4-1-1954

Records and Descriptions of North American Megachilid Bees

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Reprinted from the
Journal of the Kansas Entomological Society
Vol. 27, April, 1954, No. 2

RECORDS AND DESCRIPTIONS OF NORTH AMERICAN MEGACHILID BEES[1]

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In the course of preparing a paper on the Californian species of certain megachilid bees in cooperation with Dr. P. D. Hurd, numerous new distributional records outside of California as well as some new species have come to light. The present paper has been written in order to bring our knowledge of these recently revised groups up to date and to make certain records and new names available for use in the above mentioned work. Dr. Hurd provided much help in bringing together the locality data.

The specimens recorded or described below come from many sources. I am indebted to each of the following for use of material under his care: Dr. W. F. Barr of the University of Idaho [U. I.]; Dr. G .E. Bohart of the Bureau of Entomology and Plant Quarantine, Logan Utah [G. E. B.]; Dr. G. D. Butler, Jr. of the University of Arizona [U. A.]; Dr. M. A. Cazier of the American Museum of Natural History [A. M. N. H.]; Dr. P. D. Hurd of the University of California, Berkeley [U. C., B.]; Dr. G. F. Knowlton of the Utah State Agricultural College [U. S. A. C.]; Mr A. T. McClay of the University of California, Davis [U. C., D.]; Dr. L. W. Quate of the University of Nebraska [U. N.]; Dr. E. S. Ross of the California Academy of Sciences [C. A. S.]; Dr. H. A. Scullen of Oregon State College [O. S. C.]; Mr. P. H. Timberlake of the University of California, Riverside [U. C., R.]. The letters in brackets are used to identify these collections in the following pages.

Considerable material in the Snow Entomological Museum of the University of Kansas [K. U.], mostly collected by Dr. R. H. Beamer or under his direction, is herein recorded for the first time.

Heriades cressoni Michener

Nebraska: Monroe Canyon, Sioux County, August 18, 1902, on Solidago (E. J. Taylor), August 15, 1908 (E. W. Dawson); Glen, Sioux County, 4000 feet altitude, August 20, 1906 (L. Bruner) [all U. N.]. Utah: Bryce National Park (rim road), June 21, 1939, on *Senecio* (P. H. Timberlake) [U.C., R.]. Wyoming: Jenny Lake, Grand Tetons [G.E.B.].

Heriades leavitti leavitti Crawford

This form, formerly thought to be confined to the eastern and Gulf coasts, is now known to be widespread in the interior of the continent, as shown by the following records:

Illinois: Carlinville (C. Robertson). Nebraska: Roca, on *Anthemes cotula,* June 28, 1910 (M. H. Swenk); Omaha, July 27, 1914, August 16 and 18, 1913, September 3, 1913 (L. T. Williams); Wyoming, on *Melilotus officinalis,* June 5, 1913 (M. H. Swenk) [all U. N.]. Texas: Salado Creek, Bexar County, March 21, 1952 (M. Wasbauer) [U. C., B.].

[1]Contribution Number 861 from the Department of Entomology, University of Kansas.

Hymenoptera-Apoidea - Heriades ~~Osminae~~
" Ashmeadiella
" Proteriades
" " Chelostoma

These records are based on males. Females are virtually indistinguishable from those of the much commoner *H. variolosus,* although the wings average darker.

Contrary to the synonymy indicated in a previous paper (Michener, 1938), the *carinatus* of Robertson (1903, Trans. Amer. Ent. Soc., 29:171) was *leavitti* mixed probably with females of *variolosus.*

Heriades leavitti crawfordi Graenicher

NORTH CAROLINA: New River, September 20 to 30, 1944 (G. E. Bohart) [G.E.B.]. FLORIDA: Orlando, March, 1944 (G. E. Bohart) [G.E.B.].

Heriades texana Michener

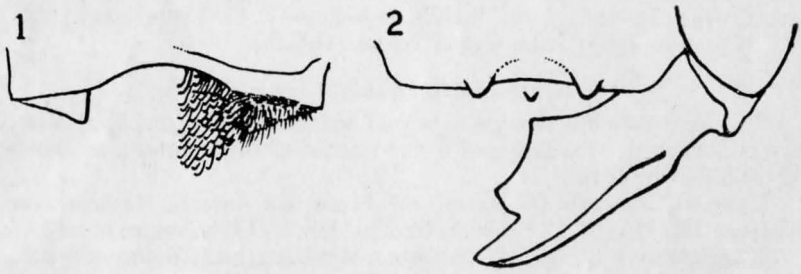
TEXAS: Uvalde, April 14, 1952 (Michener, Beamers, Wille, La Berge) [K. U.].

