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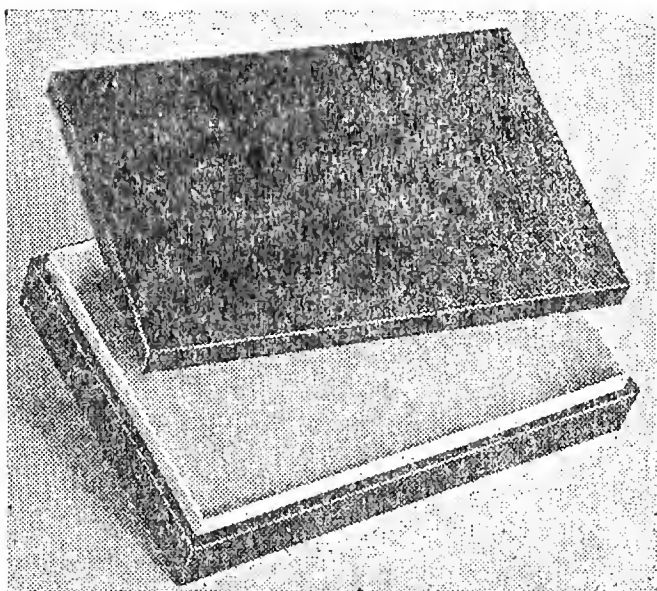
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SOME NEW GENERA AND SPECIES OF EPEOLINE AND NOMADINE BEES (Hymenoptera, Nomadidæ)

BY E. GORTON LINSLEY

University of California, Berkeley

The following descriptions are offered in advance of a more comprehensive study, now in progress, of the genera of the bee family Nomadidæ.

Genus EPEOLUS Latreille

Epeolus Latreille, 1802, Hist. nat. Fourmis, p. 427.

Phileremus, Cresson (nec Latreille), 1887, Trans. Am. Ent. Soc., Suppl., pp. 132, 297 (pars).

Argyroselenis Robertson, 1903, Can. Ent., 35:284.

Since the time of Cresson, a group of Epeoline bees with two submarginal cells has been separated from *Epeolus*, usually under the name of *Phileremus*. The latter name was proposed by Latreille for a group of distantly related bees and has long been considered synonymous with *Ammobates* Latreille. Ducke (1908) has referred one of these species with two submarginal cells to *Epeolus* (*americanus* Cresson) and has been followed in this respect by Cockerell (1921, 1934). *Phileremus montanus* Cresson is very closely related to *P. americanus* and the two should have the same generic disposition. Both species agree with typical *Epeolus* in the form of the mandibles, maxillary palpi, and structure of the terminal abdominal segments, differing only in having lost the second transverse cubital vein in the anterior wing. The group typified by *Phileremus mesillæ* Cockerell, however, is not closely related to the above mentioned Cresson species. It differs in having the mandibles simple or with a feeble inner tooth at middle, rather than with a stout subapical tooth, the wings are hyaline instead of tinted with fuscous, and the abdominal bands are entire, unbroken at the middle, and attaining the lateral tergal margins. This group is confined to the desert areas of southwestern United States and

although it seems advisable for the time being to retain these in *Epeolus*, it may sometime be necessary to separate them subgenerically. In southern California, in addition to what appears to be typical *mesillæ*, there is a larger subspecies (7.5 — 8 mm. as compared with 5.5 — 6 mm.) which differs in having the abdominal bands less distinctly defined and the dark areas clouded with white pubescence. This form may be designated as *Epeolus mesillæ palmarum*, new subspecies. Holotype female (No. 4789, Calif. Acad. Sci., Ent.) and allotype male (No. 4790, Calif. Acad. Sci., Ent.), collected by the writer at Edom, Riverside County, California, March 28, 1937, at flowers of *Larrea glutinosa*. Paratypes from Palm Canyon, Edom, and Box Canyon, all in Riverside County, in the collections of Mr. P. H. Timberlake, Mr. C. D. Michener, and the writer.

Argyroselenis Robertson, based on *Triepeolus minimus* Rob., is merely an *Epeolus* with two free segments in the maxillary palpi.¹ In both *Epeolus* and *Triepeolus* the palpi may have either one or two free segments, although there are usually two in the latter and one in the former. The palpal characters are therefore insufficient to separate the two genera. The most fundamental difference between them is in the structure of the genitalia and form of the apical abdominal segments. In the female of *Epeolus* the fifth tergite bears a silvery pubescent band and the pseudopygidial area is undifferentiated, the pygidial field of the sixth tergite is narrowly rounded at the apex, and the sixth sternite terminates in two broadly curved processes. In *Triepeolus* the fifth tergite bears a flattened, bevelled, pseudopygidial area, the pygidial field of the sixth tergite is broadly rounded, and the sixth sternite terminates in two long, straight, slender processes armed at the apex with stout, diverging spines. *Epeolus* is a Holarctic group of northern origin, *Triepeolus* an American group, probably of southern origin.

Triepeolus mojavensis Linsley, new species

Female: Black, pubescence black, variegated with whitish on pronotum and mesoscutum and with bands of white on abdominal tergites. *Head* narrower than thorax; vertex sparsely pubescent,

¹ Cockerell (1921, Am. Mus. Nov., 23:2) has suggested that *Argyroselenis* may be the same as *Diepeolus* Gribodo, which has two free segments in the maxillary palpi. The type species of Gribodo's genus is unknown to me but the probabilities are that it should also be considered an *Epeolus*.

moderately coarsely, closely punctured, the surface becoming rugose near the eye margins; ocelli separated by nearly one ocellar diameter; frons coarsely, closely punctured, rather densely clothed with moderately long, erect, black hairs; cheeks moderately coarsely, closely punctured, not carinate; antennæ black, scape robust, less than three times as long as broad, pedicel moderately retracted within apex of scape, about one and one-half times as broad as long, first flagellar segment shorter than second; clypeus subglabrous, finely punctured basally, a little more coarsely, closely toward apex; labrum more coarsely and less regularly punctured than clypeus, apex feebly emarginate at middle; maxillary palpi composed of two free segments. *Thorax* robust; pronotum clothed along dorsal margin with prostrate, whitish hairs; mesoscutum moderately coarsely punctured, the punctures averaging a little less than one puncture width apart, becoming sparser on posterior disk, anterior and lateral margins clothed with prostrate, whitish hairs; tegulæ subglabrous, distinctly and only moderately finely punctured; axillæ triangular but not produced as a tooth or spine; mesoscutellum moderately biconvex, punctures similar to those of mesoscutum, varying from less than one to one puncture width apart, median line and lateral and posterior margins clothed with prostrate whitish hairs; mesepisterna coarsely, closely, subrugosely punctured, clothed with erect, black hairs which are replaced by white along dorsal margin; mesosternum similarly punctured, the hairs all black; metanotum more finely punctured than mesoscutellum, clothed with prostrate whitish hairs, a little longer and suberect at sides; propodeum with triangular area shining, very finely, closely punctured, subglabrous, sides of propodeum moderately densely clothed with long, whitish, prostrate and suberect hairs; wings lightly tinted with fuscous, marginal cell longer than distance from its apex to tip of wing, first submarginal cell along posterior margin, about as long as second and third together; legs black, clothed with short, black pubescence. *Abdomen* with tergites finely, closely punctured, dark areas clothed with prostrate, brownish black pubescence; first tergite with a broad, dense band of white pubescence at sides, narrowly separated on posterior margin, more widely and arcuately at middle where it leaves an oval dark area on disk; tergites two, three, and four with a broad, white band of hairs along apical margin; fifth tergite with a broad pseudopygidial area, defined primarily by coarse, erect and suberect, brown hairs; pygidial plate of sixth tergite broadly triangular, sides straight, apex broadly rounded; sternites black, finely, closely punctured, sparsely clothed with prostrate black pubescence; processes of sixth sternite slender, straight, apices spinose and clothed with long hairs. Length: 8-10 mm.

Holotype female (No. 4801, Calif. Acad. Sci., Ent.), and two paratypes, also female, collected by the writer at the junction of Deep Creek and the Mojave River, on the Mojave Desert near Hesperia, California. The specimens were flying about the nests of an undescribed species of *Anthophora*.

This remarkably anomalous species is intermediate in many of its characters between *Triepeolus* and *Epeolus*, but seems unquestionably to belong to the former genus. The maxillary palpi are composed of two free segments, the marginal cell is elongate, and the processes of the sixth sternite are slender, straight, and spinose at the apex, but the pygidial plate of the sixth tergite is broadly triangular with the apex broadly rounded. From all of the species of *Triepeolus* known to the writer, *mojavensis* differs in the absence of carinæ on the cheeks.

Protepeolus integer Linsley, new species

Male: Black, the antennæ, mouthparts, pronotal tubercles, tegulæ, scutellum, and legs entirely, or dominantly, reddish; pubescence mostly whitish, with small patches of brown. *Head* with vertex behind the ocelli shining, subglabrous, moderately coarsely punctured, the punctures varying from less than one to one puncture width apart; occiput clothed with long, erect, pale hairs; facial pubescence very dense, white, obscuring the surface, longer and suberect on clypeus; ocelli large, nearly touching, lateral ocelli separated from margin of compound eye by less than two ocellar diameters; antennæ with scape slender, pedicel longer than broad, distinctly longer than second flagellar segment, first segment of flagellum about as long as the three following together; mandibles piceous at apex, basal half of outer face densely fringed with long, white hairs; maxillary palpi short, ultimate segment robust. *Thorax* moderately stout; pronotal tubercles clothed with white pubescence; mesoscutum punctured similarly to, but a little more closely than, vertex, the punctures finer anteriorly; anterior and lateral margins and anterior half of median longitudinal impression clothed with whitish hairs; pubescence of remaining surface shorter, brownish; lateral face of mesepisterna margined with white pubescence, disk more coarsely punctured than mesoscutum, clothed with longer brownish hairs; mesocutellum biconvex, more coarsely punctured at middle, surface subglabrous except for median line and lateral margins; metanotum subglabrous, more finely punctured than mesocutellum; propodeum with sides shining, coarsely punctured, sparsely clothed with long, white hairs; triangular area sparsely clothed with shorter, suberect hairs; legs reddish, coxæ and trochanters piceous to black, sparsely

clothed with white pubescence; wings lightly infuscated, a dusky streak beyond marginal cell, marginal cell broadly rounded at apex. *Abdomen* without a deep constriction between first and second sternites; transverse bands of tergites entire, formed of dense, short, plumose, white hairs; first and second tergites with a finely punctured, shining band along apical margins which is sparsely clothed with brownish hairs; tergites three to seven very densely white pubescent, the pubescence of tergite seven and the base of tergite five so dense as to appear velvety and more or less cream colored; tergite seven without a pygidial plate; sternite five very densely clothed with short, velvety, somewhat ochreous pubescence. Length approximately 13 mm., anterior wing 6 mm.

Holotype: male (in collection of P. H. Timberlake), from Douglas, Arizona, August 18, 1935, collected by Mr. W. W. Jones.

This species differs from *P. singularis* Linsley and Michener, its only known congener, by the more coarsely punctured integument, the sparsely pubescent metanotum, propodeum, coxæ, and trochanters, and the entire pubescent bands of the abdominal tergites. Morphological differences, some of which are probably sexual, may be enumerated as follows:

- Antennæ with first flagellar segment shorter than the following two together; anterior and lateral ocelli smaller, separated by about one ocellar diameter; maxillary palpi longer, ultimate segment slender; marginal cell obliquely truncate at apex; abdomen with a deep constriction between first and second sternites*singularis*, ♀
- Antennæ with first flagellar segment about as long as the following three together; anterior and lateral ocelli nearly touching; maxillary palpi shorter, ultimate segment robust; marginal cell broadly rounded at apex; abdomen without a deep constriction between first and second sternites.....*integer*, ♂

Hesperonomada Linsley, new genus

Integument finely punctured. *Head* nearly as wide as thorax; eyes attaining on vertex a line tangent to anterior margin of lateral ocelli, very narrowly separated from base of mandibles below, inner margins converging slightly on lower face; ocelli large, anterior ocellus separated from lateral ocelli by less than the diameter of a single ocellus, lateral ocelli separated from margin of eye by about four ocellar diameters; vertex rounded above, frontal suture distinct; antennæ short, scape robust, a little more than three times as long as broad, pedicel large, broader than long, flagellar segments longer than broad, the first shorter than

second; labrum broader than long, apex broadly rounded; mandibles simple, inner margin edentate; maxillary palpi distinctly shorter than first segment of labial palpi, composed of five free segments, the first about one and one-third times as long as second, remaining segments subequal in length. *Thorax* robust; mesoscutum convex, median impression distinct; axillæ rounded; scutellum more or less evenly convex, feebly bilobed; metanotum very transverse; mesepisterna short, vertical; anterior coxæ simple, not spined; legs short, anterior femora without a tooth; wings infuscated; marginal cell acute, apex not separated from costa, submarginal cells two, subequal in length, the second cell receiving the two recurrent veins at about an equal distance from base and apex. *Abdomen* slender, pubescent; lateral tergal processes of first segment closely appressed to sternite; pygidial area of seventh tergite of male entire, rounded.

Genotype: *Hesperonomada melanantha* n. sp.

This genus is related to *Nomada* but differs in the very short, five segmented maxillary palpi, finely punctured integument, and in having the lateral tergal processes of the first abdominal segment closely appressed to the sternite. From most of the subgenera of *Nomada* (*Heminomada* and *Melanomada* excepted) it also differs in having only two submarginal cells. *Hesperonomada* superficially resembles *Epeoloides* but may readily be distinguished by the elongate (rather than minute) last segment of the maxillary palpi, pointed marginal cell which is not separated from the costa at the apex, the more widely separated eyes with inner margins converging slightly below, and the form of the pygidial area in both sexes. From the Chilean genus *Herbstiella*², to which *Hesperonomada* may be related, it differs in the elongate (rather than broad) first discoidal cell and the simple mandibles.

Hesperonomada melanantha Linsley, new species

Female: Black, the mouthparts, flagellum, legs, and abdomen reddish; pubescence whitish. *Head* with vertex shining, finely, sparsely punctured; antennæ with scape and pedicel piceous, shining; flagellum dark reddish; frons dullish, a little more coarsely punctured than vertex, the punctures mostly separated by three or four puncture diameters; surface moderately densely,

² Hicks (1933, Am. Mus. Nov., 616:1) has recorded this genus from North America, describing a new species, *H. cockerelli* from California. An examination of the type by C. D. Michener and the writer reveals that the Hicks species is really a *Stelis* and *Herbstiella* should therefore be removed from our North American lists.

white pubescent, the hairs at side of face longer and more heavily plumose; clypeus pale reddish, darker at base, surface finely, sparsely punctured and pubescent; labrum, pale reddish, more coarsely, subcontiguously punctured; maxillæ and palpi pale reddish; mandibles reddish with the apices rufo-piceous. *Thorax* black; pronotal tubercles clothed with white hairs; mesoscutum shining, moderately coarsely punctured, the punctures of anterior discal area close, nearly contiguous, those of posterior discal area irregularly spaced, varying from less than one to two or three diameters apart, surface very sparsely clothed with depressed and suberect, plumose hairs; tegulæ rufo-testaceous, very finely punctured; mesepisterna densely clothed with white pubescence; scutellum a little more finely punctured than mesoscutum, very sparsely pubescent; metanotum sparsely punctured, densely clothed at sides with suberect, heavily plumose hairs; legs reddish, femora shining, finely, sparsely punctured, sparsely clothed with long, white, simple hairs, a few plumose hairs beneath; tibiæ and tarsi a little more closely punctured and pubescent; wings tinted with fuscous, with a pale area before apex just beyond second submarginal and discoidal cells; veins and stigma dark brownish. *Propodeum*, except triangular area, moderately finely punctured, densely clothed with depressed, laterally directed, heavily plumose white hairs; triangle very finely, closely punctured, subglabrous except for anterior angles. *Abdomen* pale reddish, tergites one to four, finely, sparsely punctured at base, with a broad, impunctate apical margin, these tergites sparsely clothed at sides with suberect, plumose hairs which under very low magnification suggest vague lateral bands or patches; tergite five finely, sparsely punctured at base, sparsely clothed with suberect, simple hairs, pseudopygidial area very densely clothed with short pubescence which obscures the surface; processes of sternite six with a number of black hairs at apex. Length: 5.5 mm.

Male: Black, including antennæ, legs, and abdomen, only the labrum, mouthparts and tarsi reddish; abdominal tergites one to five with a broad impunctate margin; pygidial area of seventh tergite finely punctured; apex broadly rounded. Length: 5.75 mm.

Holotype female (No. 4791, Calif. Acad. Sci., Ent.), and allotype male (No. 4792), captured at the Hastings Natural History Reservation near Jamesburg, California, in the Santa Lucia Mts., June 8-11, 1938, by Charles Michener. Paratypes: one male with the same data as the allotype, in the collection of Mr. Michener, one male from Antioch, California, September 10, 1936, M. Cazier collector, in the collection of P. H. Timberlake, one male from Westwood Hills, Los Angeles County, Cali-

fornia, July 27, 1935, in the collection of the writer, and one female, Laguna Beach, California (Baker).

H. melanantha resembles a species of *Nomada* (undescribed?) common on *Salix* at Berkeley, California.

Triopasites Linsley, new genus

Female: Integument finely punctured; vestiture not squamiform. *Head* nearly as wide as thorax; eyes with inner margins converging slightly below, widest at lower one-fourth, barely separated from base of mandibles; ocelli arranged in a triangle, hind margin of anterior ocellus barely intersecting a line tangent to anterior margins of lateral ocelli, anterior and lateral ocelli separated by a little less than the diameter of a single ocellus; antennæ inserted on a line a little below middle of eyes, scape slender, about four times as long as broad, pedicel nearly as long as broad, about one-half as long as first flagellar segment, first segment of flagellum a little longer than second, remaining segments subequal in length, except the last which is nearly one and one-half times as long as broad; labrum wider than long, subtriangular; mandibles short, armed with a feeble internal tooth; maxillary palpi very short, composed of three free segments which are more or less subequal in length, last segment slender, more or less acute at apex; labial palpi elongate, first segment a little half times as long as broad; labrum wider than long, subequal in length, together about two-thirds as long as second. *Thorax* robust; mesoscutum with median line impressed; axillæ very feebly dentate; scutellum almost evenly convex, indistinctly bilobed; metanotum about one-third as long as scutellum; anterior coxæ longer than broad; mesepisterna convex, anterior and ventral angles obtusely rounded; anterior wings with three submarginal cells, the first nearly as long as the second and third together, second receiving first recurrent nervure at about middle, third receiving second recurrent vein near apex, marginal cell large, nearly as long as discoidal cell, apex distinctly separated from costa, obliquely truncate; intermediate and posterior legs short, stout, their tibiæ with a few short spines on outer faces, claws simple, neither cleft nor toothed, pulvilli short, apex not swollen. *Abdomen* with five visible sternites, the sixth represented by a pair of narrow, projecting processes armed at the apex with a few diverging spines; fifth tergite with a pseudopygidial area at apex.

Genotype: *Triopasites timberlakei* n. sp.

This genus exhibits a remarkable combination of characters, some of which appear to bridge the gap between the Nomadine and Pasitine genera. In the former group it appears to be re-

lated to *Hesperonomada*, differing primarily in the form of the marginal cell (separated from costal margin), number of submarginal cells, and the short, three segmented maxillary palpi. The first of these characters will distinguish *Triopasites* from all of the Nomadine genera but *Hexepeolus*. In the Pasitine group, the genus bears a striking, although possibly superficial, resemblance to *Pasites* and *Oreopasites*. It may be distinguished from these genera by the venation of the anterior wings (marginal cell rounded at apex, three submarginal cells), the absence of carinæ along the inner ocular margins, the short, broad labrum, and the presence of a pygidial plate on the sixth abdominal tergite of the female.

Triopasites timberlakei Linsley, new species

Female: Black, mouthparts, legs, and abdomen pale reddish. *Head* sparsely clothed with short, suberect, heavily plumose white hairs; vertex finely, sparsely punctured about antennal bases, where the punctures are one to two diameters apart, more coarsely and irregularly near margin of eyes; antennæ reddish piceous, scape polished, very sparsely punctured; clypeus reddish, shining, finely sparsely punctate, the punctures mostly from four to six diameters apart, surface sparsely clothed with short, fine hairs; labrum similarly but more coarsely punctured than clypeus; mandibles pale reddish, becoming piceous toward apex. *Mesoscutum* polished, subglabrous, more coarsely punctured than head, punctures of disk largest and varying from nearly contiguous along median line to from one to three diameters apart at sides; tegulæ testaceous, darker at middle; scutellum punctured similarly to scutum, subglabrous; metanotum densely clothed with long, heavily plumose, white hairs; mesosternum shining, sparsely, coarsely punctured, the punctures mostly separated by from one to five diameters; mesepisterna moderately coarsely, closely punctured, sparsely clothed with depressed pale hairs, anterior coxæ clothed beneath with long, heavily plumose white hairs; legs moderately clothed with long pale hairs. *Propodeum* with sides coarsely punctured, clothed with long, white, plumose hairs, triangular area subglabrous, dull, tessellate. *Abdomen* dullish, tergites finely punctured at base, apical margin depressed, almost impunctate; tergites one to four sparsely clothed with very short, fine, inconspicuous pale hairs except for lateral apical margins which bear a transverse patch of long, heavily plumose, white hairs; pseudopygidial area of fifth tergite finely punctured, clothed with fine, erect, simple hairs; sternites finely punctured, sparsely clothed with long, depressed, pale hairs. Length: 5 mm.

Holotype female, from Riverside, California, May 10, 1926, in the collection of Mr. P. H. Timberlake who very kindly sent the specimen to the writer for study.

This species has almost exactly the form and coloration of an undescribed species of *Oreopasites* which occurs in the same region.

Paranomada velutina Linsley, new species

Male: Black, integument polished, shining, almost impunctate; pubescence white and ochraceous. *Head* distinctly narrower than thorax; occiput thinly clothed with pale pubescence; vertex subglabrous, with only a few, scattered hairs; ocelli small, anterior ocellus in a slight depression, separated from lateral ocelli by more than a single ocellar diameter; eyes small, attaining on vertex a line tangent to posterior margin of lateral ocelli, inner margins subparallel; frontal carina evanescent above, represented by a pit above antennal insertions; antennæ short, pedicel about as long as broad, flagellar segments subequal in length, wider than long, the first a little longer than the second; frons about antennal bases densely clothed with moderately long, suberect, pale pubescence; clypeus subglabrous, dark reddish; labrum densely pubescent; mandibles pale reddish, apices piceous; maxillary palpi very short, composed of four free segments, the first longer than broad, second about three times as long as third, third and fourth subequal in length. Thorax broad, dorso-ventrally compressed; pronotal tubercles densely clothed with pale pubescence; mesoscutum slightly convex, median impression not evident, pubescent only along lateral margins; metanotum pubescent, more densely at sides; lower mesepisterna and mesosternum subglabrous, with a few, short, widely separated, suberect, fine hairs; legs reddish brown, coxæ not strongly lamellate externally; femora moderately densely clothed with long, suberect, pale hairs, tibiæ and tarsi densely pubescent; wings tinted with fuscous, anterior pair with a large pale area before apex beyond the last submarginal and the discoidal cells, veins and stigma brownish. *Propodeum* polished, irregularly pubescent, with a patch of depressed whitish hairs along lateral margins, a patch over anterior angles of triangular area, and a patch on each side of posterior angle of area. *Abdomen* shining; tergites finely, sparsely punctured at base, with scattered, short, suberect hairs; tergites two to six with a very dense, narrow, convex band of velvety, ochraceous pubescence along apical and lateral margins; seventh tergite clothed with long, erect and suberect, ochraceous hairs, pygidial area clothed with short, suberect hairs, apex subtruncate, entire. Length: 12.5 mm.

Holotype: male (in collection of P. H. Timberlake), from Douglas, Ariz., August 10, 1936, collected by Mr. W. W. Jones.

This interesting species shares so many characters with *Paranomada nitida* Linsley and Michener, that I have placed it in the same genus in spite of the fact that the maxillary palpi are only four segmented and the coxæ lack the broad, lamellate processes. Since *P. nitida* is known only in the female and *velutina* only in the male sex, it is possible that the lamellate coxæ represents a sexual character. If this is not the case, and the palpal differences prove constant, it may be necessary at some time to separate *velutina* either generically or subgenerically. Other differences, which may or may not be sexual, include the following: (1) in *velutina* the legs, and especially the posterior tibiæ, are more slender; (2) in *nitida* the gular groove is more narrowed posteriorly; and (3) in *velutina* the anterior metatarsus is robust and angulate beyond the middle whereas it is slender throughout in *nitida*.

AN EXOTIC CONODERUS NEW TO CALIFORNIA, WITH
A NEW NAME FOR BICARINATUS VAN DYKE

(Coleoptera, Elateridæ)

Specimens of *Conoderus* (*Heteroderes*) *laurentii* (Guer.) have recently been collected near Huntington Park on the outskirts of Los Angeles. On July 10 and August 2, 1938, E. S. Herald, a University of California student, while working in his garden picked up several adult beetles.

This species is South American in origin, being represented in the British Museum, and Candeze Collection in the National Museum in Brussels by specimens from the West Indies, Argentina, Peru, Brazil and Colombia. It was first recorded in this country in 1927 in Southern Alabama (Hyslop, 1934), later in Florida and described by Blatchley as *fuscus*. In my review of the genus (Proc. Calif. Acad. Sci., Series 4, 20:298, 1932), I wrongly identified it as *amplicollis* Gyll.

Conoderes bicarinatus Van Dyke (nec Reitter, 1891), described in the same paper, should be changed to *Conoderus arizonicus* Van Dyke, new name.—Edwin C. Van Dyke.

ORNITHODOROS TALAJE ON THE CALIFORNIA
MAINLAND

BY THOMAS H. G. AITKEN

University of California, Berkeley

While traveling in Southern California during the past spring, the writer collected specimens of what is believed to be the first actual record of *Ornithodoros talaje* (Guérin-Mèneville) on the California mainland. This species was described by Guérin-Mèneville(1) in 1849 from Guatemala. Banks(2) in his "Revision of the Ixodoidea, or Ticks, of the United States," reports examining specimens from Gum Cave, Citrus County, Florida; Brownsville, Texas, and San Clemente Island, California. It has also been reported from New York(3), Wisconsin, Minnesota, and Colorado, but is primarily a Mexican, Central and South American species.

The adult ticks, fortunately one male and one female, were discovered in the trunk at the rotted base of a Joshua tree (*Yucca brevifolia* Englm.) in the Mojave Desert, about one mile east of Palmdale, San Bernardino County (April 14, 1938). In hacking at the trunk, any signs of a rodent's nest that might have been present were destroyed; however a few bits of dried grass and brush as well as other debris were found, which might have been the remains of a nest.

The finding of this tick in the Mojave Desert is of interest in that it adds to the list of potential relapsing fever vectors in this state. *Ornithodoros hermsi* Wheeler, 1935, is the vector of California Relapsing Fever in the High Sierra(4), whereas *Ornithodoros talaje* is considered the principal agent in relapsing fever transmission in Mexico, Central America and northern South America. The third species which has been reported from California, *Ornithodoros turicata* (Duges 1876), is the arthropod vector in Kansas and Texas.

Determinations were made by Dr. Charles M. Wheeler, The George William Hooper Foundation for Medical Research, University of California.

Mr. D. E. Howell has recently informed the writer that on August 6, 1938, he collected what he determined as *Ornithodoros talaje* on the west slope of Mt. Diablo, Contra Costa County, at an approximate elevation of 2000 feet. The single

specimen, a last nymphal instar, was found at the side of a rodent hole. Mr. Howell's identification has been confirmed by Dr. R. A. Cooley, Rocky Mountain Laboratory, Hamilton, Montana.

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TWO NEW AEDES RECORDS FOR CALIFORNIA

(Diptera, Culicidæ)

BY THOMAS H. G. AITKEN

University of California, Berkeley

On the 20th of June, 1937, while collecting in northeastern Shasta County, the writer captured several unusual-looking mosquitoes which have since been identified as *Aedes* (*Ochlerotatus*) *flavescens* (Müller) and *Aedes* (*Taeniorhynchus*) *nigromaculis* (Ludlow). Neither of these species have previously been reported from California.

Aedes flavescens (Müller) is distributed throughout the northern plains area of the United States and Canada, and has been recorded as far west as British Columbia and at Big Fork near Flathead Lake, Montana (Dyar, H. G. *The Mosquitoes of the United States*. Proc. U. S. Nat. Mus. Vol. 62, Art. 1, p. 74. 1922). Mail (*The Mosquitoes of Montana*. Montana Exp. Sta., Bull. 288, p. 30. 1934) states that the Big Fork record is doubtful, as it is the sole record west of the Divide, and furthermore the collection was made out of season, the mosquitoes being collected by E. Ricker, November 14, 1904. Mail suggests that Montana is the western boundary of the mid-continental range

of this species. Recent correspondence with Mr. H. H. Stage (Associate entomologist, U. S. Dept. Agric., Bureau of Ent. and Plant Quar., Portland, Oregon) permits me to further enlarge upon the distributional picture of this species. The following are definite Oregon records: Chewaucan Marsh (near Paisley), Lake County, June 16, 1931, and Adel, Lake County, July 16, 1932 (C. M. Gjullin Coll.); "OO" Ranch (near Burns), Harney County, August 21, 1933 (H. H. Stage Coll.). Stage states that *Aedes flavescens* (Müller) has been found generally abundant throughout Malheur, Harney, Lake and somewhat in Klamath counties; it probably also occurs in Grant and Baker counties. This pestiferous species appears to be widely distributed throughout the desert and semi-desert regions of Eastern Oregon where it is found breeding in water from irrigation ditches that has overflowed onto alkali flats. It is quite probable that both of the species dealt with in this paper will be found in Eastern Washington and in the northeastern corner of California in Lassen and Modoc counties. *Aedes flavescens* (Müller) also occurs in Alaska, Asia and Europe.

Aedes nigromaculis (Ludlow) apparently is chiefly an inhabitant of the arid plains of the Middle West where it breeds in rain puddles and irrigation water. It has been reported from Brownsville, Texas, northwards on both sides of the Divide to Alberta and Saskatchewan. The westernmost record until now appears to have been Boise, Idaho, August 4, 1901, C. B. Simpson (reported by Dyar). Through the kindness of Mr. Stage additional data are available from Oregon. There are records of this species from the eastern part of the state, and in particular, Hereford, Baker County, May, 1932 (C. M. Gjullin Coll.). Martini reports the collection of this species (one female) by Dr. Dampf from Santa Lucrecia, Veracruz, México, September 9, 1930 (Martini, E. *Los Mosquitos de México*. Boletines Técnicos, Serie A: Entomología Médica y Parasitología. No. 1, Departamento de Salubridad Pública, México. D. F. 1935).

The above species, together with *Culex tarsalis* Coquillett, were collected as they flew up from the grass in a somewhat marshy field, caused by high water in the nearby river. The locality for this new western record in California is Warm Springs, some seven miles northeast of Glenburn in the Fall River Valley; the elevation is approximately 3400 feet.

NEW SPECIES AND SUBSPECIES OF WEST AMERICAN
COLEOPTERA

BY EDWIN C. VAN DYKE

University of California, Berkeley, California

FAMILY LAMPYRIDÆ

Genus *Brachylampis* Van Dyke, new genus

Small, short and compact. Head of moderate size, concealed from above by overhanging prothorax because of flexed position, when extended fully reaching the anterior margin of prothorax; antennæ neither pectinate nor serrate but robust, somewhat compressed and almost reaching middle of elytra, the second, or second and third, segments short and transverse, less than one-half the length of the following; remaining segments almost one-half longer than broad, the proximal subtriangular, the distal with sides somewhat parallel, the eleventh or terminal elliptical, rounded at apex and without an appendix; eyes rather large, somewhat coarsely granular and well separated. Prothorax transverse, broadly rounded in front, with anterior margin narrowly reflexed; base bisinuate, with median area broadly lobed and narrowly margined, the hind angles acute, divergent and carinate, with deep foveæ within. Beneath: middle coxæ contiguous; epipleura distinct and broad at base; legs flattened, the fourth tarsal segments bilobed, short, concealing only the base of last segment; last three abdominal segments testaceous, the last ventral rounded at apex.

Genotype: *Brachylampis sanguinicollis*, new species.

This peculiar genus apparently belongs in the tribe Lucidotini but it is anomalous, looking like none of the other genera in North America. Its peculiar features are its small size and compact body, the prothorax strongly bifoveate at base, with bisinuate posterior margin and well defined, divergent hind angles, the head inflexed and concealed from above but well developed and reaching front margin of pronotum when extended, the antennæ short and compact, with first or first and second segments very short, the following elongate and more or less parallel sided, fourth tarsal segments short, covering only the base of the last, and the last three ventral segments testaceous, the last rounded at apex. As far as I know, it does not emit light. In size and shape it somewhat resembles *Brachypsectra* or *Omethes*, being generally broader and more robust than the latter but of the same length.

Brachylampis sanguinicollis Van Dyke, new species

Figure 1.

