volsella small, approximately oval in outline; cuspis and digitus fused, neither elongate; nearly horizontal, the notch between cuspis and digitus oriented dorsoventrally; nearly transverse, the diti closely approximated; with relatively few, strongly sclerotized sensilla basiconica (not spicules); not fused with mate midventrally; with firm yet membranous attachment to gonoforceps; dorsal surface of digitus firmly attached to and articulating with ventral lobe of aedeagus; without small, separate, dorsal sclerotization. Penis and penis valves fused, the resulting aedeagus more or less completely sclerotized, slender, without dorsolateral flange or more basal lateral process and not excavated laterally; aedeagus more or less sickle-shaped in lateral aspect, directed dorsad basally, sharply bent caudad and then ventrad; distal portion of aedeagus more strongly sclerotized than proximal portion, deeply cleft, the resulting lobes contiguous or nearly so; penis not emergent or inflatable, the gonopore between bases of distal lobes; base of aedeagus, between apodemes of penis valves, abutting on and immovably attached to dorsal inflection of gonoforceps; apodeme of penis valve extended caudad and produced into a large, strongly sclerotized ventral lobe that articulates with dorsal surface of digitus.

FEMALE. Head. Facial quadrangle longer than broad to as long as broad. Eyes slightly divergent to slightly convergent ventrally. Facial fovea broad, extending mesad to or beyond level of outer edge of lateral ocellus, and deeply impressed above, becoming narrower and shallower below; short, extending ventrad only to level of upper margin of antennal socket; pubescence outstanding and greyish brown, chocolate brown, or dark brown in upper portion, becoming appressed and silvery in lower portion. Clypeus slightly to conspicuously protuberant beyond level of supraclypeal area. Anterior mandibular articulation below

or in front of lower anterior eye margin. Integument non-metallic, usually black, sometimes dark brown, sometimes slightly reddened ventrally. Pubescence less abundant and shorter than in male; clypeus sparsely pubescent. Disk of clypeus nearly impunctate except for submedian longitudinal group of punctures; polished. *Antenna*. Shorter than in male. Flagellar segment 1 slightly shorter than to slightly longer than combined length of segments 2 and 3; segment 2 shorter than segments 1 or 3; segments 3-9 broader than long to longer than broad. *Mouthparts*. Labrum with all or part of lateral submedian hair arising from groove or depression.

Mesosoma. Propodeum long to moderately long, the basal portion moderately to steeply declivous. Propodeal corbicula poorly developed; anterior margin without fringe; dorsal margin with dense vestiture of long, straight to curved, barbed or short-plumose hair; interior with short to long hair. Pubescence whitish to silver-white except on dorsum and sometimes upper portion of pleuron and propodeum, where it is partially or entirely pigmented.

Legs. Basitibial plate large, broad, its upper surface more or less plane and with a central patch of short, dense tomentum. Tarsi shortened; fore tarsus 1.1-1.3 length of fore tibia; mid tarsus 1.3-1.4 mid tibia; hind tarsus 0.9-1.0 hind tibia. Mid basitarsus not expanded medially; slightly broadened and flattened; anterior and posterior margins subparallel. Hind basitarsus short, 0.5-0.6 hind tibia and 0.9-1.0 mid basitarsus; broad, width about 0.32-0.42 length; anterior and posterior margins subparallel; apex conspicuously produced beyond base of tarsal segment 2 posteriorly. Hind coxa and trochanter with hair dense to very dense, more or less straight, short to moderately long; longer hair, particularly on trochanter, predominantly simple, shorter hair predominantly barbed or short-plumose. Hind tibia with scopal hair dense, long, slender, flexible, simple, and gently curved toward apex of segment; longest hair much longer than apical width of tibia. Hind basitarsus with scopal hair similar to that of hind tibia; longest hair more than 0.5 length of basitarsus. Legs reddish brown to dark brown or black basally, usually lighter distally. Tibial spurs testaceous yellow to deep amber, frequently darkened apically. General pubescence of legs abundant, predominantly loose. Mid femur with abundant short hair on posterior surface. Hind femur with abundant long hair on upper portion of anterior surface. Fore basitarsus with hair of outer surface long, simple, and gently curved toward apex of segment. Mid basitarsus with hair of outer surface dense, moderately long, plumose. *Wings*. Fore wing moderately pubescent basally.

Metasoma. More flattened than in male. Not curled under. Terga II-IV slightly to moderately swollen cephalad of apical depression. Apical 0.36-0.44 of middorsal postgradular area of terga II and III depressed, the depression narrowing and becoming more distinct laterally. Tergum VI with large pygidial plate with elevated edge and broad,

flat-topped, strongly elevated median keel basally; pygidial plate longer than broad and with lateral margin usually concave distally. Pubescence abundant; tergum I with hair predominantly long, erect and loose, silver-white or weakly pigmented; terga II-IV with hair predominantly short and outstanding, pigmented; apical margin of terga I-IV with conspicuous, well developed, complete or medially interrupted white fascia; prepygidial fimbria pigmented, emarginate, the notch with short dense tomentum; pygidial fimbria pigmented; sterna I to III or IV with scopa; scopal hair simple and erect, strong and elongate on sterna I and II; apicolateral margin of sterna II-V with elongate, plumose hair.

DISCUSSION. *Ancylandrena* can be distinguished from *Andrena* as follows: in both sexes by (1) the moderately to strongly protuberant clypeus, (2) the shortened hind coxa, (3) the slightly enlarged distitarsi, and (4) the long, concave anterior face of metasomal tergum I; in the male by (1) the large, distinct pygidial plate, (2) the long, diverging anterior arms and the strongly sclerotized, distinctly Y-shaped process of metasomal sternum VII, (3) the large, more or less quadrangular internal portion and the glabrous, flat-topped, keeled plate at the base of the process of sternum VIII, (4) the characteristically shaped gonoforceps that are contiguous for 0.25-0.30 their length at the base dorsally, excavated around the aedeagus, and continued apically as undivided, massive projections, (5) the immovable attachment of the aedeagus to the dorsal inflection of the gonoforceps, and (6) the articulation of the volsella with a ventral lobe of the aedeagus; and in the female by (1) the short to moderately long, more or less straight hair on the hind coxa and trochanter, (2) the shortened hind tarsus and basitarsus, and (3) the scopa on the basal metasomal sterna. In addition, *Ancylandrena* can be distinguished from most species of *Andrena* by (1) the absence of specialized setae on the paramandibular carina, (2) the short and narrow pterostigma, and (3) the broad, median keel in the basal portion of the pygidial plate of the female.

In spite of the small number of included forms, the genus *Ancylandrena* is rather varied structurally and the four species differ in such features as size, robustness, length and protuberance of the clypeus, length and declivity of the propodeum, concaveness of the anterior face of the first metasomal tergum, and length of the antennae. This structural diversity, in association with the diversity of pollen sources, suggests that the group is an old one.

BIOLOGY. Relatively little is known about the biology of *Ancylandrena*. All species are vernal. Males are seldom found sleeping in flowers; those of at least *A. koebelei*, *A. larreae*, and *A. timberlakei* fly extremely rapidly between and around shrubs frequented by females. The foraging behavior of females has not been observed. *Ancylandrena koebelei*, the one species with enlarged ocelli, is active primarily only in the very early morning and at least one

of the remaining species, *A. timberlakei*, is active throughout most of the day. *Ancylandrena larreae* is definitely oligolectic, on *Larrea tridentata*, while *A. timberlakei* is apparently polylectic. The remaining two species may be oligolectic on legumes, *Lupinus* and *Lotus* in the case of *A. atoposoma* and *Dalea* in the case of *A. koebelei*. Mating of *Ancylandrena* has not been observed and nests have not been found.

DISTRIBUTION. *Ancylandrena* is presently known from only the states of California, Nevada, and Arizona in the United States and Baja California and possibly Sonora in Mexico. One species, *A. atoposoma*, is largely restricted to coastal areas while the other three occur in the Mohave, Colorado, and Sonoran deserts.

KEYS TO THE SPECIES OF *ANCYLANDRENA*

Males

1. Integument of clypeus partially cream colored or yellowish; mandible with large, whitish or yellowish, nearly circular blister at base of outer surface; fore femur with very short hair on posterior and ventral surfaces..... 4. *A. koebelei*
 Integument of clypeus black; mandible without blister or with small, yellowish, tan, or brown, transverse blister at base of outer surface; fore femur with long hair on posterior and ventral surfaces..... 2
2. Mandible with small, yellowish, tan, or brown, transverse blister at base of outer surface; preapical, transverse groove of clypeus moderately strong; metasomal sternum II with pubescence long and conspicuous and sterna III and IV without conspicuous band of dense, shortened hair midapically..... 3. *A. larreae*
 Mandible without blister at base of outer surface; preapical, transverse groove of clypeus very strong; metasomal sterna not as above, either sternum II with pubescence short and inconspicuous or sterna III and IV with conspicuous band of dense, shortened hair midapically..... 3
3. Clypeus moderately long, strongly protuberant and densely pubescent; apex of labrum gently convex; metasomal sternum II with pubescence of middle portion moderately long and relatively conspicuous and sterna III and IV with a conspicuous band of dense, shortened hair midapically..... 2. *A. timberlakei*

Clypeus short, moderately protuberant and moderately pubescent; apex of labrum subtruncate; metasomal sternum II with pubescence of middle portion predominantly short and inconspicuous and sterna III and IV with poorly developed band of shortened hair midapically..... 1. *A. atoposoma*

Females

1. Mandible with large, whitish or yellowish, nearly circular blister at base of outer surface; scopal hair of hind tibia and basitarsus light to moderate amber in color; apical fascia of metasomal terga II-IV broadly interrupted medially..... 4. *A. koebelei*
- Mandible without blister or with small, yellowish, tan, or brown, transverse blister at base of outer surface; scopal hair on outer surface of hind tibia and basitarsus white, cream colored, greyish brown, brown, or black; apical fascia of metasomal terga II-IV complete or very narrowly interrupted or indented medially..... 2
2. Mandible with small, yellowish, tan, or brown, transverse blister at base of outer surface; preapical, transverse groove of clypeus moderately strong; metasomal sterna III and IV with definite scopa, the hair nearly as long and strong as hair on sterna I and II..... 3. *A. larreae*
- Mandible without blister at base of outer surface; preapical, transverse groove of clypeus very strong; metasomal sternum III with weakly developed scopa, the hair much shorter and finer than hair on sterna I and II; sternum IV without definite scopa, the hair short and fine..... 3
3. Scopal hair on outer surface of hind tibia and basitarsus predominantly greyish brown, brown, or black; clypeus moderately long, strongly protuberant; apex of labrum gently convex..... 2. *A. timberlakei*
- Scopal hair on outer surface of hind tibia and basitarsus predominantly white to cream colored; clypeus short, moderately protuberant; apex of labrum subtruncate... 1. *A. atoposoma*

1. *Ancylandrena atoposoma* (Cockerell).
(Figures 1, 3.)