Heriades variolosa purpurascens Cockerell

TAMAULIPAS: Twenty miles north of El Limón, November 10, 1946 (E. S. Ross) [C. A. S.].

Heriades micropthalma new species

This species of the subgenus *Neotrypetes* superficially resembles the common and widespread species, *Heriades variolosa* (Cresson). It differs strikingly in both sexes from *variolosa* in the much smaller ocelli, which are usually separated by two or more diameters. In *variolosa* they are separated by little more than one diameter. In occasional specimens of *micropthalma* the posterior ocelli are less minute, but never as large as in *variolosa.* The tubercles which delimit the clypeal emargination of the female are simple and subacute, not double or crenulate as usual in *variolosa.* The first metasomal sternum of the male is rounded, not pointed as in *variolosa.* Other differences are indicated in the description. Small ocelli like those of *micropthalma* are known among American *Heriades* only in *H. micheneri* Timberlake which is very different as shown in the accompanying key.



EXPLANATION OF FIGURES

Heriades micropthalma. 1, posterior part of fifth metasomal sternum of male, vestiture omitted at left. 2. lower part of face and mandible of female.

H. micropthalma occurs in the desert areas from western Texas to Utah and Arizona. In most of this area *variolosa* is scarce or absent. It does, however, occur at Las Cruces, Mesilla, and Socorro, New Mexico, and *H. asteris* Cockerell from the first of these localities is clearly a synonym of *variolosa,* as indicated previously (Michener, 1938) and not the same as the present new species.

Female.—Length 6.5 mm. (varying from 5 to 7.5 mm. among paratypes). Pubescence white. Labrum with one basal tubercle; mandible with two widely separated longitudinal carinae extending to base, each of them slightly thickened and elevated between one third and one fourth of the distance from base to apex of mandible; because of these elevations the lower margin of the mandible appears slightly concave medially when seen from front; distance between first and second mandibular teeth less than that between second and third; malar space produced to a small tooth beneath; clypeus above as coarsely punctate as supraclypeal area; anterior margin of clypeus with emargination two thirds as wide as base of clypeus, delimited on each side by a sharp tubercle. Wings light brownish (paler than the average *variolosa*). First and second metasomal terga more finely punctate than others, the abdominal punctation essentially as in *variolosa variolosa.*

Male.—Length 5.5 mm. (varying to 6 mm. among paratypes). First segment of flagellum much broader than long; lower (or anterior) margin of mandible slightly convex basally; labrum with basal raised area. Legs black. First metasomal sternum produced far over second, its apex rounded, its profile elevated to a gentle convexity about two thirds of the distance from the base of the sternum to its apex; profile of sixth tergum straight apically; fifth sternum with dense masses of capitate hairs on either side of midline (figure 1); sixth sternum down curved at pointed apex, with dense subapical hair band, broken medially.

Holotype female.—Williams, ARIZONA, July 3, 1950 (Paul P. Cook) [K. U.]. Allotype male, same locality and date (R. H. Beamer) [K. U.]. Twenty three female and two male paratypes from the following localities: ARIZONA: Grand Canyon, August 19, 1939 (E. C. Van Dyke) [C. A. S.]. UTAH: Glendale, July, 1951 (G. F. Knowlton) [U. S. A. C.]. NEW MEXICO: Grant, on *Tetradymia canescens,* July 20, 1950 (C. D. Michener) [K.U.]; Rito, August, 1910 [K.U.]; Sandia Mountains, on *Monarda* and on *Melilotus officinalis,* July 17, 1952 (R. H. and L. D. Beamer, W. La Berge C. Liang [K.U.]; San Jose, on *Petalostemon,* July 21, 1950 (C. D. Michener) [K.U.]. TEXAS: Davis Mountains, Jeff Davis County, July 9 and 10, 1952 (H. A. Scullen) [O. S. C.]; Chisos Mountains, Big Bend National Park, July 3, 5, 9, and 10, 1942 (H. A. Scullen) [O. S. C.], July 4 and 6, 1942 (E. C. Van Dyke) [C. A. S.]; Big Bend, June 23, 1947 (R. E. Elbel) [K. U.].

Heriades micheneri Timberlake

ARIZONA: Baboquivari Mountains, October, 1924 (O. C. Poling); 17 miles south of Tucson, 2800 feet altitude, August 16, 1946 (H. A. Scullen); 10 miles north of Nogales, Santa Cruz County, 3700 feet altitude, August 16, 1946 (H. A. Scullen) [O. S. C.].

I am indebted to Mr. P. H. Timberlake for the loan of the only two previously known specimens of this species (holotype and allotype) in order to verify the identification. All known specimens are from a limited area in southern Arizona. Because three species of the subgenus *Neotrypetes* have been described since the genus *Heriades* was revised, the following new keys are presented. The subspecies of *leavitti* and *variolosa* are not considered in the keys.