Small, compact, subparallel, black except prothorax which is rufous and the three terminal ventral segments which are testaceous; sparsely, finely pubescent throughout. Head of moderate size, front punctured, clypeus feebly sulcate; antennæ robust, second segment small and transverse, about one-half length of third, the following feebly triangular and almost one-half longer than broad. Prothorax about twice as broad as long, feebly convex; sides somewhat convergent forwards from hind angles; front slightly arcuate; disk with a fine median longitudinal impression

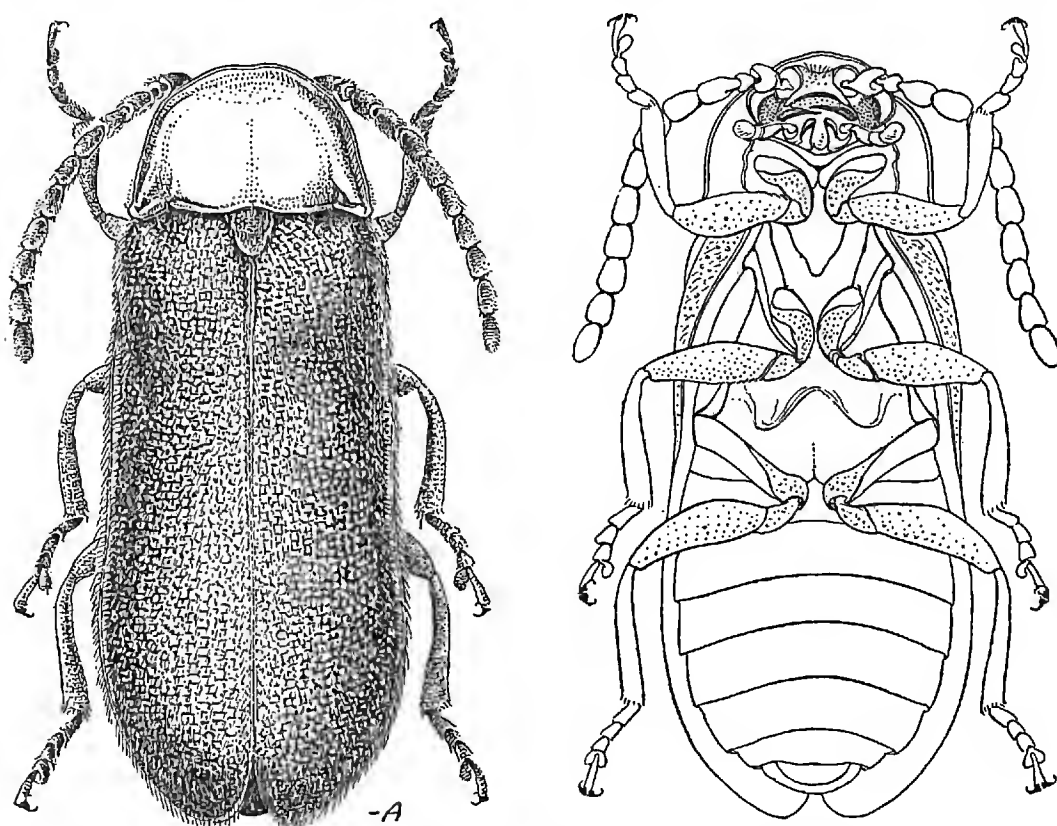


Fig. 1. *Brachylampis sanguinicollis* Van Dyke, n. sp., dorsal and ventral views. x 13.

and a small transverse ridge in front just behind the anterior reflexed margin; rather sparsely, feebly punctured; its other characters mentioned in the generic description. Scutellum well developed, rounded at apex, coarsely punctured, with short pubescence that appears slightly fulvous in strong light. Elytra twice as long as broad, subparallel and conjointly rounded at apex, the disk coarsely, irregularly punctured and rugose. Ventral surface rather finely punctured and scabrous. Length 5.25 mm., breadth 2 mm.

Holotype (No. 4766, Mus., Calif. Acad. Sci., Ent.) and numerous designated paratypes from a series of sixty-four specimens in my own collection in the California Academy of Sci-

ences, and forty-six specimens loaned me for study by Mr. Arthur T. McClay. All were collected at various times during June, 1929, from amongst the drift debris collected in a reservoir near Potwisha, Sequoia National Park, California. The color of the prothorax fades somewhat after death.

Brachylampis blaisdelli Van Dyke, new species

This species is very similar superficially to the preceding but differs by being in general slightly larger, proportionally broader, the prothorax in particular; by having the anterior prothoracic margin almost a complete semicircle as seen from behind, and the disk with a black spot extending from the apex to the middle of the base, the punctuation also considerably coarser; antennæ with segments II and III both small and transverse, II the larger; each about a third the length of IV which is triangular, twice as long as broad and somewhat broader than III or IV in *sanguinicornis*, the following segments gradually narrower toward the apex; scutellum subacute at apex, with a median longitudinal carina in front; and the elytra more coarsely and deeply sculptured.

Holotype (No. 4767, Mus., Calif. Acad. Sci., Ent.) from San Diego, California, and paratype from Poway, San Diego County, California, both collected by Dr. F. E. Blaisdell and now in his collection in the California Academy of Sciences. A third specimen from Mt. Wilson, Los Angeles County, California, collected in July, is in the Fenyès collection, also in the California Academy of Sciences. It is in agreement with the preceding in all regards except as to the color of the pronotum, this being entirely orange red.

This very distinct species is readily separated from the preceding by the type of antennæ and the more coarsely sculptured elytra, and in most cases by the maculate prothorax, as well as by its slightly larger size and proportionally broader antennæ.

FAMILY MYCETOPHAGIDÆ

Mycetophagus pluriguttatus franciscanus Van Dyke,
new subspecies

Of the same size and form as *pluriguttatus* and sharing with it antennæ which have the three outer segments in the form of an elongated, slightly enlarged club; the prothorax broadest behind the middle, with rather evenly arcuate sides, subbasal foveæ somewhat elongate, and disk densely punctured; elytra with shal-

lowly impressed striæ that are finely, rather closely punctured on the disk but more or less obliterated at the sides and toward the apex; differing in color pattern, the entire insect being of a uniform piceous color except for the legs, which are generally rufous, the apical antennal segment, which is often testaceous, and the prothorax, which is sometimes rufopiceous or at least lighter in shade than the elytra. Length 5.5 mm., breadth 2.5 mm.

Holotype (No. 4768 Mus., Calif. Acad. Sci., Ent.) and several designated paratypes, collected by myself in the Oakland hills, California, March 28, 1920, or on other dates. This very distinct and more or less unicolorous subspecies seems to be limited to the San Francisco Bay region. In former years I used to find it quite frequently during the winter months or early spring about the fungus growths of decaying stumps in the hills back of Oakland. Our series in the collection of the California Academy of Sciences consists of over twenty-three specimens, all remarkably uniform as to size and coloration. These were collected in the following localities: Oakland hills, Berkeley, Lake Lagunitas and other places in Marin County, San Francisco and Carmel, all collected by either Dr. F. E. Blaisdell or myself.

The more typical bicolored *pluriguttatus* is generally found more inland, particularly in the Sierra Nevada Mountains. Once or twice I have found the coastal subspecies with more or less well defined subapical elytral light markings but never any specimens with a color pattern approaching that of the typical form.

FAMILY PYTHIDÆ

Cononotus bryanti Van Dyke, new species

Very elongate, rufotestaceous, with fine, closely appressed gray pile, sufficiently dense to in great part conceal the sculpturing. Head, including the eyes, about as broad as apex of prothorax; rather finely, somewhat densely and indistinctly punctured; front longitudinally subcarinate at middle; eyes rather large yet feebly convex; antennæ about reaching base of prothorax, with all segments longer than broad, but segments IX and X very slightly so. Prothorax obconical; three-fourths as broad as long and broadest one-fourth distance from apex; apex almost twice as broad as base; sides feebly sinuate behind; disk densely and shallowly punctured. Elytra elongate elliptical, almost two and a half times as long as broad, convex; punctures fine and irregularly distributed though to a great extent concealed by the pubescence. Length 3.75 mm., breadth 1 mm.

Holotype (No. 4769, Mus. Calif. Acad. Sci., Ent.) collected in the Tuscon Mountains, Arizona, March 15, 1936, by Owen Byrant and kindly presented by him. Five paratypes, also from the same locality, collected February 21, 1937, by Mr. Bryant, four of which will be returned to the collector.

Of the three species with elytral punctures irregularly distributed, this species may be distinguished by being much the narrowest as well as by being somewhat coarsely pubescent.

Cononotus lanchesteri Van Dyke, new species

Elongate, somewhat flattened, rufotestaceous, and sparsely clothed with short, fine, closely appressed pile. Head, including eyes, as broad as apex of prothorax; rather coarsely, closely and somewhat cribrately punctured; eyes prominent; antennæ reaching base of prothorax, segments IX and X about as broad as long. Prothorax obconical; almost as broad as long, broadest close to apex; apex twice as broad as base; sides feebly sinuate behind; disk densely punctured. Elytra elongate elliptical, over twice as long as broad; feebly convex above, with sides subcarinate; punctures on disk distinct though fine and irregularly distributed in front and very minute, almost imperceptible behind, the general surface feebly shining. Length 4.25 mm., breadth 1.30 mm.

Holotype (No. 4770, Mus. Calif. Acad. Sci., Ent.), and three paratypes, collected at Parma, Idaho, March 24, 1930, by H. P. Lanchester, and by him very kindly presented to me. A single specimen in the Fenyes Collection, from "Leeds Ut., Aug. 4-7, Wickham," belongs with the above.

This species is the longest in the genus and may be separated from the preceding, which is also very elongate, by being slightly broader and flatter, more finely, sparsely punctured and by having the head more coarsely punctured, the outer segments of the antennæ also a bit more transverse.

SYNOPTIC KEY TO CONONOTUS¹

1. Elytra with punctures fine but numerous and irregularly dispersed; length 2.75-4.25 mm..... 2
- . Elytra with punctures more or less regularly arranged in rows and generally coarser..... 4
2. Pubescence fine and sparse, not perceptibly concealing sculpturing; prothorax almost as broad in front as long..... 3
- . Pubescence quite evident, concealing sculpturing to quite a degree; prothorax narrower in front than long; elytra elongate

¹An elaboration of the key published by me in Bull. Brooklyn Ent. Soc., XXIII, pp. 258-259, 1928.

- elliptical, almost two and one-half times as long as broad; length 4 mm., S. Arizona.....*bryanti*
3. Head finely and discretely punctured; antennæ with segments VII to X distinctly transverse; prothorax broadest one-fourth distance from apex; elytra elliptical, twice as long as broad, somewhat dull and with punctures moderately coarse and close in front and very fine behind; length 2.75-3.25 mm. S. California *sericans*
- . Head coarsely and closely, somewhat cribrately punctured; antennæ with segments all as long as, or longer than, broad; prothorax broadest close to apex; elytra elongate elliptical, over twice as long as broad, somewhat shining and with punctures fine and sparse in front and very minute behind; length 4.25 mm. Idaho.....*lanchesteri*
4. Pubescence fine and sparse, not concealing sculpturing..... 5
- . Pubescence dense; elytra elliptical, striæ not impressed; length 3 mm. Owens Valley, California.....*macer*
5. Larger and darker species; elytral striæ evidently impressed, elytra slightly broader anteriorly; length 2.5-3 mm. Los Angeles, California*striatus*
- . Smaller and more testaceous colored species; elytral striæ not distinctly impressed, elytra elliptical; length 1.75-2 mm. Santa Clara and Alameda counties, California.....*punctatus*

FAMILY PYROCHROIDÆ

Dendroides pacificus Barrett (1932) = *D. marginata* Van Dyke (1928);

RHIPIDOTHRIPS BRUNNEUS Williams

This species was described by Mr. C. B. Williams in 1913 (Records and Descriptions of British Thysanoptera, Journal Economic Biology, Vol. VIII, No. 4, pp. 216-230) and, so far as known up to the present time, has been found only in Sussex, England.

On April 8th and 15th, 1936, Messrs. George Ferguson and B. Crowell made collections of this species on Canary grass, oats and *Osmaronia* flowers at Corvallis and Granger, Oregon (Moulton Nos. 5547 and 5548). This identification is from printed description only and not by comparison with identified material but there can be little doubt as to its proper classification. This is the first record of the finding of this species in North America.—Dudley Moulton.

NOTES ON SYMPHYLA WITH DESCRIPTIONS OF THREE
NEW SPECIES OF SYMPHYLELLA FROM CALIFORNIA

BY A. E. MICHELbacher

University of California, Berkeley

Members of the class Symphyla are widely distributed throughout California. During the past year considerable time has been devoted by the author to a search for members of this class. They have been found under a wide variety of conditions, and apparently can be collected in practically any location in the region adjacent to San Francisco Bay. Representatives of the class have been found in pasture land, on hill sides, along stream banks, in forested areas, at Point Reyes on the beach at highest tide level, and in fact in almost every conceivable environment. They may be found in soils varying from sands to clays. They are probably as abundant in nature as most other arthropods.

Although a number of new species have been collected, only three members belonging to the genus *Symphylella* will be described in this paper. The writer believes that considerable caution should be practiced in describing new species because the variation found within a species is so great that it would be quite possible to describe two different stages of the same species as new. In working out the life history of *Scutigerebella immaculata* (Newp.)¹ marked variations were observed even after the animals reached the stage with twelve pairs of legs. It was found that they moult from time to time throughout their entire life, and that this makes possible morphological changes.

No life-history study has been attempted with any other member of the class, but enough information is at hand to indicate that most of the species have a rather complex life history. For example, in studying cleared and stained large specimens of *Symphylella subterranea*, an individual was encountered which at the time it was collected was just about ready to cast its skin. On the slide the old and new integuments are easily seen, one within the other. This specimen was as large as any I have ever collected, indicating that moulting in this species probably occurs from time to time even after sexual maturity is reached. Other specimens have been examined in about the same condition, where a new skin can be seen within the old one.

¹ Michelbacher, A. E. The biology of the garden centipede, *Scutigerebella immaculata*. Hilgardia, 11 (3): 55-148, 1938.

In studying large series of individuals which appear to be mature, variations in size, number of antennal segments, and number of setæ on the various anatomical regions are encountered. These variations are probably the result of the moulting characteristics of the group. Because of these differences, I have found it very difficult to describe a species and believe it inadvisable to do so unless an investigator has a large series with which to work. Several symphylans have previously been described from one or two specimens, but such a practice can often lead to confusion. In some cases much stress has been placed on chaetotaxy. The present study certainly shows that in the same species the chaetotaxy of two individuals may show considerable variation.

The following descriptions are made from prepared mounts and all measurements given have been obtained from mounted specimens.

Symphylella subterranea Michelbacher, n. sp.

Figures 1a to 1g

Head somewhat elongate, about 1.3 times longer than wide; central rod (coronal suture) interrupted at the middle, without median lateral branches; anterior branches (frontal sutures) prominent but less distinct than the central rod; post-antennal organs of average size. *Antennæ* with 18 to 23 segments (holotype 21 segments); setæ on basal segments very prominent and rather long, but much reduced on the distal segments; setæ on inner side of the basal segments nearly twice as long as those on outer side; beginning of a second whorl of setæ at about the 7th or 8th segment; with several small circular sensory organs along greatest circumference of ante-apical segment, this segment usually containing the largest number of these organs, although they may be present on the next 11 or more segments toward the proximal end. On the right antenna of the holotype there are three of these organs on the second segment and one each on the next 13 segments while on the left antenna there appear to be two such organs on the second segment and one each on the next 12 segments. Only the 13 *scuta* having the triangular processes are considered and these are referred to by numbers; processes all triangular in shape, their tips produced into small knobs. Knobs in the holotype generally round, their greatest diameter usually slightly more than the width of their attachment. Anterior-lateral setæ of second scutum much shorter than the processes. First pair of *legs* reduced to wart-like structures, remaining pairs well developed, and sparsely covered with setæ.

Tarsus of last pair of legs about 4.3 times as long as wide, its upper surface with six rather prominent setæ which are as long as, or a little longer than, width of tarsus. Tibia of last pair of legs with four rather prominent setæ on upper surface, their length equal to about half the depth of the segment. *Styli* very much reduced, cone-shaped, densely covered with short hairs, and about twice as long as their width at base. Seven pairs of fully developed *coxal sacs* located at bases of fully developed legs from second to eighth pairs inclusive. *Cerci* large and well covered with setæ, those setæ on the inner surface curved and of nearly equal length, while those on the outer surface are of two types—short, more numerous curved setæ, and larger protruding setæ. Striped organ only about the length of the apical setæ or not quite as long as the longest lateral setæ. Length of cerci about 3.5 times their greatest width. *Length* of holotype 5.1 mm.

Holotype, No. 4798, Calif. Acad. Sci., Ent., Clarksburg, California.

Occasionally specimens are encountered in which the knobs are elongate on some of the scuta. In such cases their greatest width is nearly the same as their attachment. The number of setæ between the anterior lateral and the apical setæ of the scuta shows considerable variation even in mature specimens. The variation in the type and the range in variation is shown in table 1. The number of marginal setæ on the two sides of the same scutum of the same individual may show some variation.

This species has only been collected in a single field where it was encountered in fair abundance. It inhabits the lower layers of soil and can seldom be taken above a depth of six inches. It is not attracted to growing vegetation and probably feeds on fungus. It is rather slow in motion.

Probably the most prominent feature of this species is its large size, which distinguishes it from most other members of the genus. It is most closely related to *S. essigi* n. sp. and the differences are considered under the description of the latter species.

Symphylella essigi Michelbacher, n. sp.

Figures 2a to 2h

Head somewhat elongate, about 1.2 times as long as wide; central rod (coronal suture) interrupted at about middle, without median lateral branches; anterior branches (frontal sutures) prominent, but slightly less distinct than the central rod. Post-antennal organs of average size. *Antennæ* of 18 to 21 segments

(holotype 21 segments); setæ very prominent and rather long on basal segments but much reduced on distal segments; setæ on inner side of basal segments about one and one-half times as long as those on outer side; a second whorl of setæ beginning at about the sixth segment. Beginning with the second from the apical segment, and in the type on the next six segments, small circular sense organs are found which are in line with the whorl of primary setæ. The number of sense organs found on the different segments starting with the third from the apical segment on the right antenna is 2, 2, 1, 1, 1, 1, 1; for the left antenna 2, 2, 1, 1, 2, 2, 2. This is a variable character and even in mature specimens these sense organs may be present on only five segments. The most constant feature is that they apparently always start with the second segment from the apex. Only the 13 *scuta* having the triangular processes are considered and these are referred to by numbers. In all cases the triangular processes are prominent and their tips rounded. There is a comparatively slight indication of the tips being produced into knobs. The number of setæ between the anterior lateral and the apical setæ shows considerable variation even in mature specimens. The variation in the type and the range in variation expected to occur in the species is shown in table 1. The number of marginal setæ on the two sides of the same scutum of the same individual may show some variation. The anterior-lateral setæ of the second scutum are shorter than the processes. First pair of *legs* reduced to wart-like structures, the remaining pairs well developed and sparsely covered with setæ. Tarsus on the last pair of legs about four and one-half times as long as wide, its upper surface with eight rather prominent setæ about as long as the depth of the segment. This character shows some slight variation as individuals with seven or nine setæ are encountered. Tibia of the last pair of legs with four rather prominent setæ on the upper surface (in the holotype there are six), their length equal to at least one-half the depth of the segment. *Claws* very unequal, the anterior one being twice the size of the posterior. *Styli* much reduced, cone-shaped, densely covered with very short hairs, about twice as long as their width at the base. Seven pairs of fully developed *coxal sacs* are located at bases of fully developed legs from second to eighth pairs inclusive. *Cerci* large, well covered with recurved setæ which are all about the same length, although there may be one or two protruding setæ which are slightly longer than the rest. Striped organ only about as long as the apical setæ. Length of the cerci at least three times their greatest width. The holotype, which is not normally extended, measures 3.8 mm. Large, normally extended individuals should measure 4 mm. to 4.8 mm.

Holotype, No. 4799, Calif. Acad. Sci., Ent., collected on a stream bank in a silty loam near Moraga, Contra Costa County,

California. Other specimens have been collected in several localities in Marin and Napa counties. It is possible that some of the individuals collected in these latter localities may prove to be new although no character has yet been found to separate them. This species is adapted to a wide range of soils and has also been taken in the sand hills at Point Reyes.

This species is rather closely related to *Symphylella subterranea* but is easily separated from it by several good characters. The tips of the triangular processes of the scuta are rounded whereas in *S. subterranea* they are produced into knobs. Also, fewer setæ are found along the lateral margins of the scuta in *S. essigi*. There are fewer setæ on the upper surface of the tarsus of the last pair of legs in *S. subterranea* than in *S. essigi*. The peculiar circular sensory organs are present on the second from the apical segment in *S. essigi* whereas in *S. subterranea* they are found on the first from the apical segment and occur on a larger number of segments toward the proximal end. In *S. subterranea* the setæ on the outer side of the cerci are long and short whereas in *S. essigi* they are nearly of the same length.

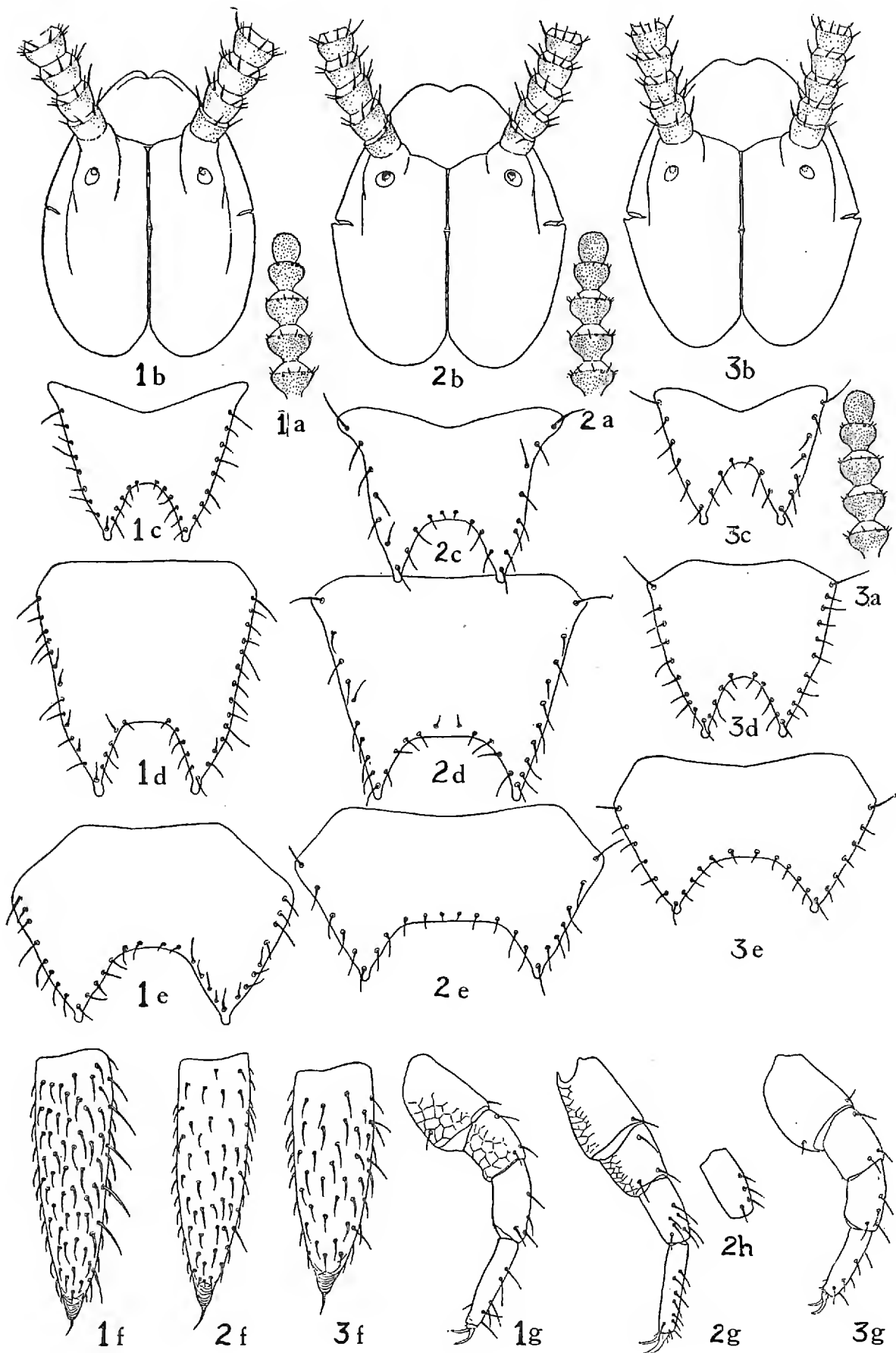
TABLE I

Number of Setæ Found between the Anterior Lateral Setæ and the Apical Setæ on the Scuta which have Triangular Processes.

Scutum number	<i>Symphylella subterranea</i> sp. n.		<i>Symphylella essigi</i> sp. n.		<i>Symphylella capitata</i> sp. n.	
	Number of setæ*	Range in the number of setæ**	Number of setæ*	Range in the number of setæ**	Number of setæ*	Range in the number of setæ**
1	7 - 7	6 - 7	5 - 6	4 - 6	5 - 4	4 - 7
2	12 - 11	9 - 12	8 - 8	7 - 8	8 - 9	6 - 9
3	7 - 7	5 - 7	4 - 5	4 - 6	5 - 5	4 - 5
4	8 - 7	6 - 8	6 - 5	4 - 6	6 - 6	5 - 7
5	13 - 13	9 - 13	9 - 9	8 - 9	9 - 9	6 - 9
6	9 - 8	6 - 9	5 - 5	5 - 6	5 - 5	4 - 6
7	9 - 10	7 - 10	6 - 5	4 - 6	6 - 5	5 - 7
8	10 - 12	9 - 12	8 - 7	7 - 9	8 - 9	7 - 9
9	7 - 6	5 - 7	5 - 4	4 - 6	4 - 4	4 - 5
10	9 - 7	6 - 9	6 - 5	4 - 6	? - 6	4 - 6
11	10 - 11	9 - 11	7 - 7	7 - 8	7 - 7	6 - 9
12	5 - 6	5 - 7	3 - 4	3 - 5	4 - 3	3 - 5
13	9 - 9	6 - 9	6 - 6	4 - 6	5 - 4	4 - 7

*The number of submarginal and marginal setæ, between the anterior lateral setæ and the apical setæ, and the variation observed on the two sides of the same scutum in the type specimen.

**Range in the number of submarginal and marginal setæ between the anterior lateral setæ and the apical setæ.



EXPLANATION OF PLATE

Fig. 1. *Symphylella subterranea* n. sp. 1a tip of antenna, x 80; 1b head, x 80; 1c to 1e first three large scuta, x 95; 1f spinneret, x 110; 1g hind leg, x 100.

Fig. 2. *Symphylella essigi* n. sp. 2a tip of antenna, x 80; 2b head, x 80; 2c to 2e first three large scuta, x 95; 2f spinneret, x 105; 2g hind leg, x 95; 2h tibia of hind leg showing usual number of setæ, x 95.

Fig. 3. *Symphylella capitata* n. sp. 3a tip of antenna, x 130; 3b head, x 130; 3c to 3e, first three large scuta, x 140; 3f spinneret, x 140; 3g hind leg, x 135. Only marginal and submarginal setæ have been drawn on the scuta.

Symphylella capitata Michelbacher, n. sp.

Figures 3a to 3g

Head somewhat elongate, about 1.2 times as long as wide; central rod (coronal suture) interrupted at about middle without lateral branches; anterior branches (frontal sutures) prominent but not as distinct as central rod; post-antennal organs of average size. *Antennæ* of 17-22 segments (holotype 18 segments); setæ very prominent and rather long on basal segments but much reduced on distal segments; setæ on inner side of basal segments slightly longer than those on outer side. Beginning with the first from the apical segment and on the next ten segments in the holotype, small circular sense organs are found which are in line with the whorl of setæ. On the first from the apical segment there are three organs and on the other segments one each. The number of segments carrying these sense organs shows some variation within the species, but in mature specimens they should be found on at least 11 segments. In some cases the apical segment may carry a single sensory organ. This was found rather commonly in specimens collected at Lagunitas, California. The arrangement in one large specimen from that locality, which has 22 segments in the right antenna, is as follows, starting with the apical segment: 1, 4, 1, 2, 1, 1, 1, 1, 1, 1, 2, 1, 1, 1, 1, 1. The number found on the two antennæ of the same individual may show some variation. Only the 13 *scuta* having the triangular processes are considered and these are referred to by numbers. In all cases the triangular processes are prominent and their tips are produced into rounded knobs whose diameters are about one and one-half times the width of their attachment. The number of setæ between the anterior-lateral and the apical setæ shows considerable variation even in mature specimens. The variation in the holotype and the range in variation expected to occur in the species is shown in table 1. Anterior-lateral setæ of second scutum about two-thirds as long as processes. First pair of *legs* reduced to wart-like structures, the remaining pairs well developed and sparsely covered with setæ. Tarsus of the last pair of legs about three and one-half times as long as wide, its upper surface with six prominent setæ which are as long as the greatest depth of the

segment. Tibia of the last pair of legs with four prominent setæ on the upper surface which are at least as long as one-half the width of the segment. *Styli* very much reduced, cone-shaped, densely covered with very short hairs, about one and one-half times as long as their width at the base. Seven pairs of fully developed *coxal sacs* located at the bases of fully developed legs from second to eighth pairs inclusive. *Cerci* large, well covered with setæ; setæ on inner surface recurved and all of about the same length, while those found on the outer surface are of two types—recurved setæ similar to those found on the inner surface, and much longer straight setæ. Striped organ about the length of the apical setæ. Length of cerci about three times their greatest width. *Length* of holotype, 3 mm.

Holotype, No. 4800, Calif. Acad. Sci., Ent., Tunnel Road Canyon, Oakland, California, January 22, 1938. Specimens were found abundant on canyon slope in first two inches of soil. This species is rather widespread, having been taken on El Cerrito Hill, El Cerrito, California, and in several localities in Marin and Napa counties. Collections were made during the months of January to April inclusive, and individuals were found most abundant in the first two inches of soil. Moist sedimentary soils having a grass cover appeared to be localities best suited to the species.

This species appears to be rather closely related to *Symphylella pusilla* (Han.) but can easily be distinguished from that species by its larger size and fewer antennal segments. Also in *S. pusilla* there are fewer setæ on the second scutum between the anterior lateral and apical setæ. The large rounded knobs found on the tips of the triangular processes also tend to separate *S. capitata* from other members of the genus.

PERSONAL NOTE

Owing to the rapid growth of the Department of Entomology of the California Academy of Sciences it has become increasingly difficult for me to keep up with that work and at the same time to do justice to the editing of the Pan-Pacific Entomologist. I have, therefore, asked the Publication Committee to find some one else to act as editor. They have now selected R. L. Usinger as such editor, and correspondence regarding editorial matters connected with this journal should be addressed to him, here at the California Academy of Sciences.—E. P. Van Duzee.

GEOMETRID NOTES AND NEW SPECIES

BY EDWARD GUEDET

Napa, California

RACHEOSPILA TENUIMARGO Warren

This pretty little species, described Nov. Zool. XII, 319, 1905, is fairly common on the east coast of Mexico, and extends south as far as Guiana. Two specimens taken by Mrs. Leslie Forsythe at Florida City, south of Miami, Florida, are in my collection. This should be of interest to those who like a record of strays from other lands.

Stannoctensis vernon Guedet, n. sp.

Primaries pointed at apex, light ochreous, irrorate with reddish brown, especially along the costa and outer margin. Costa marked with three dark brown spots. The basal area dark, especially along the costa. First spot one-fourth from the base of the wing, outwardly oblique. Second about the middle of the costa and heavier and broader than the first, preceded by an indefinite, broad, light, median shade, which crosses the costa at right angles and is lost in the ground color. The third spot about three-quarters out from the base of the wing, marking the beginning of brownish subterminal line. Subterminal line angled inwardly on the subcostal vein, running thence outwardly and obliquely to vein V, where it is sharply angled, and curving slightly inwardly, attains the inner margin about two-thirds out from the base of the wing. This line is followed by a light ochreous band. A horizontal dash extends from this band toward the apex, where it separates into two branches. In the subterminal area the veins are free of the darker irrorations. Fringe checkered with reddish brown.

Secondaries light ochreous, with the markings of the underside showing through.

Primaries beneath marked much as above. The horizontal dash in the subapical region showing more prominently on account of the darker background. Secondaries beneath light ochreous, with a reddish brown dash which is outwardly oblique at the center of the costa. Median vein distinctly marked with reddish brown, with a series of horizontal striations of reddish brown across the median area.

The distinctive feature of this species is a heavy reddish brown line which begins in the center of the subterminal area and runs with a slight outward curve toward the center of the inner margin without reaching it. There is a lighter reddish brown shade between this line and the outer margin.

I propose for this species the name *vernon* after the type locality.

Holotype, male, (No. 4779), Vernon, Apache County, Arizona, July, 1936, and allotype, female (No. 4780), same data, both in the collection of the California Academy of Sciences, San Francisco, California. Paratypes, two males and one female, same data, in my collection; one male, same data, in collection of the United States National Museum, Washington, D. C., one male, Jemez Springs, New Mexico, June; one male, Jemez Springs, no date; one male, Bent, New Mexico, no date; two males, "New Mexico," April 1, 8, all in my collection.

Philedia punctomacularia connecta Guedet, n. var.

Philedia punctomacularia Hulst was described (Ent. Amer. Vol. III, page 214, 1888) from two males and two females taken in California and Vancouver Island, B. C. The male type is pictured in Holland's Moth Book, plate 43, fig. 59. Dr. Harrison Dyar (Proc. U. S. Natl. Mus. Vol. XVII, page 909, 1904) tells us on the authority of Mr. Theodore Bryant that the food plant is the common brake (*Pteris*). In the British Columbia Check List (1927) it is listed as inhabiting Southern Vancouver Island, Lower Frazer Valley and Kaslo.

On the primaries of the typical form, the ante-median line is "marked by a short black streak on each vein" and there is a post-median "row of black points on the veins nearly parallel with the outer margin." The secondaries have this post-median row of black points.

A series of nine specimens from Carmel, California, have these points connected so as to form diffuse bands. The ante-median band of the primaries is light brown, broad, diffuse, shading outwardly toward the center of the wing. The discal spot is also light brown and diffuse. The post-median band on both wings is broad, light brown, with the veins faintly marked with minute, black points. The ground color is light brown, rather than the typical blue gray. For this variety, which is without a name, though present in many collections, I propose the name *connecta*.

Holotype, male (No. 4781), Carmel, Nov. 5, 1925 (L. S. Slevin), allotype, female (No. 4782), Carmel, Dec. 25, 1933 (L. S. Slevin), both in the collection of the California Academy

of Sciences. Paratypes, male and female, same data, in my collection, and in the collections of the California Academy of Sciences and in the U. S. Natl. Mus., Washington, D. C.

Phengommataea olifata Guedet, n. sp.