Andrena (*Ancylandrena*) *heterodoxa* Cockerell, 1930, pp. 6-7.
Junior primary homonym of *Andrena heterodoxa* Perez, 1903.
Andrena atoposoma Cockerell, 1934, p. 82. *Nomen novum* for
A. heterodoxa Cockerell, 1930.
Ancylandrena atoposoma of Cockerell, 1941, p. 347; Michener,
1944, p. 242; Linsley, 1951, p. 1086.
Megandrena (*Ancylandrena*) *atoposoma* of Lanham, 1949, p. 193;
Timberlake, 1951, pp. 411, 412, 413.

TYPE. Holotype male, Riverside, Riverside County,
California, 25 April 1930, P. H. Timberlake, on *Cryptantha*
intermedia (USNM 55307).

BOTH SEXES. *Head*. Greatest width 1.24-1.35 length
from top of vertex to apex of clypeus. Ocelli normal.
Clypeus moderately protuberant; short; preapical transverse
groove very strong, slightly curved away from apex laterally.
Punctuation fine and close in center of face, becoming dis-
tinctly coarser dorsad. Integument smooth. *Mouthparts*.
Apex of labrum subtruncate. Mandible without basal blister.

Mesosoma. Pubescence of mesoscutum relatively sparse.
Punctuation predominantly moderately fine and moderately
close in anterior portion of mesoscutum. Integument smooth
on anterior portion of mesoscutum and disk of scutellum.

Metasoma. Integument of disk of terga II-IV predomi-
nantly smooth.

MALE. Length, exclusive of antenna, 8.7-11.1 mm.
Length of fore wing 6.5-7.3 mm. Width of head 3.1-3.4 mm.

Head (fig. 3). Width of face at level of clypeal base
0.90-0.93 length from lower edge of median ocellus to apex
of clypeus. Eyes convergent ventrally. Pale mark of lower
paraocular area usually yellowish to yellow; usually
scarcely broadened below and nearly crescentic; clypeus
black. Pubescence of clypeus usually moderately dense, long.
Hair on upper part of face and vertex whitish to brown, dark
brown, or black. *Antenna*. Flagellum short, segment 1
slightly shorter or slightly longer than segment 3, segment 2
broader than long, segments 3-10 1.16-1.32 times as long as
broad. *Mouthparts*. Mandible black with reddened apex.

Mesosoma. Propodeum long, the basal portion moderately
declivous. Dorsal mesosomal hair rarely entirely silver-
white, usually some pigmented, the darkest, varying from
brown to black, on posterior half of mesoscutum and
scutellum; sometimes additional light brown hair on pos-
terior lateral edge of mesoscutum, axilla, and edges of
scutellum. *Legs*. Fore femur with long hair on posterior
and lower surfaces. *Wings*. Fore wing moderately pubescent
basally.

Metasoma. Concavity of first tergum moderately con-
spicuous. Pygidial plate (fig. 3) more or less deltoid;
short, length 1.0-1.3 basal width; lateral margin straight
to slightly concave; median keel moderately developed.

Pubescence of terga entirely white to silver-white, or much or most dorsal, long, erect hair tan or brown; apical or apicolateral margin of terga II-V with poorly developed fascia of shortened, semierect or decumbent, white to silver-white hair; hair of middle portion of sternum II much shorter than hair of sternum I and scarcely longer or without a complete apical fringe, with a poorly developed band of shortened hair midapically; pubescence of proximal sterna predominantly silver-white. Punctuation of terga moderately fine, moderately close. *Distal sterna and genitalia* (fig. 3). Sternum VI with gradulus not reaching antecosta medially. Sternum VII with emargination between arms of caudal process parabolic in shape; basal portion of emargination sparsely pubescent; membranous flap of process narrow, with moderately dense pubescence, the proximal hair short and simple to long and sparsely plumose, the distal hair long, densely plumose. Sternum VIII with caudal process moderately broad, usually slightly expanded at apex which is subtruncate to broadly rounded; dorsolateral edge of process without flange; pubescence of side and apex of process moderately dense. Gonoforceps slightly curved ventrad distally; apex pointed in ventral aspect; subapical angle directed ventrolaterally. Volsella with digitus and cuspis separated by deep notch with sensilla basiconica on its walls. Aedeagus strongly bent, the distal portion directed ventroposteriorly; distal lobe of aedeagus not expanded.

FEMALE. Length, exclusive of antenna, 10.1-11.8 mm.

Length of fore wing 6.8-7.2 mm. Width of head 3.3-3.5 mm.

Head. Width of face at level of clypeal base 0.93-1.01 length from lower edge of median ocellus to apex of clypeus. Eyes slightly convergent ventrally. Preapical transverse groove of clypeus usually densely setaceous laterad to near level of lateral edge of labrum. Integument uniformly black or slightly reddened ventrally. Some hair on upper part of face and vertex tan to dark brown or black.

Antenna. Flagellum short, width of segments 3-9 subequal to or greater than length. *Mouthparts.* Mandible black with reddened apex.

Mesosoma. Propodeum long, the basal portion moderately declivous. Brown to black hair on posterior portion of mesoscutum, scutellum, and sometimes center of metanotum; fulvous, tannish, or greyish hair on anterior portion and edge of mesoscutum, edge of scutellum and metanotum, and sometimes on axilla, posterior lobe of pronotum, upper portion of pleuron, and upper lateral portion of propodeum.

Legs. Pubescence of coxae, trochanters, and femora predominantly white to silver-white; pubescence of outer surface of fore and mid tibiae light chocolate brown to brown; elongate hair of fore basitarsus brown; pubescence of outer surface of mid basitarsus white and/or light brown; scopal hair on outer surface of hind tibia and basitarsus predominantly white to cream colored.

Metasoma. Concavity of first tergum moderately conspicuous. Long hair of tergum I silver-white; short outstanding hair of terga II-IV predominantly dark brown to blackish, that at base of segments whitish, forming a narrow, pale band; apical fascia of terga II-IV complete or very narrowly interrupted or indented medially on segments II and III; hair of apical fasciae usually not closely appressed to integument; prepygidial and pygidial fimbriae greyish brown, chocolate brown, or dark brown medially, becoming lighter or white laterally; scopa poorly developed, present on sterna I-III; scopal hair of sterna I and II sparse; scopal hair of sternum III conspicuously shorter and finer than that of sterna I and II; sternum IV with hair short and fine, similar to hair of sternum V; pubescence of proximal sterna predominantly white to silver-white; hair of sternum VI chocolate brown to brown. Punctuation of terga moderately fine to fine, moderately close to close.

DISCUSSION. *Ancylandrena atoposoma* is separated from the most similar species, *A. timberlakei*, as follows: in both sexes by (1) the shorter and less protuberant clypeus, (2) the subtruncate apex of the labrum, and (3) the smoother integument of the metasomal terga; in the male by (1) the sparser, shorter pubescence of the clypeus, (2) the shorter and less conspicuous pubescence of metasomal sternum II and the poorly developed band of dense, shortened hair midapically on sterna III and IV, (3) the usually yellowish to yellow, more or less crescentic, integumentary mark in the lower paraocular area, (4) the stouter flagellum of the antenna, and (5) the broader caudal process on metasomal sternum VIII; and, in the female by the predominantly white to cream colored scopal hair on the outer surface of the hind tibia and basitarsus.

This species is considerably variable. The males from Ventura County, California, are smaller than average and have predominantly or entirely whitish pubescence on the head and mesoscutum; the males from Deep Creek, on the north side of the San Bernardino Mountains, San Bernardino County, California, also have the pubescence of the head and mesoscutum lightened and have the pale integumentary mark of the lower paraocular area of the face slightly broadened below; some males from the extreme western part of the Colorado Desert northeast of Palm Springs, Riverside County, and at Morongo Valley, San Bernardino County, California, have the face marks larger, more triangular, and/or more cream colored than usual, some have dense pubescence on the clypeus, and some have the metasomal integument roughened; and, finally, the males from east of Socorro in the Sierra San Pedro Martir of Baja California, Mexico, have the face marks whitish. The single female from Monterey County, California, has the pubescence of the upper part of the head and mesoscutum predominantly tannish or fulvous, the hair of the metasomal fasciae closely appressed to the integument, the brown hair of the

prepygidial fimbria reduced in extent, and the punctures of the metasomal terga finer and closer than usual.

Ancylandrena atoposoma and *A. timberlakei* are closely related, basically allopatric species. At the one locality where they have been taken together, Deep Creek, on the north side of the San Bernardino Mountains, the only possible evidence of interbreeding between them is the slightly broadened face marks in the males of *A. atoposoma*. The variations in the males of *A. atoposoma* from the extreme western part of the Colorado Desert northeast of Palm Springs and at Morongo Valley listed in the previous paragraph are in the direction of *A. timberlakei* and probably indicate that both species occur in this region and occasionally hybridize.

Of the four species of *Ancylandrena*, *A. atoposoma* is the most generalized anatomically, the least dimorphic sexually, and the only one largely restricted to a mesic habitat. For these reasons I believe it is the most primitive species of the group.

BIOLOGY. The recorded seasonal flight period of *A. atoposoma* extends from 5 March to 21 June. No information is available on the daily flight period.

Females exhibit a preference for flowers of the leguminous genera *Lupinus* and *Lotus*. A complete list of flower records for 44 males and 47 females is: *Lupinus hallii*, 4 ♂, 24 ♀; *Lupinus formosus*, 5 ♀; *Lupinus paynei*, 4 ♀; *Lupinus* species, 2 ♀; *Lotus scoparius*, 5 ♂, 3 ♀; *Lotus glaber*, 2 ♀; *Lotus* species, 1 ♂, 1 ♀; *Calochortus splendens*, 8 ♂; *Calochortus* species, 6 ♂; *Ceanothus* species, 1 ♂, 3 ♀; *Convolvulus* species, 1 ♂; *Cryptantha intermedia*, 2 ♂, 1 ♀; *Eriodietyon trichocalyx*, 12 ♂; *Eriogonum fasciculatum*, 1 ♂; *Gilia virgata*, 1 ♀; *Penstemon* species, 1 ♂; *Phacelia ramosissima*, 1 ♀; *Sphaeralcea ambigua*, 2 ♂.

DISTRIBUTION (fig. 1). *Ancylandrena atoposoma* occurs in cismontane southern California, cismontane northern Baja California, and the adjacent desert regions. There is also one distant, uncertain record from Sonora, Mexico.

SPECIMENS EXAMINED. 66 males, 54 females, as follows:
MEXICO

BAJA CALIFORNIA. Ensenada, 15 April 1941, T. D. A. Cockerell, on *Convolvulus*, 1 ♂ (USNM). Socorro (6 km. E.), Sierra San Pedro Martir, 27 May 1958, J. Powell, 2 ♂ (UCB).