Keys to the Species of Heriades, subgenus Neotrypetes

Females

1. Clypeus truncate or with broad, very shallow, apical emargination, as wide as basal width of clypeus 2
   Clypeus with median apical emargination narrower than basal width of clypeus 3
2. Basal end of ventral carina of mandible produced to a high tubercle or tooth less than half distance from base to apex of mandible; malar space with small ventral denticle (central Texas to southern Arizona) ..... *texana* Michener
   Neither mandibular carina produced to form a tubercle, but anterior face of mandible with strong horizontal subbasal ridge; malar space produced to large ventral tooth (New Mexico, Arizona) ..... *crucifera* Cockerell
3. Middorsal portions of metasomal terga with punctures rather small and well separated; no contrast in punctation between second and third terga (Central America) 4
   Middorsal portion of at least sixth tergum with punctures close, without shining interspaces; punctures of dorsal portions first two terga usually conspicuously finer than those of following terga. (North America) 5
4. Abdominal pubescence white (Panamá) ..... *currani* Michener
   Abdominal pubescence yellow or reddish (Costa Rica) ..... *bruneri* Titus
5. Ocelli large, separated by little more than their diameters 6
   Ocelli small, separated in most specimens by nearly twice their diameters 7
6. Apical half of wing usually darker brown (Nebraska and Texas to the Atlantic) ..... *leavitti* Crawford
   Apical half of wing usually paler brown (North America from Southern Canada to Yucatan; absent from southwestern deserts) ..... *variolosa* Cresson
7. Mandibular carinae low and uniform throughout; clypeal emargination minutely denticulate (Southern Arizona) ..... *micheneri* Timberlake
   Mandibular carinae both elevated before middle; clypeal emargination smooth (West Texas to Utah and Arizona) ..... *micropthalma* Michener

Males

1. Apex of first metasomal sternum broadly truncate, the sternum medially produced to large high tubercle which is acute seen in

profile (this sternum suggestive of that of the subgenus *Physostetha*) ..... *micheneri* Timberlake
First metasomal sternum produced to a rounded or pointed apex, the sternum only gently elevated medially 2
2. First metasomal sternum produced to a pointed apex; anterior legs normally partly red ..... *variolosa* Cresson
First metasomal sternum with apex rounded; anterior legs black except in rare individual variants 3
3. First metasomal sternum with ventral elevation more than two thirds of distance from base to apex 4
First metasomal sternum with ventral elevation less than two thirds of distance from base to apex 6
4. Fourth metasomal tergum with punctures much coarser than those of second; subapical hair of sixth sternum soft and white ..... *crucifera* Cockerell
Fourth metasomal tergum with punctures not coarser than those of second; subapical hair of sixth sternum (at least in *currani*) consisting of a row of coarse, amber spatulate hairs extending in full width of sternum 5
5. Abdominal pubescence white ..... *currani* Michener
Abdominal pubescence yellow ..... *bruneri* Titus
6. Ocelli large, separated by little more than their diameters ..... *leavitti* Crawford
Ocelli small, usually separated by nearly twice an ocellar diameter ..... *micropthalma* Michener

Chelostoma phaceliae Michener

NEVADA: Dagget Pass, Douglas County, June 16, 1952 (E. I. Schlinger) [U. C., D.]. WASHINGTON: Asotin, June 25, 1936 (I. McCracken) [C. A. S.]. UTAH: Logan, June 4, 1948 and July 14, 1947, the latter on *Phacelia linearis* (all G. E. Bohart) [G. E. B.].

Chelostoma marginatum incisuloides new subspecies

As will be reported elsewhere, the forms such as *marginatum* previously considered as subspecies of *C. minutum* Crawford are good species as indicated by their overlapping distributions and distinct morphological differences. The most characteristic specific character of *marginatum* is the fringe of the fifth sternum of the male which occupies only the median part of the sternal margin and consists of pale bristles which are unbranched but wavy apically.

C. marginatum marginatum is known from southern California, northward in arid regions east of the Sierra Nevada at least to the Argus Mountains, Inyo County. West of the Sierra Nevada in central California another form, *incisuloides,* occurs, as described below:

Male.—Differs from typical *marginatum* in that the median teeth of the seventh metasomal tergum are fused almost to their apices, so that the emargination between them is only about as wide as deep.

Female.—Differs from *marginatum* in the somewhat longer head, so that a line drawn tangent to the summits of the eyes passes a full ocellar diameter in front of the median ocellus.