Expanse 35 mm. Head, antennæ, thorax and abdomen light ochre-yellow. Primaries light ochre-yellow, crossed by a darker yellow band. Basal area lightly shaded with brown. Inner edge of the median band with a dark brown line, beginning on the costa half way out, sweeping sharply outward around a diffuse, linear, discal spot, then curving inward and going with a very slight wave to inner margin about one-fifth from base. Inner side of this line without the brownish shading of the basal area. Exteriorly this line is heavily shaded with brown. A similar dark brown line marks the outer edge of the median band. This line, beginning on the costa 3 mm. from the apex, is slightly and evenly sinuate and reaches the inner margin about 5 mm. from the anal angle; it is bordered inwardly by a brownish shading and outwardly by an even band of the ochre-yellow ground color; between these two lines the wing is dark brownish yellow. Subterminal area shaded with a dark ochre color, but not so dark as the median area; median veins slightly shaded with brown.

Secondaries light yellow, their only maculation being a sinuate post-median dark brown line, accented by dots on the veins. Subterminal and terminal areas slightly darker.

Primaries beneath light yellow with a diffuse, brownish cloud running from the base almost to the discal area in the upper half of the wing; discal spot linear, a trifle less diffuse than above; the dark yellow median band being very faintly reflected. Secondaries also light yellow, their only maculation being a row of dots on the veins in the subterminal area parallel to the outer margin. This row of spots does not correspond with the post-median line on the upper side of the secondaries.

It gives me great pleasure to propose for this beautiful species the name *olifata*, in honor of Reverend J. A. McAuliffe, of San Francisco, through whose kindness and encouragement I became interested in the study of *Lepidoptera*.

Holotype, male, No. 4783, Turkey Flat, Chiricahua Mountains, Cochise County, Arizona, 9000 feet, July 22, 1927 (J. A. Kusche), allotype, female, No. 4784, same data, both in the collection of the California Academy of Sciences. Six paratypes, male and female, same data, in my collection and in the collection of the U. S. Natl. Mus., Washington, D. C. and six paratypes, male and female, Fly's Peak, Chiricahua

Mountains, Cochise County, Arizona, 9800 feet, July 10-30, 1927, in the collection of the California Academy of Sciences, San Francisco.

Caripeta piniata suffusata Guedet, n. var.

Packard described *piniata* in the genus *Parennomos* (New and Little Known Insects, Rept. Mass. Ag. page 247, 1870), but in his Monograph, page 238, 1876, he sinks this as a synonym of *Caripeta angustiorata* Walker. Strecker described his *seductaria* in the genus *Caripeta* (Lep. Rhop. Het. Suppl. II, page 9, 1899). It is a synonym of *piniata* Pack. Holland published a figure in his Moth Book, Pl. 44, fig. 2, which he called *Caripeta angustiorata* Walker. This was an error, as was pointed out by Taylor (Can. Ent. Vol. 36, p. 245). *Angustiorata* Walker is the species figured by Packard in his Monograph, Plate 9, figure 52. Holland's figure is a representation of *piniata* Pack. (*seductaria* Strecker) which is a good species, as noted by Taylor, l.c., and by Barnes and McDunnough (Cont. Lep. N.A., Vol. II, page 209, 1914).

In the typical form the primaries are "deep ochreous and paler at the base." Five specimens taken by Mr. J. A. Kusche, in the Chiricahua Mountains, Cochise County, Arizona, July, 1927, have much darker ochreous primaries; the strigations of the typical form are present; there is a distinct, whitish, evenly curved basal line; the antemedian area is the same shade as the median area, and the white line which, in the typical form, marks the boundary of the basal area, is barely indicated by two splashes of white in these specimens. The silvery, post-median line is radically different. In the typical form, "it curves inward just below the median vein, and again slightly opposite the discal spot." In these specimens this line is angled outwardly on the subcostal vein, running thence almost straight to the inner margin. Secondaries sparsely covered with darker irrorations, a trifle heavier outwardly; dark discal spots distinct. Smoky post-median line broad, broken and sinuate. Primaries beneath are much as in the typical form. Secondaries with a linear dark-brown discal spot; post-median line broad, heavy and dark brown but not reaching the inner margin. I propose for this variety the name *suffusata*.

Holotype, male, No. 4785, Rustler Park, Chiricahua Mountains, Cochise County, Arizona, 9000 feet, July 15, 1927; allotype, female, No. 4786, Fly's Peak, Chiricahua Mountains,

Cochise County, Arizona, 9-9800 feet, July 30, 1927. Paratypes, one male, Turkey Flat, Chiricahua Mountains, Cochise County, Arizona, 9000 feet, July 22, 1927, and one male and one female, Fly's Peak, Chiricahua Mountains, Cochise County, Arizona, 9-9800 feet, July 30, 1927, all in the collection of the California Academy of Sciences, San Francisco.

Semiothisa kuschea Guedet, n. sp.

Expands 33 mm. Palpi moderate, rough-scaled. Antennæ of both sexes simple. Head white. Thorax creamy white, scaled. Abdomen tufted at end, creamy white.

Primaries glistening, creamy white, crossed by four clay-brown bands; the first, 1 mm. wide, runs obliquely from the discal, sometimes with a slight curve, to the inner margin which it reaches about 2 mm. from the base; discal dot very minute, black; post-median line about 1 mm. wide, running from the costa, about 2 mm. from the apex, with a slight in-curve to the inner margin three-fifths out from the base; subterminal line beginning slenderly at apex, widening rapidly to about 1 mm., then running almost straight to the inner margin near the anal angle. A thin but very distinct line of the ground color separates this line from the marginal line. Fringe creamy.

Secondaries of a lighter cream-color, with a small black discal dot and sometimes with traces of a subterminal line showing on the lower half of the wing. Fringe as on primaries.

Primaries beneath much as above; costa a bit more yellowish and the subcostal area slightly irrorate with brown from the base to beyond the discal line; lines of the upper surface distinctly reproduced; discal dot somewhat obscure. Secondaries much as above. The discal dot sharp, contrasting.

Holotype, male, No. 4787, Fly's Peak, Chiricahua Mountains, Cochise County, Arizona, July 18, 1927 (J. A. Kusche); allotype, female, No. 4788, Turkey Flat, Chiricahua Mountains, Cochise County, Arizona, 8-9000 feet, July 22, 1927 (J. A. Kusche). Paratypes, three males, Fly's Peak, July 18; Turkey Flat, July 22; Bar Foot Park, July 20; all in the Chiricahua Mountains, Cochise County, Arizona (J. A. Kusche, collector), and all in the collection of the California Academy of Sciences, San Francisco. Also two males, Fly's Peak, July 30, 1927, and July 29, 1927, Chiricahua Mountains, Cochise County, Arizona, in the collection of the author.

Superficially this appears to be a large *Euaspilates spinataria* Packard (Sixth Rep. Peab. Acad. Sci., page 45, 1874 and Geometrid Moths of N. A., page 204, 1876), but the male antennæ are simple, the dark lines of the primaries heavier, and, on close comparison, it proves to be altogether different. It is possible that this species is referred to by Strecker (Surv. Dept. Mo., Ruffner, 1878, Appendix, page 1863), where he speaks of two examples (of *spinataria* Pack.) both of which had "the dark lines of the primaries much heavier than represented in Packard's figure." It is difficult to believe that so good an entomologist as Strecker would have passed over the difference in the antennæ. I am convinced that the present species has nothing in common with *spinataria* Pack.

I propose for this species the name *kuschea* after the collector.

Vinemina perdita Guedet, n. sp.

Expands 37 mm. Palpi moderate, upturned, fuscous. Antennæ bipectinate in male with simple apex; pectinations long, arising from base of the segments, simple in the female. A large fovea at base of the primaries. Front fuscous clay color. Thorax gray, irrorate with black. Abdomen fuscous, ringed with white.

Primaries creamy white, heavily irrorate with black. Costa marked with eight spots which are the beginnings of as many irregular lines. First line very close to the base and sharply toothed outwardly in the subcostal area, disappearing before reaching the inner margin. Ante-median area with two almost equidistant subparallel lines, the second of which is heavier than the first and widens below the costa and at the inner margin; these cross the wing in three uneven scallops with the points directed inwardly. Median line heavy, crossing the wing in three scallops with the points directed outwardly. Space between the ante-median and the median lines less heavily irrorate with black in some specimens, giving this portion of the wing a slightly lighter appearance. Wing beyond the median line shaded with heavier irrorations which cloud the discal spot in some specimens. Post-median line composed of many small zigzag dashes; not parallel with the outer margin but approaching the median line on vein 1b, then sharply diverging to the inner margin. Subterminal line sinuate, composed of disconnected black spots. A dark shade opposite the discal area runs almost to the outer margin and is cut by a faint line of the ground color which fol-

lows the sinuate, subterminal line. Marginal line composed of triangular black spots on the veins. Fringe checkered white and brown.

Secondaries creamy white, evenly irrorate with brown, the discal spot brown. The only other maculation is a subterminal line of diffuse brown spots, parallel to the outer margin, and a marginal row of blackish spots more or less connected.

Primaries beneath suffused with dark brown, giving them the color of the secondaries above; maculation of the upper surface faintly reflected. Secondaries much as above.

Holotype, male, No. 4796, Fly's Peak, Chiricahua Mountains, Cochise County, Arizona, 8-9000 feet, July 30, 1927 (J. A. Kusche); allotype, female, No. 4797, Chiricahua Mountains, Cochise County, Arizona, 8500 feet, August 6, 1927 (J. A. Kusche). Paratypes, 10 males and 3 females, Bar Foot Park, Fly's Peak and Turkey Flat, all in the Chiricahua Mountains, Cochise County, Arizona, July 27 to August 2, 1927, in the collection of the California Academy of Sciences, San Francisco. Also two males and two females, Fly's Peak and Turkey Flat, July 3 to August 6, Chiricahua Mountains, Cochise County, Arizona, in author's collection, and two specimens sent from the same series three years ago to J. McDunnough and now in the Canadian National Museum at Ottawa, Canada.

I am indebted to Mr. J. McDunnough for the generic reference.

HISTORY OF BEEKEEPING

History of American Beekeeping, by Frank C. Pellett, First edition. 213 pages, illustrated. 1938. Collegiate Press, Inc., Ames, Iowa. Cloth bound, \$2.50.

In the pages of this book the author has traced in an interesting manner the important events in the early history of American beekeeping, from the time of the first importations of bees into this country until well into the present decade. The development of beekeeping in America has very closely paralleled the improvements, inventions of equipments and the perfection of their use in relation to bee behavior. The dates and men connected with these historical events are gathered together in a manner that will delight the student or teacher of the American system of beekeeping. Two chapters are devoted to American periodicals and books on beekeeping and another on beekeeping societies and conventions.—J. E. Eckert, Davis, Calif.

THE APHID GENUS KAKIMIA IN CALIFORNIA

BY W. W. SAMPSON

University of California

Genus KAKIMIA Hottes and Frison

Kakimia, Hottes and Frison, 1931, Ill. Nat. Hist. Surv. Bull., XIX:344 (*Subgenus*).

Kakimia, Gillette and Palmer, 1934, Ann. Ent. Soc. Am., XXVII:159.

Vertex convex with frontal tubercles small, hardly exceeding the vertex, aphis-like; antennæ with six segments, at least as long as body, with secondary sensoria subcircular and tuberculate; hairs usually capitate, and equal in length to diameter of the member bearing them; cornicles subvasiform to cylindrical; cauda medium sized, slightly constricted, sometimes tapering, aphis-like; lateral tubercles present; media twice-branched in the fore-wings; media and cubitus present in hind-wings.

Genotype *Myzus thomasi* Hottes and Frison.

KEY TO THE CALIFORNIA SPECIES

- | | |
|---|----------------------------|
| 1. Cornicles dusky..... | 2 |
| –. Cornicles pale..... | 4 |
| 2. No sensoria on third antennal segment of apteræ..... | <i>mimulicola</i> |
| –. Sensoria on third antennal segment of apteræ..... | 3 |
| 3. Unguis longer than third antennal segment..... | <i>cynosbati</i> |
| –. Unguis shorter than third antennal segment..... | <i>ribifolii</i> |
| 4. Legs pale; abdomen of alatae with irregular markings on dorsum | <i>essigi</i> |
| –. Legs with at least tips dark; abdomen of alatae with few markings on dorsum..... | <i>castelleiæ</i> , n. sp. |

Kakimia castelleiæ Sampson, new species

Alate viviparous female: Somewhat small, not robust, of yellowish green color; abdomen of uniform light green color, cornicles, cauda, and anal plate of lighter color; antennæ slightly dusky, tarsi and tip of tibiæ darker; antennæ longer than body, sparsely to moderately haired; combined length of thorax and abdomen equal to that of the tibiæ of the hind legs; tibiæ of all legs hairy toward the apices, rest of the leg-parts only slightly so. Abdominal tubercles present.

Average length of body: 1.87 mm.; width, .78 mm. Average lengths of antennal segments: I, .085 mm.; II, .064 mm.; III, .61 mm.; IV, .30 mm.; V, .29 mm.; VI, base, .1 mm., unguis, .71 mm., total, .81 mm. Length of cornicles: .16 mm.; of cauda, .19 mm.; of rostrum, .60 mm., reaching just to posterior edge of second pair of coxæ; from 27 to 36 secondary sensoria on third antennal segment, with an average of 30; on fourth antennal segment, 8 to

16, with an average of 10; on segment five, 0 to 2, with an average of one. Length of fore-wings: 2.7 mm.; of hind-wings, 1.5 mm.

Apterous viviparous female: More robust than alate form, body a light yellow green; top of abdomen sometimes with bands of light brown. Antennæ dusky from tips of fourth antennal segment outward. Cornicles duskier than in alate forms. Tarsi and tips of tibiæ dark. Rostrum reaches to middle of third pair of coxæ.

Length of body: 1.98 mm.; width, 1.00 mm. Average length of antennal segments: I, .085 mm.; II, .069 mm.; III, .50 mm.; IV, .22 mm.; V, .69 mm.; VI, base, .085 mm., unguis, .60 mm., total, .685 mm. Length of cornicles, .19 mm.; of cauda, .17 mm.; of rostrum, .50 mm. From 17 to 25 secondary sensoria on antennal III, with an average of 20; on antennal IV, 0 to 5, with an average of one; there are no sensoria on antennal V.

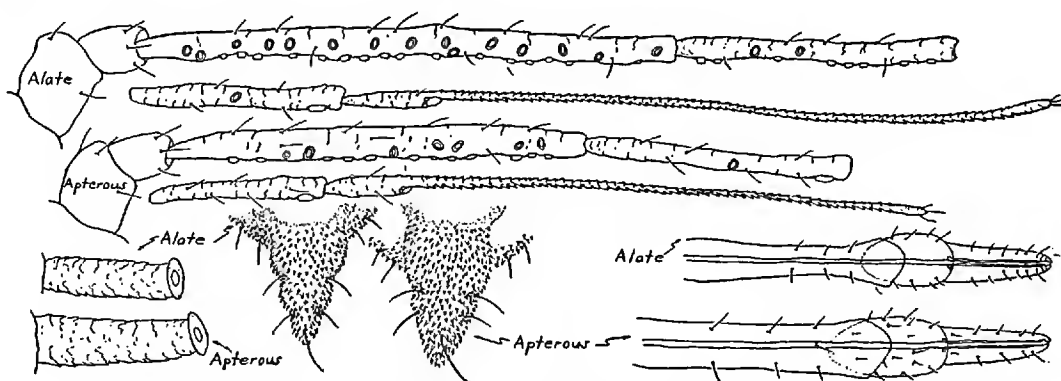


Fig. 1. *Kakimia castelleiæ* Sampson

There seems to be very little variation in size or color. In the antennæ of both forms the lengths closely approach the averages given above.

This species seems to be close to *K. thomasi* H. and F., differing in the lengths of the unguis in relation to the length of the third antennal segment, as well as in the number of sensoria on the segments; very few markings are present on the apterous forms of the new species, while there are many on those of *K. thomasi*; the host plants of the two differ also. It also comes near *K. cynosbati* (Oest.), the latter having the tips of the legs pale, and bands on the dorsum; there are no sensoria on antennal segments four and five.

This species is described from eight slides of specimens which were collected at Point Reyes Peninsula, Marin County, California, April 13, 1936, by Professor E. O. Essig, E. W. Baker, and the author, on *Castelleia neglecta*.

Holotype, collected by the author at the location cited, in the collection of the California Academy of Sciences (type No.

4616). Paratypes, collected by E. O. Essig, E. W. Baker, and the author, in the collections of these persons.

KAKIMIA CYNOSBATI (Oest.)

Oestland, 1887, Minn. Geol. and Nat. Hist. Surv., Bull. IV:81.

Swain, 1919, Univ. Calif. Pub. Ent. III:75.

Gillette and Palmer, 1934, Ann. Ent. Soc. Am., XXVII:162.

This species is seldom taken; the apparently last collection was by Paul S. Bartholomew, December 22, 1932, on the campus of Stanford University. As identified by Professor Essig, there was one alate and one apterous form.

KAKIMIA ESSIGI (Gillette and Palmer)

Essig, 1917, Univ. Calif. Pub. Ent., I:314, (*Myzus aquilegiæ*).

Swain, 1919, Univ. Calif. Pub. Ent., III:73, (*Myzus aquilegiæ*).

Gillette and Palmer, 1929, Ann. Ent. Soc. Am., XXII:30.

Gillette and Palmer, 1934, Ann. Ent. Soc. Am., XXVII:163.

This species is rather common throughout the state on *Aquilegia*, especially in the spring and summer.

KAKIMIA MIMULICOLA Drews and Sampson

Drews and Sampson, 1937, Pomona Journal Zool. and Ent., XXIX:29.

This aphid was first taken in Marin County. It has since been taken in Berkeley, California, by Essig (Oct. 4, 1937), and Sampson (Oct. 6, 1937); the latter also took it at Half Moon Bay (Jan. 16, 1938).

KAKIMIA RIBIFOLII (Dvdn.) (new combination)

Davidson, 1917, Journal Econ. Ent., X:294, (*Myzus*).

Swain, 1919, Univ. Calif. Pub. Ent., III:76, (*Myzus*).

Examination of this species, which was taken in fair numbers on *Ribes glutinosum*, on Strawberry Creek, University of California, during April and May of 1937, has convinced the writer that the species belongs in this genus rather than in *Myzus*.

KAKIMIA HOUGHTONENSIS (Troop)

Troop, 1906, Ent. News, XVII:59, (*Aphis*).

Swain, 1919, Univ. Calif. Pub. Ent., III:107, (*Aphis*).

Gillette and Palmer, 1934, Ann. Ent. Soc. Am., XXVII:164.

This species has never been found since the provisional identification by Davidson of an *Aphis* as this species. It was found on currant, and is mentioned here in hope that it will again be found and reported.

A NEW SUBGENUS OF NORTH AMERICAN SAPRINUS

(Coleoptera, Histeridæ)

BY EDWARD S. ROSS

University of California, Berkeley

This new division as defined below is proposed for a rather closely related group of species of *Saprinus* which differ abruptly from other members of the genus by characters deemed of sufficient importance to place the group in a more significant position than any of the group divisions of *Saprinus* adopted by Horn in 1873. Two of the species included in the new division, *opacus* Horn and *carinifer* Fall, have previously been assigned to groups of *Saprinus*, the former to group II and the latter to an intermediate position between groups I and II. Two additional species are herein described.

Eremosaprinus Ross, new subgenus

Very broadly oval, moderately convex, sides of pronotum and elytra continuously arcuate. Head with front unmarginated, supra-orbital striæ very feeble; vertex, clypeus, labrum and mandibles rugoso-punctate, clypeus shallowly impressed. Pronotum nearly twice as wide as long; sides strongly convergent, only feebly arcuate laterally, abruptly rounded at apical angles; frontal emargination broad, shallow; basal margins nearly straight, converging at scutellum in a sharply defined broad obtuse angle; surface punctate throughout, strongly longitudinally rugulose in lateral third. Elytra subevenly punctate throughout; disc striate, striæ finely carinate along outer edges, more strongly so basally; fourth dorsal stria arched at base and joining the sutural stria which may be obsolete basally in some species. Propygidium not prominent. Pygidium large, equilaterally triangulate, nearly flat in basal two-thirds, abruptly convex apically; evenly but not strongly punctate. Prosternum elevated, surface broad, nearly flat, moderately sloping forward, sides vertical; inner pair of striæ horizontal, sinuate, arcuately converging apically and in some species meeting; striæ definitely limit the flat face of the prosternum; outer pair of striæ on vertical sides obsolete. Pro-tibiæ broad, thin; four- to seven-denticulate. Tarsal claws long and slender, feebly curved, subequal, fused in some species.

Type: *Saprinus (Eremosaprinus) unguiculatus* Ross, n. sp.

The species in this division have the general facies of certain members of *Saprinus* s. str., but aside from this superficial

resemblance bear no close relationship. In the form of the prosternum there is an approach to that found in the genus *Gnathoncus*, differing, however, in not being sharply narrowed anteriorly and in sloping forward rather than toward the mesosternum.

The subgenus consists of four species which form a very homogeneous group. These species are apparently confined to Lower California and the arid regions of Southern California and are very rare in collections.

KEY TO SPECIES OF EREMOSAPRINUS

- A. Surface smooth or only faintly alutaceous, shining; sutural striæ of elytra entire, strong.
 - B. Inner subhumeral striæ of elytra obsolete, first dorsal striæ deeply impressed; prosternal striæ joining anteriorly (1) *unguiculatus*
 - BB. Inner subhumeral striæ of elytra present, entire, first dorsal striæ only moderately impressed; prosternal striæ interrupted anteriorly, tips terminating in small foveæ (2) *falli*
- AA. Surface strongly alutaceous, dull; sutural striæ of elytra obsolete basally.
 - B. Prosternal striæ united apically..... (4) *opacus*
 - BB. Prosternal striæ interrupted apically..... (3) *carinifer*

(1) *Saprinus* (*Eremosaprinus*) *unguiculatus* Ross, new species

Very broadly oval, convex, black, surface shining, partially and faintly alutaceous; legs dark rufous. Head finely rugose-punctate; front with a distinct shallow impression. Pronotum slightly less than twice as wide as long, sides converging, rounded slightly at base, more strongly so at apical angles; punctures fine, sparse medially, gradually becoming denser and more elongate laterally, finally longitudinally rugulose along sides; hypomera very finely and sparsely pubescent. Elytra one-third wider at basal fourth than sutural length; surface subevenly sparsely punctate, punctures almost obsolete outside of first dorsal striæ, denser at apical third; dorsal striæ raised, more strongly so basally, almost unimpressed except for the entire first dorsal which is deeply grooved; marginal stria fine, almost obsolete medially; external subhumeral short, basal, deeply impressed, present in basal third; internal subhumeral entirely obsolete; oblique humeral moderately impressed, present in basal third, subparallel to first dorsal; second dorsal somewhat shorter than first, hooked inward at base; third dorsal equal in length to second,

sharply arched at base and joining arch of fourth dorsal; fourth dorsal stria abbreviated half way toward apex, broadly arched at base and joining sutural stria which is entire. Pygidium alutaceous, median punctures sparse, indistinct, closer and more distinct laterally and apically. Prosternum with striæ only feebly sinuate, joined anteriorly in an abrupt arch. Protibiæ five-dentate. Tarsal claws of all legs long, slender, subequal, fused, appearing as a single claw, three-fourths length of terminal tarsal segment. Length 3 mm., width 2.75 mm.

Holotype, female (No. 4777, Mus., Calif. Acad. Sci., Ent.) (Blaisdell Collection) and three female paratypes all from La Puerta, San Diego County, California, collected by Mr. G. H. Field. Two paratypes are deposited in the Museum of the San Diego Society of Natural History, San Diego, California, and one in the collection of the writer.

This species is peculiar in having its tarsal claws fused, whereas they are separate in the other known species of the subgenus. The complete absence of the inner humeral striæ of the elytra and the deeply grooved first dorsal striæ are additional features peculiar to this species. Very little variation is exhibited by the four specimens at hand.

(2) *Saprinus* (*Eremosaprinus*) *falli* Ross, new species

Very broadly oval, convex, color dark ferrugineous*, surface shining, not alutaceous. Head rugoso-punctate in front, punctures more distinct at vertex; front with a distinct shallow impression. Pronotum almost twice as wide at base as long, sides convergent, straight, evenly rounded apically, surface finely, sparsely punctate baso-medially, punctures becoming longer and more elongate medio-laterally, longitudinally rugulose at sides; hypomera finely, sparsely pubescent, hairs not visible from above. Elytra one-third wider at basal fourth than the sutural length, surface subevenly sparsely punctate, sparser at sides and denser in apical third; dorsal striæ very lightly impressed; marginal striæ fine, entire; outer subhumeral deep, short, basal; inner subhumeral fine, entire, abbreviated slightly at apex; oblique humeral distinct, extending one-third of elytral length, not joining first dorsal at base; first dorsal entire, moderately impressed; second and third subequal, terminating at apical fourth of elytra, strongly hooked inward at base, hook of third dorsal not quite joining arch of fourth dorsal; fourth dorsal slightly shorter than last two striæ, sharply sub-

*Light color probably due to immaturity.

angulately arched at base and uniting with the entire sutural stria. Pygidium moderately punctate, punctures somewhat finer and denser at sides and apex. Prosternum broad, short; striæ moderately sinuate, not uniting anteriorly but terminating in small but distinct widely separate foveæ; surface minutely sparsely punctate. Anterior tibiæ broad, thin, four-dentate. Tarsal claws long, slender, two-thirds length of terminal tarsal segment, not fused; outer claw three-fourths length of the inner. Length 3.25 mm., width 3 mm.

Holotype, male (No. 4778, Mus. Calif. Acad. Sci., Ent.) from Kings County, California, April, 1933.

The anterior foveæ of the prosternum are not present in the other species of the subgenus, the dorsal striæ of the elytra are also peculiar, being longer and more parallel than in any of the other species.

This interesting species is named for Dr. H. C. Fall, who has contributed much to the increase of our knowledge of North American Histeridæ.

(3) *Saprinus* (*Eremosaprinus*) *carinifer* Fall

Saprinus carinifer Fall, 1917, Can. Ent. 49:167.

The original description adequately describes this species. The following notes kindly made for me from the type specimen by Dr. Fall are desirable additions however:

Prosternum with striæ "sensibly less" widely separated at middle than at base; interrupted anteriorly but "without trace of small foveæ." "Tarsal claws slender, completely free and about two-thirds or three-fourths as long as the last tarsal joint."

This species was collected by Mr. G. H. Field, as was *unguiculatus*, in the mountains on the western border of the Colorado Desert in California, perhaps not far from La Puerta. In spite of their being from the same general locality, the two species are very distinct, *unguiculatus* being immediately separable by its shining surface, the absence of inner humeral striæ and by the long fused tarsal claws.

(4) *Saprinus* (*Eremosaprinus*) *opacus* Horn

Saprinus opacus Horn, 1894, Proc. Calif. Acad. Sci. (2) 4:364.

The following summary of characters of this species was made

by the writer from the type specimen in the museum of the California Academy of Sciences (Type No. 15).

Broadly oval; surface dull, finely, evenly alutaceous throughout. Discal area of pronotum finely, evenly punctate, punctures separated by interspaces three times width of punctures; lateral rugulose areas extending well up toward discal area, but decreasing in strength. Elytra strongly punctate, abruptly finer along suture within confines of fourth dorsal; outer marginal stria strong, entire; outer humeral stria oblique, joining outer marginal at base and extending apically one-fourth elytral length; inner humeral stria fine, subentire, abbreviated near apex; oblique humeral stria very faint, barely traceable by a weak impression; dorsal striæ not hooked inward basally; first three striæ carinate, first and second subequal in length extending nearly to apex, third shorter extending to apical fourth; fourth dorsal stria and sutural stria much finer than other dorsals, the fourth terminating slightly within apical half and arching basally, sutural stria obsolete in basal half. Pygidium strongly, closely, evenly punctate, punctures unevenly quadrate in shape. Prosternum somewhat depressed; striæ sinuous, meeting apically; anteriorly deeply unevenly impressed. Legs dark rufous; protibiæ seven-denticulate; tarsal claws long, slender, separate, three-fourths length of terminal tarsal segment. Length: 3.5 mm.

Described by Horn from a single example collected at San Jose del Cabo, Lower California.

The writer, who recently collected throughout Lower California, was unsuccessful in an attempt to secure additional specimens of this species while at San Jose del Cabo during July of 1938.

Carinifer and *opacus* are apparently very closely related, if not identical. The difference in the apical condition of the prosternal striæ, as indicated in the key and the descriptions, seems to be the most reliable point for separating the two.

The writer wishes to express thanks to Dr. H. C. Fall for his useful notes concerning the type of *carinifer*, to Mr. E. P. Van Duzee for granting permission to study the type of *opacus* deposited in the California Academy of Sciences, to Dr. F. E. Blaisdell for material loaned from his collection, and to Clinton G. Abbot and Ian Moore for a loan of three specimens of *unquiculatus* from the Field Collection in the Museum of the San Diego Society of Natural History.

PACIFIC COAST ENTOMOLOGICAL SOCIETY

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PROCEEDINGS

One Hundred and Forty-sixth Meeting, December 6, 1936.

Meeting held at 2:00 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco, California, with President C. D. Duncan in the chair. Members present: C. D. Duncan, R. L. Usinger, E. G. Linsley, L. W. Saylor, B. D. White, J. E. Elsea, M. A. Cazier, M. A. Embury, W. Hovanitz, W. M. Upholt, G. F. Ferris, J. B. Steinweden, J. R. Clark, E. R. Leach, C. D. Michener, P. DeBach, A. E. Michelbacher, D. DeLeon, J. L. Gressitt, J. C. von Bloeker, A. R. Mead, G. R. Struble, F. E. Blaisdell, J. O. Martin, E. C. Van Dyke, and E. P. Van Duzee. Visitors present: C. Atkins, Mrs. H. E. Peterson, Phyllis Brown, Ferne Haut, R. G. Pisano, W. Robinson, Elizabeth Turner, Dorothy Curry, R. C. Dickson, T. Aitken, D. D. Jensen, Pauline Schulthess, R. L. Kitchell, Miss I. Fraser, Miss D. Markwad, W. Lester, G. R. Ferguson, W. C. Reeves, D. P. Furman, and S. F. Light.

The Society unanimously elected to membership Dr. Florence M. Frost, Mr. George R. Ferguson, Mr. Dilworth D. Jensen, Mr. Deane P. Furman, Mr. Rocci G. Pisano, Miss Isabelle Fraser, Miss Ferne Haut, Miss Phyllis Brown, Mr. Will Lester, Jr., Mr. William C. Reeves, Mr. R. C. Dickson, Mr. Wilbert Robinson, and Mr. Clifford Atkins.

Mr. E. G. Linsley exhibited a box of *Andrena* and discussed some of the ecological and taxonomic problems involved in the study of this group of bees. He mentioned that nearly a thousand names had been applied to North American members of the genus but that many of the species had been very inadequately described. Their study is further complicated by great sexual dimorphism and difficulties in associating the sexes, many of which have been described as distinct species. Mr. Linsley estimated that at least five hundred species of *Andrena* occur in California, attributing the cause for such great speciation to the fact that most of the species are oligotropic and gather pollen from only a few, closely related species of plants.

Mr. Usinger commented upon some of the taxonomic problems involved in a study of the genus *Triatoma* and exhibited a box of significant species. He emphasized the fact that due to the importance of many of the species as vectors of trypanosomes, several of them had been originally described by medical men. Since the prime object of these men was to make available a name that could be utilized in medical literature, the species were rarely adequately described and often unrecognizable from the descriptions.

Mr. Upholt presented some data on the distribution of Mayflies and pointed out that many of our California species occur throughout a much greater area than has generally been believed.

Dr. Duncan then presented Dr. S. F. Light of the Department of Zoology, University of California, who addressed the Society on the origin of the termite caste and the mechanism of caste determination. Dr. Light's data, mostly gained from a study of the ontogeny of a termite colony, will be published elsewhere.

After a general discussion of Dr. Light's paper the meeting was adjourned.—E. G. LINSLEY, Secretary.

One Hundred and Forty-Seventh Meeting, March 6, 1937.

Meeting held at 2:00 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco, California. Members present: C. D. Duncan, E. G. Linsley, E. C. Van Dyke, E. P. Van Duzee, J. R. Clark, R. C. Dickson, M. A. Embury, A. R. Mead, C. D. Michener, I. Frazer, C. H. Atkins, P. Brown, F. Haut, W. H. Lange, Jr., W. M. Upholt, J. O. Martin, A. E. Michelbacher, G. E. Bohart, R. M. Bohart, P. C. Ting, J. B. Steinweden, G. F. Ferris, G. R. Wilson, D. D. Jensen, L. W. Saylor, W. C. Reeves, W. P. Furman, G. R. Ferguson, P. DeBach, J. L. Gressitt, G. R. Struble, D. DeLeon, F. E. Blaisdell, A. T. McClay, H. E. Burke, W. Hovanitz. Visitors present: E. B. Babcock, P. H. Timberlake, S. F. Light, P. S. Lange, G. Prole, O. Hartman, W. F. Boyer, R. E. Hackley, R. P. Allen, G. S. Hensill, G. Vargas, G. Kaloostian, and H. C. Donohoe.

The following were unanimously elected to membership in the Society: Dr. S. F. Light, Mr. P. H. Timberlake, Mr. Bryce Boyer, Mr. Glenn Vargas, Mr. R. E. Hackley, and Mr. George Prole.

Dr. Blaisdell exhibited a number of drawings of melyrid and tenebrionid beetles and stated that the lateral tergal processes of tenebrionid pupæ offer good characters for the separation of genera.

Dr. Duncan then announced that the subject for discussion for the afternoon program was "The Species Concept," and introduced the first speaker, Dr. E. B. Babcock of the Department of Genetics, University of California. Dr. Babcock affirmed that species actually exist in nature and pointed out that a species could be defined on the basis of the following five points: (1) *resemblances* between individuals composing the species (these resemblances being morphological, physiological, ecological, cytological, etc.); (2) *similar heredity* (their nuclei carry the same genes); (3) *constancy* of characters within certain ranges (involving stability); (4) *common descent* (evolutionary aspect); and (5) *syngamy* (or complete fertility and free intercrossing of individuals). To these five points Dr. Babcock added two additional ones: (1) Absence of free intercrossing with other species and

low fertility or sterility in hybrid progeny, and (2) formation of intra-specific groups (subspecies, races, etc.). Dr. Babcock also emphasized that an important practical aspect of the species question was "recognition" and that this could be based on morphological features, physiological features, geographical distribution, cytology, etc., and pointed out that a study of hybrids assisted greatly in the study of species.