SONORA. San Bernardo, 25 March 1935, G. E. and R. M. Bohart, 1 ♂ (UTAH).

UNITED STATES

CALIFORNIA. *Inyo County*: Mountain Springs Canyon, Argus Mts., 22 May 1937, C. D. Michener, 1 ♀ (UK). *Los Angeles County*: Claremont, 5 March 1928, M. McFadden, 1 ♀ (LACM). *Monterey County*: Stone Canyon, 27 April 1919, E. P. Van Duzee, 1 ♀ (CAS). *Riverside County*: Banning, 15 May 1926, W. D. Pierce, on *Calochortus*, 6 ♂ (LACM). The Gavilan, 15 May 1930, C. M. Dammers and P. H. Timberlake, on *Calochortus splendens*, 6 ♂ (UCR); 18 May 1939, P. H. Timberlake, on *Calochortus splendens*, 1 ♂ (UCR), 1 ♂ (USNM).

Hemet (16 km. S.), 20 May 1927, T. Craig, 1 ♂ (CAS). Keen Camp, San Jacinto Mts., 10 June 1939, J. G. Shanafelt, on *Penstemon*, 1 ♂ (LACM); (13 km. W.), 17 May 1939, E. S. Ross, 1 ♂ (UCB). Palm Springs (14 km. NE.), 19 April 1957, R. R. Snelling and M. D. Stage, on *Lotus scoparius*, 2 ♂, 1 ♀ (GIS), 2 ♂ (LACM). Riverside, P. H. Timberlake, on *Lupinus hallii*, 16 April - 1 May 1936, 4 ♂, 24 ♀ (UCR); on *Lupinus paynei*, 9, 11, 14 May 1929, 2 ♀ (USNM), 1 ♀ (UCR), 1 ♀ (CAS); on *Lotus glaber*, 22 April 1926, 13 May 1936, 2 ♀ (UCR); on *Lotus scoparius*, 16 May 1935, 1 ♀ (UCR); on *Cryptantha intermedia*, 28 April 1929, 5 May 1930, 1 ♂ (CAS), 1 ♀ (UCR); on *Gilia virgata*, 2 June 1926, 1 ♀ (UCR); on *Phacelia ramosissima*, 6 May 1935, 1 ♀ (UCR); on *Eriogonum fasciculatum*, 20 May 1926, 1 ♂ (USNM); E. G. Linsley, 10 June 1936, on *Lupinus*, 2 ♀ (UCB). San Jacinto River Canyon, 14 May 1939, E. C. Van Dyke, 1 ♂ (CAS). Soboba Hot Springs, 16 May 1941, E. C. Van Dyke, 1 ♂ (CAS). San Bernardino County: Cajon Pass, 25 April 1936, D. Clancey, 1 ♂ (UCR). Deep Creek, Mojave Desert, 5 May 1936, P. H. Timberlake, on *Eriodictyon trichocalyx*, 11 ♂ (UCR); same data except E. G. Linsley, 1 ♂ (UCB); 16 May 1937, P. H. Timberlake, on *Lupinus formosus*, 3 ♀; on *Lotus scoparius*, 1 ♂, 1 ♀ (UCR). Morongo, 19 April 1937, P. H. Timberlake, on *Cryptantha intermedia*, 1 ♂ (UCR). Morongo Valley, 23-27 May 1941, E. C. Van Dyke, 4 ♀ (CAS); 19, 22, 27 April 1957, R. R. Snelling, 9 ♂ (LACM), 2 ♂ (GIS); 21 April 1957, R. R. Snelling and M. D. Stage, on *Lotus*, 1 ♂ (LACM); on *Sphaeralcea ambigua*, 2 ♂ (GIS); 12 April 1960, R. R. Snelling, on *Lotus*, 1 ♀ (LACM). San Bernardino Mts., 15 May 1937, E. G. Linsley, on *Ceanothus*, 1 ♂, 3 ♀ (CAS). San Diego County: Warner Springs, 9 May 1936, P. H. Timberlake, on *Lupinus formosus*, 2 ♀ (UCR). Ventura County: Ventura (80 km. N.), 21 June 1952, R. H. and L. D. Beamer, W. LaBerge, A. Wolf, C. Liang, and C. Weiner, 2 ♂ (UK). Locality Unknown: 1 ♂ (ANSP).

2. *Ancylandrena timberlakei* Zavortink, new species.
(Figures 1, 4.)

Megandrena (*Ancylandrena*) *larreae* in part of Timberlake, 1951, p. 413.

TYPES. Holotype male, allotype female, and 15 paratypes (2 males, 13 females) from foothills of Spring Mountains, 21 km. NW. of Las Vegas, Clark County, Nevada (36°15'N., 115°18' to 115°21'W.), 915 to 1040 m. elevation, 11 to 15 May 1969, T. J. Zavortink. Holotype male and 1 paratype male collected 11 May sleeping in flowers of *Mentzelia tricuspis* between 1710 and 1810 Pacific Standard Time; allotype female and 3 paratype females collected 15 May on *Mentzelia tricuspis* between 0830 and 1000 Pacific Standard Time; 1 paratype male and 5 paratype females collected 13 May on *Dalea fremontii* between 0745 and 0845 Pacific Standard Time; 4 paratype females collected 13 May on

Lepidium fremontii between 0845 and 0915 Pacific Standard Time; 1 paratype female collected 13 May on *Larrea tridentata* between 0845 and 0915 Pacific Standard Time. Holotype, allotype (CAS Type Number 11798), and paratypes deposited in the Department of Entomology collection, California Academy of Sciences.

BOTH SEXES. *Head.* Greatest width 1.13-1.27 length from top of vertex to apex of clypeus. Ocelli normal. Clypeus strongly protuberant; moderately long; preapical transverse groove very strong, considerably angled or curved away from apex laterally. Punctuation fine and close in center of face, becoming distinctly coarser dorsad. Integument smooth. *Mouthparts.* Apex of labrum gently convex. Mandible without basal blister.

Mesosoma. Pubescence of mesoscutum relatively sparse. Punctuation predominantly moderately fine and moderately close in anterior portion of mesoscutum. Integument smooth on anterior portion of mesoscutum and disk of scutellum.

Metasoma. Integument of disk of terga II-IV predominantly roughened.

MALE. Length, exclusive of antenna, 8.0-9.0 mm. Length of fore wing 5.9-6.5 mm. Width of head 2.7-2.9 mm.

Head (fig. 4). Width of face at level of clypeal base 0.88-0.93 length from lower edge of median ocellus to apex of clypeus. Eyes convergent ventrally. Pale mark of lower paraocular area cream colored to slightly yellowish; always much broadened below and more or less triangular; clypeus black. Pubescence of clypeus dense to very dense, long. Hair on upper part of face and vertex whitish to tan, brownish, or grey. *Antenna.* Flagellum short, segment 1 slightly shorter or slightly longer than segment 3, segment 2 broader than long, segments 3-10 1.22-1.40 times as long as broad. *Mouthparts.* Mandible black with reddened apex.

Mesosoma. Propodeum long, the basal portion moderately declivous. Dorsal mesosomal hair sometimes entirely silver-white, usually some pigmented, the darkest, varying from very light to dark brown, on center of scutellum; when central scutellar hair is deeply pigmented, then additional very light brown to brown hair on posterior half of mesoscutum, axilla, edges of scutellum, metanotum, and upper lateral portion of propodeum. *Legs.* Fore femur with long hair on posterior and lower surfaces. *Wings.* Fore wing sparsely pubescent basally.

Metasoma. Concavity of first tergum moderately conspicuous. Pygidial plate (fig. 4) more or less deltoid; short, length 1.0-1.3 times basal width; lateral margin straight to slightly concave; median keel moderately developed. Pubescence of terga entirely silver-white to white, or most dorsal, long, erect hair light tan to brown; apical or apicolateral margin of terga II-V with moderately well developed fascia of shortened, decumbent, white to silver-white hair; hair of middle portion of sternum II shorter than hair of sternum I, but conspicuously longer

and stronger than hair of sternum III; sterna III and IV without a complete apical fringe, with a conspicuous band of dense shortened hair midapically; pubescence of proximal sterna predominantly silver-white except for creamish to tannish shortened hair of midapical bands. Punctuation of terga fine to moderately fine, moderately close. *Distal sterna and genitalia* (fig. 4). Sternum VI with gradulus not reaching antecosta medially. Sternum VII with emargination between arms of caudal process parabolic in shape; basal portion of emargination sparsely pubescent; membranous flap of process narrow, with moderately dense pubescence, the proximal hair short and simple to long and sparsely plumose, the distal hair long, densely plumose. Sternum VIII with caudal process narrow, slightly expanded at apex which is rounded; dorsolateral edge of process without flange; pubescence of side and apex of process moderately dense. Gonoforceps slightly curved ventrad distally; apex pointed in ventral aspect; subapical angle directed ventrolaterally. Volsella with cuspis and digitus separated by deep notch with sensilla basiconica on its walls. Aedeagus strongly bent, the distal portion directed ventroposteriorly; distal lobe of aedeagus not expanded.

FEMALE. Length, exclusive of antenna, 8.3-10.1 mm.

Length of fore wing 5.7-6.4 mm. Width of head 2.7-3.1 mm.

Head. Width of face at level of clypeal base 0.93-1.00 length from lower edge of median ocellus to apex of clypeus. Eyes slightly convergent ventrally. Preapical transverse groove of clypeus usually densely setaceous medially. Integument uniformly black or slightly reddened ventrally. Some hair on upper part of face and vertex light to dark brown or black. *Antenna.* Flagellum short, width of segments 3-9 subequal to or greater than length. *Mouthparts.* Mandible black with reddened apex.

Mesosoma. Propodeum long, the basal portion moderately declivous. Light to dark brown or blackish hair on disk of mesoscutum and scutellum; tannish hair on edge of mesoscutum, edge of scutellum, usually on metanotum, and sometimes on axilla, posterior lobe of pronotum, upper portion of pleuron, and upper lateral portion of propodeum. *Legs.* Pubescence of coxae, trochanters, and femora predominantly white to silver-white; pubescence of outer surface of fore and mid tibiae light to dark brown or blackish; elongate hair of fore basitarsus brown to blackish; pubescence of outer surface of mid basitarsus very light brown to brown or blackish; scopal hair on outer surface of hind tibia and basitarsus predominantly greyish brown, brown, or black.