Holotype male, allotype female, and seven male paratypes: San Joaquin Experiment Station (near O'Neals), Madera County, CALIFORNIA, April 18, 1953 P. D. Hurd) [U. C., B.]. Most of these specimens were on *Phacelia platyloba* but one paratype was on *Amsinckia* and two on *Cryptantha.* The holotype and allotype are in the Snow Entomological Museum, University of Kansas.

Three additional specimens of this subspecies, all from CALIFORNIA, are listed as follows: five miles south of Three Rivers, on *Pentstemon laetus,* May 1, 1947 (P. H. Timberlake) [U. C., R.]; Mount Diablo, Contra Costa County, on *Eriodictyon,* April 21, 1953 (P. D. Hurd) [U. C., B.]; Adobe Creek, west Stanislaus County, May 6, 1948 (R. F. Smith) [U. C., B.].

It is strange that in its principal distinctive feature, the shape of the seventh metasomal tergum of the male, this species agrees with the closely related but distinct species, *C. incisulum* Michener. *C. incisulum* and *C. marginatum incisuloides* occupy the same range so far as known from meager records. It would be interesting to know if the *incisulum*-like characteristics of *incisuloides* resulted from introgression of genes from *incisulum* into the northern populations of *marginatum.*

A series of females collected with the types on April 18, 1953, have shorter heads and appear to be *C. incisulum.* This view is supported by three males of *incisulum* collected at the type locality on March 24, 1953, at which time no other *Chelostoma* were taken. This meager evidence suggests that the season of flight of *C. incisulum* may be earlier at this locality than that of *C. marginatum incisuloides.*

Chelostomopsis rubifloris (Cockerell)

OREGON: Klamath Falls, May 9, 1924 (C. L. Fox) [C. A. S.]; Eagle Ridge, Klamath Lake, May 14, 1924 (C. L. Fox) [C. A. S.]; Griffith Creek, Jackson County, June 29, 1951 (A. T. McClay) [U. C., D.].

Proteriades palmarum (Cockerell)

This rare black *Proteriades* is evidently quite variable and it seems almost certain that *P. nigra* Timberlake and Michener is a synonym since the characters mentioned to distinguish *nigra* when it was described appear, in the light of the three more females now available, to vary within populations and seem not to be correlated with one another.

The male of *palmarum* has not been previously described.

Male.—Length 5.5 mm. Black, tegulae and apical margins of first six metasomal terga translucent testaceous, apical halves of mandibles red, flagellum brown beneath, tarsi dark brownish, wings hyaline with veins and stigma dark brown. Head much broader than long, slightly broader than thorax; genal areas two-thirds as wide as eyes seen from side, widest below middle of eyes; antennae with middle segments of flagellum as long as wide; margin of clypeus with broad, somewhat crenulate, slightly concave truncation, the margin of which is thickened and broadly impunctate, this trunca-

tion considerably broader than labrum and limited by distinct angles; mandibles with outer tooth much longer and more slender than inner. Middle coxae each with a small tooth in front of base of trochanter; hind coxae with inner ventral carinae very high but scarcely lamellate. Sixth metasomal tergum with distinct but rounded tooth on each side, tergal margin basad of tooth slightly concave; seventh tergum produced to truncate apex less than half as wide as base of tergum; first sternum evenly convex across apex where it is only slightly elevated above following sternum, pubescence sparse, evenly distributed except for being somewhat denser along posterior margin; second sternum without definite preapical swelling; apical fringes on second to fifth sterna very long and white, these sternal margins straight or the more posterior ones gently concave; ferruginous median fold on sixth sternum well developed, long, narrowly flattened at summit, apex not produced as spine, short pubescence not modified. Head and thorax finely and closely punctured, punctures dense and very fine on face below middle, coarser on frons and vertex; punctures of mesoscutum not or scarcely coarser than those of vertex, those of mesepisterna distinctly coarser than those of mesoscutum and genal areas. Pubescence white, not particularly dense, the abdominal bands broken (or worn) medially.

The male described above was collected with two females at Borego, San Diego County, California, on *Cryptantha barbigera,* March 31 and April 1, 1953 (P. D. Hurd) [U. C., B.].

Proteriades incanescens nevadensis Timberlake and Michener

The male of this species is here described for the first time.