Dr. Babcock was followed by Dr. Ferris. He remarked that to some few men a species was merely a name on a pin. To the points raised by Dr. Babcock, Dr. Ferris added the importance of morphology in the stability of species, since many genetically compatible forms may be prevented from crossing due to discrepancies in the structure of their sexual organs. He likewise pointed out that crossing may be prevented by physiological or psychological incompatibility. Dr. Ferris defined species as populations of a continuous interlinking complex.

After a general discussion of the subject by the members of the Society, the meeting was adjourned.—E. G. LINSLEY, Secretary.

One Hundred and Forty-eighth Meeting, April 17, 1937.

Annual field meeting, held at 10:00 a. m. in Golden Gate Park, San Francisco, California. Members present: E. P. Van Duzee, G. F. Prole, Will Lester, Jr., J. Reitzel, R. L. Usinger, G. F. Ferris, and H. E. Burke. One-half of the group devoted its time to studying scale insects in the park, the other half to collecting in the sand dune area near the ocean.—R. L. USINGER, Secretary *pro tem*.

One Hundred and Forty-ninth Meeting, September 11, 1937.

Meeting held at 2:00 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco, California. Members present: C. D. Duncan, E. G. Linsley, W. H. Lange, Jr., J. O. Martin, J. L. Gressitt, C. D. Michener, G. E. Bohart, E. O. Essig, A. E. Michelbacher, H. E. Burke, R. E. Hackley, R. L. Usinger, S. F. Bailey, M. A. Stewart, A. R. Mead, E. C. Van Dyke, R. G. Pisano, M. A. Embury, B. E. White, E. L. Kessell, P. DeBach, W. M. Upholt, R. C. Dickson, E. S. Ross, W. C. Reeves, G. F. Ferris, and E. P. Van Duzee. Visitors present: Mrs. W. H. Lange, Jr., Mrs. F. Parker, N. W. Frazier, B. R. Bartlett, J. J. DuBois, A. D. Cameron, K. Hagen, W. Barr, J. A. Downes, T. Aitken, K. L. Maehler, B. G. Gisla, and W. V. Pelle.

The Society unanimously elected to membership the following: Mr. Kenneth L. Maehler, Mr. J. J. DuBois, Mr. Benedict G. Gisla, Mr. Walter V. Pelle, Mr. B. R. Bartlett, and Mr. Alan D. Cameron.

The nominating committee (Dr. Michelbacher, Mr. Van Duzee, and Dr. Van Dyke, chairman) recommended that the present offi-

cers be retained for the coming year. The Society voted accordingly and re-elected Dr. C. D. Duncan, president; Mr. R. L. Usinger, vice-president, and Mr. E. G. Linsley, secretary.

Mr. Usinger exhibited an interesting bat parasite of the family Polyctenidæ (Hemiptera). The specimen represented the second U. S. capture of a member of this exceedingly rare group of insects.

Mr. Linsley exhibited stylopized females of *Andrena porterae* Cockerell, one of which showed a partial reversal of secondary sex characters. This specimen was of special interest because it presented characters of a male *Andrena* which had been described as a distinct species (*leptanthi* Vier. and Ckll.), but had been recently suspected of being the male of *A. porterae*.

Mr. Linsley also exhibited a member of the scarab genus *Pleocoma* which had been collected in Seward, Alaska, by the late Mr. J. A. Kusche. This example extends the known range of this wingless group by more than one thousand miles.

Mr. Van Duzee announced the purchase by the Academy of the Fenyes collection of Coleoptera. He reported that the collection was rich in exotic material, particularly from Mexico. The portion of the collection devoted to Aleocharinae is composed of more than 1800 species.

Dr. Duncan exhibited photographs of the embryo of *Smerinthus*, and of a termite colony. The last was remarkable in showing reciprocal feeding, grooming, various castes, eating of dead, feeding on wood, immature soldiers, etc., in a single photograph. Dr. Duncan also discussed the Death Valley Nature School conducted by San Jose State College during the summer. He said that observations suggested that in a small pool about 75 feet in diameter on the floor of Death Valley, there were at least half a million insects. Similar observations on a tumbling stream in the San Jacinto Mountains, resulted in estimates of twenty-three million aquatic insects to a mile of stream.

Dr. Duncan then introduced Prof. Essig, who had just returned from abroad, and who spoke upon some observations on European entomology. Prof. Essig first went to Cambridge, which served as his headquarters for much of his visit. He described his participation in an ecological survey of Wicken Fen, where he was much interested in the wide variety of equipment carried by collectors. During his stay in England, Prof. Essig attended meetings of the Linnean Society, the Royal Entomological Society, and the Zoological Society of London. Prof. Essig discussed the work of the various British and continental universities, and closed his talk with a word of appreciation for the fine spirit of cooperation and friendliness which was shown to him by entomologists everywhere that he had traveled.—E. G. LINSLEY, Secretary.

One Hundred and Fiftieth Meeting, December 4, 1937.

Meeting held at 2:00 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco, California. Members present: C. D. Duncan, E. G. Linsley, E. C. Van Dyke, J. O. Martin, G. F. Ferris, A. E. Michelbacher, E. O. Essig, F. E. Blaisdell, A. R. Mead, R. L. Usinger, R. E. Hackley, H. E. Burke, E. P. Van Duzee, R. C. Dickson, W. Lester, E. R. Leach, M. A. Cazier, and Mr. and Mrs. C. T. Atkins. Visitors present: L. A. Brubaker, D. Hackley, K. Sinclair, R. K. Goodline, T. Aitken, H. J. Rainwater, J. A. Downes, J. R. Douglas, M. F. Blair, J. W. Tilden, B. E. Rees, M. J. Vogel, G. Mansfield, K. D. Snyder, J. S. Yuill, J. E. Patterson, R. B. Foley, and P. Brown.

The following were unanimously elected to membership in the Society: Mr. Thomas G. Aitken, Mr. J. A. Downes, Mr. Karl D. Snyder, Mr. Millard F. Blair, and Mr. Marcel J. Vogel.

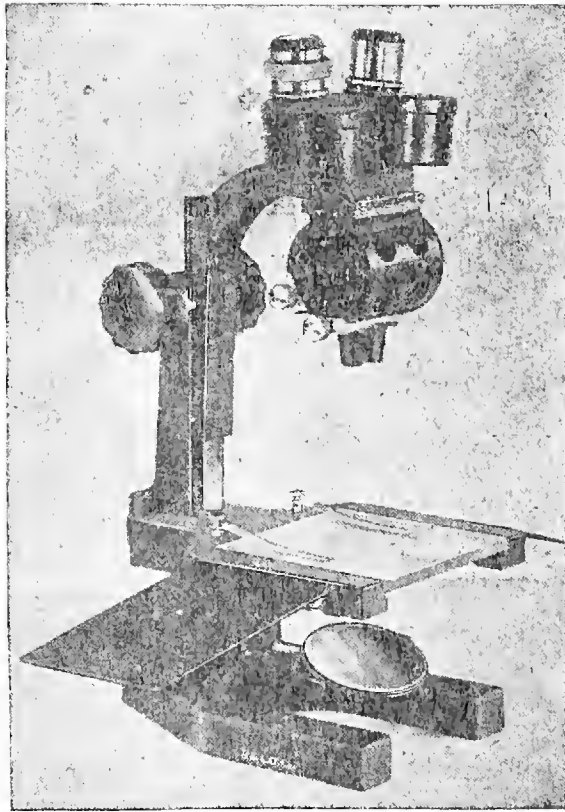
Mr. Usinger reported that the Historical Committee had published a statement in the PAN-PACIFIC ENTOMOLOGIST concerning the purpose and activities in connection with the accumulation and preservation of materials of historical interest to entomology.

Prof. Essig announced that vacancies in the Publication Committee required a reorganization of the group. He proposed that a business manager be added to the permanent staff of the journal and that in addition to the editor, associate editor, treasurer, and business manager, the committee be composed of nine rotating members, each to serve for a period of three years with freedom of re-election. The reorganized committee proposed by Prof. Essig, including the present membership, was as follows:

E. P. Van Duzee, editor; E. C. Van Dyke, associate editor; E. R. Leach, treasurer; R. L. Usinger, business manager. Rotating members: F. E. Blaisdell, G. F. Ferris, and E. O. Essig, to serve through 1938, E. G. Linsley, F. X. Williams, and S. F. Bailey, to serve through 1939, and C. D. Duncan, J. A. Comstock, and H. H. Keifer, to serve through 1940. The report was accepted by the Society and the new members unanimously elected.

Dr. Duncan then introduced the speaker of the day, Mr. Lester A. Brubaker, of San Jose State College, who spoke upon the subject of insect photography. Mr. Brubaker spoke of his early interest in pictorial photography and its gradual change to an interest in the photography of insects. He discussed various methods which he had developed for special problems encountered in this field. Of special interest was a frame and mirror attachment to the camera which throws light directly on the insect, and the use of water cells for photographing aquatics. Mr. Brubaker showed numerous lantern slides of insects in various habitats, including a particularly fine series of the mourning cloak butterfly.

Following a discussion of Mr. Brubaker's remarks, the meeting was adjourned.—E. G. LINSLEY, Secretary.



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1939

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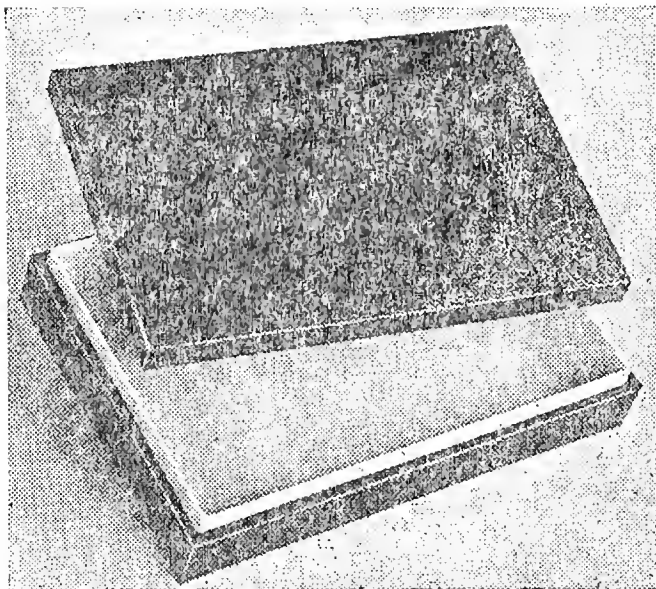
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THE SPECIES OF EUPARYPHUS RELATED TO CROTCHII O. S.

(Diptera, Stratiomyidæ)

BY MAURICE T. JAMES

Colorado State College, Fort Collins

The genus *Euparyphus* has reached its highest development in the southwestern part of the United States, the related *Oxycera* replacing it to a large extent in the eastern states and in Europe. Along with this development, there occurs what seems to be a natural group of species which is restricted to the Rocky Mountain and Pacific Coast region of British Columbia, the United States, and Mexico. These species should not be separated generically from typical *Euparyphus*, but since they form a well defined section of the genus, I am designating this as—

Caloparyphus James, new subgenus

This subgenus includes comparatively large species, 8 mm. or more in length (except *tahoensis* Coq. and *crucigerus* Coq., which measure somewhat less); scutellar spines separated, at base, by a distance at least as great as, usually much greater than, length of spines; thorax black, with four longitudinal yellow vittæ; head yellow with black markings (predominantly black in *obliquus*), and abdomen black, with conspicuous arcuate lateral marking or a once-interrupted arcuate band each on segments three and four (*decem-maculatus* O. S. varies from this pattern). Eyes pilose or bare.

Type, *Oxycera crotchii* O. S.

Ten species are here referred to this subgenus. Of these, *E. decem-maculatus* is unknown to me and has been placed here on the basis of its description. Two lines along which speciation has taken place are in the antennal structure and the abdominal pattern. (1) The antennæ, in one group of species (*amplus*, *currani*, *crucigerus* and *tahoensis*), have been shortened, especially in respect to the terminal two segments (seventh and eighth), whereas, in a second group, the antennæ remain long.

(2) The basic abdominal pattern apparently consists of yellow markings on a black background, in the form of large spots at the base of the first and apex of the fifth, and more or less arcuate bands on the second, third, and fourth, segments. The bands are doubly interrupted in *decem-maculatus*, once so in the other species; the yellow areas furthermore tend to become reduced in size, or to disappear completely, the extreme melanic condition being reached in *tahoensis*, typical form. On this basis, three species groups might be recognized:

- (a) Abdominal bands twice interrupted—*decem-maculatus*.
- (b) Abdominal bands once interrupted; antennæ shortened—*amplus*, *currani*, *crucigerus*, *tahoensis*.
- (c) Abdominal bands once interrupted; antennæ not shortened—*mariposa*, *pretiosa**, *crotchii*, *major*, *flaviventris*.

I am indebted to Messrs. G. E. Shewell, J. N. Knull, and Charles T. Green for information regarding the Curran, Hine, and Coquillett types, respectively.

The valid species may be separated by means of the following key.

1. Abdominal segments three to five each with an isolated median yellow spot; these, together with three lateral spots on each side and an apical one, make a total of ten abdominal spots.....*decem-maculatus* O. S.
- . Abdomen with at most eight yellow spots, and without the median ones on the segments..... 2
2. Antennæ no longer than head; terminal segment (eighth) definitely shorter than first and second combined; seventh segment not more than half the length of either third, fourth, or fifth 3
- . Antennæ at least one and one-half times length of head; terminal segment (eighth) at least as long as combined length of first and second; seventh segment at least as long as fourth or fifth..... 6
3. Vein R_4 normally wanting; femora black; antennæ with at most one segment yellowish, frequently entirely black..... 4
- . Vein R_4 normally present; femora yellow; antennæ extensively yellow basally, at least second and third segments entirely yellow*amplus*

**E. pretiosa* presumably belongs here. Only the first and second antennal segments are present in the type, the only specimen of this species known.

4. Larger species (8 mm.); venter entirely black; face of female with a median, inverted, U-shaped, black marking, but otherwise yellow *currani*
- . Smaller species (6-7 mm.), venter more or less extensively yellow at middle; face of female with a median, inverted, V-shaped, black marking and a longitudinal black spot on each side of it, the spots sometimes connected with each other.... 5
5. Front (♀) black, with an oblique spot on each side near middle, yellow *tahoensis*
- . Front in large part yellow..... *crucigerus*
6. Femora entirely yellow..... 7
- . Femora in part black..... 8
7. First and second antennal segments yellow; frontal black band continuous with black of face..... *mariposa*
- . First and second antennal segments black; black frontal band ending at antennæ..... *pretiosa**
8. Mid-dorsal yellow stripes ending at or before suture; arcuate bands of third abdominal segment separated by a distance much greater than their length; sixth and seventh antennal segments subequal, eighth greatly elongated..... *crotchii*
- . Mid-dorsal yellow stripes extending beyond suture; arcuate bands of third and fourth abdominal segments closely approaching each other, almost contiguous; sixth antennal segment much longer than seventh..... 9
9. Venter black, segments marked at middle with yellow.... *major*
- . Venter yellow, segments sometimes black on anterior margin *flaviventris*

EUPARYPHUS (CALOPARYPHUS) DECEM-MACULATUS O. S.

Euparyphus decem-maculatus Osten Sacken, Biol. Centr.-Amer., Dipt., 1:40, 1886.

Only the male type, from northern Sonora, Mexico, is known. The abdominal pattern is characteristic. The type may be lost. Mr. H. Oldroyd says he cannot find it in the British Museum, where the other *Biologia* types are.

EUPARYPHUS (CALOPARYPHUS) AMPLUS Coquillett

Euparyphus amplus Coquillett, Proc. U. S. Nat. Mus., 25:100, 1902.

Female (previously undescribed). Head yellow; the entire vertex, however, black, together with a prominent marking on front and face which takes somewhat the form of an inverted Y; stem of Y extending from vertex along mid-frontal line to a point somewhat above base of antennæ, where it divides, one fork extending

*See footnote page 50.

along each side of antennæ and to oral margin; from this Y, above antennæ, an angular prominence extends on each side toward the eyes; narrow ocular orbits above antennæ more or less extensively black; cheeks black; oral margin more or less blackish within. Proboscis yellow. First antennal segment black, its apex yellow; second yellow; third, fourth, and fifth entirely yellow, or grading from yellow at base of third to brown on fifth; sixth to eighth black; comparative length of the eight segments, 6:8:8:7:7:11:2:11; entire antenna somewhat shorter than head, as seen from the side. Pile of head yellow, inconspicuous except on proboscis; occipital orbit silvery below. Eyes bare. Thorax black, except the following areas which are yellow: a pair of dorsal stripes which extend almost from anterior margin to a point more than half way from suture to scutellum; humeri and broad lateral stripes extending to wing bases; post-alar calluses and a contiguous triangle pointing in an anterior direction; scutellum, except its narrow base and extreme apices of spines; the larger part of propleura; and a large area comprising narrow upper and broad posterior margins of mesopleura, upper part of sternopleura, and extensive areas on pteropleura, hypopleura, and metapleura. Halteres greenish, stems somewhat infuscated. Legs yellow, at most slightly brownish yellow on femora. Wings hyaline; veins yellow. Vein R_4 present; first posterior vein shortened to a stump, the other posterior veins not reaching wing margin. Abdomen black; first segment more or less yellowish basally; second with a small semi-circular yellow spot on each side; third and fourth each with an arcuate yellow cross-band, more or less broadly interrupted at middle, but length of yellow half-bands much greater than the distance separating them; narrow lateral margins of second to fifth segments, and apical third of fifth, yellow. Venter yellow; narrow bases of segments black. Length, 8 mm.

Described from five females, Spanish Fork, Utah (D. Elmo Hardy); one female, Hooper, Utah, June 30, 1937 (D. Elmo Hardy). The holotype, a male from Chimney Gulch, Colorado, is in the United States National Museum.

***Euparyphus (Caloparyphus) currani* James, new species**

Female. Head yellow; vertex, a broad frontal band, middle of face and oral margin, and cheeks black; frontal band half as broad as front and ending angularly just above antennæ; black area of face taking the form of an inverted U. Proboscis yellow. Antennæ black, second segment somewhat yellowish; ratio of segments, 7:8:8:7:7:9:3:10. Pile of head yellow, inconspicuous except on proboscis; occipital orbits silvery pollinose below. Eyes

with short, scattered pile. Thorax black except the following areas, which are yellow: two longitudinal dorsal stripes which extend from anterior margin to a point half-way between suture and scutellum; humeri and a lateral stripe extending from each humerus to suture; postalar calluses and a contiguous triangle, directed forward; scutellum and its spines; upper margins of mesopleura, broadened at wing bases; and four small spots, one on each sternopleuron and pteropleuron. Halteres yellow, their stalks infuscated. Legs yellow, except basal half of each femur and a small median ring on each hind tibia, which are brownish-black. Wings hyaline, veins yellow. Vein R_4 wanting; posterior veins not reaching wing margin, and first posterior reduced to a fold beyond its base. Abdomen black; a small yellow spot at base of first segment, and one on each lateral margin of second; segments three and four each with narrowly interrupted arcuate yellow bands; narrow lateral margins of all segments but first and a large, semi-circular spot covering approximately apical half of fifth segment, yellow. Length, 8 mm.

Holotype, female, Riding Mountains, Manitoba, July 21 (J. B. Wallis), in the American Museum of Natural History.

EUPARYPHUS (CALOPARYPHUS) TAHOENSIS Coq.

Euparyphus tahoensis Coquilett, Proc. U. S. Nat. Mus., 25:98, 1902.

A black species; the female with a pair of oblique yellow markings at middle of front near the eyes and another pair on lower part of face; a male, which I refer to this species, with frontal triangle yellow and face entirely black. Thoracic markings characteristic of the group.

E. obliquus Hine probably should not be considered specifically distinct. I therefore propose the following subspecific designations:

E. tahoensis tahoensis Coq., loc. cit. Abdomen black, with the margin and an interrupted fascia on the fourth abdominal segment yellow. Type, female, Lake Tahoe, California, in the United States National Museum. Also a male, Summit Prairie, Oregon, August 3, 1935 (Joe Schuh).

E. tahoensis obliquus Hine, Can. Ent., 36: 87, 1904. Abdomen black, with the margin, a small lateral spot on the second segment, and an interrupted fascia each on the third and fourth segments, yellow. Type, Vernon, B. C., in the Ohio State University collection.

EUPARYPHUS (CALOPARYPHUS) CRUCIGERUS Coq.

Euparyphus crucigerus Coquillett, Proc. U. S. Nat. Mus., 25: 99, 1902.

Euparyphus nicolensis Curran, Trans. Royal Soc. Canada, Sect. V: 221, 1927.

A black species, close to *tahoensis*; indeed, I should consider it a subspecies, were it not for the different basic pattern of the pale markings of the head.

Crucigerus with occipital, facial, and frontal orbits yellow, and with a subquadrate spot at base of antennæ which may be confluent with the frontal and facial orbits above and connected below by means of oblique markings with lower part of facial orbits. Thoracic markings typical; abdomen with margins, sometimes base of first segment, and an interrupted vitta each on third and fourth segments yellow.

The presence of the yellow V on the face, by which Curran distinguished *nicolensis*, does not, according to the series of specimens before me, seem to be even of subspecific value.

Type, a female from Colorado, in the United States National Museum.

Distribution. South Dakota: Custer, July 17, 1924. Colorado: Fort Collins, July 24 and 31, 1895 (C. P. Gillette); Florissant, June 21, 1937 (M. T. and H. B. James). Utah: Summit, June, 1926 (Brown); Amalga, June 19, 1937 (C. F. Smith). Washington: Longmire, Rainier Nat. Park, July 27, 1920 (E. C. Van Dyke). Oregon: Wallowa Mts., Baker County, July 4, 1922 (Van Dyke). California: Buck Creek, Modoc County, June 21, 1932 (C. L. Fox); Meadow Valley, Plumas County, 4000-5000 feet (Van Dyke). Arizona: McNary, June 14, 1934 (M. T. and H. B. James). The type of *nicolensis* is from Nicola, B. C.

Euparyphus (Caloparyphus) *mariposa* James, new species

Female. Head black in ground color, but actually in large part yellow, the yellow areas including: occipital, facial, and frontal orbits, the last two being very broad; an inverted, U-shaped area on face, connected below with orbits and above with a small area at base of antennæ; a small triangle above antennæ; and, in the holotype, a small, U-shaped marking extending from each posterior ocellus backward onto occiput. Pile of face sparse, yellow, that of front and vertex black and denser, especially dense on black areas; all the pile, however, short. First and

second antennal segments reddish yellow, the others black; ratio of the segments, 14:13:10:7:8:18:12:42; antennæ one and three-fourth times as long as head. Eyes with short, scattered pile. Thorax with four dorsal yellow vittæ; median pair extending more than halfway from suture to scutellum; lateral pair broadly interrupted behind suture; upper margin of mesonotum bordered very narrowly with yellow, the border expanding, however, into a large area just anterior to wing base, which, in turn, extends onto sternopleuron, pteropleuron, and metapleuron, thus surrounding wing base in the form of a semi-circular band; a prominent yellow spot on each propleuron. Scutellum yellow, narrowly black at base; spines separated by a distance equal to one and one-third times the length of each. Pile of thorax light yellow. Legs yellow, the anterior coxæ black basally, posterior ones slightly brownish. Wings hyaline; veins yellow; R_4 distinctly present. Abdomen black; most of median half of first segment, apical half of fifth, an arcuate lateral marking on each side of second, broadly interrupted arcuate bands on third and fourth, and venter, yellow. Length, 9 mm.

Holotype, female, Mariposa County, Calif., W. M. Wheeler collection, in the American Museum of Natural History.

Paratype, female, Mariposa County, Calif., June 6, 1914 (F. W. Nunenmacher), in the Oregon State College collection.

EUPARYPHUS (CALOPARYPHUS) PRETIOSA Banks

Euparyphus pretiosa Banks, Can. Ent., 51: 65, 1920.

Only the type, a female from Vancouver, B. C., is known. The eyes are pilose; the antennæ are broken off beyond the second segment. Type in the Museum of Comparative Zoology.

EUPARYPHUS (CALOPARYPHUS) CROTCHII (O. S.)

Oxycera crotchii Osten Sacken, West. Dipt., Bull. U. S. Geol. Geog. Surv. Terr., 3: 212, 1877.

Euparyphus septem-maculatus Adams, Kans. Univ. Sci. Bull., 2: 31, 1903 (Synonymy, Banks, Can. Ent., 51: 65, 1920).

The antennæ are broken off beyond the second segment in the type, and this fact was responsible for Osten Sacken's generic reference, quite a natural mistake, as *Euparyphus* and *Oxycera* are indistinguishable except by the antennal structure. Fort Collins specimens in my collection have the following ratio of the antennal segments: 15:10:9:8:7:15:15:40. Type, a female from California, in the Museum of Comparative Zoology.

Distribution. Colorado: Masonville, September 6, 1934; Fort Collins, April 8, 1910 (reared specimens). Washington: Quillene, July 21, 1935 (W. Baker); Shelton, August 31, 1935 (Baker). California: Paraiso Springs, May 7, 1922 (L. S. Slevin); Inverness, August 14, 1910 (Van Dyke); Carmel, Monterey County, February 5, 1917 (Van Dyke) and May 13, 1919 (L. S. Slevin); Jewell Station, Marin County, July 15 (C. L. Fox); Geysers, 1750 feet, May 21, 1897 (W. M. Wheeler). The type of *septem-maculatus*, a male, is from Palo Alto, California. Curran has recorded this species from Vancouver, B. C.

EUPARYPHUS (CALOPARYPHUS) MAJOR Hine

Euparyphus major Hine, Ohio Nat. 1: 112, 1901.

Euparyphus octomaculatus Curran, Trans. Royal Soc. Canada, Sect. V: 222, 1927.

The above species seem to be absolutely synonymous. *E. major* was omitted from Aldrich's Catalogue, and for that reason may have been overlooked by Curran. The type of *major*, from Boulder, Colorado, is in the Ohio State University collection; that of *octomaculatus*, from Penticton, B. C., is in the Canadian National collection.

Distribution. Kansas: Atchison County, July 7, 1924 (E. P. Breakey). Colorado: Boulder, type: North Park, August 30, 1899; Masonville, September 4, 1934; Pingree Park, August 24, 1923 (R. C. Smith). Wyoming: Yellowstone Park, July 20, 1925 (A. A. Nichol). Montana: Anaconda, July 21, 1931 (J. Nottingham). Utah: Provo Canyon (D. Elmo Hardy). Washington: Mt. Rainier, August 10, 1935 (W. R. Camp); Green River Gorge, August 6, 1932 (Baker). Oregon: Horseshoe Lake, Blue Mts., 7500 feet, July 26, 1929 (Scullen); Woodruff Meadows, Jackson County, August 4, 1932 (Chamberlin). California: Los Gatos, September 25, 1910.

EUPARYPHUS (CALOPARYPHUS) FLAVIVENTRIS James

Euparyphus flaviventris James, Pan-Pac. Ent., 12: 89, 1936.

The type series is from Lake City (holotype), Buck Creek, and Davis Creek, in Modoc County, and Grass Lake, Tahoe, California. Type in the California Academy of Sciences. A specimen in the American Museum of Natural History is from Mariposa County, California, June 6, 1914 (F. W. Nunenmacher).

A NEW FIJIAN OROCHLESIS

(Coleoptera, Curculionidæ)

BY ELWOOD C. ZIMMERMAN

Bernice P. Bishop Museum, Honolulu, T. H.

The cryptorhynchine genus *Orochlesis* Pascoe, 1873, although distributed from Malaya to the Society Islands, has more than a third of its described species in Fiji. Considerable speciation has taken place in Fiji, and many new species are yet to be described. The following new species is the eighth from Fiji.

My key to the Fijian species (Occasional Papers, B. P. Bishop Museum, Vol. 12, No. 22, 1936) can be amended to include this species by changing the 4 in dichotomy 3 to 3a and inserting the following lines after dichotomy 3:

- 3a. Interocular area not narrowed dorsally, but slightly widened toward the tops of the eyes; a black species.....*ater*
Interocular area conspicuously narrowing from the base of the rostrum to the tops of the eyes..... 4

Orochlesis ater Zimmerman, n. sp.

Derm shiny black, with the antennæ and tarsi diluted with red; head normally with pale scaling; scales on the pronotum mostly black, but normally with pale scales on either side of the median line and before elytral intervals four and five and with a few scattered pale scales, scales in front of elytral interval three black; elytral scaling black, tessellated with small patches of yellowish brown scales, each interval picked out with rather widely spaced, usually white setæ; pale or white setæ predominating on the legs; scaling on the pleura and below white excepting occasional dark scales or setæ on the fifth ventrite.

Head coarsely, deeply, rather irregularly punctate; interocular area widened instead of narrowed dorsally; scaling sparse, mostly setiform and with only a few elongate-oval scales. Rostrum coarsely punctate only at the extreme base and laterally sulcate to the antennæ, otherwise smooth and shiny, sparsely and minutely punctate. Antennæ with the scape as long as the first four funicular segments; first and second funicular segments subequal in length, the second as long as three plus four plus half of five, three to seven successively slightly more transverse and these combined as long as the club. Prothorax seven-tenths as long as broad, base bisinuate, broadly rounded on the sides to just before

the apex and there with a rather shallow but distinct subapical constriction which is just perceptibly flatly impressed across the dorsum; dorsum otherwise evenly convex; very coarsely, closely, reticulately punctate, the interstices shiny, much narrower than the diameters of the punctures; scaling sparse, not hiding the derm, without round scales, each puncture giving rise to a narrow, elongate, setiform prostrate scale, with a few scattered broader scales near the base. Elytra rather tumid in dorsal and lateral outline, almost evenly arcuate on the sides from the sinuous base to the apex, about two-thirds as broad as long and about three times as long as the prothorax; intervals, at least in the basal half, with small, low, but conspicuous, bare, shiny tubercles and a row of almost prostrate setæ; scaling, except on the tubercles, dense and concealing the derm on the intervals, the scales small; striæ at most shallowly impressed, but with the punctures large, deep and coarse near the base, well spaced, dwindling rapidly in size caudad. Legs with the femora edentate, coarsely punctate, scales sparse above, tibiæ with three carinæ on the outer face in addition to the dorsal and ventral carinæ. Sternum with the mesosternal receptacle strongly and conspicuously protuberant; metasternum deeply impressed immediately in back of the mesosternal receptacle, with large subfovea-form punctures, the hind margin rather deeply emarginate, the narrowest point between the mid and hind coxæ somewhat narrower than a hind coxa. Venter with the first two ventrites with well-defined punctures bearing prostrate squamæ or squamiform setæ, the punctures coarse near the base of the first ventrite; ventrites three and four punctate across their entire lengths; ventrite five densely punctate. Length, 4-6 mm.; breadth, 2.5-3.5 mm.

Fiji: Viti Levu and Taveuni. Holotype collected at light at Korovou, Tailevu, Viti Levu November 9, 1937, by Dr. J. M. Valentine, stored in Bernice P. Bishop Museum, and two paratypes collected at Waiyevo, Taveuni, by Dr. H. S. Evans, one February 29, 1924 (No. 701-11-23) to be deposited in the British Museum, the other March 1, 1924 (No. 793-24) in Bishop Museum.

The first abdominal segment is flattened and impressed in all three specimens, and I therefore consider them males.

The shape of the interocular area which is not narrowed from the base of the rostrum to the top of the eyes, together with the strongly protuberant mesosternal receptacle and sparsely squamose, coarsely punctate pronotum will easily distinguish this species from the other Fijian species.

BEES RELATED TO DIADASIA AUSTRALIS CRESSON

BY T. D. A. COCKERELL

Boulder, Colorado

When collecting bees on Santa Catalina Island in June, San Clemente Island from June 17 to 21, San Nicolas Island July 7 to 17, and Santa Cruz Island August 20, I found *Diadasia* visiting the flowers of *Opuntia littoralis* (Engelm.). On Santa Catalina Island in March and April and again August 29 to September 2, and on San Miguel Island early in May I found no *Diadasia*. At the time of the last visit to Santa Catalina there were plenty of *Opuntia* flowers, freely visited by *Bombus*, but not a *Diadasia* could be found.

On sorting out the numerous specimens I found I had two very distinct species:

(1). *Diadasia opuntiae* (Cockerell), described in 1901 from San Pedro, California, as *D. rinconis opuntiae*. From the mainland I have it only from San Pedro, but Timberlake has taken it at Whittier and Long Beach, though he never finds it inland in the region about Riverside. It is recognizable in both sexes by the shining area of metathorax, in the female by the broad abdominal bands, but especially by the hind basitarsi of the male having a circular plate at the end, instead of the finger-like process of all the other species of the *D. australis* group. At San Clemente it was taken at Wilson's Cove and Middle Ranch by Dr. J. T. Scott and myself. On Santa Catalina my wife and I took it at Rancho Escondido, Fisherman's Cove, the Mausoleum, and Cape Canyon. At Fisherman's Cove several males were found resting on the cup-shaped flowers of *Calochortus*.

(2). *Diadasia mimetica* (Cockerell), described in 1924, from Santa Cruz Island (Van Duzee) as *D. australis mimetica*. The area of metathorax is dull in both sexes, the females have narrow, sharply defined abdominal bands, and the males have a finger-like process at end of hind basitarsi. I found a pair at Fry's Harbor, Santa Cruz Island, August 20, at flowers of *Opuntia littoralis*. Both sexes occurred on San Nicolas Island, where no *D. opuntiae* were found. On San Clemente several were collected by J. T. Scott and myself, and my wife and I took it on Santa Catalina at Fisherman's Cove (some on the *Calochortus*

flowers), Cape Canyon and Rancho Escondido. This species is not a race of *D. australis*, but it is very close to *D. rinconis* Cockerell, described from New Mexico. In the females of *D. rinconis* the abdominal bands are broader with the anterior (cephalad) margin strongly undulate. Specimens collected by Timberlake at Riverside at flowers of *Opuntia parryi*, May 27, are clearly *D. rinconis* and not *mimetica*. *D. australis petrinus* Cockerell, 1923, from San Pedro Martir Island, is really a form of *D. rinconis* with no strong characters. In the female of *D. australis* (Cresson) tergites II to IV have the same white apical bands and the surface before them is thinly covered with light hairs. Specimens before me are from Denver (Figgins) and Livermore (Baker) in Colorado, and Santa Fé Canyon (Cockerell) in New Mexico.