Metasoma. Concavity of first tergum moderately conspicuous. Long hair of tergum I silver-white or weakly tinged with grey or tan; short outstanding hair of terga II-IV predominantly dark brown to blackish, that at base of segments sometimes whitish and forming a narrow, pale band; apical fascia of terga II-IV complete or very narrowly interrupted or indented medially on segments II and III; hair of apical fasciae closely appressed to integument;

prepygidial and pygidial fimbriae greyish brown, chocolate brown, or blackish brown medially, becoming lighter or white laterally; scopa poorly developed, present on sterna I-III; scopal hair of sterna I and II sparse; scopal hair of sternum III conspicuously shorter and finer than that of sterna I and II; sternum IV with hair short and fine, similar to hair of sternum V; pubescence of proximal sterna white to silver-white or tinged with tan or grey; hair of sternum VI light to dark brown or greyish brown. Punctuation of terga fine, close.

DISCUSSION. *Ancylandrena timberlakei* is closely related to *A. atoposoma*; it is distinguished from that species as follows: in both sexes by (1) the longer and more strongly protuberant clypeus, (2) the gently convex apex of the labrum, and (3) the rougher integument of the metasomal terga; in the male by (1) the denser, longer pubescence of the clypeus, (2) the longer and more conspicuous pubescence of metasomal sternum II and the well developed band of dense, shortened hair midapically on sterna III and IV, (3) the cream colored to slightly yellowish, more or less triangular, integumentary mark in the lower paraocular area, (4) the more slender flagellum of the antenna, and (5) the narrower caudal process on metasomal sternum VIII; and in the female by the predominantly greyish brown, brown, or black scopal hair on the outer surface of the hind tibia and basitarsus.

Specimens of *A. timberlakei* from Inyo and Kern counties, California, are larger than average and females from this same area have the pubescence of the head, mesoscutum, and legs darker than usual.

The male of *A. timberlakei* collected on the Westgard Pass Plateau, Inyo County, California, on 27 May 1937 by L. D. Phillips was misidentified as *A. larreae* and listed as a paratype of that species by Timberlake (1951, p. 413).

BIOLOGY. The seasonal flight period of *A. timberlakei* is known to extend from 13 March until 1 July and the daily flight period is known to extend from early morning (0700 hours) until at least midafternoon (1500 hours).

This species is apparently polylectic. Females gathering pollen from the flowers of *Mentzelia involucreata* and *M. tricuspis* do not have the specialized foraging behaviors of the species of *Megandrena*, *Hesperapis*, and *Xeralictus* that are oligolectic on these plants. In the foothills of the Spring Mountains northwest of Las Vegas, Nevada, *A. timberlakei* visits the flowers of *Dalea fremontii* later in the day than its larger congener, *A. koebeleii*. A complete list of flower records for 21 males and 26 females is: *Dalea fremontii*, 1 ♂, 5 ♀; *Dalea* species, 5 ♂, 2 ♀; *Eriodictyon trichocalyx*, 1 ♂; *Hyptis emoryi*, 4 ♂, 2 ♀; *Larrea tridentata*, 1 ♀; *Lepidium fremontii*, 4 ♀; *Malacothrix* species, 1 ♂, 1 ♀; *Mentzelia involucreata*, 3 ♀; *Mentzelia tricuspis*, 2 ♂, 4 ♀; *Phacelia* species, 2 ♀; *Sphaeralcea ambigua*, 1 ♂, 1 ♀; *Sphaeralcea* species, 1 ♀; *Verbesina* species, 6 ♂.

DISTRIBUTION (fig. 1). *Ancylandrena timberlakei* occurs in the desert regions of California, Nevada, and Arizona.

SPECIMENS EXAMINED. 31 males, 35 females, as follows:

UNITED STATES

ARIZONA. *Mohave County*: Oatman, 13 March 1972, P. F. Torchio, on *Malacothrix*, 1 ♂, 1 ♀ (UTAH); (8 km. S.), 13 March 1972, P. F. Torchio, on *Verbesina*, 6 ♂ (UTAH). *Pima County*: Sabino Canyon, Santa Catalina Mts., 15 April 1965, R. B. Roberts, 2 ♀ (CU). *Yuma County*: Quartzsite (51 km. S.), 23 March 1970, T. J. Zavortink, on *Mentzelia involucrata* between 1100 and 1120 Mountain Standard Time, 1 ♀ (TJZ). *Locality Unknown*: 1 ♂ (ANSP).

CALIFORNIA. *Imperial County*: Beal Well (11 km. NE.), 20 April 1949, R. C. Dickson, on *Sphaeralcea ambigua*, 1 ♀ (UCR); (16 km. NE.), 13 April 1949, P. H. Timberlake, on *Sphaeralcea ambigua*, 1 ♂ (UCR). *Inyo County*: Ballarat (12 km. SW.), 7 April 1955, E. G. Linsley, 1 ♂ (UCB). Big Pine (7 km. SW.), 1 July 1969, P. H. Timberlake, on *Dalea*, 1 ♂ (UCR). Darwin, 12 May 1969, J. Powell, J. D. Haddock, and P. Welles, 2 ♂, 1 ♀ (UCB). Shoshone (16 km. E.), 12 April 1960, P. A. Opler, 1 ♀ (GIS). Townes Pass, 6 May 1960, F. D. Parker, 1 ♀ (TAM). Westgard Pass (3 km. W.), 16 May 1969, J. Powell, 1 ♂ (UCB). Westgard Pass Plateau, 27 May 1937, L. D. Phillips, 1 ♂ (UTAH). *Kern County*: Last Chance Canyon, El Paso Mts., 30 March and 6 April 1968, T. J. Zavortink, on *Dalea* between 1115 and 1300 Pacific Standard Time, 4 ♂, 1 ♀ (TJZ). *Riverside County*: Berdoo Canyon, Little San Bernardino Mts., 5 April 1969, T. J. Zavortink, on *Hyptis emoryi* between 1245 and 1345 Pacific Standard Time, 2 ♂ (TJZ). Corn Spring, Chuckwalla Mts., 22, 25 March and 11, 12 April 1970, T. J. Zavortink, on *Hyptis emoryi* between 1000 and 1145 Pacific Standard Time, 2 ♂, 2 ♀, on *Mentzelia involucrata* between 0930 and 1000 and between 1420 and 1520 Pacific Standard Time, 2 ♀ (TJZ). Cottonwood Spring, 26 April 1949, J. E. Gillaspay, 1 ♂ (UCR). Palm Canyon, 15 April 1938, R. M. and G. E. Bohart, on *Phacelia*, 1 ♀ (UNL). Palm Springs, 15 April 1938, R. M. and G. E. Bohart, on *Phacelia*, 1 ♀ (UNL). Shavers Well (3 km. N.), 9 April 1952, J. W. MacSwain, on *Sphaeralcea*, 1 ♀ (UCB). *San Bernardino County*: Carson's Well, 4 April 1966, R. O. Schuster, 3 ♂ (UCD). Deep Creek, Mojave Desert, 5 May 1936, E. G. Linsley, on *Eriodictyon trichocalyx*, 1 ♂ (UCB).

NEVADA. *Clark County*: Las Vegas (21 km. NW.), type series, see above; (26 km. NW.), 3 May 1968, T. J. Zavortink, on *Dalea* at 0930 Pacific Standard Time, 1 ♀ (TJZ). Pahrump (30 km. NE.), 12 April 1960, P. A. Opler, 3 ♀ (LACM), 1 ♀ (GIS).

3. *Ancylandrena larreae* (Timberlake).
(Figures 2, 5.)

Megandrena (*Ancylandrena*) *larreae* Timberlake, 1951, pp. 411-413; 1951, pp. 411-413, in part; Krombein, 1958, p. 216.

TYPE. Holotype female, Panamint Valley, Inyo County, California, April 1891, A. Koebele (USNM 28559).

BOTH SEXES. *Head.* Greatest width 1.08-1.20 length from top of vertex to apex of clypeus. Ocelli normal. Clypeus strongly protuberant; long; preapical transverse groove moderately strong, conspicuously angled or curved away from apex laterally. Punctuation very fine and very close in center of face, becoming slightly coarser dorsad. Integument roughened. *Mouthparts.* Apex of labrum gently convex. Mandible with relatively small, transverse blister at base of outer surface.

Mesosoma. Pubescence of mesoscutum relatively dense. Punctuation predominantly fine and close in anterior portion of mesoscutum. Integument very slightly roughened on anterior portion of mesoscutum and disk of scutellum.

Metasoma. Integument of disk of terga II-IV roughened.

MALE. Length, exclusive of antenna, 10.0-12.2 mm. Length of fore wing 6.7-8.0 mm. Width of head 2.9-3.4 mm.

Head (fig. 5). Width of face at level of clypeal base 0.82-0.85 length from lower edge of median ocellus to apex of clypeus. Eyes convergent ventrally. Pale mark of lower paraocular area cream colored to yellowish; usually much broadened below and more or less triangular or L-shaped; clypeus black. Pubescence of clypeus very dense, long. Hair on upper part of face and vertex whitish or some tan to brown or blackish. *Antenna.* Flagellum elongate, segment 1 slightly shorter or slightly longer than segment 3, segment 2 broader than long to longer than broad, segments 3-10 1.48-1.81 times as long as broad. *Mouthparts.* Mandible black with reddened apex; blister yellowish, tan, or brown.

Mesosoma. Propodeum moderately long, the basal portion steeply declivous. Some dorsal mesosomal hair always pigmented, the darkest, varying from light brown to black, on scutellum and usually also posterior middle of mesoscutum; sometimes additional fulvous to light brown or brown hair on posterior lobe of pronotum, axilla, edges of scutellum, metanotum, and upper portion of propodeum.

Legs. Fore femur with long hair on posterior and lower surfaces. *Wings.* Fore wing sparsely pubescent basally.

Metasoma. Concavity of first tergum weakly to moderately developed, relatively inconspicuous. Pygidial plate (fig. 5) more or less deltoid; slightly elongate, length 1.3-1.6 basal width; lateral margin concave; median keel usually weakly developed. Pubescence of terga entirely white to silver-white or much or most dorsal, long, erect hair tinged with cream, yellow, or tan; terga II-V without apical fascia or fringe; most hair of sternum II as long as hair of sternum I; sternum III and IV with complete, concave to more or less even, apical fringe of long to moderately long, plumose hair;

pubescence of proximal sterna silver-white or some elongate hair tinged with tan. Punctuation of terga fine, moderately close. *Distal sterna and genitalia* (fig. 5). Sternum VI with gradulus reaching antecosta medially. Sternum VII with emargination between arms of caudal process parabolic in shape; basal portion of emargination densely pubescent; membranous flap of process narrow, with dense pubescence, the proximal hair short, simple, the distal hair long, densely plumose. Sternum VIII with caudal process moderately broad, conspicuously expanded at apex which is broadly rounded, truncate, or slightly emarginate; dorsolateral edge of process without flange; pubescence of side and apex of process dense. Gonoforceps slightly curved ventrad distally; apex pointed in ventral aspect; subapical angle directed ventrolaterally. Volsella with cuspis and digitus separated by deep notch with sensilla basiconica on its walls. Aedeagus strongly bent, the distal portion directed ventro-posteriorly; distal lobe of aedeagus not expanded.