Male.—Length 5.5 to 6.5 mm. Black, including abdominal sterna; first to third metasomal terga red, fourth red except for middorsal spot; posterior margins of terga broadly testaceous; mandibles reddish subapically; flagellum dark brown, paler beneath; wings dusky hyaline, stigma and veins black. Head much broader than long, inner orbits nearly parallel, genal areas about as broad as eyes from side; distance between posterior ocelli distinctly less than distance from one of them to posterior margin of vertex or to eye margin; clypeal margin broadly convexly rounded, slightly crenulate, angulate sublaterally, margin not thickened; mandible with outer tooth acute, inner tooth ending in about a right angle and much shorter than outer; maxillary palpi five-segmented; hairs of galeae and labial palpi sparse and scarcely hooked; hypostomal carinae rather low; flagellar segments all longer than broad, second the shortest, middle segments about one and one-half times as long as broad; upper surface of flagellum clothed with longer hairs than lower surface, those of basal segments particularly long, some of them more than half as long as diameter of flagellum. Middle coxae not toothed; posterior coxae not lamellate, carinae almost absent, but inner ventral surfaces distinctly swollen. Sixth metasomal tergum with a distinct acute tooth at each side; sides of seventh tergum gently concave, apex strongly bilobed, emargination between lobes much deeper than a semicircle and about three times as wide as one of the lobes, each lobe rather long and parallel sided, obliquely truncate apically; first metasomal sternum flat, sparsely pubescent except for irregular fringe along posterior margin, second sternum

without swellings, greatly expanded posteriorly so that third is entirely concealed medially, posterior margin of second broadly convex; third sternum with broad median emargination involving almost entire width of sternum and with a fringe only medially, this fringe completely covered by second sternum in repose; fourth sternum with posterior margin straight medially, convex laterally, fringed with yellowish hairs; fifth sternum with margin gently convex, similarly fringed; sixth sternum with light brown median fold continued as slender projection between two broad apical lobes, no specialized short pubescence present on fold or projection. Pubescence of head and thorax rather fine, that of vertex slightly coarser and closer than that of mesoscutum; clypeal margin broadly impuncate and shining. Pubescence white, brownish dorsally, largely covering face, not forming abdominal bands.

CALIFORNIA: Blanco's Corral, White Mountains, Mono County, 10,000 feet elevation, June 29, 30, and July 8, 1953 (J. W. Mac Swain) [U. C., B.]. One female, several males.

The male of this species is unique among known *Proteriades* in having the second metasomal sternum enlarged, the third emarginate, as in many *Anthocopa* and *Osmia*. Remarkable as this character may be, it is closely approached by the male of *remotula* and there seems no reason to doubt the association of these males with the female *incanescens,* especially since the presumed male of *incanescens* agrees with that of the related species, *remotula,* in the near absence of hooks on the hairs of the mouthparts.

Proteriades incanescens tota new subspecies

Female.—Length 7 mm (6.5 in paratype). This subspecies is similar to *P. i. nevadensis* but is larger in size, lacks red coloration on the abdomen and has distinctly dusky wings. The distance between the posterior ocelli is considerably less than the distance from one of them to the eye margin.

Holotype female.—Strawberry, Tuolumne County, CALIFORNIA, July 1, 1951 (J. J. Drea) [K. U.]. One paratype female: Pinecrest, Tuolumne County, CALIFORNIA, July 12, 1953 (B. L. Rozen) [U. C., B.].

Proteriades nigrella new species

This species is very small, like *P. pygmaea* and *nanula,* but differs from them in lacking red markings or in having them confined to the first two metasomal terga; in the much coarser punctation, the large and widely separated punctures of the clypeus of the female being especially conspicuous; in the strongly angled sides of the sixth metasomal tergum of the male; in the more nearly equal mandibular teeth of the male; and in the more definitely truncate clypeus of the female.

Female.—Black, posterior margins of metasomal terga broadly testaceous, apical portions of mandibles red (the teeth dark); flagellum brown beneath. Mandibles constricted basad of middle, not much broadened apically, teeth all acute, distance between lower and middle tooth less than that between middle and upper tooth; maxillary palpi tapering, four segmented; distance between posterior ocelli subequal to distance from one of them to eye margin, greater than distance from one of them to posterior margin of vertex. Clypeus

broadly truncate, angles limiting truncation rounded, sublateral angles distinct and closer to ends of truncation than to lateral angles of clypeus; clypeus unusually coarsely punctured, punctures separated by considerable shining ground medially; head and thorax otherwise considerably more finely punctured, punctures separated by less than a puncture width; wings feebly dusky, veins and stigma black. Punctures of abdomen finer than those of thorax, separated by more than a puncture width in some areas middorsally but close laterally; pubescence moderately dense and whitish, first five terga with narrow apical hair bands, fifth and sixth terga with white pubescence scattered over surfaces.

Type material: see *P. nigrella nigrella* below.

Proteriades nigrella nigrella new subspecies

Female.—Length 4 mm. (varying to 3.5 among paratypes). Abdomen without red areas; tegulae translucent brown.

Holotype female and seven female paratypes: Box Canyon, Riverside County, California, on *Cryptantha angustifolia,* April 17, 1952 (P. H. Timberlake) [U.C.,R.]. One female paratype: Twenty-two miles north of Manix, San Bernardino County, California, on *Cryptantha angustifolia,* April 26, 1953 (P. D. Hurd) [U. C., B.].