THE MALE OF BUPRESTIS CONNEXA

(Coleoptera, Buprestidae)

In dissecting genitalia of *Buprestis connexa* Horn, a male specimen taken at Camp Richardson, Lake Tahoe, California, July 16, 1938, was discovered. I am indebted to Mr. L. B. Boyer for this specimen. As no previous records of the male of this species have come to notice and as the species of *Buprestis* are placed subgenerically by the characters of the anterior tibiae of the males, this discovery is considered significant.

The male is similar to the female in general appearance but differs as follows: length, 13 mm. (15 mm. in the female); head green on occiput (cupreous in the female); pronotum with a slight depression near each anterior angle, green around lateral margins (cupreous in the female); elytra with lateral margins less cupreous than in the female; last ventral segment of abdomen subtruncate apically (distinctly emarginate apically in the female). Anterior tibiae simple, not internally emarginate, and armed with a subapical, reflexed tooth.

On the basis of the anterior tibiae *connexa* should be placed in Casey's subgenus *Cypriacis* with *aurulenta*, *adjecta*, etc., rather than following *gibbsi* in the typical subgenus *Buprestis*. *Buprestis fasciata* Fabr. and *Buprestis langi* Mann., likewise belong in *Cypriacis*.—J. R. Helfer, Caspar, California.

NEW SPECIES OF MALACHIUS FROM CALIFORNIA

(Coleoptera, Malachidæ)

BY RALPH HOPPING

Vernon, British Columbia

The writer has before him all of the known species and two new species of that *Malachius* group having the antennæ pectinate and in which the elytra are not appendiculate. Most of these species can readily be placed by means of Fall's key* published in 1901. To the species *mixtus*, however, have been relegated numerous females, many of which, upon discovery of males, have proven to be new species.

This paper was written at San Luis Obispo, California, while on my vacation in March and April, 1937.

Malachius yuccæ Hopping, n. sp.

Male. Length: 3 mm. Shining. Color blue-green except a broad band on anterior part of head, the under side of first segment of antennæ, the lateral margins of prothorax, and a central median band on each elytron, which are testaceous; a spot at apices of elytra rufous; tarsi sometimes lighter in color; pronotum with a broad testaceous band at lateral margins, the longitudinal central portion blue-green and shining; each elytron with a broad longitudinal testaceous stripe terminating at apex in a rufous spot.

Elytra not appendiculate. Antennæ pectinate, the pectinations on segments V to X longer than the segments and slender.

Female. Similar to the male but without the longitudinal stripe on each elytron although there is an indefinite indication of a stripe just above the apical rufous spot. Antennæ strongly serrate.

Pronotum wider than long in both sexes, with posterior margins broadly explanate. Elytra scabrous with indefinite longitudinal carinæ.

Holotype, male, allotype, female, and a paratype of each sex from Banning, California, collected by the author on March 6, 1933, from the flowers of *Yucca arborescens* Torr.

Superficially this species looks like the male and female of *floricola* Martin but the male antennæ in *yuccæ* are pectinate rather than serrate as in *floricola*. *Yuccæ* should be placed just

*Fall, H. C., Occ. Pap., Calif. Acad. Sci., VIII, pp. 247-248, 1901.

before *macer* Horn, a species with very much shorter pectinations of the antennæ. Three additional females were collected at Banning on March 30, 1937. Evidently a male and a female collected by Mr. F. W. Nunenmacher in Esmeralda County, Nevada, June 6, 1908, also belong to this species.

Malachius blaisdelli Hopping, n. sp.

Male. Shining and densely black in color except for the usual partly testaceous areas on the front of the head and near the eyes; lateral margins of pronotum and tips of elytra reddish; elytra shining dark blue; antennæ entirely black; pronotum with a black central area reaching the anterior and posterior margins, with a small black spot subbasally on either side; elytra dark blue except for rufous tips which fade to testaceous anteriorly; apical spots rather large and extending V-shaped into the blue of the elytra; ventral surface intensely black except for pale prothorax and margins of ventral segments; legs entirely black. An ashy, sparse, erect vestiture, especially on elytral margins and toward their apices and more or less on the ventral surface and legs.

Head with longitudinal depressions just inside the antennæ, with a broad, central, raised area between them. Antennæ pectinate with the pectination of segment V broader at base than at apex and shorter than VI; pectinations on segments VIII and IX longer than those on VI and VII, slightly longer than the segments and moderately stout. Pronotum broader than long. Elytra faintly scabrous; slightly wider near their apices. Length: 3 mm.

Female. Similar to the male but with the antennæ rather strongly serrate; the ashy, erect vestiture denser, and the lateral pronotal spots nearly obsolete.

Holotype, male, (No. 4764), and allotype, female (No. 4765), Calif. Acad. Sci., Ent., in the Blaisdell collection, taken at Stockton, California, May 12, 1933, by F. E. Blaisdell. Paratypes: two males and three females, Stockton, California, April 23, 1931; and two males and one female, near Lodi, San Joaquin County, California, April 12, 1930; all collected by F. E. Blaisdell. All paratypes in the collection of F. E. Blaisdell deposited in the collection of the California Academy of Sciences except for a pair in the collection of the author.

This species is nearest *mixtus* Horn but is more slender and smaller, *mixtus* being 3.5 to 4.5 mm. in length. Occasionally a female of *blaisdelli* lacks the lateral black spot on the pronotum.

FOUR NEW CENTIPEDES OF THE GENUS *CRYPTOPS*

BY RALPH V. CHAMBERLIN

University of Utah

The types of the following new species of *Cryptops* were found among material taken at quarantine and submitted to me for identification by the United States Bureau of Entomology and Plant Quarantine.

Cryptops nautiphilus Chamberlin, n. sp.

Cephalic plate with posterior margin free and overlapping the first dorsal plate; without longitudinal sulci. First dorsal plate with a sharply impressed transverse sulcus which is angled at the middle; behind this a W-shaped impression with longitudinal sulcus proceeding caudad from each angle of the W. The succeeding tergites bisulcate except the last, which bears a large, suboval, median impression; median keel not developed. Anterior margin of prosternum nearly straight, bearing few setæ. Ventral plates smooth, most showing a distinct median longitudinal sulcus crossed by a transverse one, the parts of which are commonly oblique. Last ventral plate short and broad, subsemicircular. Stigma elliptic. Pseudopleuræ subtruncate posteriorly, pores in an anterior patch, not reaching caudal margin by a wide space. Tarsi of all but posterior legs single jointed. Prefemur and femur of anal legs flattened above, sulcate over distal portion; prefemur with numerous spines beneath and laterally, the femur similarly armed on mesal and ventral surfaces; tibia with three stout curved teeth along ventromesal edge; first tarsal article with two similar teeth of which the distal one is larger and is near middle of length of joint. Length, 19 mm.

From Mexico. One specimen taken on banana leaf at quarantine in New Orleans, August 13, 1936.

Nautiphilus suggests *detectus* Silvestri, but is a larger species differing in having only three ventral teeth on tibia of anal legs, instead of six, and in various other details.

Cryptops venezuelæ Chamberlin, n. sp.

Dorsum in general dusky with head, first tergite, and last tergite, together with all appendages, yellow. Cephalic plate without sulci. First dorsal plate without either transverse or longitudinal sulci. The following dorsal plates likewise without complete sulci; these complete only on more posterior plates. Ventral plates with sulci forming a cruciform impression. Last ventral

plate with caudal margin straight or nearly so, the posterior corners rounded. Pseudopleuræ truncate, with pores small, about a dozen on each side in a triangular patch below ventral plate and with apex caudad, not reaching posterior margin. Tarsi of all but posterior legs one-jointed. Prefemur and femur flattened above and sulcate at distal end; bearing on mesal and ventral surfaces numerous short spines and prefemur with some on outer face where femur bears finer hairs or setæ; both of these articles without teeth except a dentiform process of intermediate character at distal end of femur below. Tibia with a series of five (six on one side) teeth and the first article of tarsus with two. Length about 10 mm.

From Venezuela, taken at quarantine in Washington, D. C., July 22, 1936.

Cryptops watsingus Chamberlin, n. sp.

Color yellow throughout. Cephalic plate not sulcate. First dorsal plate with transverse sulcus angled at the middle behind which is the typical W-shaped mark followed by the usual paired sulci. The following tergites with typical paired sulci. Prosternal margin straight or but slightly bowed, with setæ sparse. Ventral plates with cruciform impression. Last ventral plate with corners widely rounded, the median portion of caudal margin straight. Tarsi of all except posterior legs uniarticulate. Pseudopleuræ apparently without pores, in their usual position an area of short spinous points. Prefemur and femur clothed with the usual spines, those on ventral surface of femur more sparse, these articles with finer, sparse hair above and ectally; no teeth; both joints sulcate at distal end above. Tibia of anal legs with four equal teeth below, the first tarsal joint with three. Length, 20 mm.

From Guatemala, taken at New Orleans in debris on bananas, July 23, 1936.

Cryptops positus Chamberlin, n. sp.

Cephalic plate free and overlapping the first dorsal plate, without sulci. First dorsal plate with sharply impressed, transverse sulcus angled at middle; paired sulci very fine, ending in a W-mark caudad of transverse sulcus. Tergites finely bisulcate except the last which has a median depression; no median keel. Prosternal margin straight. Ventral plates with the usual cruciform impression. Last ventral plate wide, sides converging caudad, the caudal corner widely rounded. Pseudopleuræ truncate; pores in a patch along ventral plate, not reaching caudal margin by a wide space. Tarsi of all but posterior legs one-jointed. Prefemur and femur of anal legs flattened above and below, dorsally sulcate from end to end, the sulcus deepest caudally; these joints bearing

numerous spines ventrally and mesally as usual but having a narrow longitudinal glabrous band along mesal face of femur; femur with a tooth on mesoventral edge about one-fourth the length from the caudal end; tibia with a series of four teeth; first tarsal joint with two ventral teeth. Length, 17.5 mm.

Holotype from Honduras; one specimen taken at New Orleans November 1, 1937. Paratype from Nicaragua; two specimens taken at quarantine at New Orleans, November 21, 1936.

Very close to *C. nautiphilus*, but a more robust species with the articles of the anal legs decidedly thicker and proportionately shorter.

NOTES ON THE MELOIDÆ

Lytta agrestis Fall (1901), described from three specimens in the American Museum of Natural History, is extremely rare and apparently unrepresented in any of the larger western collections. Recently, however, Mont Cazier called my attention to four perfect male specimens of this species taken by R. P. Allen, 20 miles east of Tuba City, (northeastern) Arizona, on June 26, 1938.

Also taken at the same locality was a unique damaged specimen which P. J. Darlington, Jr., was kind enough to compare with Leconte's type of *Lytta cribrata*. This species was taken by the Mexican Boundary Commission (1853) and is apparently known only from the type. Unfortunately the condition of the Tuba City specimen made it impossible to positively identify, although it did seem to approach the type.

Epicauta magnomaculata J. O. Martin (1932) was described from a series of nine specimens taken at Ballarat, Panamint Valley, Inyo County, California, May, 1931. I had never seen any other specimens except this series in the California Academy of Sciences until recently when looking over some material taken by Messrs. J. DuBois, B. White and V. Wooley. They took 112 specimens from two bushes of Arrow-weed, *Pluchea sericea*, at Stove Pipe Wells, Death Valley, California, on April 13, 1938. It is interesting to note the manifestation of their gregarious habit, the specimens having been taken on two bushes close together while, although a considerable area surrounding these bushes was surveyed, no additional specimens were found.—K. L. Maehler.

ON THE STANDING OF THE GENUS *LIBURNIA* STÅL

(Hemiptera, Fulgoridæ)

BY EDWARD P. VAN DUZEE

California Academy of Sciences

In zoological nomenclature it probably is impossible to formulate any rule or set of rules that will fit all cases. There always will be the element of personal judgment to interject itself into the application of such rules. One of these puzzling cases is that of *Liburnia* Stål. No student of nomenclature questions for a moment the rule that the type of a genus must be found among the species included in the genus at the time it was founded. However, the name *Liburnia* was first given by Stål, not as a new genus, but as a name for what was at that time an old and well known generic concept. Therefore to find its type, one must first locate the type of the genus that had been masquerading under that name. The whole trouble comes from the fact that Stål, in 1866, called that genus *Delphax* Auct. instead of *Delphax* Latreille. Stål's meaning will become perfectly plain to anyone who will look up the history of the generic name *Delphax*. To ignore these facts and misinterpret Stål's use of *Delphax* Auct. is a mere quibble.

Here are a few pertinent facts: Latreille, in 1796, described a genus *Cercopis* in his "Precis" (p. 91) for which he substituted *Asiraca* at page 202 but without the mention, in either place, of a species. This genus *Asiraca*, he validated in 1802 by including the species *longicornis* Latr., *clavicornis* Fabr. and *crassicornis* Fabr. In the meantime (1798), however, Fabricius had established his genus *Delphax* with *crassicornis* and *clavicornis* as species, and in 1803 he added eight other species. In 1804 Latreille reaffirms his genus *Asiraca*, complains that Fabricius had redescribed it as *Delphax*, and lists nine species, among them *clavicornis*, *crassicornis* and *pellucida*, thus making his *Asiraca* equivalent to *Delphax* of Fabricius. But in 1807 he recognizes *Asiraca* with *clavicornis* and four other species, and *Delphax* Fabr. with "pellucida Fabr. "ejusd. Delphacies *flavescens*, *striata*, *marginata*, *minuta*." This statement by Latreille distinctly designates *pellucida* as the type of his genus *Delphax* and it is this generic concept that was used by practically all hemipterists until Stål corrected the liberties Latreille

had taken with Fabricius' genus, by renaming *Delphax* of Latreille as *Liburnia*. This genus *Liburnia*, as named by Stål in 1866, was so used by Scott in his revision of the family in 1870-1871, by Sahlberg in 1871, by Fieber in his Katalog of 1872 and in his monograph of 1875, by Melichar in 1896 and by me in 1897. Until the time of Muir, the only work of a monographic character in which the name *Delphax* was used in place of *Liburnia* was that by Kirschbaum, and it is probable that this work (1868) was written before Kirschbaum had seen Stål's Hemiptera Africana.

The validity of the name *Delphax* Fabricius does not affect the standing of genus *Liburnia* Stål and need not be considered here.

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GENUS LIBURNIA Stål

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A NEW SPECIES OF ACMÆODERA (COLEOPTERA- BUP-
RESTIDÆ) WITH BIOLOGICAL NOTES ON OTHERS
FROM SANTA BARBARA COUNTY, CALIFORNIA

By BURDETTE E. WHITE

University of California, Berkeley

Sunset Valley, which is near Figueroa Mountain in the Santa Barbara County portion of the Coast Range, has, through the results of three collecting trips, been proved to be an unusual region for the genus *Acmæodera*. A total of 18 species and 2 subspecies was found to inhabit this area. Two of these were new species with the probability of a third being new. One of these has since been described while another is described below.

Two of the three trips were made exactly one year apart—July 4, 1937 and 1938. The third trip followed two weeks after the second. The members of the first trip were Mr. George Holsten and the author; the second included Mr. V. L. Woolley, Mr. Robert Zaph, and the members of the first trip; the third trip was a hasty but successful one made by Mr. Mont Cazier and the author.

The 1937 seasonal development of the flora was apparently about two weeks earlier than that of 1938, probably due to the abundance of precipitation in the intervening winter. This may or may not have been responsible for the fact that a slightly different group of species was taken on each of the trips. The majority of the specimens and representatives of all the species were collected along a three mile stretch of road that was cut through the "chamise belt" at about 2000 feet elevation. The fact that 19 members of a single genus were collected in such a restricted area seems in itself worthy of mention; however, along with the list of these species will be included the preferred plant of each as was shown by the persistence of the adults in flying to, or by the fact that they were consistently beaten from, the same species of plant.

The main plants with which the *Acmæodera* were associated were scrub oak, *Quercus dumosa*; hard tack, *Cercocarpus betuloides*; chamise, *Adenostoma fasciculatum*; *Eriodictyon crassifolium* variety *traskiæ*; Christmas berry, *Photinia arbutifolia*;

manzanita, *Arctostaphylos* sp.; and an unidentified, small, yellow-flowered composite. These, with a few other species of plants, formed a rather dense association on the shale slopes.

Although host preferences are of very little significance for adult *Acmaeodera* according to the general consensus of opinion, the author is convinced that they have some biological significance, at least locally. On the three trips which were taken at relatively wide intervals, careful observations were made of the host preferences of each species. Each particular species, with the exception of those visiting flowers, was consistently taken on a single species of plant. This, together with the fact that numerous specimens were collected, that the plants were not at all isolated but growing in close association, and finally that similar results were obtained on each of the three trips, surely suggests at least a strong degree of local host selectivity. However, most of the species from the Santa Barbara region have been reported from different plants in other localities, which would indicate that the host specificity is local or that there has been some error in the citing of the plant species.

ACMÆODERA FENYESI Fall

Over sixty individuals of this well-known species were taken as they flew to *Eriodictyon crassifolium* var. *traskiæ*. Not a single specimen was observed flying to any other plant and none was beaten from any other plant. These specimens of *fenyessi* differ from the typical form by being entirely immaculate and in being more shining bronze.

ACMÆODERA PLAGIATICAUDA Horn

Seven specimens of this rare species were collected after hours of beating manzanita shrubs (*Arctostaphylos*). These specimens present a considerable degree of variation from *plagiaticauda* of other regions. The median lateral spot of the elytra is straw-yellow in place of the usual red of more northern specimens.

ACMÆODERA JOCOSA Fall

Some 200 specimens of this beautiful species were taken. All were swept out of the air as they hovered over *Adenostoma fasciculatum*, or were collected from the tips of the branches of

that plant. Not a single specimen was observed to light on any other plant but this, although other species of plants often grew so close as to have their branches mixed with those of the *Adenostoma*.

ACMÆODERA ADENOSTOMÆ Cazier

The author collected 30 specimens of this species and approximately 30 more were taken by the other members. The preferred plant, as the name implies, is the chamise, *Adenostoma fasciculatum*. This species greatly resembles *jocosa* in markings and was taken with that species on the same plant.

ACMÆODERA COQUILLETTI Fall

Over 50 specimens of this pretty species were collected from *Quercus dumosa*. They were not observed on any other plant.

Acmæodera holsteni White, new species

Moderate sized; dark chocolate bronze; broad and somewhat depressed, the sides of body parallel to apical third of elytra; elytra with a series of three transverse lateral spots, the anterior spot largest and yellow, located medianly and internally curved forward, the mid-spot smaller and red externally, the posterior spot subapical, small and reddish marginally. The dorsum moderately covered with rather long, erect, light gray and fuscous hairs, somewhat recumbent over apices of elytra.

Head densely covered with medium sized punctures; upper portion densely covered with erect dark hairs, the lower portion immediately above clypeus more sparsely covered with shorter whitish hair. Antennæ finely pubescent, the last seven segments broadly serrate, extending back as far as basal third of pronotum. Pronotum as wide as base of elytra and a little less than twice as wide as long, 7:4; evenly, moderately punctured on the disk, the punctures increasing in size laterally; lateral margin gradually, evenly rounded to apical angle; a median, shallow carina extending from base to apical third; a conspicuous shallow fovea near basal angles; surface relatively densely clothed with long, erect, dark and light hairs which are much shortened at apical angles; basal margin reflexed ventrally so as to be visible only from a lateral view. Elytra each with a median lateral kidney-shaped spot yellow, extending from margin two-thirds of the distance to suture; another spot at apical fourth narrower, externally red, extending from margin three-fourths of the way to suture; a third subapical spot more red than yellow; elytral intervals smooth on the disk, laterally rugose, first three

striae consisting of well defined circular punctures basally but becoming elongate posteriorly, finally coalescing into a narrow groove at the middle and extending thus to apex, the intervals with a row of fine punctures with a single hair arising from each; umbone conspicuous. Body beneath bronze; evenly punctured except at base of first ventral segment which is more coarsely punctured; latero-ventral area between second and third pairs of legs and especially near elytral margin covered with long white hair; prosternum trisinate with strong cusps. Length, 9mm.; breadth, 3:25 mm.

Holotype, female, and allotype, male, collected at Sunset Valley, Santa Barbara County, California, July 4, 1938. Four hundred paratypes, mostly collected by Mr. George H. Holsten and the author on *Adenostoma fasciculatum* at the same locality and on the following dates: July 4, 1937, July 4, 1938, and July 16, 1938. A few specimens were also collected by Mr. M. A. Cazier, Mr. V. L. Woolley, and Mr. Robert Zaph, all from the above locality. A single specimen was collected by Mr. C. D. Michener at the Frances Simes Hastings Natural History Reservation at Jamesburg, Monterey County, California, June 13, 1938, elevation 1900-2700 feet (Santa Lucia Mts.). A specimen labeled, "San Gabriel Mts. Cal., VI-1920" and one labeled, "Pasadena, Cal., VI-10-1916" are in the Cazier collection. Paratypes are deposited in the collections of the following men: Mr. Frank Parker, Mr. C. A. Frost, Mr. J. J. du Bois, Dr. H. C. Fall, Mr. Mont Cazier, Mr. H. B. Leech, Mr. Robert Zaph, Mr. V. L. Woolley, Mr. M. Embury, and in the California Academy of Sciences.

It is with great pleasure that this species is named after Mr. Holsten, who so kindly aided the author in collecting most of the above-mentioned specimens.

Acmaeodera holsteni has been confused with several other species, particularly *coquilletti* and *angelica*. *Holsteni* differs from *coquilletti* by being darker (chocolate bronze), while the latter has a highly shining, brassy dorsal surface. *Holsteni* is also broader, more depressed, and more blunt apically. There are also good differences in the structure of the subgenital plates in the females of the three species (see figures). From *angelica*, *holsteni* differs by having the dorsal surface smooth. *Angelica* typically has the dorsal surface shining black, has a

different structure and placement of the spots, is less depressed, and has the apices of the elytra more pointed, and the margins of the pronotum less evenly rounded apically than in *holsteni*.

Holsteni is constant in all characters but the spots. Occasional specimens have an additional sub-basal yellow spot on each elytron. Other specimens have been observed with a considerable reduction in the size of the spots. The sexes can be distinguished only by dissection.

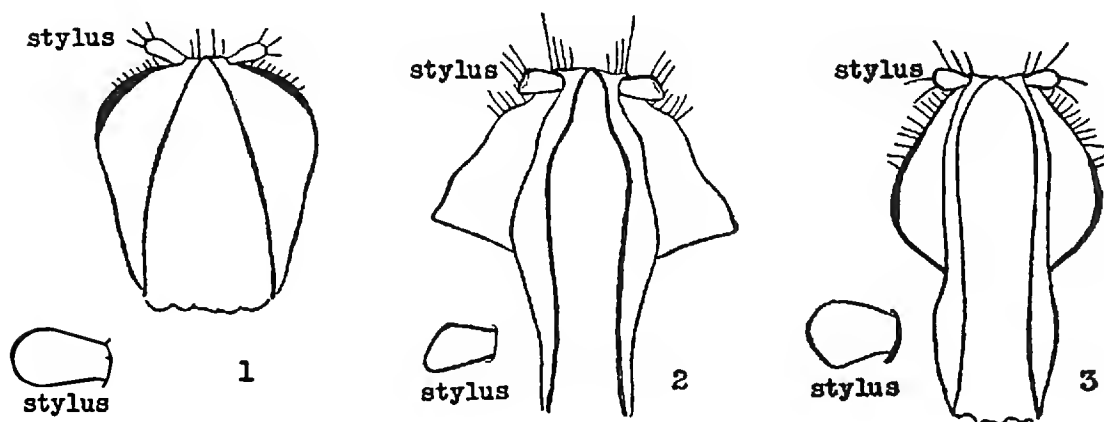


Fig. 1, *Acmaeodera coquilletti* Fall, subgenital plate of female; 2, *A. holsteni* White, n. sp., same; and 3, *A. angelica* Fall, same.

ACMÆODERA ANGELICA Fall

Several specimens of this variable species were taken from *Cercocarpus betuloides*.

ACMÆODERA ANGELICA NEXA Fall

Over one hundred specimens of this form were collected along with *angelica* on *Cercocarpus betuloides*.

ACMÆODERA HEPBURNI LeConte

This species occurred abundantly on the flowers of *Eriodictyon crassifolium* var. *traskiæ* as well as on various other flowers, particularly a small yellow-flowered composite.

ACMÆODERA QUADRISERIATA Fall

This species, though not common, was taken on a variety of flowers. It was found most abundantly on the above-mentioned yellow composite.

ACMÆODERA ACUTA LeConte

Numerous specimens were swept from the yellow-flowered composite along with *hepburni*, *quadriseriata*, and *gemina*. These specimens differ considerably from the usual *acuta* in their smaller average size, the reduction of the markings of the elytra, and by their stronger brassy lustre.

ACMÆODERA CONNEXA LeConte

Only a few of this otherwise common and well-known species were collected. They were found on various flowers, including milkweed (*Asclepias*).

ACMÆODERA PRORSA Fall

More than fifty examples of this beautiful species were collected from *Eriodictyon crassifolium* var. *traskiæ*. On the last trip when the blossoms of the *Eriodictyon* were found to be dried up, eight specimens of *prorsa* were caught flying about the blossoms of *Photinia*.

ACMÆODERA SINUATA Van Dyke

This strikingly distinctive species was apparently rare. However fifteen specimens were taken, and all were from *Cercocarpus betuloides*.

ACMÆODERA DOHRNI Horn

These specimens are here called *dohrni* only tentatively. They differ from the description of that species in several features and a definite decision cannot be made before they are compared with the type. Fourteen examples were collected from the *Cercocarpus betuloides*.

ACMÆODERA MARIPOSA BERNARDINO Van Dyke

A dozen specimens were taken from *Cercocarpus betuloides*. A few of the specimens are more brassy and are lighter colored than the specimens described by Van Dyke, but they are similar in markings and other characteristics.

ACMÆODERA DOLOROSA Fall

Two specimens of this species were taken in flight.

ACMÆODERA POSTICA Fall

Twenty specimens of this rather uncommon species were beaten from *Cercocarpus betuliodes*.

ACMÆODERA GUTTIFERA LeConte

Ten examples were caught flying about and resting on the small dead twigs of *Cercocarpus betuliodes*.

ACMÆODERA GEMINA Horn

Several specimens of both the vittate and the mottled form (*nebulosa* Horn) were collected in flight, on dry grass, and on the small yellow-flowered composite.

BIOLOGY OF VESPINE WASPS

A Contribution to the Biology of North American Vespine Wasps. C. D. Duncan, Stanford Univ. Publ. Biol. Sci., Vol. VIII, No. 1, 272 pages, LIV plates, 1939. Price, paper, \$2.50; cloth, \$3.25.

The accumulated observations, dissections, and experiments of twenty years have been brought together in excellent style in this combined morphological, systematic, and biological account of the vespine wasps. Sixty-eight pages and thirty-two plates are devoted exclusively to a detailed account and portrayal of the skeletal and muscular morphology of the Western yellow-jacket, *Vespula pensylvanica* (Sauss.). A high standard of perfection has been attained in delineation of morphological details and in the labeling and reproduction of plates.

Systematically, three genera are recognized and defined on the basis of structural and biological characteristics, namely *Vespa* Linnaeus, *Vespula* Thom., and *Dolichovespula* Rohwer.

The biological section deals with "habits, behavior, nest building, and life history" of various species of Vespinae including descriptions of the immature stages of *Vespula pensylvanica*. This section is profusely illustrated with fifty-eight separate photographs of nests and nesting sites, excellently reproduced by the collotype process.

Dr. Duncan has shown, in this work, what can be accomplished by intensive and enlightened research, even on the commonest of insects.—R. L. Usinger.

TAXONOMY OF THE TYPICAL SUBGENUS ODYNERUS
IN NORTH AMERICA

(Hymenoptera, Vesidæ)

BY RICHARD M. BOHART

University of California, Los Angeles

Since the publications by S. A. Rohwer on *Odynerus*, this large and systematically complex genus has been relatively neglected in America. The excellent work of J. Bequaert constitutes an outstanding exception to this statement, but his papers lay emphasis more on the eastern than on the western species.

The author recently had the opportunity of studying the more important collections of *Odynerus* in this country, and this paper is the first of a series to be published on the genus.

Acknowledgment is gratefully made to the U. S. National Museum, California Academy of Sciences, Washington State College, and Joseph Bequaert for the loan of material used in this study.

ODYNERUS Latreille, sensu stricto

Odynerus Latreille, 1802. Hist. Nat. Crust. Ins., 3:362.

Epipone Kirby and Spence, 1818. Intr. Ent., 1:34.

Oplopus Wesmael, 1836. Bull. Acad. Sci. Belg., 3:45.

Oplomerus Westwood, 1840. Intro. Mod. Class Ins., Synopsis, 2:84.

Hoplomerus C. G. Thomson, 1874. Skandinaviens Hymenoptera 3(1):35, 41.

Type: *Vespa spinipes* Linneus, 1758.

The typical subgenus *Odynerus* is abundant in the Palearctic realm but is represented in North America by only a few rare species found in Canada and western United States. Some of these, however, are among the most bizarrely colored members of the genus. *Odynerus sensu stricto* is not easily separable from the subgenus *Rygchium*, as many intermediate forms exist. Two North American species which fall in this category are *aldrichi* Fox and *morelius* Sauss. (= *nigrohirsutus* Cameron and *canamexicus* Rohwer). On the basis of the character of the front face of the pronotum, however, *aldrichi* can be retained in *Odynerus sensu stricto* while *morelius* falls in *Rygchium*. To the author's knowledge, the characters of the front face of the pronotum in eumenids have not heretofore been

recognized as of systematic value. As this area is usually obscured by the head, the latter should be pulled slightly forward and downward in the process of mounting.

The following sum of characters will distinguish the North American species of the typical subgenus as defined in this paper: Vertical front of the pronotum with faint, widely separated pits or depressions (compare figs. 13 and 14); male antennæ usually rolled apically rather than hooked; first abdominal tergite without a transverse carina at its summit; second tergite with relatively uniform puncturation and little or no subapical depression.

On the basis of the absence of a carina on the first tergite *Odynerus sensu stricto* readily can be separated from *Ancistrocerus*, *Symmorphus*, and *Alastoroides*. Furthermore, it can easily be distinguished from *Stenodynerus* (including *Parancistrocerus*) by the presence in the latter of large, deep, approximate pits on the vertical front of the pronotum (fig. 14).

KEY TO THE SUBGENUS ODYNERUS OF NORTH AMERICA

1. Mesonotum without evident notaulices; predominantly black and yellow or black and white species.....2
- Mesonotum with sharply impressed notaulices usually running the entire length of the scutum; predominantly black and bright orange-red species.....3
2. With a sharp, complete carina on the anterior margin of the dorsal surface of the pronotum; with a complete whitish band across the scutellum and postscutellum; erect hair on the horizontal surface of the first tergite less than the length of an ocellus; male antennæ hooked, hardly rolled; male mandible and clypeus as in figure 5.....*aldrichi*
- Without a complete carina on the anterior margin of the dorsal surface of the pronotum; usually male only with whitish bands across the scutellum and postscutellum; erect hair on the horizontal surface of the first tergite longer than the length of an ocellus; male antennæ greatly flattened and rolled apically; male mandible and clypeus as in figure 6; male middle femur strongly serrate.....*dilectus*
3. Pronotum with a fairly sharply rounded front margin, lateral angles bluntly pointed; red coloration on first five abdominal segments; wings in female dark brown violaceous; female vertex with two distinct postocellar pits; male middle femur with a sharp sub-basal carina bordering a shallow concavity; terminal segments of male antennæ large and well coiled; male clypeus and mandible as in figure 8.....*erythrogaster*

- Pronotum without a sharp front margin, smoothly rounded off; lateral angles of pronotum rounded off, not projecting; wings in female lightly stained with brown; depressions on female vertex almost or quite obsolete; terminal segments of male antennæ small; male middle femur without a basal concavity or ridge.....4
- 4. Dorsum of thorax completely black; first two abdominal segments (at most) with red coloration; hair on second tergite about as long basally as apically; female clypeus black; male clypeus whitish-silvered; male antennæ rolled apically.....
..... *margaretellus*
- Pronotal angles and tegulæ red-spotted; first four abdominal segments (at least) with red coloration; hair on apex of second tergite much shorter than at base; female clypeus orange-red; male antennæ not rolled apically.....*cinnabarinus*

ODYNERUS ALDRICHI Fox

(Figs. 1, 5, 9, 13)

Odynerus aldrichi Fox, 1892. Ent. News, 3:197 (type, U. S. N. M.).

Male. Black; mandible, clypeus, a line from the clypeus to emargination of eye, frontal spot, first antennal segment partly, a post-ocular spot, front margin of pronotum, tegula except a central spot, small spot on mesopleuron, complete stripe across both scutellum and postscutellum, legs for the most part, apical margins of abdominal tergites one to six, the first with a squarish attached lateral spot, and apical margin of sternites two to six, whitish; antennæ beneath and last two segments entirely, stains on femora and tarsi, anterior margins of wings, and stains on first abdominal segment, ferruginous. Body clothed with very short pubescence, clypeus not silky but almost glabrous, erect hair on horizontal portion of first tergite less than the length of an ocellus. Head and thorax coarsely, closely punctured; propodeum coarsely punctured except in the weakly striate enclosure which has definite inferior and weak exterior carinate margins; abdominal tergites with large, well separated punctures; mesoscutum without notaulices. Antennæ as in figure nine, clypeus and mandible as in figure five, genitalia as in figure one. Length to apex of second tergite, 7-9 mm.

Female. Markings as in male with following exceptions: Antennæ black, clypeus black except for two pale basal spots, mandible black except at base, first five abdominal tergites and second sternite with apical whitish bands, legs black basally, femora, tibiæ, and tarsi mostly ferruginous. Clypeus about as long as broad, weakly incised apically, latero-apical edges convex; vertex with a median semi-circular depression. Length to apex of second tergite, 9 mm.