FEMALE. Length, exclusive of antenna, 11.8-13.6 mm. Length of fore wing 7.3-8.1 mm. Width of head 3.4-3.7 mm. *Head.* Width of face at level of clypeal base 0.90-0.98 length from lower edge of median ocellus to apex of clypeus. Eyes slightly convergent ventrally. Preapical transverse groove of clypeus densely setaceous medially. Integument uniformly black or slightly reddened ventrally. Some hair on upper part of face and vertex light orange-brown to tan, brown, or blackish. *Antenna.* Flagellum moderately long, segments 3-9 longer than broad. *Mouthparts.* Mandible black with reddened apex; blister yellowish, tan, or brown.

Mesosoma. Propodeum long, the basal portion moderately declivous. Very pale grey or pale tan to fulvous or orange-brown hair on mesoscutum, axilla, scutellum, metanotum, posterior lobe of pronotum, upper portion of pleuron, and upper portion of propodeum; light to dark brown or black hair usually on posterior half of mesoscutum and scutellum.

Legs. Pubescence of coxae, trochanters, and femora predominantly white to silver-white; pubescence of outer surface of fore and mid tibiae very light to dark brown; elongate hair of fore basitarsus amber or golden brown to brown; pubescence of outer surface of mid basitarsus very light brown to brown; scopal hair on outer surface of hind tibia and basitarsus predominantly white or cream colored or, particularly on basitarsus, tinged with brown distally.

Metasoma. Concavity of first tergum moderately conspicuous. Long hair of tergum I silver-white to light tan or orange-brown; short outstanding hair of terga II-IV predominantly dark brown to blackish, that at base of segments usually not whitish; apical fascia of terga II-IV complete or very narrowly interrupted or indented medially on segments II and III; hair of apical fasciae closely appressed to integument or not; prepygidial and pygidial fimbriae chocolate brown to dark brown medially, becoming lighter or white laterally; scopa well developed, present on sterna I-IV; scopal hair of sterna I and II dense; scopal hair of sternum III only slightly shorter and finer than

that of sterna I and II; sternum IV with hair only slightly shorter and finer than that of sternum III; pubescence of proximal sterna silver-white, white, cream colored, or slightly tinged with tan; hair of sternum VI tan to chocolate brown or brown. Punctuation of terga fine to very fine, close.

DISCUSSION. *Ancylandrena larreae* is distinguished from all other species of the genus in both sexes by (1) the small, transverse, yellowish, tan, or brown blister at the base of the outer surface of the mandible, and (2) the weaker, preapical, transverse groove of the clypeus. It is further distinguished from *A. atoposoma* and *A. timberlakei*, the only species with which it is likely to be confused, as follows: in both sexes by (1) the longer clypeus, (2) the finer and closer punctuation of the face, and (3) the roughened integument of the face; in the male by (1) the longer flagellum of the antenna, (2) the long, conspicuous pubescence of metasomal sternum II in combination with the absence of a midapical band of dense, shortened hair on sterna III and IV, and (3) the absence of an apical fascia on metasomal terga II-V; and, in the female by the well developed scopa on metasomal sterna I-IV.

Females of *A. larreae* from the western part of the Colorado Desert in Riverside and San Diego counties, California, uniformly lack brown or black pubescence on the mesoscutum and scutellum. Males from the same region frequently have the pale integumentary mark of the lower paraocular area of the face reduced in extent and more or less L-shaped. The single male collected on *Dalea greggii* in the Santa Catalina Mountains, Pima County, Arizona, is smaller than average and has reduced face marks and shortened antennae.

BIOLOGY. The seasonal flight period of *A. larreae* is known to extend from 5 March to 4 June. The daily flight period is not definitely known, but may be largely restricted to the morning hours.

This species was abundant during April 1969 in the Chemehuevi Valley west of Havasu Lake, California. On 21 April individuals were common on *Larrea tridentata* during the 1.5 hours following sunrise, less abundant from 1.5-4.5 hours after sunrise, absent from 4.5-5.5 hours after sunrise, and rare during the 0.5 hour preceding sunset. No attempt was made to collect at this site before sunrise, during the late morning, or during the afternoon and it is not known if *A. larreae* was active at these times.

A. larreae is oligolectic on creosote bush, *Larrea tridentata*, and all but two of the 58 males and 80 females for which there are flower records have been recorded from this plant. The exceptions are single males taken on *Dalea greggii* and *Prosopis juliflora*.

DISTRIBUTION (fig. 2). *Ancylandrena larreae* occurs in the deserts of southern California, southern Nevada, and Arizona. There are, in addition, two questionable records from cismontane southern California, at Idyllwild, Riverside County, and Carpinteria, Santa Barbara County.

SPECIMENS EXAMINED. 67 males, 91 females, as follows:

UNITED STATES

ARIZONA. *Maricopa County*: New River, 19 April 1962, G. E. Bohart, on *Larrea tridentata*, 3 ♀ (UTAH). *Pima County*: Ajo (21 km. N.), 14 April 1955, G. D. Butler and F. G. Werner, on *Larrea tridentata*, 1 ♀ (UA). Dripping Springs, Organ Pipe Cactus National Monument, 10 April 1953, A. and H. Dietrich, 1 ♂ (CU). Old Tucson, 23 March 1972, A. E. and M. Michelbacher, on *Larrea tridentata* between 0815 and 0830 Mountain Standard Time, 1 ♂ (UCB). Organ Pipe Cactus National Monument, 14, 15 April 1955, G. D. Butler and F. G. Werner, on *Larrea tridentata*, 5 ♀ (UA). Picture Rocks, 6 May 1935, A. J. Basinger, 1 ♀ (UCR). Santa Catalina Mts., 17 April 1955, G. D. Butler and F. G. Werner, on *Dalea greggii*, 1 ♂ (UA). Tucson, 23 March 1972, E. G. Linsley, A. E. and M. Michelbacher, on *Larrea tridentata* at 0730 Mountain Standard Time, 1 ♂ (UCB). *Pinal County*: Standfield (W.), 11 April 1955, G. D. Butler and F. G. Werner, on *Larrea tridentata*, 3 ♂ (UA). *Yuma County*: Quartzsite (48 km. S.), 29 March 1969, T. J. Zavortink, on *Larrea tridentata* between 0820 and 0850 Mountain Standard Time, 2 ♂ (TJZ). Tacna (8 km. E.), 17 April 1965, F. D. Parker, 1 ♂ (UCD). Yuma (26 km. N.), 21 March 1966, B. Burwell, on *Larrea tridentata*, 3 ♂, 1 ♀ (UTAH).

CALIFORNIA. *Inyo County*: Ballarat, 6 April 1961, R. P. Allen, 1 ♂ (LACM). Furnace Creek, Death Valley, 8 April 1939, E. G. Linsley, on *Larrea tridentata*, 1 ♂ (UCB). Panamint Valley, April 1891, A. Koebele, 1 ♂ (USNM). Salsberry Pass, 6 May 1960, F. D. Parker, 1 ♀ (TAM). Surprise Canyon, Panamint Mts., 24 April 1957, J. Powell, 1 ♀ (UCB). *Riverside County*: Berdoo Canyon, Little San Bernardino Mts., 5 March 1968, J. C. Hall, 1 ♂ (UCR). Blythe (18 km. W.), 16 April 1951, P. H. Timberlake, on *Larrea tridentata*, 1 ♀ (UCR). Box Canyon, 4 April 1937, E. G. Linsley, on *Larrea tridentata*, 2 ♂ (UCB). Cathedral City, 10 April 1936, C. D. Michener, on *Larrea tridentata*, 1 ♀ (UK); (3 km. E.), 10 April 1936, E. G. Linsley, on *Larrea tridentata*, 1 ♀ (UCB). Idyllwild, 18 April 1957, J. Helfer, 1 ♀ (UCB). Palm Springs, 10 March 1935, P. H. Timberlake, on *Larrea tridentata*, 1 ♂ (UCR); 21 April 1951, E. I. Schlinger, 1 ♀ (TAM). Palm Springs (8 km. E.), 16 March 1963, R. R. Snelling, on *Larrea tridentata*, 2 ♂ (LACM); Andreas Canyon, 24 March 1933, P. H. Timberlake and H. L. McKenzie, on *Larrea tridentata*, 2 ♂, 1 ♀ (UCR); Palm Canyon, 15 April 1958, R. M. and G. E. Bohart, on *Larrea tridentata*, 1 ♂ (UCD); Tahquitz Canyon, 24 March 1936, C. M. Dammers, on *Larrea tridentata*, 8 ♂, 4 ♀ (UCR); 16 April 1938, R. M. and G. E. Bohart, on *Larrea tridentata*, 5 ♂, 2 ♀ (UTAH), 1 ♂ (UCD). Thousand Palms (10 km. E.), 20 March 1960, D. P. Gregory, on *Larrea tridentata*, 1 ♂ (UCB). *San Bernardino County*: Earp (16 km. N.), 22 April 1960, J. R. Powers, on *Larrea tridentata*, 2 ♀ (UCB). Havasu Lake (W.), 16 March 1968, T. J. Zavortink, on *Larrea tridentata* between 0955 and 1010 Pacific Standard Time, 4 ♂;

13, 21, 22 April 1969, T. J. Zavortink, on *Larrea tridentata* between 0520 and 1000 Pacific Standard Time and between 1730 and 1800 Pacific Standard Time, 5 ♂, 36 ♀ (TJZ). Joshua Tree National Monument, 14 April 1969, P. F. Torchio, on *Larrea tridentata*, 2 ♂ (UTAH). Needles, 18 April 1969, P. F. Torchio, on *Larrea tridentata*, 1 ♀, on *Prosopis juliflora*, 1 ♂ (UTAH). Victorville (6 km. SW.), 4 June 1938, P. H. Timberlake, on *Larrea tridentata*, 1 ♀ (UCR). *San Diego County*: Anza-Borrego Desert State Park, 23 April 1951, E. I. Schlinger, 2 ♀ (TAM); Coyote Creek, 24 March 1959, C. A. Toschi, 1 ♀ (GIS). Borrego, 5 April 1940, R. M. Bohart, 2 ♂ (UTAH); 25 April 1949, J. E. Gillaspay, 1 ♀ (UCB); 26 April 1954, P. H. Timberlake, on *Larrea tridentata*, 3 ♀ (UCR); 26 April 1954, J. G. Rozen, 2 ♀ (AMNH); 26-29 April 1954, P. D. Hurd, on *Larrea tridentata*, 1 ♂, 15 ♀ (UCB). Borrego Valley, Palm Canyon, 29 March 1936, P. H. Timberlake, on *Larrea tridentata*, 7 ♂, 1 ♀ (UCR); same data except E. G. Linsley, 2 ♂ (UCB). *Santa Barbara County*: Carpinteria, 18 April 1938, J. DuBois, 1 ♂ (UK). NEVADA. *Clark County*: Henderson (13 km. SE.), 21 April 1966, P. F. Torchio, Rust and N. N. Youssef, on *Larrea tridentata*, 1 ♂, 1 ♀ (UTAH). Overton (near), Rodgers Spring, Lake Mead National Recreation Area, 5 April 1962, E. R. Jaycox, 1 ♂ (UTAH).