Proteriades nigrella attonita new subspecies

Female.—Length 5 mm. Sides of first metasomal tergum and extreme sides of second red; tegulae nearly black.

Male.—Length 4 mm. Coloration as in female though red at sides of metasoma basally very dark and inconspicuous. Head broader than long; inner orbits converging below; genal areas more than half as wide as eyes seen from sides; clypeal truncation not quite as wide as base of labrum, limited by distinct angles, its margin broadly impunctate, not thickened, scarcely crenulate; mandibles with teeth acute, outer one not greatly longer than inner; hypostomal carinae low; distance between posterior ocelli scarcely greater than distance from one of them to eye margin, distinctly greater than distance to posterior margin of vertex; middle segments of flagellum about as broad as long. Punctation of head and thorax rather coarse, that of mesepisterna slightly finer than that of mesoscutum, the latter coarser than that of head. Middle coaxae not toothed. Tooth on each side of sixth metasomal tergum distinct, acute, though apex rounded; seventh tergum with apex narrow and distinctly bilobed because of rather deep median emargination; first sternum sparsely pubescent, evenly convex across apex; second sternum without preapical swelling, its apical fringe long, similar to that of third, fourth and fifth sterna; apical margin of second sternum weakly emarginate medially; third and fourth sterna distinctly and rather broadly emarginate medially, fringe of fourth sternum conforming to this emargination but that of third not so, hairs of median portion longer than those elsewhere; sixth sternum with the usual ferruginous median fold. Pubescence white, rather dense on the face but surface not completely hidden by it; bands of metasomal terga not evident (perhaps worn off).

Holotype female, allotype male, and one female paratype: Suprise Canyon, Inyo County, CALIFORNIA, on *Cryptantha racemosa*, April 29, 1953 (P. D. Hurd and G. A. Marsh) [K. U.].

Ashmeadiella californica florissantensis Michener

WYOMING: Jenny Lake, Grand Tetons National Park, July [G. E. B.]. IDAHO: Lewiston, July 18, 1925 (C. L. Fox) [C. A. S.].

Ashmeadiella difugita emarginatula Michener

NEVADA: Charleston Mountains, 9000 feet altitude, June 21, 1940 (R. M. Bohart) [G. E. B.]; twenty-five miles northwest of Gerlach, Washoe County, May 29, 1939 (P. C. Ting, M. A. Cazier, J. A. Downes, T. Aitken) [U. C., B.]. OREGON: Steens Mountains, 7000 feet altitude, June 9, 1927 (H. A. Scullen) [O. S. C.]. IDAHO: Twelve miles south of Rock Creek, Twin Falls County, July 1, 1951; five miles northeast of Midvale, Washington County, July 9, 1952, on *Eriogonum;* Coyote Grande, Nez Pearce County, on *Grindelia,* August 15, 1951 (all W. F. Barr) [U. I.]. The species is new to each of the states listed above. The femora are black or largely so in each specimen listed. Only one or two specimens were collected at each of the localities listed.

Ashmeadiella femorata (Michener)

NEVADA: Six miles south of Las Vegas, April 6, 1953 (Libby Smith) [U. C., B.].

Ashmeadiella cactorum cactorum (Cockerell)

WYOMING: Newcastle, June (M. Cary) [U. N.].

Ashmeadiella aridula aridula Cockerell

WYOMING: Worland, July 5, 1917 (L. Bruner) [U. N.] (three females). IDAHO: Downey, on *Solidago,* August 19, 1947 [K. U.] (one female). UTAH: Santa Clara, June 21, 1950 (G. F. Knowlton) [U. S. A. C.] (one female).

Ashmeadiella aridula astragali Michener

WYOMING: Grand Teton National Park, July, 1937 (R. M. and G. E. Bohart) [G. E. B.] (a single male.) This specimen is from a point well within the range of the subspecies *aridula,* although it agrees with *astragali.* It is recorded under *astragali* since there is a possibility that these subspecies overlap broadly geographically while occupying ecologically different zones.

One of two female specimens from Topaz Lake, Mono County, California, August 17, 1951 (E. I. Schlinger) [U. C., D.] lacks tegular punctures and therefore agrees in this respect with the subspecies *aridula* proper, although collected with a specimen of the subspecies *astragali* and within the range of that subspecies.

Ashmeadiella foveata Michener

The male of this species is here described for the first time.