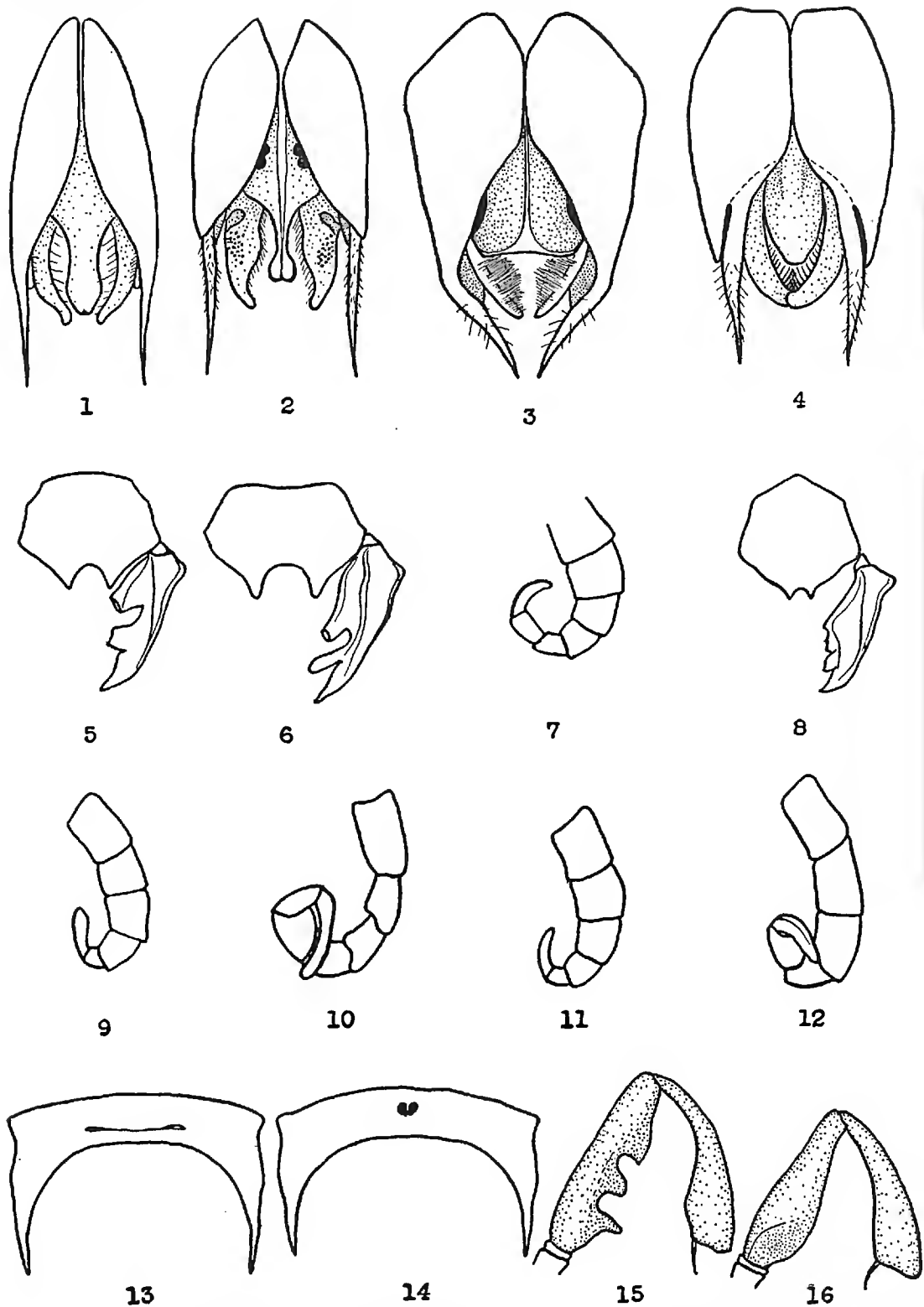


Fig. 1, *aldrichi*, male genitalia, dorsal; fig. 2, *dilectus*, male genitalia dorsal; fig. 3, *margaretellus*, male genitalia, dorsal; fig. 4, *erythrogaster*, male genitalia, dorsal; fig. 5, *aldrichi*, male clypeus and mandible; fig. 6, *dilectus*, male clypeus and mandible; fig. 7, *margaretellus*, apex of male antenna; fig. 8, *erythrogaster*, male clypeus and mandible; fig. 9, *aldrichi*, apex of male antenna; fig. 10, *dilectus*, apex of male antenna; fig. 11, *cinna-barinus*, apex of male antenna; fig. 12, *erythrogaster*, apex of male antenna; fig. 13, *aldrichi*, front face of pronotum; fig. 14, *Stenodynerus* sp., front face of pronotum; fig. 15, *dilectus*, male middle femur and tibia, lateral; fig. 16, *erythrogaster*, male middle femur and tibia, lateral.

Paratypes of this species are in the Academy of Natural Sciences at Philadelphia and at the U. S. National Museum. The data on the entire type series is Brookings, South Dakota, May and June, 1891. Additional records are as follows: One male, near Denver Glacier, Skagway, Alaska, July 1, 1923 (J. A. Kusche); three females, Grand Coulee, Washington, June, 1902; one female, Silver Bow County, Montana, August, 1937; males, Grand Teton National Park, Wyoming, July, 1937 (J. McSwain); one male, Estes Park, Colorado, July 12, 1923 (R. A. Leussler); two females, Colorado (Snow collection, University of Kansas).

O. aldrichi is readily recognized by the whitish banded scutellum and postscutellum in combination with the short pubescence on the first abdominal tergite. Specimens of a Chinese *Odynerus* in the collection of the U. S. National Museum appear to be identical with *aldrichi*. If this should prove to be the case, an earlier name may have to be used. In any event, the origin of this species in Asia and its distribution along the Rocky Mountains by way of Alaska is indicated.

ODYNERUS DILECTUS Saussure

(Figs. 2, 6, 10)

Odynerus dilectus Sauss., 1870. Rev. Mag. Zool., (2) 22:141.

Odynerus (Epiponus) dilectus Sauss., 1875. Sm. Misc. Coll., Vol. 14, 254:363.

Male. Black; mandible, clypeus, underside of antennal segments one and two, frontal spot, inner orbit below emargination of eye, postocular spot, front margin of pronotum, complete bands across scutellum and postscutellum, femora partly, tibiae mostly, tarsi at base, apical margins of first six abdominal tergites and second and third sternites, pale yellow; third to seventh segments of antenna beneath, wing veins and tarsi apically, ferruginous. Pubescence of head and thorax long, sparse, and black; upper half of clypeus sparsely pubescent; erect hairs on horizontal portion of first tergite three times as long as an ocellus; abdomen clothed with minute, appressed pubescence in addition to the erect hair on the first tergite. Head and thorax closely, moderately punctured, tending to become longitudinally striate on head below ocelli; propodeum obscurely and finely striate; abdomen minutely punctured throughout, antenna tightly coiled apically, the last segment about three times as long as wide at base; mandible three-toothed, basal tooth molar-like and followed by a deep incision (fig. 6); clypeus deeply and widely incised at apex; pronotal angles small but distinct; mesonotum without notaulices;

inferior edge of middle femur three-toothed; basal half of middle tibia strongly constricted (fig. 15); propodeum without carinae; genitalia as in figure two. Length to apex of second tergite, 7-8 mm.

Female. Markings as in male with following exceptions: Pale coloration whitish, only first four abdominal tergites banded, fourth interrupted at middle; clypeus, mandible, antenna, scutellum except for a small lateral spot, postcutellum, legs for the most part, black. Clypeus not closely but coarsely punctured, apex slightly and broadly emarginate; vertex with a well defined oblique pit behind each posterior ocellus. Length to apex of second tergite, 8 mm.

This species can be recognized at once by the extraordinary serrate middle femora of the male. The only species with which it might be confused is the European *spinipes* (Linn.). In the latter, however, the last antennal segment in the male is less than twice as long as broad at the base. Also, the basal tooth of the middle femur is more slender in the latter. Otherwise the two species are extremely similar. Specimens of *dilectus* are in the U. S. National Museum collection from New Mexico, Colorado, and Edmonton and Banff, Canada. Additional records are: Two females, Coupeville, Washington, April 30, 1898; one male, Eagle Ridge, Klamath Lake, Oregon, May 23, 1924 (C. L. Fox).

Odynerus erythrogaster Bohart, new name

(Figs. 4, 8, 12, 16)

Monobia bicolor Provancher, 1888. Add. Faune Hymen, Canada, Suppl. p. 429 (nec *Odynerus bicolor* Saussure, 1856).

Male. Black; clypeus except marginally, a post-ocular spot, and usually apical margins of first to fifth tergites, whitish yellow; lateral spot on pronotum (not always present), femora apically, tibiae and tarsi entirely, abdominal tergites one to five except the apical margins and median basal black spots on tergites one to three, sternite one partly, sternite two entirely, and sternites three and four mostly, bright orange-red; wing heavily brown-stained especially around the margins. Head, thorax, first and second abdominal sternites, first tergite and base of second, covered with erect, long, black hair; clypeus also with appressed, silvery pubescence; abdominal sternites three to six with dense, fulvous pubescence especially toward the center. Head and thorax coarsely punctured, more sparsely on thorax, becoming obsolete on posterior face of propodeum; abdomen minutely punctured. Antenna coiled

at apex, last segment less than twice as long as broad at base and strongly flattened and curved; clypeus and mandible as in figure eight. Thorax as viewed from above about one-third longer than broad; pronotum with a fairly sharply rounded front margin, lateral angles bluntly pointed; thorax flattened dorsally beginning at middle of mesoscutum; mesoscutum with well defined notaulices; middle femur with a flattened area at base (fig. 16); first abdominal sternite with a faint median basal suture; genitalia as in figure four. Length to apex of second tergite, 9-11 mm.

Female. Markings as in male with following exceptions: Clypeus entirely black, no yellowish bands margining abdominal tergites, only the first five tergites with red coloration, wings more darkly brown-stained and distinctly violaceous. Pubescence as in male except on clypeus which is without appressed pubescence. Clypeus with a sharp, straight apical truncation of moderate breadth; with an oblique foveate depression behind each posterior ocellus. Length to apex of second tergite, 9-10 mm.

This species had gone unrecognized until the type, acquired by the U. S. National Museum with the Coquillet collection, was identified by J. Bequaert as an *Odynerus*. Together with *margaretellus* and *cinnabarinus*, it forms a peculiar group of hairy, black and orange-red *Odynerus*. The red coloration is not dissimilar to that caused by overexposure to cyanide fumes but is brighter and more intense. In addition to their pubescence and coloration these three species are unique in having deeply impressed notaulices. At present *erythrogaster* is known only from southern California where it frequents the sides of dry canyons. The following records are available: One male, Coalinga, May 14, 1938 (M. Cazier); one female and two males, Los Angeles County; one female, Los Angeles County (D. W. Coquillet, holotype); one female, Soboba Springs, Riverside County, June 3, 1917 (E. P. Van Duzee); five females, Riverside, May (P. H. Timberlake); one female, Edom, Riverside County, March 14, 1937 (E. G. Linsley).

ODYNERUS MARGARETELLUS Rohwer

(Figs. 3, 7)

Odynerus margaretellus Rohwer, 1916. Proc. U. S. Nat. Mus., 49:242 (holotype, U. S. N. M.).

Male. Black; clypeus whitish yellow; femora partly, tibia and tarsi entirely, first two abdominal tergites except at base, first four sternites mostly, bright orange-red; wings moderately brown-stained around the margins. Head, thorax, and abdomen except third and following sternites clothed with long, black, erect hairs;

clypeus also silvery pubescent; third and following sternites with thick fulvous pubescence toward the center and black hair toward the sides. Head and thorax coarsely punctured, posterior face of propodeum finely punctured, hardly striate; abdomen minutely punctured. Antenna loosely coiled at apex, last segment strongly flattened and about twice as long as wide at the base; mandible obscurely five-toothed, about as in figure eight; clypeus angularly emarginate at apex, about as in figure eight. Thorax, as viewed from above, about as long as broad at the tegulæ; pronotum smoothly rounded off, lateral angles rounded off, not projecting; mesoscutum with well defined notaulices; scutellum not flattened on top, convex. Median basal suture of second abdominal sternite obsolete or absent; genitalia as in figure three, the ædeagus greatly expanded and truncate apically. Length to apex of second tergite, 8 mm.

Female. Markings as in male with the following exceptions: Clypeus black, third and following abdominal sternites black. Clypeus coarsely and sparsely punctured, clothed only with long black hairs, angularly emarginate at apex. Vertex with a tiny, almost indistinguishable, pubescent pit behind each posterior ocellus. Length to apex of second tergite, 9 mm.

The characteristic which makes this species outstanding is that at most the first two abdominal tergites are marked with red. It is easily separated from *erythrogaster* by the much darker wings and more pointed prothoracic angles of the latter. The male genitalia are also very different. Records of the species are: One female, Asotin, Washington, April 15, 1923 (V. Argo); one female, North Yakima, Washington, May 27, 1903 (Eldred Jenne); one male and one female, Klamath Falls, Oregon, May 10, 1924 (C. L. Fox); one female, Blitzen Valley, Harney County, Oregon, April 19, 1936 (S. G. Jewett); type series, one female and two males, Troublesome, Colorado, altitude 7,345 feet, June 8, 1908 (S. A. Rohwer).

Odynerus cinnabarinus Bohart, new species

(Fig. 11)

Male. Black; clypeus yellowish; a small postocular spot, a large spot laterally at the pronotal angle, tegula, femora mostly, tibiæ and tarsi entirely, and first five abdominal segments except for basal black spots at the middle of tergites one to three, bright orange-red. Wings slightly stained with brown especially around the margins. Head, thorax, and first abdominal segment sparsely covered with long black hair; black hair on second and following tergites averaging only about two and one-half ocellus lengths, that on second sternite longer; third and following sternites very

sparsely covered with black hair but with thick golden pile toward the middle; clypeus, in addition to black hair, with thick yellowish-silver appressed pubescence; abdomen and legs with minute golden pubescence. Head and thorax strongly punctured, becoming less dense on thorax, almost obsolete on propodeum; abdomen minutely punctured. Antenna intermediate between rolled and hooked types (fig. 11), last segment about twice as long as broad at base; mandibles five-toothed, the two basal teeth almost indistinguishable; clypeus about as long as broad, with two sharp teeth on either side of angular apical emargination (mandible and clypeus about as in fig. 8). Thorax, as viewed from above, about as long as broad at tegulæ, front margin of pronotum and pronotal angles completely rounded off; mesonotum with notaulices deeply impressed; scutellum convex; propodeum without carinæ setting off enclosure. Second sternite with a faint, almost obsolete, basal median suture; genitalia stout, tips of squamæ bent inward and crossing each other, volsella slender as viewed dorsally but triangular, plate-like, as viewed laterally, ædeagus truncate apically and inflated, with sharp median dorsal ridge and depressed sides (proportions from dorsal view about as in fig. 3). Length to apex of second tergite, 10 mm.

Female. Coloration, pubescence and puncturation as in male with the following exceptions: Clypeus bright orange-red, glabrous except for erect, long, black hair; golden pubescence on abdomen less prominent; third and following sternites without unusually long fulvous pile. Length to apex of second tergite, 11 mm.

Although very close to *margaretellus*, *cinnabarinus* can be separated by its more extensive red coloration, the shorter pubescence, and the less strongly rolled antennæ of the male. It resembles *erythrogaster* in abdominal coloration but the more prominent pronotal angles of the latter are an easy means of differentiation. At present the species is known from Utah, California, Arizona, and Texas.

Holotype, male, allotype, female, and twelve male and four female paratypes, Beaver Creek Hills, Beaver County, Utah, June; one male paratype, Death Valley, California; one female paratype, Santa Catalina Mountains, Arizona (C. D. Duncan); one male paratype, Belton, Texas, April (holotype and allotype donated by J. Bequaert, paratypes from collection of U. S. National Museum and collection of author). Holotype and allotype to be deposited in the California Academy of Sciences, paratypes in the U. S. National Museum, Academy of Natural Sciences at Philadelphia, University of Kansas, collection of J. Bequaert, and collection of the author.

NOTES ON THE GENUS SCHIZOPUS WITH A KEY
TO THE SPECIES

(Coleoptera, Buprestidæ)

BY MONT A. CAZIER

University of California, Berkeley

During the past two years, specimens of this rare and phylogenetically important genus have been taken in considerable numbers and various new and interesting facts have been observed. There are only two described species in the genus, one of which, *Schizopus sallei* Horn, has been known only from the unique female type and the other, *Schizopus laetus* Lec., from an occasional but rare specimen.

It was early observed that in *laetus* there was a good deal of sexual dimorphism, the male having the elytra brownish-testaceous, the female brilliant blue or green. Most taxonomists interested in this genus have been looking for the male of *sallei* in order to see what the sexual dimorphism would be, in as much as the female was known to have the elytra brownish-testaceous similar to the male of *laetus*. It was the good fortune of Mr. I. M. Ferguson and J. R. Warren, collecting at Mariposa, Mariposa County, California, on the summer 49 course of the University of California to obtain two specimens each of this rare species. One specimen collected was a male and has disclosed the astonishing fact that there is very little sexual dimorphism in this species. The differences between male and female will be pointed out in a brief description of the male which, to the author's knowledge, has never before been described.

SCHIZOPUS SALLEI Horn

Male similar to the female except for the venter of the abdomen which has the lateral margins not withdrawn from edge of elytra, the apical sternite shallowly emarginate at tip and the color dark cupreous-green with faint brownish tinges. In the female, the lateral margins of the abdomen are withdrawn from the edge of the elytra, the apical sternite is evenly rounded at tip and the under-surface is mottled brownish-testaceous. In the male, the dark brown vittæ extending from the humeral umbones do not reach the tip of the elytra, while in the female at hand they reach the tip but are narrowed in front. These markings are probably as variable as in the males of *laetus* which may have the green or blue sutural vittæ lacking or very broad. There are, however, no indications of humeral vittæ in *laetus* although in a

female specimen of *sallei* there are pronounced brown sutural vittæ as well as humeral vittæ.

Type locality, "Mariposa, Cala." (Horn, 1885). The male described above taken three miles south of Mariposa, about one mile south of Mormon Bar, June 13, 1938. It was collected within 25 yards of a small stream, on flowers of a species of Compositae and on grass.

In the early spring (April 30) of 1937 Mr. Hugh B. Leech, P. C. Ting and the author made a collecting trip to the Mojave Desert and obtained a good series of both males and females of *laetus* at Cronise Lake and Ludlow, San Bernardino County, California. These specimens were taken on the flowers of *Geraea canescens*, were very sluggish and were not observed in flight. During the same season it was understood that several other collectors took good series of this species in the same region. Collecting trips to this region at about the same season in previous years have failed to yield specimens of this genus, showing that the unusually wet spring of 1937 was apparently very favorable for *Schizopus*, as it was also for *Scarabaeidae*.

Since both species are very similar structurally, it will be necessary to rely upon color to distinguish between them in the key to follow. As far as known there is no integradation in the coloration and, since it is the most readily discernible character, it will be freely used.

KEY TO SPECIES

- Pronotum dark brown to testaceous, femora brown to testaceous, elytra with humeral vittæ.....*sallei*
 Pronotum brilliant blue, green or cupreous-green, femora blue, green or cupreous-green, elytra without indication of humeral vittæ*laetus*

The writer wishes to express his gratitude to both Mr. Ferguson and Mr. Warren for two specimens of *sallei* and for information concerning the exact habitat from which they were taken.

STRATIOMYID FLY LARVAE IN HONEY BEES' NESTS

On February 1, 1939, Miss Nora K. Morres of the Santa Barbara Museum sent me some dipterous larvae which were invading a house from an old bees' nest which had been established in the chimney. Recently one of these emerged. It proved to be *Hermetria illucens* Linn., a European species, now well established here and there in this country.—Edwin C. Van Dyke.

THREE NEW SPECIES OF TINGITIDÆ (HEMIPTERA)
FROM AUSTRALIA

BY CARL J. DRAKE

Iowa State College, Ames

The present paper contains the descriptions of three species of lace bugs from Australia. The types are in the Drake collection.

Cysteochila hackeri Drake, n. sp.

Head reddish brown, with five, short, testaceous spines. Antennæ yellowish brown, moderately long; segment one short, stouter and slightly longer than two; three long, slender, slightly more than three times as long as four. Rostrum long, dark brown, extending between hind coxæ; rostral channel narrow, open behind. Legs rather short, reddish brown, clothed with numerous pale, bristle-like hairs.

Pronotum concealed on each side by the reflexed and inflated paranota, the triangular process reticulate; collar faintly raised, reticulate; median carina moderately raised, uniseriate; lateral carinæ visible on triangular process, uniseriate, slightly divaricating posteriorly; paranota large, reflexed and inflated, concealing disc on each side of pronotum but not covering median carina, brown. Elytra grayish brown, some nervelets infusate, constricted beyond middle; costal area very narrow, the areolæ very small, with several small black-fuscous spots; subcostal area biseriate, the areolæ large; discoidal area large, the nervure separating it from subcostal area curved and with a raised, black place a little before the apex, the areolæ rather large and five deep in widest part, the nervure between discoidal and sutural areas sharply raised. Length, 3.90 mm.; width, 1.00 mm.

Holotype, female, Melrose, Australia, A. M. Lea; paratype, Murray Bridge, and two paratypes, Parachilna Flanders Range, E. L. Savage.

The hair on legs and the raised nervure separating discoidal and sutural areas are distinguishing characters. It is very distinct from other members of the genus known to occur in Australia. *C. constantis* (Drake) is a larger species with higher paranotal cysts.

Dicysta cara Drake, n. sp.

Large, testaceous, some of the nervelets embrowned. Head brown, concealed by anterior cyst, the spines short, testaceous and

appressed. Bucculæ not meeting in front. Rostrum long, brown, dark at tip, extending to end of sulcus. Antennæ slender, testaceous; segment one long, three times as long as two; three long, twice as long as four. Legs long, slender, yellowish brown.

Pronotum convex, finely pitted, grayish brown, the lateral carinæ wanting; paranota large, circular in outline, shaped like a shallow bowl, reflexed upright, testaceous, the nervelets embrowned. Hood large, high, rounded from above, testaceous; hind cyst large, narrowed at summit; foliaceous median carina arising a little below middle of hind margin of hood, sharply raised, slightly higher and attached to the summit of hind cyst. Elytra very broad, strongly widened at base, testaceous, widely reticulate, with large tumid elevations, the outer margin finely serrate; costal area very broad, with fine areolæ in widest part. Length, 3.65 mm.; width, 2.40 mm.

Holotype (female), allotype (male) and eight paratypes, Maleny, Queensland, January 10, 1929, collected by H. Hacker. In some of the specimens the nervelets near the margin of elytra are considerably embrowned.

Dicysta parilis sp. nov.

Color, form, size and markings very similar to *D. cara* n. sp., but readily distinguishable by its large cysts of nearly equal size and the membrane connecting them which is not arched and not as high as the hind cyst. The cysts are also closer together. Other characters very similar to *D. cara*. Length, 3.65 mm.; width, 3.35 mm.

Holotype, female, Mackay, Queensland, June 10, 1932, collected by W. A. McDougall. This species and *D. cara* are very typical members of the genus *Dicysta* Champion and the first records of the genus in Australia.

CONTINENTAL DRIFT

Our Wandering Continents. Alexander L. Du Toit. Edinburgh: Oliver & Boyd, Ltd., 1937, pp. xii+366, 48 figs. 18 s net.

In this volume the author has brought together the evidence of Taylor, Wegener, van der Gracht, and others and has added materially to this from his own extensive researches on both sides of the Atlantic. The result is a comprehensive and convincing, although heterodox, picture of earth history which strikes at the very foundations of geology.

Du Toit meets problems squarely, answers criticisms, points out weaknesses on both sides of the question and, in general, has given us an excellent summary of one of the theories which may have profoundly influenced the distribution of insects.—R. L. Usinger.

AN OUTBREAK OF A NEEDLEMINER, EPINOTIA
MERITANA, IN WHITE FIR

(Lepidoptera, Olethreutidae)

BY DONALD DE LEON

Berkeley, California

A heavy, localized outbreak of the needleminer (*Epinotia meritana* Heinrich) in white fir [*Abies concolor* (Gordon) Parry] was found by Junior Forester L. J. Farmer and the writer on Escalante Summit near Escalante, Garfield County, Utah, on June 10, 1937. Hitherto this species seems to have been known only from pine from Carbon County, Utah, and Victoria, B. C.

The needleminer was defoliating the fir on an area of about ten square acres. Defoliation had apparently been going on for four or five years, and many of the trees were practically dead. The foliage of the more recently infested trees was very thin and much that remained had a scorched appearance. Although trees of all age classes were infested, the heaviest defoliation was of trees of middle age.

Both the larval and pupal stages of the insect were present. The larvæ usually construct a loose web around several needles and, at the time of observation, both the larvæ and the pupæ were found chiefly in the needles which had separated from the twigs but were held hanging to them by this web. There were also many empty mined needles so held, as well as mined but abandoned needles covering the ground. Needles mined by what were apparently first instar larvæ generally remained fast to the twig without being held by any webbing; some of these needles had died completely even though only partly mined, while others had died in the mined area only, which, in the early stages, is confined to the distal half of the needle.

The larvæ are about 8 mm. long, greenish in color, with a brownish head and a nearly black, sagittally separated, sclerotized area on the caudal two-thirds of the pronotum. Some of the larvæ, however, had a lighter colored sclerotized area on the pronotum but it is probable that they had but recently moulted. The pupæ, which were found only in the needles, are about 6 mm. long and dark brown. The abdomen is somewhat lighter than the rest of the insect. The dorsa of abdominal segments three to seven are provided each with a transverse row of small spines one-third the distance from the anterior and posterior margins respectively. The spines of the posterior row are smaller and more numerous

than those of the anterior row. Abdominal segments two and eight have the dorsa each with a single row of spines but the row on segment two is composed of the finer sized spines and the row on segment eight of the larger sized spines. The dorsa of abdominal segments one and nine lack spines and the terminal segment is furnished with a row of four to five spines which are larger than those on the other segments. Emergence of the moths from material collected occurred previous to July 8, 1937.

The moths are grayish, mottled with nearly black scales some of which have a metallic luster. The mottling is heavier at the basal and apical thirds of the wing. The hind wing is leaden gray.

Larvæ that were no doubt of this species were common throughout the near-by Bryce Canyon National Park, Utah, during the latter part of May and June, 1937. In no place were there signs of an outbreak but, because of what is happening outside of the park, this insect should be considered a potential threat to the stands of white fir within the park. Larvæ and pupæ were found in the park as late as June 24, 1937. Pupæ were present in needles of both 1935 and 1936 growth.

This species was described in 1923 in Bulletin 123 of the U. S. National Museum by Heinrich, who states that the material he received was reared by Herbert J. Peck, from Carbon County, Utah, where the larvæ were mining the needles of pine. The moths were reported to have issued in May and June, 1921. Other specimens were received from Victoria, B. C.

Acknowledgments are made to Mr. H. H. Keifer of the California State Department of Agriculture, Sacramento, who kindly determined this species.

OBITUARY

Notice has recently been received of the death, on January 11, 1939, of B. Preston Clark at the age of 79 years. While amassing the largest collection of Sphingidae in the world, Dr. Clark generously augmented the principal collections of hawk moths of this country from his extensive series. With this assistance the collection of Sphingidae of the World in the California Academy of Sciences now numbers 334 species.

Dr. Clark has likewise turned over a considerable amount of material in other orders to western collections from the incidental material picked up by his collectors, particularly by J. August Kusche.—R. L. Usinger.

THE HINDS COLLECTION OF THYSANOPTERA

BY STANLEY F. BAILEY

University of California, Davis

About 35 years ago the students of the order Thysanoptera in North America could be counted on one hand. At the time that the late W. E. Hinds published his monograph of the order (1902) he was the leading taxonomist in this group of insects. Following the appearance of this paper an increased interest was shown in the taxonomy of thrips, at least judged by the miscellaneous papers which were published by Franklin (1903-09), Daniel (1904), Shull (1909), D. L. Crawford (1909-10), Back (1912), P. R. Jones (1912), and Morgan (1913-1929), later followed by articles from Treherne (1918-19) and Mason (1922-26). In addition to these workers there were three others who have been the leaders, namely Hood (1908-) and Moulton (1907-), who have been publishing for about 30 years, and Watson, whose papers have appeared since 1913, or 25 years.

In more recent years in the wake of Priesner's monograph on the Thysanoptera of Europe (1926-28), articles by Steinweden (1930-33), Watts (1934-35), Andre (1936), J. C. Crawford (1938) and the writer (1931-) have been published on thrips. At the present time there are known to the writer at least 12 students of this group of insects who are collecting, studying, publishing, or contemplating publishing on North American Thysanoptera. Without a doubt as time goes on there will be more taxonomists in this group. Therefore, anything that can be done to facilitate the work is to be encouraged. This can be done by clearing up the synonymy of the older species and illustrating them by means of improved optical equipment as well as making available for study the types of various scattered collections.

For these reasons, during the past summer the writer visited Amherst, Massachusetts, to study and catalog the Hinds collection, deposited at the Department of Entomology of Massachusetts State College¹. Hinds stated in his monograph (page 80), "Of the new species described in this paper, a complete set of types has been deposited in the Massachusetts Agricultural College;

¹ This study was made possible through the kindness of Prof. C. P. Alexander.

a set of cotypes, so far as they exist, has been deposited in the United States National Museum; a third set of cotypes I have retained for my own use, and the remainder I have also deposited in the Massachusetts Agricultural College.”

In correspondence with the writer (December, 1935) Hinds stated that his own collection was lost by fire in 1926. As far as is known to the writer, the specimens sent to Washington, D. C., have been incorporated with those of Pergande, Morgan, and Franklin in the rapidly growing collection of thrips under the direction of the Taxonomic Division of the Bureau of Entomology and Plant Quarantine. In addition to the specimens collected and mounted by Hinds himself, were those he obtained from Franklin, D. L. Crawford, Beach and Hooker. Through the efforts and generosity of J. D. Hood and J. C. Crawford many additional specimens have been added in recent years to the original Amherst collection, which now totals about 95 species. For the benefit of those interested in Thysanoptera and to identify the original Hinds' collection as an important taxonomic entity, a complete list of the specimens is here presented.

The following new species² were described by Hinds:

- **Aeolothrips bicolor*—6323
- Chirothrips crassus*—6324
- Chirothrips obesus*—6325
- Limothrips avanæ*—6326
- Sericothrips cingulatus*—6327
- **Euthrips fuscus*—6328
- Euthrips nicotianæ*—8434
- **Rhaphidothrips fuscipennis*—6329
- **Heliothrips fasciapennis*—6330
- Trichothrips ambitus*
- Trichothrips beachi*
- Cephalothrips yuccæ*—6331
- Phloeothrips uzeli*—6332
- **Phloeothrips pergandei*
- Acanthothrips magnafemoralis*
- Malacothrips zonatus*—6333
- Eurythrips ampliventralis*—6334
- Eurythrips osborni*—6335
- **Cryptothrips aspersus*—6336

It is indeed fortunate that all (labelled “cotype” or “meta-

² N. B.: No attempt is made here to discuss the validity of Hinds' species or the synonymy of any species in the collection.

type") but two, *Chirothrips obesus* and *Trichothrips ambitus*, are still present. However, it should be noted that the species marked with asterisks above are represented by such badly mutilated or poorly mounted specimens as to render a study of their characters very difficult and in some cases impossible. The numbers refer to the catalog number in the U. S. National Museum. Since *T. ambitus* was described from a unique female it is the only Hinds species that is lost and unavailable for study.

Other specimens, many of which are types, present in the original collection are listed below:

Anaphothrips longipennis D. L. Crawford
Anaphothrips striatus Osborn, homotype
Ctenothrips bridwelli Franklin, cotype
Euthrips cephalicus D. L. Crawford
Euthrips insularis Franklin, paratypes and cotypes
Euthrips minutus Moulton
Heliothrips rubrocinctus (Giard)
Heterothrips decacornia D. L. Crawford
Sericothrips variabilis (Beach) homotypes
Thrips abdominalis D. L. Crawford
Thrips perplexus Beach, homotype
Aleurodothrips fasciapennis Franklin, cotype
Anthothrips gowdeyi Franklin, paratypes and cotypes
Anthothrips niger (Osborn), homotype
Anthothrips variabilis D. L. Crawford
Cryptothrips fasciapennis Franklin, type
Idolothrips angusticeps D. L. Crawford
Liothrips bakeri D. L. Crawford
Trichothrips niger Franklin, type

An obituary of W. E. Hinds has appeared under the pen of F. L. Thomas (Jour. Econ. Ent., 29:225-226, 1936) and the writer published a note in THE PAN-PACIFIC ENTOMOLOGIST (Vol. 14, page 96) on the chime dedicated to Doctor Hinds.

Of the more than one hundred publications credited to him, as far as is known, he published only three papers on Thysanoptera which are cited below:

1900. The grass thrips, *Anaphothrips striatus* (Osb.), 37th An. Rpt. Mass. Agr. Col., Public Document No. 31, Jan., pages 83-97, 4 plates.
1902. Contribution to a monograph of the insects of the order Thysanoptera inhabiting North America. Proc. U. S. Nat'l Museum, 26:79-242 (No. 1310), 11 plates.
1905. A new tobacco thrips. Proc. Biol. Soc. Wash., 18:197-200.

A NEW SPECIES OF PSEUDOMETHOCA FROM ARIZONA

(Hymenoptera-Mutillidæ)

BY ARCHIBALD H. CALDWELL, JR.

*Phoenix, Arizona**Pseudomethoca sacatona* Caldwell, new species

Female: Length 19 mm. Ferruginous, head ferruginous, front and vertex clothed with fiery-red pubescence and sparse, erect similarly colored hair, genæ clothed with sparse, semi-erect, silvery pubescence; front and vertex rugoso-punctate, the genæ with close, strong, confluent punctures; mandibles tridentate; antennæ separated at base by a distance equal to half length of scape; length of pedecellum equal to half length of first segment of flagellum; eyes large and slightly ovate, the distance between hind margins of eyes and postero-lateral angles slightly greater than longitudinal diameter of eyes; longitudinal carina of genæ strong and sharp; relative widths of head and thorax 1-1.

Thorax dark ferruginous; about as long as wide; dorsum of thorax rugoso-punctate extending over the edge of propodeum; posterior face of propodeum sparsely punctured with large separate punctures amongst which are finer punctures, less so caudad; dorsum of thorax clothed with fiery-red pubescence and sparse erect pubescence of the same color; posterior face of propodeum with long, sparse black hairs; humeri rounded, cephalic margin of propleura with sharp carina; propleura punctate; mesepisternum finely rugose and punctate; mesepimeron with large confluent punctures on the caudal margin; metapleura smooth and shining; sides of propodeum smooth and shining with a few sparse punctures medially and rugose-punctate on the caudal margin.