4. *Ancylandrena koebelei* (Timberlake).
(Figures 2, 6.)

Megandrena (Ancylandrena) koebelei Timberlake, 1951, pp. 413-414; Krombein, 1958, p. 216.

TYPE. Holotype male, Panamint Valley, Inyo County, California, April 1891, A. Koebele (USNM 28560).

BOTH SEXES. *Head*. Greatest width 1.14-1.27 length from top of vertex to apex of clypeus. Ocelli enlarged. Clypeus strongly protuberant; long; preapical transverse groove very strong, conspicuously angled away from apex laterally. Punctuation very fine and very close in center of face, becoming slightly coarser dorsad. Integument slightly roughened. *Mouthparts*. Apex of labrum gently convex. Mandible with large, nearly circular blister at base of outer surface.

Mesosoma. Pubescence of mesoscutum dense. Punctuation predominantly very fine and close in anterior portion of mesoscutum. Integument slightly roughened on anterior portion of mesoscutum and disk of scutellum.

Metasoma. Integument of disk of terga II-IV usually slightly roughened.

MALE. Length, exclusive of antenna, 12.4-14.1 mm. Length of fore wing 7.8-9.0 mm. Width of head 3.4-3.8 mm.

Head (fig. 6). Width of face at level of clypeal base 0.85-0.92 length from lower edge of median ocellus to apex

of clypeus. Eyes subparallel to slightly convergent ventrally. Pale mark of lower paraocular area cream colored to yellowish; much broadened below and more or less triangular; clypeus black and brown with cream colored to yellowish mark extending from base to preapical transverse groove medially and for a variable distance laterally above transverse groove. Pubescence of clypeus moderately dense to dense, moderately long. Some hair on upper part of face and vertex brown to dark brown or blackish. *Antenna*. Flagellum elongate, segment 1 much longer than segment 3, segment 2 slightly to conspicuously longer than broad, segments 3-10 1.55-1.75 times as long as broad. *Mouthparts*. Basal 0.5-0.6 of outer surface of mandible, including blister, whitish to yellowish, remainder black except for reddened apex.

Mesosoma. Propodeum short, the basal portion nearly vertical. Some dorsal mesosomal hair always pigmented, the darkest, varying from blackish brown to black, in a large subrectangular patch on posterior half of mesoscutum; sometimes additional light brown-tipped hair on scutellum. *Legs*. Fore femur with very short hair on posterior and lower surfaces. *Wings*. Fore wing sparsely pubescent basally.

Metasoma. Concavity of first tergum very conspicuous, broad, high. Pygidial plate (fig. 6) more or less broadly lanceolate; elongate, length 1.5-2.0 basal width; lateral margin convex; median keel weakly developed. Pubescence of terga white to silver-white with dark brown to black, long, erect hair in basal band on terga II-V; apical margin of terga II-V with moderately well developed fringelike fascia of long, decumbent, white to silver-white hair; hair of midbasal part of sternum II as long as hair of sternum I; sterna III and IV with a complete, more or less even or slightly concave, apical fringe of moderately long, plumose hair; pubescence of proximal sterna predominantly silver-white except for tannish elongate hair laterally or apico-laterally. Punctuation of terga fine to very fine, moderately close. *Distal sterna and genitalia* (fig. 6). Sternum VI with gradulus reaching antecosta medially. Sternum VII with emargination between arms of caudal process angulate, with nearly parallel sides and rounded bottom; basal portion of emargination densely pubescent; membranous flap of process broad, with very dense pubescence, the proximal hair short, simple, the distal hair moderately long to long, sparsely to densely plumose. Sternum VIII with caudal process broad, conspicuously expanded at apex which is deeply emarginate; dorsolateral edge of process with flange; pubescence of side and apex of process very dense. Gonoforceps moderately curved ventrad distally; apex blunt in ventral aspect; subapical angle directed ventrally. Volsella with cuspis and digitus separated by slightly depressed area between two groups of sensilla basiconica. Aedeagus very strongly bent, the distal portion directed ventrally; distal lobe of aedeagus expanded sternally at base.

FEMALE. Length, exclusive of antenna, 12.8-14.7 mm. Length of fore wing 7.6-8.8 mm. Width of head 3.4-3.8 mm.

Head. Width of face at level of clypeal base 0.87-0.94 length from lower edge of median ocellus to apex of clypeus. Eyes very slightly convergent to very slightly divergent ventrally. Preapical transverse groove of clypeus densely setaceous medially. Integument uniformly black or dark brown, or reddened ventrally, or black except for dark brown clypeus. Some hair on upper part of face and vertex brown to dark brown or blackish. *Antenna.* Flagellum moderately long, segments 3-9 longer than broad. *Mouthparts.* Mandible dark brown to black with reddened apex, or predominantly light brown or reddened with darker apex; blister whitish to yellowish.

Mesosoma. Propodeum moderately long, the basal portion steeply declivous. Light to dark brown hair in subrectangular patch on posterior half of mesoscutum; hair that is lightly to moderately pigmented tan or orange-brown distally on anterior half and posterior edge of mesoscutum, axilla, scutellum, metanotum, and upper portion of pleuron, and sometimes on posterior lobe of pronotum and upper lateral portion of propodeum. *Legs.* Pubescence of coxae, trochanters, and femora predominantly white to light amber; pubescence of outer surface of fore and mid tibiae light golden brown, light orange-brown, or light brown; elongate hair of fore basitarsus golden to amber; pubescence of outer surface of mid basitarsus light tan to light golden brown; scopal hair on outer surface of hind tibia and basitarsus pale to moderate amber.

Metasoma. Concavity of first tergum conspicuous. Long hair of tergum I silver-white to light tan or orange-brown; short outstanding hair of terga II-IV predominantly dark brown to blackish medially, becoming light greyish brown, light golden brown, or light brown laterally; hair at base of segments usually not whitish; apical fascia of terga II-IV broadly interrupted medially; hair of apical fasciae closely appressed to integument or not on segments II and III, not closely appressed on segment IV; prepygidial and pygidial fimbriae light golden brown to amber medially, becoming lighter or white laterally; scopa moderately well developed, present on sterna I-IV; scopal hair of sterna I and II moderately dense; scopal hair of sternum III slightly to considerably shorter and finer than that of sterna I and II; sternum IV with hair nearly as long and strong as hair of sternum III; pubescence of proximal sterna silver-white, creamish, lightly tinged with tan or grey, or light amber; hair of sternum VI amber, yellowish tan, or tan. Punctuation of terga very fine, moderately close.

DISCUSSION. *Ancylandrena koebelei* is the most distinctive species in the genus and is easily separated from all others by several unique characteristics, as follows: in both sexes by (1) the large, nearly circular, whitish or yellowish blister at the base of the outer surface of the mandible, (2) the conspicuous, broad, high concavity of

the anterior face of the first metasomal tergum, and (3) the enlarged ocelli; in the male by (1) the cream colored or yellowish integument of the clypeus and basal portion of the outer surface of the mandible, (2) the very short hair on the posterior and ventral surfaces of the fore femur, and (3) the broadly lanceolate pygidial plate; and in the female by (1) the amber color of the scopal hair of the hind tibia and basitarsus, (2) the broadly interrupted apical fascia of metasomal terga II-IV, and (3) the amber or light golden brown color of the prepygidial and pygidial fimbriae.

The only observed variation in *A. koebelei* is that the two females from Inyo County, California, are smaller than all other specimens examined.

BIOLOGY. The seasonal flight period of *A. koebelei* is known to extend from 22 April to 26 May. The daily flight period is known to be largely restricted to the very early morning hours.

This species was common during May 1969 in the foothills of the Spring Mountains northwest of Las Vegas, Nevada, where it was a matinal visitor of *Dalea fremontii* and *Oenothera refracta*. Individuals were abundant from 0.5 hour before sunrise until 1.0 hour after sunrise, less abundant from 1.0-2.0 hours after sunrise, and absent thereafter. Males flew very rapidly between and around *Dalea* shrubs. Females visited the flowers of this plant and, less frequently, those of *Oenothera*. The pollen in the scopa of all females collected on both *Dalea* and *Oenothera* is entirely or predominantly that of *Dalea*.

A complete list of flower records for 6 males and 40 females is: *Dalea fremontii*, 4 ♂, 32 ♀; *Dalea* species, 1 ♂; *Oenothera refracta*, 5 ♀; *Oenothera* species, 1 ♀; *Stanleya pinnata*, 2 ♀; *Echinocactus* species, 1 ♂.

DISTRIBUTION (fig. 2). *Ancylandrena koebelei* is presently known from the deserts of southeastern California and southern Nevada.

SPECIMENS EXAMINED. 6 males, 41 females, as follows:

UNITED STATES

CALIFORNIA. *Inyo County:* Surprise Canyon, Panamint Mts., 24 April 1957, J. Powell, on *Stanleya pinnata*, 1 ♀ (UCB), 1 ♀ (UCR). *Riverside County:* Blythe, April 1941, G. E. Bohart, on *Echinocactus*, 1 ♂ (UTAH). *San Bernardino County:* Needles (22 km. S.), 22 April 1969, T. J. Zavortink, on *Dalea* at 0920 Pacific Standard Time, 1 ♂ (TJZ).

NEVADA. *Clark County:* Glendale, 9 May 1961, G. E. Bohart, on *Oenothera*, 1 ♀ (UTAH). Las Vegas (21 km. NW.), 11-13, 26 May 1969, T. J. Zavortink, on *Dalea fremontii* between 0415 and 0645 Pacific Standard Time, 4 ♂, 32 ♀, on *Oenothera refracta* between 0445 and 0530 Pacific Standard Time, 5 ♀ (TJZ); 26 May 1969, R. R. Snelling, 1 ♀ (LACM).