Male.—Length 4.5 to 6 mm. Similar to female (see Michener, 1939) except for the usual sexual characters. Clypeus as coarsely punctured as frons and vertex; emargination of apical edge of clypeus much shorter than basal

width of clypeus and demarked by rather distinct angles; pubescence of clypeus not dense, not obscuring surface; distance between posterior ocelli slightly greater than distance to eye margin or to posterior edge of vertex. Tegulae black (also true of many females); mesepisterna more coarsely punctured than mesoscutum. Abdominal terga with punctures slightly coarser than those of mesoscutum; median teeth of sixth tergum fully as long as basal width, rather slender apically, having much the form of these teeth in species in which the teeth are much longer (It seems likely that specimens will be found having teeth conspicuously longer than broad.), emargination between these teeth slightly deeper than a semicircle.

CALIFORNIA: Mount Diablo, April 21, 1953 (P. D. Hurd) [U. C., B.].

In the key to the species of *Ashmeadiella* (Michener, 1939) the male of this species runs either to couplet 31 or to *gillettei* in couplet 24. It differs from Pacific coast populations of the latter species in the entirely black abdomen among other characters. The following additional records are based upon females:

NEVADA: Twenty-five miles northwest of Gerlach, Washoe County, May 29, 1939 (P. C. Ting, M. A. Cazier, J. A. Downes, T. Aiken) [U. C., R.]; Mount Montgomery, 7000 feet altitude, June 21, 1942 (R. M. Bohart) [G. E. B.]. UTAH: Ninety miles west of Hinckley, June 29, 1950 (C. D. Michener) [K. U.]. ARIZONA: Maricopa Mountains, April 14, 1947 (H. and M. Townes) [K. U.].

Ashmeadiella altadenae Michener

The hitherto undescribed female of this species appears to be represented by the single specimen from very near the type locality described below:

Female.—Length 5 mm. Pubescence pale brown, that of dorsum of head and thorax darkest, that of other areas much whiter; inner margins of eyes distinctly converging toward clypeus; face measured from outer margins of the eyes much broader than long; clypeus very finely and closely punctuate, anterior margin broadly reddish brown, truncation narrowly impunctate, width of truncation conspicuously shorter than distance from its end to eye margin, ends of truncation prominent; mandibles largely red except for the dark bases, distance from first to third mandibular tooth much less than width of eye, less than length of last three antennal segments taken together; distance from apex of lower tooth to apex of middle tooth distinctly more than that from apex of middle to upper tooth; frons and vertex distinctly more coarsely and less closely punctured than clypeus but genal areas more finely punctured, like clypeus; anterior ocellus farther from antennal bases than from posterior margin of vertex (but much nearer midpoint than in *rufitarsis*), distance between posterior ocelli slightly less than distance from one of them to eye margin or to posterior edge of vertex; mouthparts short, much as in *rufitarsis* but with maxillary palpi four-segmented instead of two segmented. Mesoscutum with punctures similar to those of vertex but slightly coarser, anterior margin rather densely hairy but without spots of especially dense pubescence; tegulae testaceous; mesepisterna with punctation middorsally distinctly finer than that of mesoscutum but laterally nearly as coarse as that of mesoscutum; punctures of dorsum of second tergum separated by a little

less than a puncture width; sides of first tergum largely red; posterior margins of terga testaceous; first five metasomal terga with apical whitish bands of pubescence; scopa thin, whitish; sixth matasomal sternum with broad transverse concavity in which the punctures are rather widely separated but not particularly larger than those elsewhere on sterna, surface between punctures minutely roughened and dull, concavity broader than convex space behind it.

CALIFORNIA: Arroyo Seco, San Gabriel Mountains, July 6. [K. U.].

In the key to the species of *Ashmeadiella* (Michener, 1939) this species runs to *rufitarsis* to which it is undoubtedly closely related. It differs from *rufitarsis* not only in the four-segmented maxillary palpi but in having the clypeal punctation much finer than that of the frons. It must be admitted that since males and females of this species have yet to be collected together, some doubt exists as to the correct association of the sexes, but in view of the peculiarities of the mouth parts this doubt seems extremely small.

Ashmeadiella bigeloviae (Cockerell)

NEVADA: Twenty-two miles south of Las Vegas, on a composite, April 3, 1953 (J. W. Mac Swain) [U. C., B.].

Ashmeadiella digiticauda Cockerell

BAJA CALIFORNIA: Fifteen miles north of San Ignacio, September 29, 1941 (Ross and Bohart) [C. A. S.]; Las Animas, Sierra Laguna, October 12, 1941 Ross and Bohart) [C. A. S.].

Ashmeadiella gillettei gillettei Titus

NEBRASKA: Harrison, on *Stenopetalum,* June 11, 1910 (L. Bruner) [U. N.]. A single female with the abdomen entirely black. SOUTH DAKOTA: Badlands National Monument. June 3, 1943 (G. R. Ferguson) [O. S. C.]. A single black female.