Abdomen ferruginous; first segment completely sessile with second; first tergite with close, confluent punctures and sparse, long, erect, black hairs and a band of black, recumbent, bristle-like hairs at apex and with silvery recumbent hairs laterally; second tergite with close, confluent punctures, clothed with silvery pubescence narrowly at sides, the remainder of the tergite with thick, appressed, fiery-red pubescence and sparse erect hairs of the same color, the median seven-eighths of apex with a narrow band of black recumbent pubescence, the remaining space on either side of apex with recumbent silvery pubescence merging into the silvery pubescence of the sides; tergites three to five closely punctate with a recumbent band of silvery pubescence on each entire apical margin, clothed with black, sparse, erect hairs making an erect fringe along the cephalic margin of each silvery band; tergite six with copper colored pubescence; pygidial area distinct, finely rugose; second sternite with large, elongate, separated punctures, and with a sparse, silvery pubescence at apex; sternites three to five sparsely silvery pubescent at apex. Legs dark ferruginous, clothed with long, sparse, silvery pubescence; calcaria pale.

Holotype, female, No. 4793, Cal. Acad. Sci., Ent., June, 1927, Sacaton, Arizona. Paratypes, two females, June, 1927, Sacaton, Arizona, in the author's collection.

This species keys to *P. flammigera* Mickel in his key in "The revision of Mutillid Wasps," Proceedings of the United States National Museum, Volume 64, Art. 15, p. 6, but has the following differences according to Mickel's description: the size of the insect and the posterior face of the propodeum sparsely punctured with large separate punctures amongst which are finer punctures, less so caudad; the median seven-eighths of the apex of the second tergite with a narrow band of black recumbent pubescence, the remaining space on either side of the apex with recumbent silvery pubescence merging into the silvery pubescence of the sides; tergites three to five closely punctate with each entire apical margin with a recumbent band of silvery pubescence as well as black, sparse, erect hairs making an erect fringe along the cephalic margin of each silvery band.

THE MANDIBLES OF OMUS DEJEANI RCHE. AS SECONDARY SEXUAL ORGANS

(Coleoptera, Cicindelidæ)

BY ROBERT Y. PRATT

Coupeville, Washington

On May 2, 1938, while collecting on Whidby Island, Washington, I discovered two *Omus (Megomus) dejeani* Reiche under a piece of wood, mating. The male was on the back of the female, clasping her with his powerful, well developed jaws in the constriction between the pronotum and the elytra. Only the posterior pair of legs of the male were resting on the ground. This is also true in the case of *Tetracha carolina* (L.) and has been described in several species of *Cicindela*.¹

These two *Omus dejeani* were first discovered, in the act of mating, at 5:49 p. m. They were placed in a covered box and were found, still attached to each other, at 10:02 a. m. on May 3. They readily separated when disturbed at that time, but at 9:57 p. m. the previous evening, after four hours and eight minutes of observed mating, the male did not attempt to change his posi-

¹ Balduf, Walter Valentine, The Bionomics of Entomophagus Coleoptera, John S. Swift Co., Inc., p. 5, 1935.

tion when the female was turned over for an instant, placing the male on his back with the female on top of him. The female, when disturbed, would seek shelter, carrying the male with apparently no inconvenience. I do not know how long the pair had been mating when first found or how long they would have remained in that state if undisturbed, but the total observed period of mating was sixteen hours and thirteen minutes. The position of the jaws of the male *Omus dejeani* was not observed at 10:02 a. m. on May 3. They may or may not have been clasping the female at that time. Further research along this line would be interesting.

NOTE ON SILPHA (THANATOPHILUS)
COLORADENSIS WICKHAM

Silpha coloradensis was described by Wickham (Can. Ent., XXXIV, p. 180, 1902), from a single male from Argentine Pass, near Georgetown, Colorado, at an elevation of over 12,000 feet. He later (Bull. Lab. Nat. Hist. St. Univ. Iowa, V, p. 274, 1902), reported a second specimen from Gunnison, Colorado, and there are a male and female in the Hatch collection from Manitou in the same state. Portevin, misinterpreting the original description (Portevin, Encycl. Ent., VI, p. 43, 1926; Hatch, Jour. N. Y. Ent. Soc., XXXV, p. 346, 1927 and Col. Cat. 95, p. 85, 1928), redescribed the species as *obalskii* (Portevin, Bull. Mus. Hist. Nat. Paris, p. 507, 1920; Encycl. Ent. VI, p. 50, fig. 45, 1926), on the basis of a series of specimens from British Columbia.

In view of the rarity of the species and the absence of any information on its habits, it is here noted that Frances Bjorkman took a series of six specimens at Independence Pass, Colorado, at an altitude of more than 12,100 feet in a can of old coffee grounds on July 9, 1938 and a second series of four specimens at Spring Creek Pass, Colorado, at an altitude of more than 11,000 feet in a sheep carcass on July 19, 1938. On both occasions *coloradensis* was associated with individuals of *Silpha* (*Thanatophilus*) *lapponica* Herbst, a widely distributed carrion-inhabiting species. Specimens have been placed in the Hatch collection at the University of Washington.—Frances Bjorkman and Melville H. Hatch, Department of Zoology, University of Washington.

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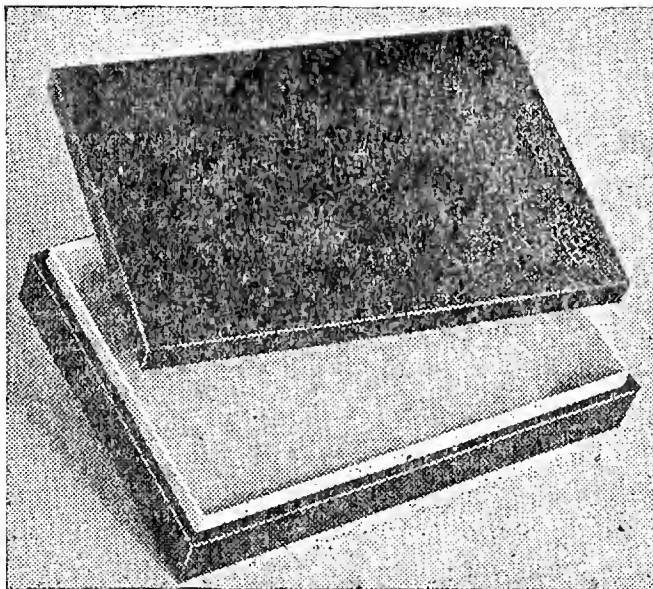
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NOTES ON ODYNERUS WITH A KEY TO THE NORTH AMERICAN SUBGENERA AND DESCRIPTION OF A NEW SUBGENUS

(Hymenoptera, Vespidae)

BY RICHARD M. BOHART

University of California, Los Angeles

KEY TO THE SUBGENERA OF ODYNERUS IN NORTH AMERICA

1. First abdominal sternite nearly flat, hardly as broad as its median length; head distinctly longer than broad as viewed from the front; second abdominal sternite without a median basal furrow.....*Dolichodynerus* Bohart
- First abdominal sternite much broader than its median length2
2. Median length of second abdominal tergite more than twice the median length of the second sternite; second sternite flat, not curved toward the base; second tergite with a membranous apical margin.....*Maricopodynerus* Viereck
- Median length of second tergite less than twice that of second sternite3
3. Front face of pronotum without a pair of distinct pits or impressed lines near the middle.....4
- Front face of pronotum with two distinct pits or impressed lines near and on either side of the middle.....9
4. Summit of first abdominal tergite with a distinct transverse carina, rarely obsolete at the dorsal middle.....5
- First abdominal tergite without a transverse carina.....7
5. Second cubital cell of the forewing petiolate anteriorly.....*Alastoroides* Saussure
- Second cubital cell of the forewing not petiolate; no pale markings in the emarginations of the eyes.....6
6. First abdominal tergite with a median longitudinal post-sutural groove; first tergite without long erect hair; male antennæ thirteen-segmented, not hooked or rolled apically.*Symmorphus* Wesmæl
- First tergite without a longitudinal groove, with long erect hair; male antennæ hooked apically.....*Ancistrocerus* Wesmæl
7. With a carina running from the pronotal angles obliquely to the mesothorax; propodeum usually bordered superiorly with prominent membranous ridges; male antennæ apparently eleven-segmented, the last two segments being minute.....*Pachodynerus* Saussure

- Without a carina running from the pronotal angles obliquely to the mesothorax; male antennæ hooked apically.....8
- 8. Small species, often silvery-pubescent and marked with rufous; first abdominal tergite usually well punctured and often with the apical margin swollen; clypeus usually apically incised*Leptochilus* Saussure
- Medium to large species; first tergite thinly margined apically and usually hardly punctured; clypeus rarely apically incised.....*Ryghium* Spinola
- 9. Pits on front face of pronotum linear and well separated; male antennæ usually coiled apically; markings often bright red in North American species; body form robust.....*Odynerus* Latreille
- Pits on front face of pronotum close together and round or oval; male antennæ hooked apically; slender species.....10
- 10. Summit of first abdominal tergite with a shelf-like transverse carina.....*Parancistrocerus* Bequaert
- Summit of first tergite without a shelf-like carina.....*Stenodynerus* Saussure

Subgenus LEPTOCHILUS Saussure

Leptochilus Saussure, 1852. Etud. Fam. Vesp., 1:233.

Parodynerus Saussure, 1856. Etud. Fam. Vesp., 3:245.

Microdynerus Thomson, 1874. Scandinaviens Hymenoptera, 3:58.

Zendalia Robertson, 1928. Flowers and Insects, p. 12 (erects new genus for *acoluus* Sauss. and *zendaloides* Robt.).

Subgenotype: *Pterochilus mauretanicus* Lep.

The original generic description of Saussure was as follows:

“Lèvre longue, linéaire. Palpes labiaux sensiblement plus courts que la languette, de quatre articles, très grêles, presque glabres; le premier très long, le quatrième très petit. Machoires et mandibules comme dans le genre *Pterochilus*, mais les palpes très grêles. Chaperon aussi large, ou plus large que long, arrondi en dessus. Le rest comme le genre en question.”

The genus was erected by Saussure for *Pterochilus mauretanicus* Lep.; *Discoelius cruentatus* Brullé; *Odynerus oraniensis* Lep.; and *Leptochilus fallax* Sauss., *ornatus* Sauss., *parvulus* Sauss., and *exiguus* Sauss. In a recent paper Blüthgen has divided *Leptochilus* and *Microdynerus* into several genera and subgenera (Blüthgen, P., Beitrage zur Kenntnis der palaearktischen Eumeniden, *Deutsche Ent. Zeitschr.*, 1938:434-496). In the author's opinion Blüthgen has overemphasized species group differences, and the multiplicity of names which he has added tend to confuse rather than simplify the complex eumenine picture.

All intergrades occur between species typical of *Leptochilus* and those typical of *Microdynerus*. A comparison of the European type species, *O. (Microdynerus) exilis* Herrich-Schaeffer, with a variety of North American species leads the author to the conclusion that *Microdynerus* merely represents the less heavily sculptured *Leptochilus*.

When *Leptochilus* was placed in *Odynerus* by Dalla Torre, *ornatus* was preoccupied and the name *republicanus* was substituted for it. Apparently, this species has not been recognized since Saussure described it. However, the author has examined specimens of both sexes of a species which agrees exactly with the original description and figures. Moreover, this species, which is rare, appears to be the only one of its species group occurring in the locality designated by Saussure, *e. g.*, "Carolina." A redescription of this species is given below. The other species described by Saussure from "America," *fallax*, has never been identified with a North American species and, as Saussure himself suggested, probably was mislabeled.

Among the numerous species of North American *Leptochilus* are *O. rufinodus* Cr., *bellulus* Cr., *electus* Cr., *congressus* Vier., *rufobasilaris* Ashm., *fedorensis* Cam., *tosquineti* Cam., and *zendaloides* Robt.

ODYNERUS REPUBLICANUS Dalla Torre

(Figs. 1-3)

Leptochilus ornatus Saussure, 1852, *Etud. Fam. Vesp.*, 1:233, pl. 20, fig. 4 (nec Smith, 1852).

Odynerus republicanus Dalla Torre, 1889. *Wien. Ent. Zeitsch.*, 8:125.

Male. Black; clypeus except apical margin, first antennal segment in front, pronotum anteriorly except at middle, mesopleural spot, tegula, two spots on scutellum, femora apically, outsides of tibiae, apical margins of first two or three abdominal tergites and second sternite, yellow; mandible partly, first antennal segment behind, legs mostly, first abdominal segment except for apical margin, dark reddish; wings dark smoky, the veins black. Clypeus and emargination of compound eye weakly silvered; pubescence of head and thorax sparse, pale, and hardly longer than an ocellus; pubescence of abdomen minute, silvery. Body coarsely punctured, punctures almost contiguous; clypeus and front face of pronotum coarsely punctured; apical abdominal tergites with finer puncturation. Clypeus much broader than long, strongly convex in lateral

view, with a very small apical incision; mandible four-toothed; last antennal segment curved, finger-like, as long as tenth segment and reaching to its apex; inter-ocellar area with a pair of prominent tubercles; head greatly developed behind ocelli; post-scutellum serrately crested; hind face of propodeum roundly concave; middle femur normal; abdomen short and stout (see fig. 2); second sternite without a median basal suture; length to apex of second tergite, 6.5 to 7.5 mm.

Female. Coloration, pubescence, and puncturation about as in male with the following exceptions: Clypeus dark yellow, red, and black. Clypeus weakly incised apically, once and two-thirds as broad as long; length to apex of second tergite, 8 mm.

Records. "Carolina" (male and female types, Paris Museum); one male, South Carolina, July; one female, Nelson County, Virginia, July 30, 1926 (W. Robinson); one female, Hilliard, Florida, August 19, 1930 (J. Nottingham); one male and one female, Fedor, Texas, April, 1899; one male, Medora, Kansas, June 24, 1926 (D. R. Lindsay); one female, Graham County, Kansas, August 16, 1912 (F. X. Williams).

Subgenus STENODYNERUS Saussure

(Fig. 13)

Stenodynerus Saussure, 1854. *Melanges Hyménoptérologiques*, fasc. 1:58.

Type by present designation, *Odynerus chinensis* Saussure.

The following is quoted from the original description of the subgenus:

"Formes du corps grêles, allongées. Thorax allongé. Abdomen souvent cylindrique; écusson aplati, métathorax convexe, creusé d'une fossette variable; à bords en général arrondis."

Of the two species included in the original description, *angustus* Sauss. and *chinensis* Sauss., the latter appears to be typical of North American species commonly placed in this subgenus by previous workers.

Stenodynerus probably contains more species than any other American subgenus. They are mostly small to medium sized, slender, and with the clypeus often longer than broad. The two distinct approximate pits on the front face of the pronotum are also characteristic of *Parancistrocerus*, and these two subgenera intergrade so that some species are difficult to place. A few species of *Stenodynerus* resemble certain *Leptochilus* closely and

apparently form an intermediate link between the two. In such cases the pronotal pits are the only means of separation. The following North American species are typical of *Stenodynerus*: *O. anormis* Say, *blandus* Sauss. (fig. 13), *taos* Cr., *cochisensis* Vier., *lucidus* Roh., *pedestris* Sauss., *toltecus* Sauss., and *fundatus* Cr.

Dolichodynerus Bohart, new subgenus

(Figs. 4-10)

Subgenotype, *Odynerus turgiceps* Bohart.

This subgenus contains the most elongate species of North American *Odynerus*. It is probably most closely allied to *Stenodynerus* and may possibly be a derivative of it. Only two species are known at present and both are rare in collections. Of these, *tanynotus* is the least modified. The greatly lengthened first sternite occurs in both species and readily separates the subgenus from all others in North America.

Body elongate; head distinctly longer than broad in front view; thorax strongly flattened dorsally and about twice as long in dorsal view as broad at the tegulæ; first abdominal segment about twice as long as its greatest thickness in lateral view, first sternite with its median length about as great as its breadth. Front face of pronotum coarsely punctured, without discrete pits, or with a single median pit. Female vertex without depression. Pronotal carina separated from mesonotum by more than three ocellus lengths. Second cubital cell of forewing strongly narrowed anteriorly. First abdominal tergite with rudiments of a transverse carina near its base; second sternite flattened basally and without a median furrow. Male antenna thirteen-segmented, apically hooked, last segment straight. Third segment of female antenna about one and one-third times as long as second. Male genitalia slender; ædeagus simple at apex, notched sub-basally; parameres simple, slender, and weakly haired.

KEY TO THE SPECIES OF DOLICHODYNERUS

- With prominent smooth swellings behind and close to the compound eyes; edges of compound eyes at the emarginations distinctly above the level of the face at that point; second abdominal tergite not raised apically; apices of second and third tergites fitting against sub-basal carinæ on tergites three and four; coloration black and yellow.....*turgiceps*
- Without swellings behind the compound eyes; edges of compound eyes on a level with the rest of the face at the emarginations; second tergite smoothly raised apically; no carinæ on tergites three and four; coloration largely red and yellow.....*tanynotus*

Odynerus turgiceps Bohart, new species

(Figs. 4-8)

Particularly remarkable are the sub-basal carinæ of the third and fourth tergites which prohibit the telescoping of these segments as in other *Odynerus*. This unique condition adds materially to the elongate appearance of the species.

Male. Black; first antennal segment in front, spot on mandible, clypeus mostly, frontal stripe, post-ocular spot, stripe across pronotum, mesopleural spot, spot on tegula, two spots on scutellum, elongate spot on propodeum laterally, outsides of tibiæ, crescent-shaped spot at center of basal third of first abdominal tergite, apical margins of first to fourth tergites and fourth to seventh sternites, lateral spots on second and third sternites, bright yellow; wings darkly brown-clouded especially along anterior third. Pubescence of entire body minute, less than one ocellus length. Puncturation of head, thorax, and first four abdominal segments coarse and close; clypeus less coarsely than front; front face of pronotum coarsely throughout; propodeum weakly striate; last two abdominal segments finely punctured. Clypeus roughly five-sided except for roundly incised apex; head depressed at emargination of compound eye to depth of an ocellus; with a pair of shining post-ocellar tubercles originating between hind ocelli; with two pairs of large post-ocular tubercles or humps; prothorax with a median longitudinal crease, with a sharp transverse anterior carina, sharply rounded pronotal angles, distance from carina to mesonotum about five ocellus lengths; posterior face of propodeum roundly concave, with rough dorsal edges; first abdominal tergite with a weak sub-basal carina, apex slightly raised; second tergite slightly constricted at basal third; third and fourth tergites with sub-basal carinæ which prevent their slipping under tergites two and three respectively; length to apex of second tergite, 6.5 mm.

Female. Markings, pubescence and puncturation about as in male with the following exceptions: Clypeus, antenna, hind tibia and last two abdominal sternites black; mandible and tarsi reddish-tinted. Second to fourth antennal segments with a length ratio of 3:4:3 respectively; mandible five-toothed, subapical tooth very weak; length to apex of second tergite, 7 mm.

Holotype, male, no. 4829, Calif. Acad. Sci., Ent., allotype, female, no. 4830, Calif. Acad. Sci., Ent., and one paratype, female, Sunset Valley, Santa Barbara County, California, July 14, 1938 (M. A. Cazier). Other paratypes, Arizona: One female, Santa Rita Mountains. California: One female, San Jacinto Mountains, July, 1912 (J. C. Bridwell); one female, La Crescenta, Los

Angeles County, August 7, 1938, on *Eriogonum* (C. Michener and R. Bohart); one female, Eagle Rock Hills, Los Angeles County, June 22, 1934 (C. D. Michener); one male, Glen Ivy, Riverside County, May 13, 1928, on *Eriogonum fasciculatum* (P. H. Timberlake); one female, Dos Palms, Riverside County, March 28, 1934. Holotype and allotype in the California Academy of Sciences; paratypes in U. S. National Museum, and the respective collections of J. Bequaert, P. H. Timberlake, and the author.

ODYNERUS TANYNOTUS Cameron

(Figs. 9-10)

Odynerus tanynotus Cameron, 1909. Pomona Jour. Ent., 1:133.

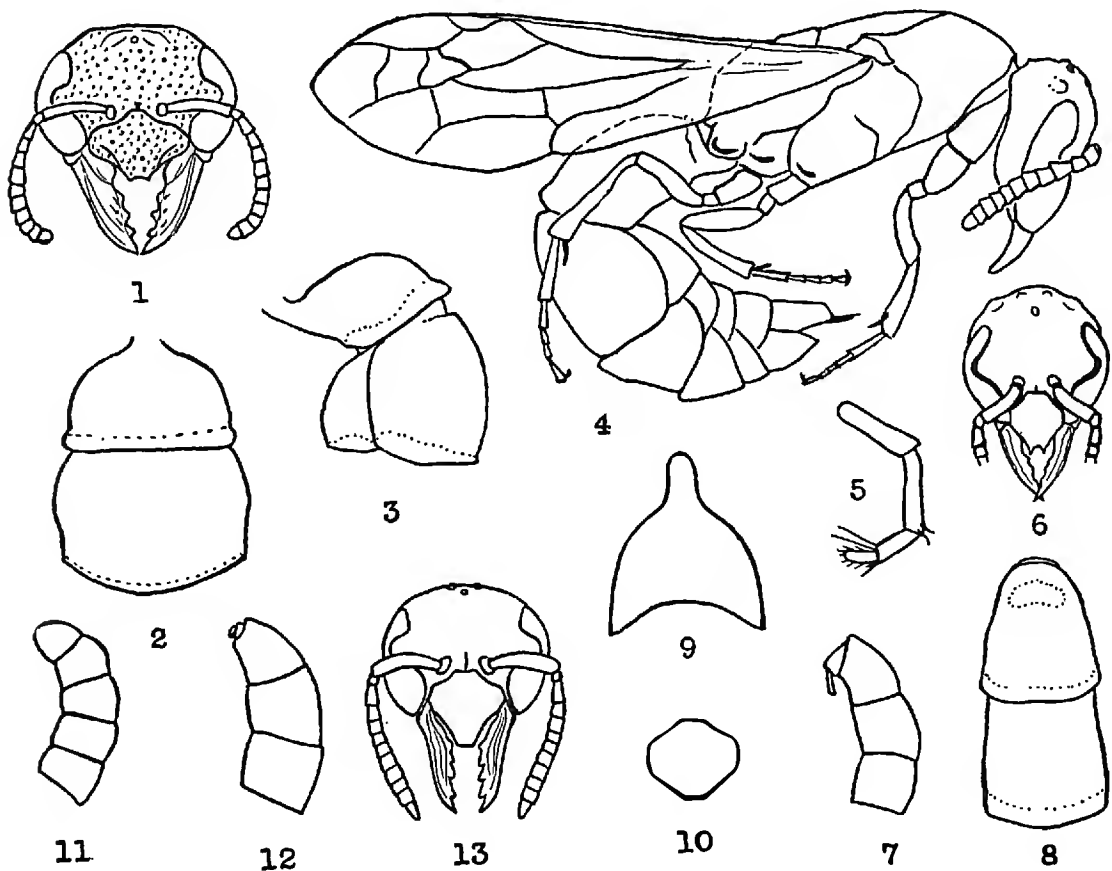
The most peculiar feature of this species is its long second abdominal tergite which, at rest, is half concealed beneath the first. By virtue of this fact it is able to bend its abdomen sharply at right angles by exposing the basal portion of the second tergite. This condition also occurs to a lesser extent in *turgiceps*. Although similar in general body shape to the latter, *tanynotus* can readily be distinguished by the characters given in the key. The following is an original description of the male and a re-description of the female.

Male. Black, extensively marked with varying amounts of yellow and red; head largely black and yellow, thorax largely black and red; abdomen largely red and yellow; clypeus, eye emargination, first antennal segment in front, frontal stripe, front margin of pronotum and scutellum posteriorly yellow; legs reddish, tinted with yellow on tibiae. Pubescence obscure. Body, except for abdomen apically, closely and coarsely punctured. Mandible five-toothed; clypeus narrowly and angularly notched apically; last antennal segment longer than twelfth, last two segments together as long as eleventh; low, punctured, inter-ocellar tubercles present; distance from pronotal carina to mesonotum about four ocellus lengths; middle femur slightly depressed at its outside middle; first abdominal tergite roughened at base but without a distinct carina, first tergite enclosing about half of second tergite at rest; apex of second tergite smoothly raised; length to apex of second tergite, 8-9 mm.

Female. Markings, pubescence, and puncturation about as in the male with the following exceptions: Tendency toward suppression of black is greater; legs red. Mandible five-toothed; clypeus truncate apically (fig. 10); second to fourth antennal

segments with the length ratio of 4:5:4 respectively; length to apex of second tergite, 10-11 mm.

Records. California: One female, Dos Palms, Riverside County, March 28, 1934. Arizona: One female, Congress (Cameron holotype); one male, Catalina Springs; one female, Patagonia; two females, Cave Creek, Chiricahua Mountains, July 4, 1930 (E. G. Linsley); one female, Tucson, August. New Mexico: One female, Las Cruces (T. D. A. Cockerell); two females, Alamogordo. Oklahoma: One male, Stillwater (C. Locke). Texas: One female, Uvalde; two males, Austin, April 12, 1902; one male, Laredo, May 10, 1924; one male, Cotulla, May 5, 1905 (W. D. Pierce).



Odynerus republicanus, fig. 1, front view of female head; fig. 2, dorsal view of tergites one and two; fig. 3, lateral view of first two abdominal segments. *O. turgiceps*, fig. 4, side view of female; fig. 5, female labial palpus; fig. 6, front view of female head; fig. 7, end of male antenna; fig. 8, dorsal view of tergites one and two. *O. tanynotus*, fig. 9, first sternite of female; fig. 10, female clypeus. *O. (Symmorphus) debilis*, fig. 11, segments 9-13 of male antenna. *O. (Pachodynerus) californicus*, fig. 12, segments 9-13 of male antenna. *O. (Stenodynerus) blandus*, fig. 13, front view of female head.

A NEW APHID OF THE GENUS MINDARUS FROM WHITE
FIR IN BRITISH COLUMBIA

(Homoptera, Aphididæ)

BY E. O. ESSIG

University of California

This species was collected on the undersides of the young, tender tips of grand fir or white fir, *Abies grandis* Lindley, growing along "The Gorge" just back of The Gorge Hotel in the City of Victoria, British Columbia, on June 7, 1938. The two trees infested were quite young and not over 20 feet tall. They were growing in the woods on the bank and were quite shaded by larger coniferous trees. My attention was attracted by the copious covering of honeydew on and under the infested trees and by the buzzing of insects feeding upon it. The flocculent aphids were crowded on the undersides of the needles with very little noticeable curling or deformation of the latter at the time. The material was gathered in a paper bag, and the specimens later removed to vials of 80 per cent alcohol. In making the transfer I noticed the four distinct forms: the alate and apterous parthenogenetic females, the apterous oviparous females, and the minute dusky-looking males. The shining black eggs, slightly covered with wax, were also quite abundant. Although many other trees in the vicinity were examined, no additional specimens were collected. However, I thought the species was *Mindarus abietinus* Koch and therefore made no special attempt to observe the habits of those collected or to find other colonies.

Mindarus victoria Essig, new species

Color. All forms, excepting the males, are a soft jade-green color which is hidden by heavy white waxy pulverulence or cottony secretions. The winged forms are characteristically dusky or black, including much of the head and thoracic regions and the rostrum, antennæ, legs, wing veins, three to five dorsal transverse abdominal vittæ, tip of the cornicles, and anal plate. In the cleared apterous parthenogenetic females the front of the head, portions of the antennæ, the legs, and glandular areas are faintly dusky.

The sexual females appear very much like the apterous parthenogenetic females with the additional circular pigmented areas between the cornicles which, in life, bear many closely clustered glass-like wax rods.

The cleared males appear to be largely dusky throughout, with transparent cross-lines between the abdominal segments.

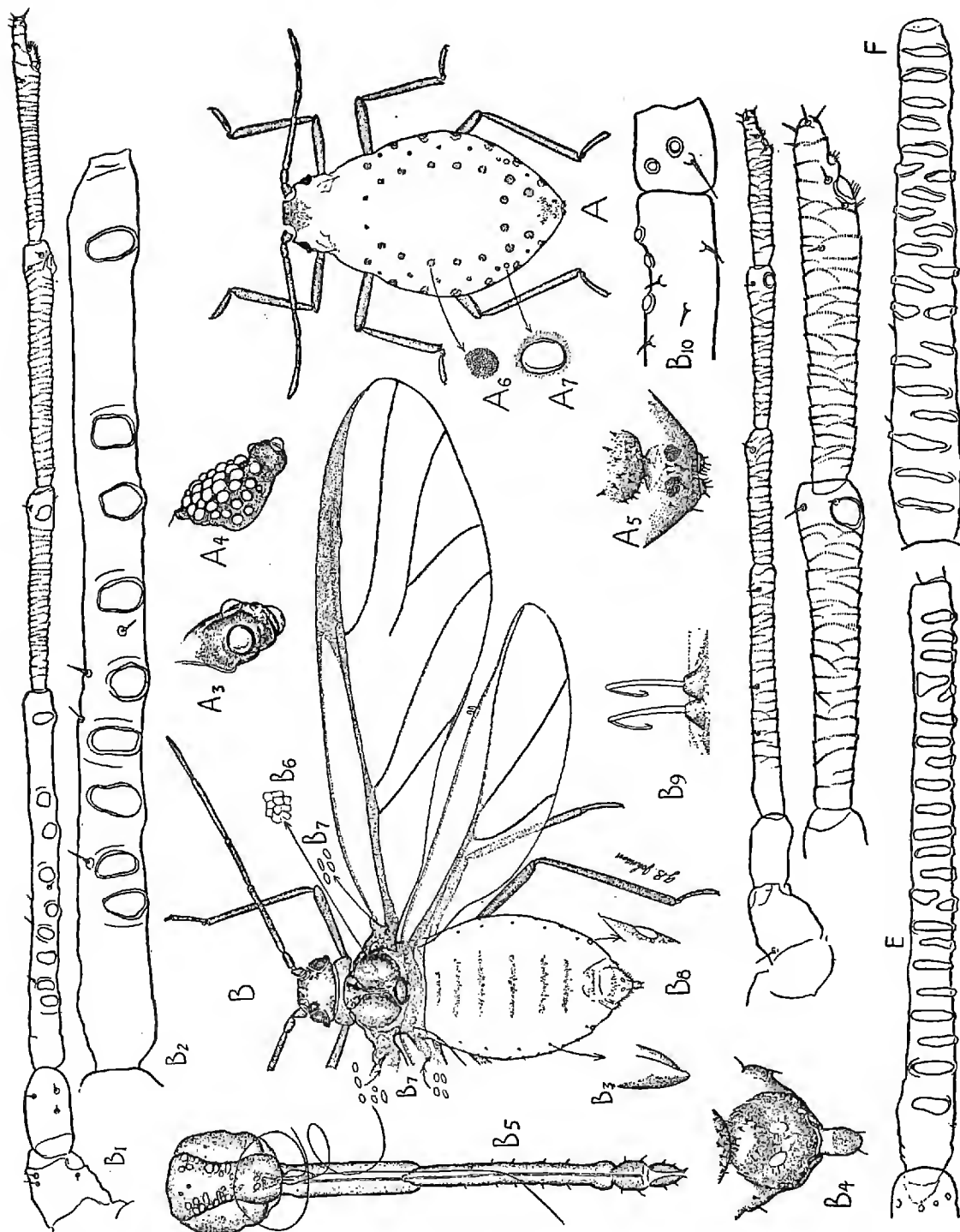


Fig. 1. *Mindarus victoria* Essig, n. sp. A, apterous viviparous female: A1, antenna; A2, segments V and VI of antenna further enlarged; A3, ocellanæ found in some individuals; A4, compound eye; A5, posterior abdominal region showing anal and genital areas and two groups of glands; A6, single wax glandular area greatly enlarged; A7, cornicle. B, winged viviparous female: B1, antenna; B2, antennal segment III; B3, abdominal tubercle; B4, ventral aspect of posterior abdominal region showing cauda, anal plate with two transparent circular areas, and portion of the genital plate; B5, rostrum; B6, reticulated derm of thoracic region; B7, fenestras at bases of subcostal veins; B8, cornicle; B9, hamuli or wing hooks, B10, sensoria on trochanter and at base of femur. E, *Mindarus abietinus* Koch: antennal segment III of the winged viviparous female. F, *Mindarus japonicus* Takahashi: antennal segment III of the winged viviparous female.

Winged viviparous female. Pulverulent or wholly covered with white cottony wax, jade-green with the head and thorax and their appendages, wing veins, tips of the cornicles, anal plate, genital plate, and abdominal vittæ dusky or black. Antennæ slightly more than half the length of the body; lengths of segments: I, 0.10 mm.; II, 0.10 mm.; III, 0.42 mm.; IV, 0.22 mm.; V, 0.27 mm.; VI, 0.25 mm. (base, 0.20 mm.; unguis, 0.05 mm.); total 1.36 mm. There is a wide range in the measurements of the different individuals examined. Large, nearly circular secondary sensoria occur on segments III and IV. On III there are from six to twelve with an average of eight or nine distributed throughout the length excepting the base. On IV there is normally but one large apical sensorium similar to the primary one on V. Only a few inconspicuous setæ are present. The rostrum is long and slender with the apical segments rather short and broad. It extends nearly to the third coxæ and averages 8 to 9 mm. in length. The cornicles are very short and little more than rings. Usually there are two sensoria on the trochanters and a row of three on the inner basal margin of the femora. The tarsi are conspicuously large and appear subequal on all the legs. Segment II is about eight times as long as I; total length to the bases of the claws is 0.23 mm. There is, on each side of the body, a row of small tubercles. The cauda is broad at the base and somewhat knobbed apically with the basal area transparent. There are a few short inconspicuous hairs present. The anal plate is nearly circular; pigmented with the exception of two large circular transparent areas, each of which has a single central seta. It is also beset with a considerable number of small setæ arising from nearly globular tubercles. The genital plate is elongated and also armed with a few setæ like those on the anal plate. Length of the body, 2.5 mm., width 0.9 mm.; length of forewing, 3.2 mm., width, 1.2 mm.