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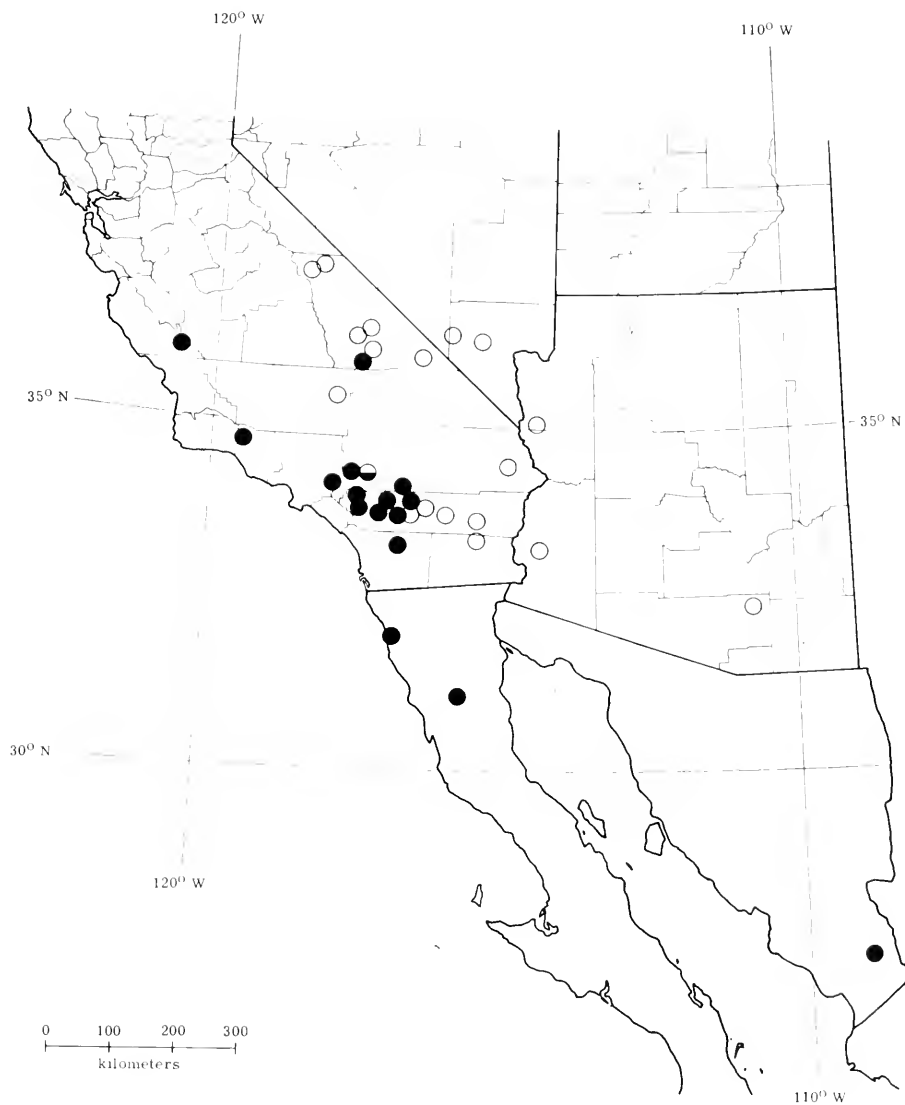


FIGURE 1. Distribution of *Ancylandrena atoposoma* (filled circles) and *Ancylandrena timberlakei* (open circles); area of sympatry (half-filled circle).

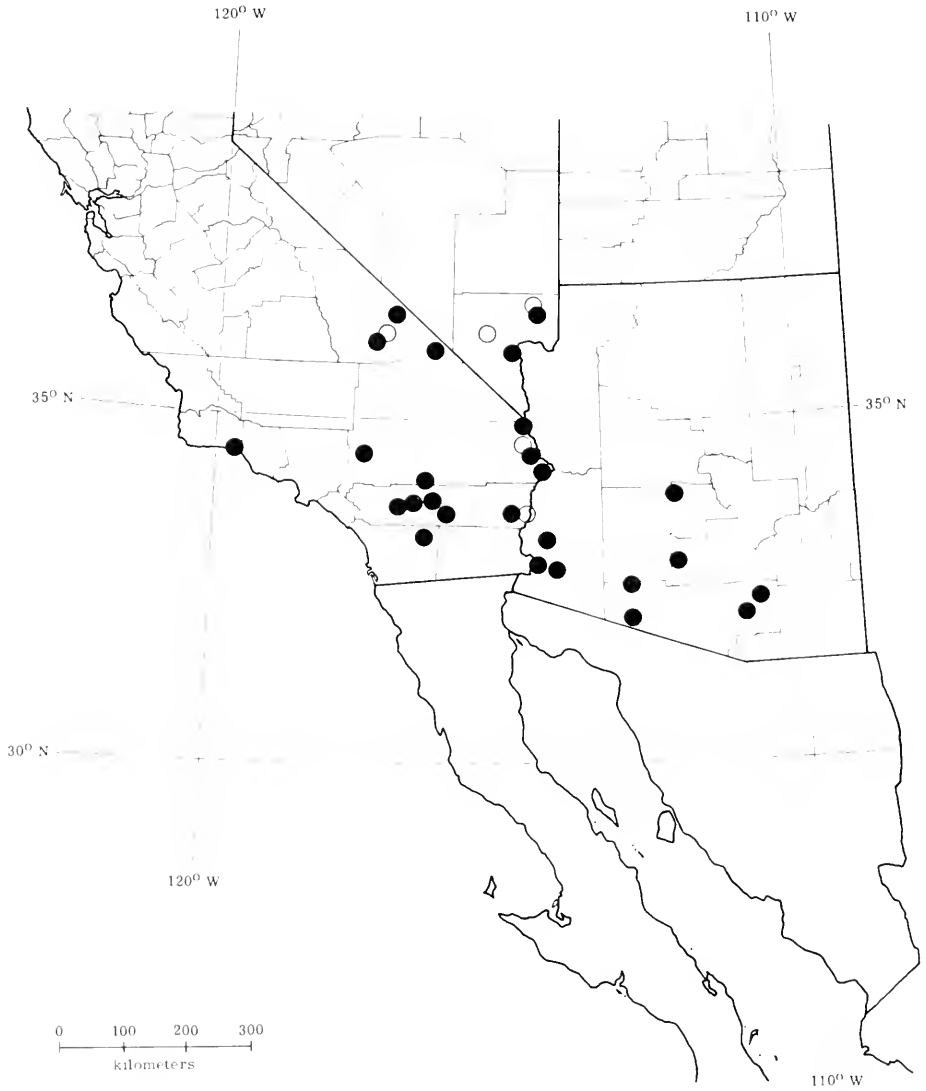


FIGURE 2. Distribution of *Ancylandrena larreae* (filled circles) and *Ancylandrena koebelei* (open circles).

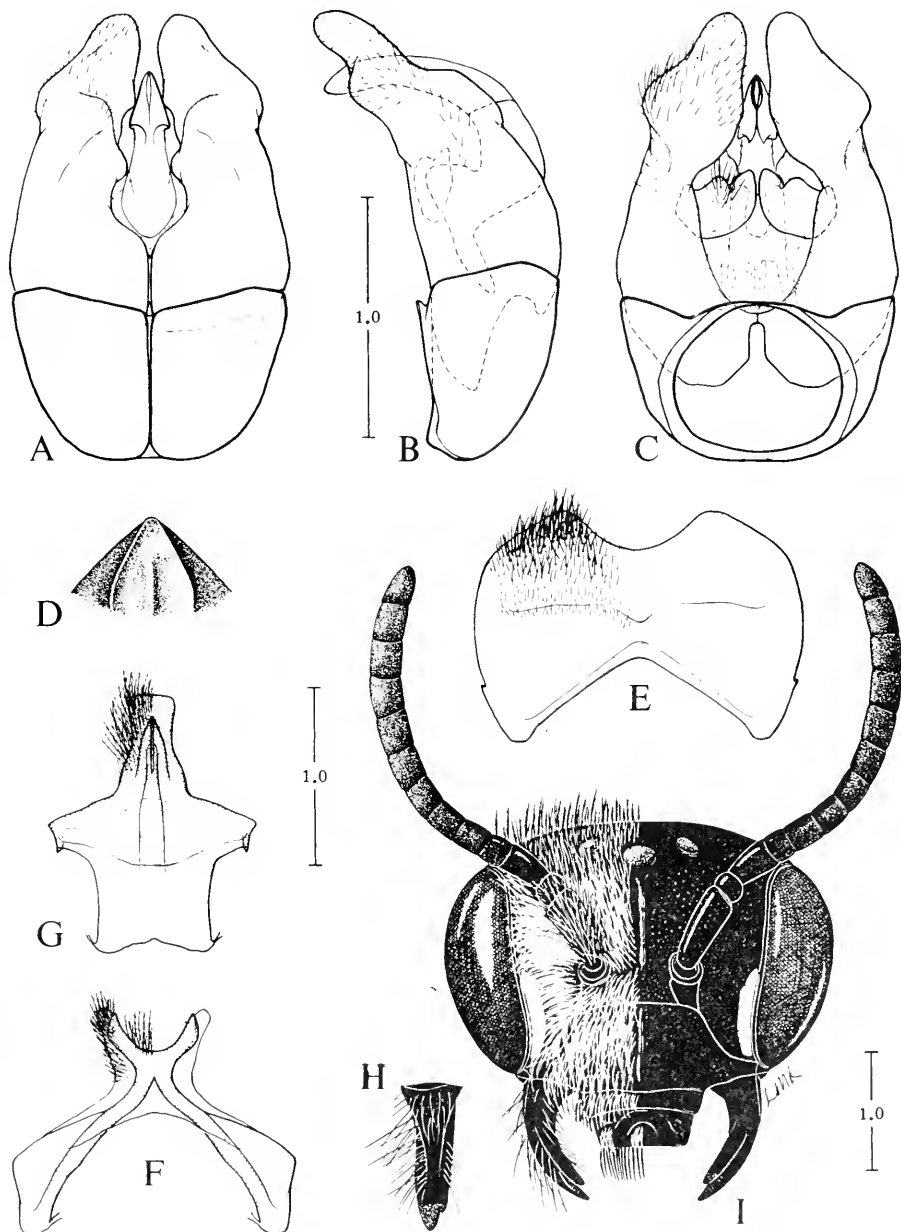


FIGURE 3. *Ancylandrena atoposoma* (Cockerell, 1934). A-C, male genitalia, dorsal, lateral, and ventral views, respectively; D, male pygidial plate; E-G, male sterna VI, VII, and VIII, respectively; H, right mandible, lateral view; I, male face, one side denuded.