Ashmeadiella occipitalis Michener

SONORA: Hermosillo, September 12, 1938 (R. H. Crandall) [U. A.]. BAJA CALIFORNIA: Fifteen miles north of San Ignacio, September 29, 1941 (Ross and Bohart) [C. A. S.].

A remarkable feature of this species, not previously described, is the sixth sternum of the female. The exposed part of this sternum is entirely shallowly concave and coarsely punctate, the concavity being emphasized by the fact that the posterolateral margins of the sternum are produced posteroventrally as broad rounded rims extending beyond the margin of the tergum and hence visible from above.

Ashmeadiella leucozona Cockerell

ARIZONA: Phoenix, April 24, 1933 (R. H. Crandall) [U. A.].

Ashmeadiella sonora Michener

BAJA CALIFORNIA: Ten miles east of San Ignacio, September 30, 1941 (Ross and Bohart); Coyote Cove, Conception Bay, October 1, 1941 (Ross and Bohart) [all C. A. S.]. UTAH: Moab, August 11, 1947 (G. F. Knowlton) [U. S. A. C.].

Aashmeadiella opuntiae (Cockerell)

UTAH: Zion Lodge, June 20, 1939 (P H. Timberlake) [U. C., R.]; Tintic, June 18, 1952 (G. E. Bohart and E. A. Cross) [G.E.B.].

Ashmeadiella pronitens (Cockerell)

COLORADO: Ragget Mountain, Gunnison County, June 28, 1950 (O. A. Downing) [U. C., D.].

Ashmeadiella cubiceps cubiceps (Cresson)

A single male, presumably of this subspecies, is from Hurricane Creek, Wallawa Mountains, OREGON, August 7, 1950 (Grace H. and John L. Sperry) [U. C., R.]. The specimen is badly worn but apparently is not distinguishable from the male of the subspecies *clypeata,* described previously (Michener, 1939).

Ashmeadiella timberlaki solida Michener

NEVADA: Carson City, May 25, 1952 (E. I. Schlinger) [U. C., D.].

Ashmeadiella lutzi Cockerell

UTAH: Logan Canyon, 7500 feet altitude, on *Phacelia heterophylla,* July 4, 1947 (G. E. Bohart) [G. E. B.].

Ashmeadiella australis (Cockerell)

UTAH: Beaver Canyon, June 11, 1946 (R. M. Bohart) [G. E. B.]; Red Rock Canyon, June, 1950 (G. F. Knowlton) [U. S. C.].

Ashmeadiella stenognatha Michener

The record below represents the second collection of this species and the first known males.

Male.—Length 4.5 to 5 mm. Agrees with *A. salviae* Michener as described (Michener, 1939) but smaller; clypeal emargination slightly deeper although broad and not demarked by distinct angles; abdomen with more red, especially posteriorly, so that less than the median third of any tergum is black and on the fifth and sixth terga the black is reduced to median spots, that of the sixth smallest.

CALIFORNIA: San Joaquin Experiment Station (near O'Neals), Madera County, on *Phacelia platyloba,* April 18, 1953 (P. D. Hurd) [U. C., B.].

Ashmeadiella clypeodentata Michener

BAJA CALIFORNIA: Twenty miles west of Mexicali, on *Prosopis,* April, 1939 (C. D. Michener) [K. U.].

Ashmeadiella breviceps Michener

BAJA CALIFORNIA: Twenty miles west of Mexicali, on *Prosopis,* April, 1939 (C. D. Michener) [K.U.]. SONORA: Halfway between Sonoyta and Punto Penasco, 500 feet altitude, March 3, 1949 (G. M. Bradt) [A. M. N. H.].

Ashmeadiella rhodognatha Cockerell

BAJA CALIFORNIA: El Mayor, on *Prosopis,* April, 1939 (C. D. Michener) [K.U.]; twelve miles south of Palacio, on *Prosopis,* April, 1939 (C. D. Mich-

ener) [K. U.]; twenty miles west of Mexicali, on *Prosopis,* April, 1939 (C. D. Michener) [K. U.]. NEVADA: Twenty-nine miles east of Reno, on *Dalea polyadenia,* June 12, 1952 (R. H. and L. D. Beamer, W. La Berge, A. Wolf, C. Liang, C. Weiner) [K. U.].

Ashmeadiella xenomastax Michener

SONORA: Halfway between Sonoyta and Punto Penasco, 500 feet altitude, March 25, 1949 (G. M. Bradt) [A. M. N. H.].

Diceratosmia subfasciata subfasciata (Cresson)

ARIZONA: Tucson, June 16, 1938 (R. H. Crandall) [U. A.]; Yuma, June 26, 1951 (L. A. Carruth) [U. A.].

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