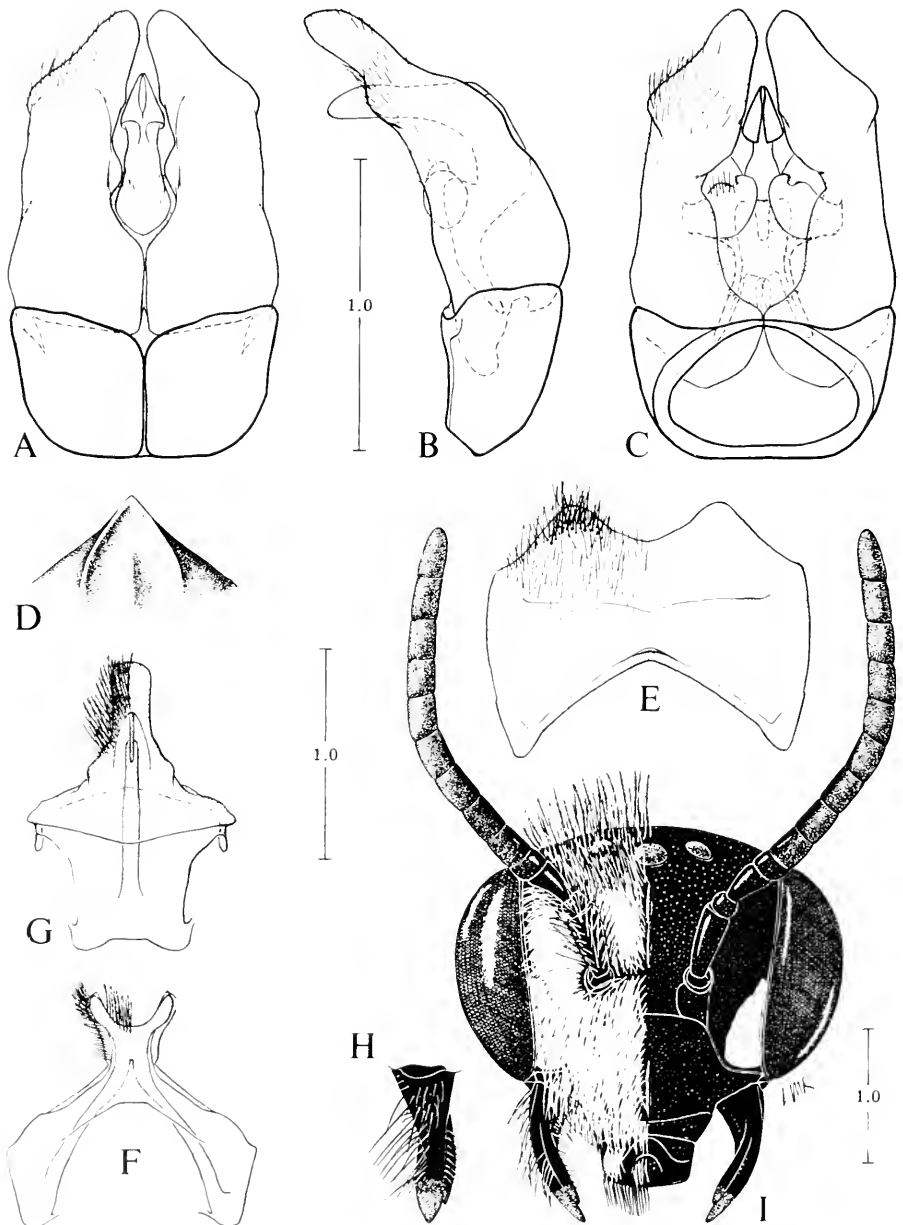


FIGURE 4. *Ancylandrena timberlakei* new species. A-C, male genitalia, dorsal, lateral, and ventral views, respectively; D, male pygidial plate; E-G, male sterna VI, VII, and VIII, respectively; H, right mandible, lateral view; I, male face, one side denuded.

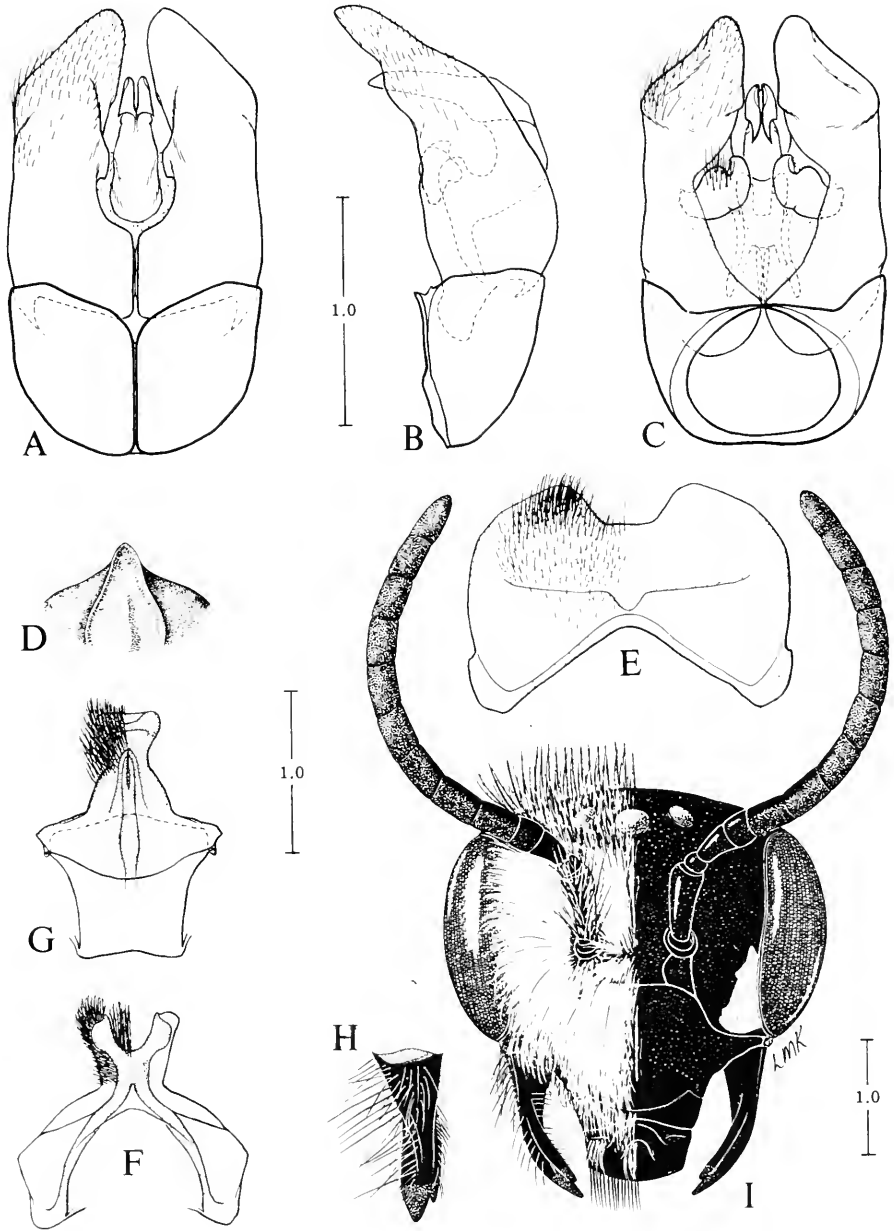


FIGURE 5. *Ancylandrena larreae* (Timberlake, 1951). A-C, male genitalia, dorsal, lateral, and ventral views, respectively; D, male pygidial plate; E-G, male sterna VI, VII, and VIII, respectively; H, right mandible, lateral view; I, male face, one side denuded.

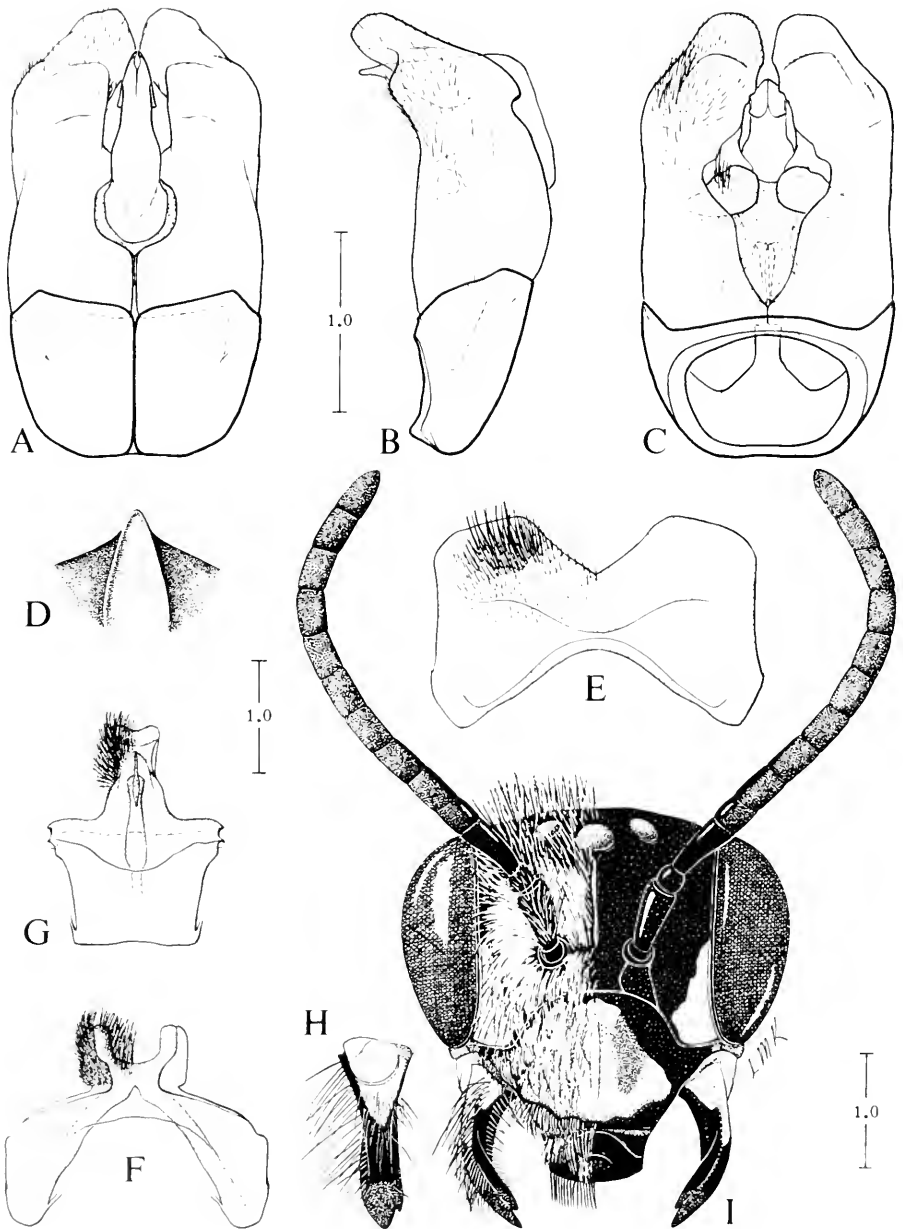


FIGURE 6. *Ancylandrena koebelei* (Timberlake, 1951). A-C, male genitalia, dorsal, lateral, and ventral views, respectively; D, male pygidial plate; E-G, male sterna VI, VII, and VIII, respectively; H, right mandible, lateral view; I, male face, one side denuded.

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