Apterous viviparous female. Pulverulent or waxy over jade green; the appendages being dusky or somewhat amber-colored. In most forms the eyes are compound but several mature individuals were noted which had only the two groups of three ocellanæ each as in the sexual forms. Lengths of the antennal segments: I, 0.09 mm.; II, 0.09 mm.; III 0.35 mm.; IV, 0.18 mm.; V, 0.18 mm.; VI, 0.21 mm. (base, 0.17 mm.; unguis, 0.04 mm.); total, 1.10 mm. There are no secondary sensoria present and but few inconspicuous setæ. Rostrum similar to that of the winged form. Cleared specimens reveal a considerable number of circular, wax glandular areas variable in size and arranged in a longitudinal marginal and submarginal row on each side with two extra areas between the cornicles. The marginal and the posterior submarginal areas are largest. Cornicles mere rings. The cauda appears to be incompletely developed or absent—the abdomen simply rounds off posteriorly. The anal and genital plates are similar to those of the alate form.

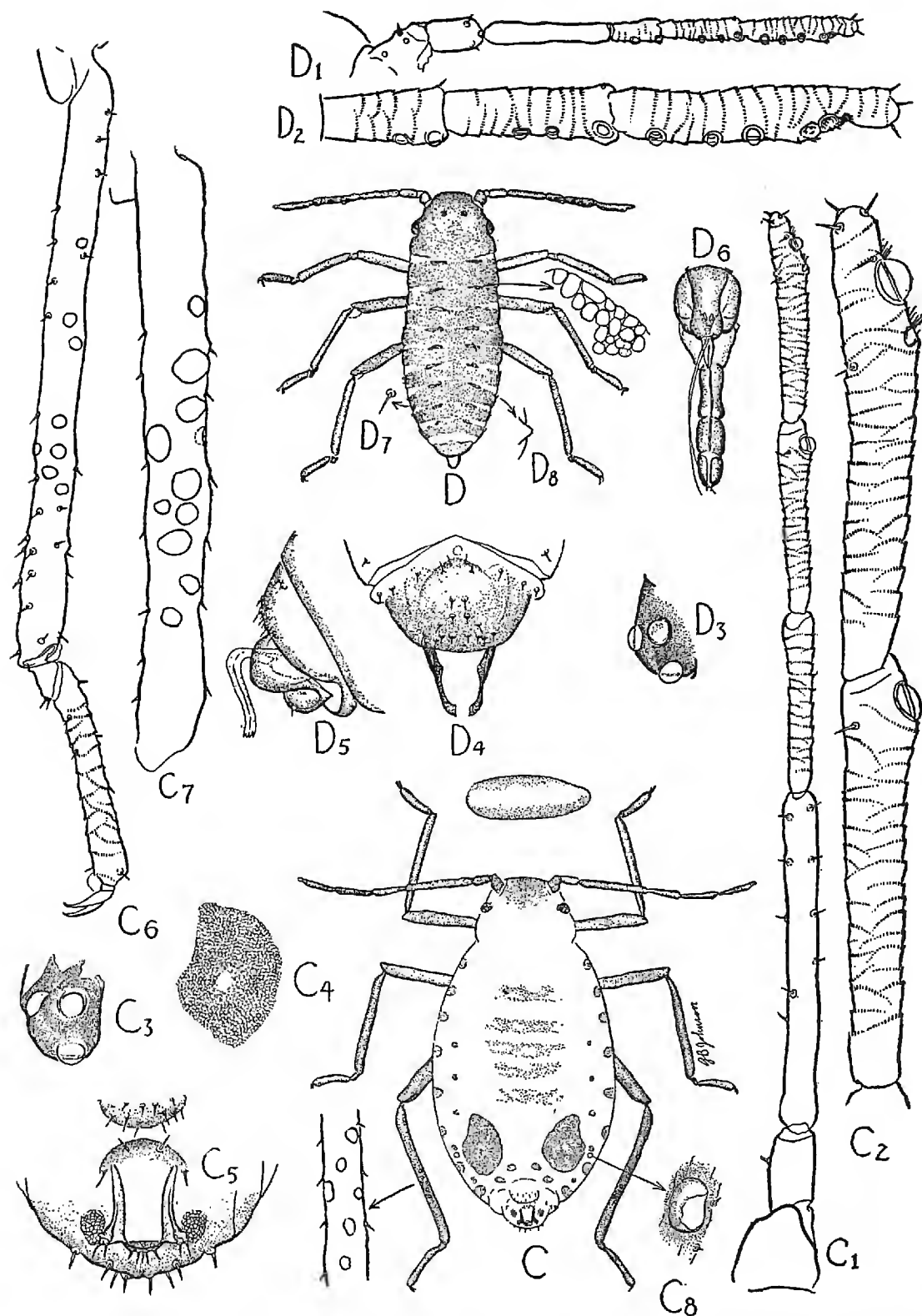


Fig. 2. *Mindarus victoria* Essig, n. sp. C, adult sexual female: C1, antenna; C2, segments V and VI of antenna; C3, group of ocellanæ; C4, one of the two large wax glandular areas between the cornicles; C5, anal area showing modified cauda, anal plate, genital plate, and wax glandular areas; C6, hind tibia and tarsus; C7, hind tibia of another individual; C8, cornicle. D, male: D1, antenna; D2, antennal segments IV to VI showing sensoria; D3, group of ocellanæ; D4, ventral aspect of anal area showing claspers, anal plate, and genital plate; D5, lateral view of anal area showing the exerted penis; D6, rostrum; D7, lateral body spine; D8, lateral body tubercle. (All drawings by aid of U. S. Works Progress Administration under supervision of author.)

Sexual oviparous female. Apterous and similar in form to the apterous viviparous female but considerably smaller in size and somewhat more yellow in color. The groups of glassy-wax rods between the cornicles and the smaller size of the bodies at once separate them in life, and the simple eyes, the large glandular areas from which the wax rods are secreted, the cleared sensoria-like areas on the hind tibiæ, and the small "u"-shaped chitinized caudal area at once distinguish the cleared, mounted specimens. The color is greenish-yellow with head and appendages dusky and a series of five or six dusky vittæ on the dorsum. The body has the two rows of oval or circular, glandular areas similar to those of the apterous viviparous forms. The anal and genital plates are not definitely pigmented but support similar setæ. The glandular patches between the cornicles are sometimes very large and indefinite in form. They each have a small clear circular area in the center. The eyes are each composed of three ocellanæ. Lengths of the antennal segments: I, 0.05 mm.; II, 0.06 mm.; III, 0.22 mm.; IV, 0.11 mm.; V, 0.13 mm.; VI, 0.15 mm. (base, 0.13 mm.; unguis, 0.02 mm.); total, 0.72 mm. There are no secondary sensoria present. The cauda is not distinct, if present at all. It is represented by a chitinized "u"-shaped area that, in some specimens, appears to define a cauda. Length quite variable—from 1.30 to 2.00 mm.

Male. Minute, dusky throughout and very inconspicuous. There are two longitudinal rows of groups of wax glands on the dorsum. Eyes are composed of three ocellanæ each. Antennæ about half the length of the body; lengths of segments: I, 0.05 mm.; II, 0.05 mm.; III, 0.10 mm.; IV, 0.05 mm.; V, 0.07 mm.; VI, 0.11 mm. (base 0.09 mm.; unguis 0.02 mm.); total 0.43 mm. Large and small circular secondary sensoria are distributed as follows: IV, 0 to 2; V, 1 to 3; VII, 2 to 3. Although there are certain light areas on III, they do not appear to be true sensoria. The rostrum extends beyond the hind coxæ and is similar in shape to the other forms. The hind tibiæ are not enlarged, but the margins are sometimes a little irregular because of the presence of the rather large oval or circular sensoria-like areas which number from 4 to 8. Other anatomical features are shown in the accompanying drawings in Figure 2.

Eggs. Regularly elongate-oval, shining black, and covered with waxy pulverulence and threads; length 0.65 mm. Laid on the undersides of the needles.

Type. A single alate viviparous female is designated as a type in the author's collection. A large series of slides of all the various forms described and taken from the original host and consisting of several hundred individuals are designated as paratypes. These are mounted on 31 slides in Canada balsam and 4 slides in a modified Berlese mounting medium. All are in the author's collection.

There are now four species referable to this genus: *Mindarus abietinus* Koch, *M. obliquus* Cholodkovsky (= *Schizoneura obliqua*), *M. japonicus* Takahashi, and *M. victoria* Essig, n. sp. The latter differs from all the others in the fewer and more circular sensoria on antennal segment III of the winged viviparous female as shown in the accompanying illustrations in Figure 1, B1, B2, E, and F. Cholodkovsky's¹ drawing of *obliqua* shows thirteen oval sensoria scattered over most of the length of the segment. He also shows three small sensoria on segment IV of the alate form instead of none or one as in the other species.

In *abietinus*² there are from fourteen to twenty-four and in *japonicus*³ from nineteen to twenty-three elongated sensoria on segment III of the alate form. In the latter species there is a tendency for some of the sensoria to be shorter and staggered along the segment. Specimens of *abietinus* from Maine, received through Dr. E. M. Patch, show a more circular type than those from Europe or from California.

¹ Zoöl. Anz., XIX, p. 256, 1896.

² Die Pflanzenläuse, p. 278, figs. 350, 351, 1857.

³ Trans. Nat. Hist. Soc. Formosa, vol. XXI, pp. 137-139, figs. 1-2, 1931.

NOTES ON THE GENUS AMBLYCHEILA

(Coleoptera-Cicindelidæ)

Recent collections from Arizona and Southern California have yielded several specimens of this very rare and desirable genus and it seems appropriate at this time to present this additional data in order to aid future collectors who may be in the vicinity of the localities cited. Mr. R. P. Allen collected four female specimens of *Amblycheila picolomini* Rche. 20 miles east of Tuba City, Arizona, July 28, 1937, at dusk, in dry, open, rocky country. Mr. Thomas Rodgers collected one small female of the very rare *Amblycheila schwarzi* W. H. in Cedar Canyon, Providence Mountains, San Bernardino County, California, June 1, 1938, in a dry, sandy wash. This locality is approximately 150 miles southeast of the only other reported California locality which is Skidoo, Inyo County, California. The specimen was presented by Mr. D. F. Tillotsen, to whom the author is indebted for this fine addition.—Mont. A. Cazier.

THE MULLEIN THRIPS

BY STANLEY F. BAILEY

University of California, Davis

The mullein thrips, *Neoheegeria verbasci* (Osborn), is a common thrips in central Europe and North America. Since 1888 miscellaneous items, both of a taxonomic and biological nature, have appeared on this insect, and it seems desirable to bring them together at this time with such notes as the writer has accumulated. In view of its exceedingly narrow host range it is doubtful that it will ever become of economic importance. It is, however, commonly found in entomological collections, and, since it is often readily obtainable, it is used in teaching as an example of the suborder Tubulifera. Therefore, a discussion of its biology and the illustrations of its various stages and important anatomical characters (Plate I, figures 1-12) may be of some value.

This thrips is a member of the family Phlæothripidae. The genus *Neoheegeria*, established by Schmutz (1909), is not abundantly represented in North America and only a single species, *verbasci*, is known from California. Representatives of this genus are much more abundant in Europe and in the old world. Priesner probably has the largest collection of this group and informs the writer that he will shortly publish a review of the genus with a key to the species.

It is possible that additional species in this genus will appear from time to time in North America and a translation of Priesner's key to European species may be of some aid to other workers. The key, from *Thysanopteren Europas*, 1928, p. 629, follows:

KEY TO EUROPEAN SPECIES OF NEOHEEGERIA

1. Head 1.2 to 1.3 as long as wide.....2
- Head only 1.1 as long as wide, the third antennal segment with two sense cones.....*verbasci* (Osb.)
2. The third antennal segment with only two sense cones.....3
- The third antennal segment with three sense cones. Body bristles long. Tube longer. Fore wings as a rule with 14-17 inter-located hairs.....*dalmatica* Schmutz
3. Fore wings with 10-12 inter-located hairs. Body stout, fore femora thick.....*lederi* Priesner

- . Fore wings with 6-7 inter-located hairs. Body less robust.
Fore femora much more slender.....*johni* Priesner

NEOHEEGERIA VERBASCI (Osborn)

1888. *Phlæothrips* sp., Osborn.
1896. *Phlæothrips verbasci* Osborn.
1902. *Anthothrips verbasci*, Hinds.
1907. *Trichothrips femoralis* Moulton.
1912. *Haplothrips verbasci*, Karny.
1920. *Neoheegeria verbasci*, Priesner.
1928. *Neoheegeria verbasci*, Priesner.

A complete, technical redescription of this common thrips is not necessary (that of Hinds, 1902 and Priesner, 1928 are sufficient.) It will suffice to say that the adult is about 2 mm. in length. The body is shiny black to the unaided eye and the wings (fig. 12) folded on the dorsum form a silvery white Y. Segments 3 to 6 of the antennæ (fig. 11) yellow and the fore tibia yellow shading to brown at the base. Base of fore wing (including scale) brown; wings narrowed in middle and colorless.

The egg (fig. 2) is oval in shape, translucent white to pale yellow in color and about 0.377 mm. long without surface reticulations. The larva (figs. 1 and 3) is lemon to orange-yellow, often nearly a burnt-orange in color in mature individuals with the antennæ and tip of abdomen brown. The pupæ (figs. 4-6) are a pinkish-orange to salmon pink in color; the appendages are colorless. Both mature larva and pupa are about the same size as the adult.

For a full technical description of the immature stages see Priesner (1928), pp. 632-634.

HOSTS

The chief host plant of *N. verbasci* is mullein (*Verbascum thapsus* L.). In central Europe Priesner records five additional species of *Verbascum* as hosts—namely, *austriacum*, *lychnitis*, *nigrum*, *phlomoides*, and *phœniceum*. Other host records found in the literature from North America include corn, cherry, ceanothus, and black-eyed daisy. (On one occasion an adult found its way into the stomach of a trout.) These plants are doubtless transitional hosts, for reproduction takes place only on mullein. Attempts made by the writer to rear this thrips on other plants have failed. It can be seen that the host plant range is extremely narrow and perhaps entirely restricted to *Verbascum*. Hood (1917) states that it “feeds exclusively on mullein.”

DISTRIBUTION

This species is one of the most generally distributed of the phlæothripids. Priesner reports it generally over the whole of Central Europe up to 1400 meters (about 4600 feet) and specifically from Austria, Hungaria, Roumania, Balkan States, and England. Bagnall (1933) states: "In my experience the species becomes more common on the continent as one goes south-east and the genus has many representatives in south-eastern Europe and in India."

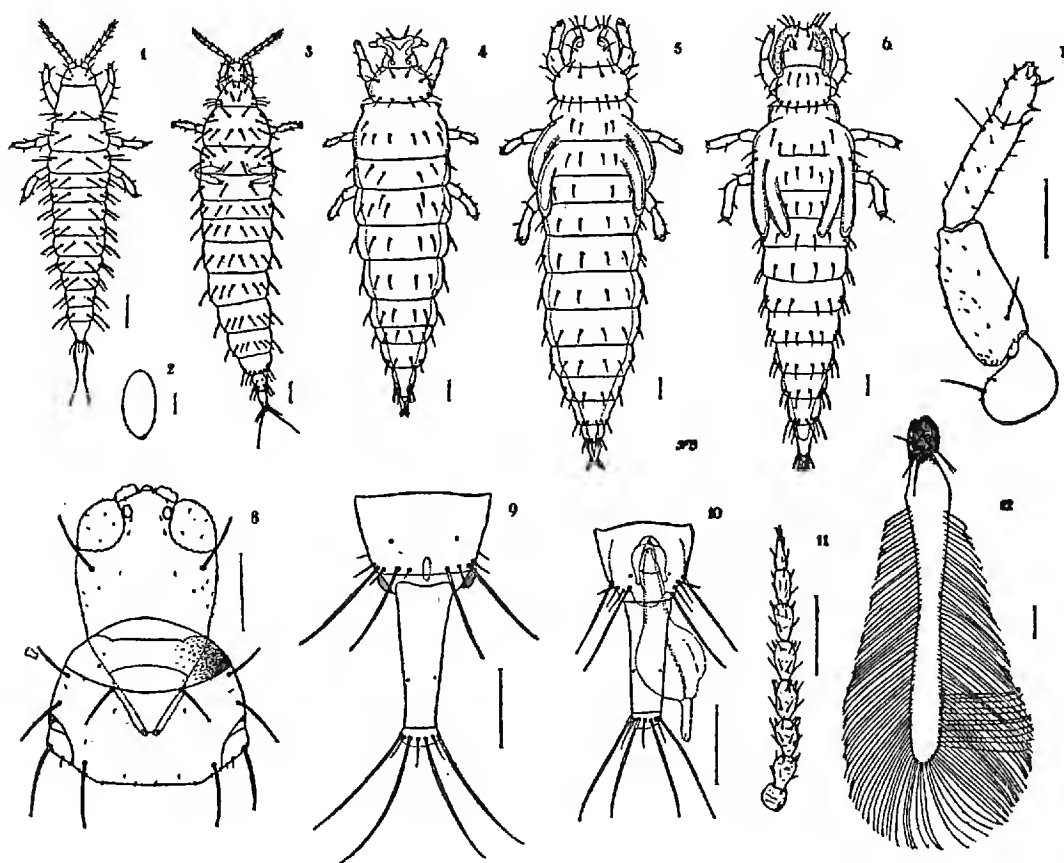
Aside from one record from Ontario, Canada, *N. verbasci* is known from the following states: California, Florida, Georgia, Indiana, Illinois, Iowa, Kansas, Maryland (and D. C.), Massachusetts, Michigan, Mississippi, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Utah, and Washington.

The presence of its host does not always mean the thrips is present, for the writer has collected on this plant in the eastern, central and western states and many times failed to find it. In California it is most commonly distributed in the Mother Lode district of the Sierra Nevada Mountains on the east side of the Sacramento Valley. From the Folsom district east to Emigrant Gap and at Donner Lake, Lake Tahoe, and Reno, Nevada, on the east side of the Sierra, it is very common. Tehama and Lassen counties are its limits to the north, the Sacramento Valley to the west, and Madera County on the south. Extensive collecting on mullein in Lake, Napa and Sonoma counties has failed to show its presence to the west of the Sacramento Valley. Collections from mullein in southern California also have been negative. In "Flowering Plants of California," Jepson states (page 896) that common mullein is found in "flats, valleys, mountain ridges or dry stream beds, nat. from Eur.: very common in the Sierra Nevada Pine belt; North coast Ranges." It is quite possible, then, that this thrips has been introduced from Europe and has not spread as rapidly as its host in North America.

BIOLOGY

The life cycle of the mullein thrips is spent entirely on the host plant. With the exception of the egg, all stages have been found throughout the year in central California during mild seasons at low elevations. At high elevations (about 3000 feet and up to 6000 feet) where the plants are partly or completely

winter-killed, the adults hibernate in the leaves at the base of the plant or in the flower spike which usually remains intact offering good protection. Early in March egg laying begins at low elevations and not until about the first of June at the highest points in its range. Since the host is usually a biennial, reproduction generally begins on the young plants which spring up around the older plants. A colony will remain on an individual plant for two years. The adults appear to migrate chiefly by crawling; they have been observed only rarely to fly. Copulation takes place on the plants in the usual manner.



Neoheegeria verbasci (Osb.): Figure 1, first instar larva; 2, egg; 3, mature larva; 4, prepupa; 5, first stage pupa; 6, second stage pupa; 7, fore leg of male; 8, head and prothorax of male; 9, tip of abdomen of female; 10, tip of abdomen of male, showing genitalia exserted; 11, antenna; 12, fore wing. Lines equal .1 mm.

The eggs are laid loosely among the forked hairs of the basal leaves and in among the flowers on the spike. In the laboratory, where the length of the stages was determined, the egg stage lasts 12 days. The larvæ feed together with the adults on the more tender growing portions of the host away from the direct sunlight. The larval stage extended on the average twenty-eight

days, but at higher summer temperatures is undoubtedly shorter. Pupation takes place among the feeding stages and consumes nine days.

There are two larval instars, a prepupal stage, and two pupal stadia or a total of five stages. Shull (1914, 1917) proved that this thrips could reproduce asexually, unfertilized eggs giving rise to males only.

After the first of June, at which time the first generation is complete, there is a continuous over-lapping, all stages being present well into October. At the lower elevations in California there appear to be three complete generations. The fuzzy nature of the leaf surface makes it difficult for natural enemies to reach the mullein thrips. However, *Triphleps tristicolor* White commonly preys upon *N. verbasci*.

These observations on the biology of the mullein thrips in California coincide with those of Osborn in Iowa and Priesner in Austria. These writers report hibernation taking place on the part of the adults in the seed pods and basal leaves. Osborn observed the eggs as being first laid in April and the first generation completed the last of June with a probable second. Priesner found larvæ and pupæ from May to late fall. The occurrence of individuals in other environments such as in drying corn husks and under willow bark (Priesner, 1928, p. 634) is undoubtedly a matter of chance.

While hundreds of adults and larvæ are often found on a single plant they apparently injure it very little. Osborn (1888) stated that the injury to the leaf showed "as yellow blotches, similar to those produced by *Tetranychus telarius*." A slight browning around the base of the individual flowers in the spike and on the smaller leaves in the basal rosette is the only evidence of injury.

There are about 36 references to this thrips in the literature, many of which give host and distributional records; only the more important and those cited in this paper are listed below.

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NOTE ON A TABANID

In a recent paper by Mr. Allan Stone on the subfamily Tabaninæ of the Nearctic Region (U. S. Dept. of Agric., Misc. Publ. No. 304, p. 28, 1938) the author states that the co-types of *Tabanus dodgei* Whitney are now lost. This species was described from nine females received by Mr. Whitney from Mr. G. M. Dodge of Glencoe, Nebraska. The G. M. Dodge collection, at his death, was left to his brother, E. A. Dodge, later of Santa Cruz, California, and at the death of E. A. Dodge came to the California Academy of Sciences. This collection contains two females of *Tabanus dodgei* labelled Dodge County, Nebraska. They agree in every respect with Whitney's description. These are without doubt co-types that were returned by Mr. Whitney to G. M. Dodge. Glencoe is in Dodge County, but a few miles from the town of Dodge. As the Whitney material seems to have been lost, I have designated one of these specimens as the lectotype of *Tabanus dodgei* Whitney.—E. P. Van Duzee.

A KEY TO THE SPECIES OF NEBRIA OF NORTHWESTERN NORTH AMERICA

(Coleoptera, Carabidæ)

BY MELVILLE H. HATCH

University of Washington

In the accompanying key to the species of *Nebria* north of California and west of Colorado, I have followed in some of its essentials the classification of Bänninger, *Ent. Mitteil.*, XIV, 1925, pp. 187-195, 256-281. For additional literature see Horn, *Trans. Amer. Ent. Soc.*, III, 1870, pp. 97-104.—LeConte, *Bull. U. S. Geol. Geog. Surv.*, IV, 1878, pp. 473-480.—Schaupp, *Bull. Brook. Ent. Soc.*, 1878.—Van Dyke, *Pan-Pac. Ent.*, I, 1925, pp. 115-122; *Ann. Ent. Soc. Amer.*, XIX, 1926, pp. 8-12.—Bänninger, *Kol. Rund*, XIV, 1928, pp. 5-7; *Deutsch. Ent. Zeitschr.*, 1931, p. 178; 1933, p. 81.—Darlington, *Psyche* XXXVII, 1930, pp. 104-105; XXXVIII, 1931, p. 24.

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KEY TO SPECIES

Tarsi above glabrous; labial palpi with penultimate segment with three setæ.

- 1 (40) Elytral humeri rounded, evident; male protarsi with three segments dilated; head behind eyes not or scarcely impressed
.....subg. *Neonebria* Hatch (*Nebria* Ganglb. nec Latr.)
- 2 (27) Pronotum with a seta-bearing puncture at side just in front of middle; legs black.
- 3 (18) Abdominal sternites three to five with from two to five seta-bearing punctures on each side of the middle along the posterior margin.
- 4 (7) Elytra shining black; pronotum with side margins widely reflexed, curving out directly from the hind angles.
- 5 (6) Only the third elytral interval with from three to five dorsal punctures, the interval not catenate; elytral humeri prominent, strongly rounded, the base of the elytra wider than the pronotum at its widest; hind angles of pronotum rectangular; head between eyes without rufous spots; length 12-13 mm.; Yukon (4), Alberta, Saskatchewan (7), eastern Washington, Idaho, western Montana, Colorado, New Mexico
(5)*hudsonica* LeC.
- 6 (5) Elytral intervals three, five, and seven catenate, with

- from four to six dorsal punctures; the elytral humeri less prominent, more broadly rounded, the base of the elytra narrower than the pronotum at its widest; hind angles of pronotum acute; head between eyes with a pair of rufous spots; length 15-16 mm.; Washington (Mt. Rainier, Olympic Mts. (15), Mt. Adams—Lane), Oregon (Mt. Hood); (*trifaria* Van Dyke *pars*¹).....*vandykei* Bänninger
- 7 (4) Elytra more or less brilliantly metallic, the third and seventh and frequently the fifth interval catenate with from one to eight dorsal punctures; head between the eyes with a pair of rufous spots.
- 8 (17) Elytral humeri prominent, strongly rounded, the base of the elytra wider than the pronotum at its widest; side margins of pronotum widely reflexed.
- 9 (10) Fifth elytral interval usually without punctures; length 10-12 mm., usually under 12; color brilliant metallic; elytral intervals rounded to flat; hind angles of pronotum acute to rectangular or subobtuse; southeastern Alaska (15) and Alberta through western Montana and northern Idaho to northern Oregon [Mt. Hood (15), Wallowa Mts.].....*gebleri* Dej.²
- 10 (9) Fifth elytral interval always with dorsal punctures; length 10-14 mm., usually over 12 mm.; elytral intervals more or less convex.
- 11 (12) Hind angles of pronotum strongly acute, the side margins in front of the hind angles evidently parallel; elytra less brilliantly metallic; length 10-13 mm., usually over 12 mm.; Washington (Glacier Peak, Mt. Rainier, Olympic Mts.).....*meanyi* Van D.
- 12 (11) Hind angles of pronotum rectangular or obtuse, the side margins curving out almost directly from the hind angles; elytra more brilliantly metallic.
- 13 (14) Elytra reddish purple, the striæ usually finely, obscurely punctate; hind angles of pronotum subrectangular; length 11-14.5 mm.; Aleutian Is. (13) along the coast to northern Washington (Mt. Rainier, Olympic Mts.); eastern British Columbia (2); western Montana (13).....*metallica* Fisch.
- 14 (13) Elytra violaceous.
- 15 (16) Elytral striæ finely, obscurely punctate; hind angles of pronotum rectangular; dorsal punctures more strongly im-

¹ *Vandykei* is said to be distinguished from typical *trifaria* LeC. (Colorado, Utah) by its more shining dorsal surface due to a finer microsculpture, relatively broader head; the pronotum with more prominent anterior angles, more feebly arcuate sides, the side margins in front of the hind angles very feebly sinuate, the side margins more strongly reflexed, the hind angles more prominent and more acute; the elytra broader, more evidently inflated behind, the intervals more convex; the ædeagus nearly evenly arcuately narrowed along its outer margin, the end broadly rounded.

² Specimens of *gebleri* in my collection from the eastern portions of its range, especially a series from the Wallowa Mountains, Oregon, seem to have the elytral intervals flatter, the hind angles of the pronotum less acute, and the side margins of the pronotum in front of the hind angles less parallel than do coast specimens, and may represent a feebly differentiated subspecies.

- pressed, from six to eight in a series; length 14 mm.; Alberta (Banff).....*schwarzi* Van D.
- 16 (15) Elytral striæ relatively coarsely punctate; hind angles of pronotum obtuse; dorsal punctures less strongly impressed, from five to seven in a series; length 13-14 mm.; replaces *metallica* at high elevations in the western portions of British Columbia (Merritt) (3) and Washington (Darrington, Glacier Peak, Mt. Baker, Mt. Rainier, Olympic Mts., Skagit River, Mt. Adams—Lane).....*piperi* Van D.
- 17 (8) Elytral humeri less prominent, more broadly rounded, the base of the elytra narrower than the pronotum at its widest; elytral intervals three, seven, and sometimes five catenate, with dorsal punctures; side margins of pronotum narrow, very narrowly reflexed, the hind angles subobtuse; elytra purple; length 11.5-12.5 mm.; western Montana (11), Idaho (15), Colorado*purpurata* LeC.
- 18 (3) Abdominal sternites three to five with only a single seta-bearing puncture on each side of the middle along the posterior margin; head between eyes without a pair of rufous spots; sides of pronotum widely reflexed.
- 19 (26) Dorsal punctures strongly impressed.
- 20 (23) Pronotum from three-fifths to two-thirds as long as broad, its sides in front of the hind angles usually appreciably subparallel; color more or less brownish; dorsal punctures confined to third interval.
- 21 (22) Length 9-10 mm.; usually smaller and less robust; Labrador (14), Alberta, Montana, British Columbia, eastern Washington*labradorica* Csy.
- 22 (21) Length 9-11 mm.; usually larger and more robust; Washington [Cascade Mts. (14), Glacier Peak (14), Mt. Bonaparte, Mt. Rainier, Olympic Mts. (14)].....*crassicornis* Van D.
- 23 (20) Pronotum less than three-fifths as long as broad, its sides in front of the hind angles very briefly constricted, curving out almost at once from the hind angles.
- 24 (25) Color black or brownish; elytra with fifth interval usually with impressed dorsal punctures, the intervals variably convex, the striæ variably punctate; the hind angles of the pronotum subrectangular to obtuse, the side margins in front of the hind angles strongly sinuate to nearly oblique; legs black to rufous; length 8.5-10 mm.; Kamchatka (13) and eastern Siberia (13) through central and south central Alaska (13) to Mackenzie (13)*bifaria* Mann.
- 25 (24) Color above metallic bronze or green to (*parvula* Sahlb., *reducta* Csy.) very black; fifth elytral interval without dorsal punctures; hind angles of pronotum nearly rectangular; length 7.5 mm.; Pribilof Is. (?) (13), southwestern (13) and central (4) Alaska, Yukon (4).....*viridis* Horn³

³ Schaupp (Bull. Brook. Ent. Soc. 1878) includes "Wash. Terr." among the localities cited, but there is no recent confirmation of the occurrence of this species in this region.

- 26 (19) Dorsal punctures not or very feebly impressed; color black, the elytra obscurely viridescent; pronotum with hind angles obtuse, the side margins in front of the hind angles oblique, scarcely sinuate; length 9-12 mm.; British Columbia (8) and northern Idaho to northern California (8); (*brevis* Csy.) *virescens* Horn
- 27 (2) Pronotum without a seta-bearing puncture at sides; abdominal sternites three to five with two to four seta-bearing punctures on each side of the middle along the posterior margin; dorsal punctures confined to the third elytral interval; head between eyes usually with a pair of rufous spots (sometimes absent in *sahlbergi*).
- 28 (39) Hind angles of pronotum subrectangular.
- 29 (34) Pronotum with side margins for a considerable distance in front of the hind angles subparallel or even incurved, side margins broadly reflexed.
- 30 (31) Pronotum with hind angles rectangular or slightly acute, the side margins in front of the hind angles subparallel or very feebly incurved; elytra black, frequently with a violaceous or viridescent tinge; legs usually black but specimens with pale legs are cited; length 8.5-9.5 mm.; south central Alaska (13) to Oregon, Colorado (13), Lake Superior (12), Labrador (12), Newfoundland (12), and New Hampshire (12) ..*sahlbergi* Fisch.⁴
- 31 (30) Pronotum with hind angles acute, the sides of the pronotum in front of the hind angles somewhat recurved.
- 32 (33) Larger (length 10-11.5 mm.); the elytra frequently metallic green or blue; legs variable in color; seacoast of southern Alaska from Unalaska to Sitka (13).....*gregaria* Fisch.⁵
- 33 (32) Smaller (length male: 9 mm., female: 11 mm.); elytra nigropiceous, the antennæ and legs paler; distinguished, according to Van Dyke, from *gregaria* by being less elongate, the pronotum with the sides more suddenly constricted posteriorly and the basal impressions better defined, the elytra with better defined humeri, sides more parallel and general shape less spatulate, and from *sahlbergi* by its shorter elytra and less evidently punctured striæ; southern Alaska (Unalaska, Katmai, Kodiak) (13).....*aleuta* Van D.⁵
- 34 (29) Pronotum with side margins curving out almost immediately from the hind angles, the side margins relatively narrow and feebly reflexed.
- 35 (38) Dorsal surface black.
- 36 (37) Legs black; length 10.5-13 mm.; southeastern Alaska (15) west of the Cascades to Oregon (15)..*mannerheimi* Fisch.⁶

⁴ Compare remarks on this species by Van Dyke (12) and Fall (4). The eastern phase is *moesta* LeC., but Miss Mank (11) believed that she detected both *moesta* and *sahlbergi* in her material from Glacier National Park.

⁵ Both *gregaria* and *aleuta* are closely similar to *sahlbergi*, of which they may be local races.

⁶ *Mannerheimi* is recorded from Colorado by Wickham (16) but the record requires confirmation.

- 37 (36) Legs pale; length 10-12 mm.; Alaska (9) through eastern and western Washington and Oregon to southern California (15); (*tenuipes*, *transversa*, *hippisleiyi*, and *formalis* of Casey) *eschscholtzi* Men.
- 38 (35) Dorsal surface and legs pale; length 9.5-11 mm.; sea beaches from British Columbia (15) to Crescent City, California (15)..... *diversa* LeC.
- 39 (28) Hind angles of pronotum obtuse, the side margin in front of the angles oblique, not or scarcely sinuate, side margins widely reflexed; black, the legs and antennæ pale; length 11-12 mm.; eastern Washington and Alberta through western Montana (6) to Wyoming (9), Colorado (16), and Utah (10) *obtusa* LeC.
- 40 (1) Elytral humeri oblique.....subg. *Nebriola* Daniel
Elytra bright metallic, the third and seventh intervals with dorsal punctures; pronotum with a seta-bearing puncture at sides just in front of middle, the hind angles rectangular or acute; head with a pair of rufous spots between eyes; legs black; male protarsi with three segments dilated.
- 41 (42) Head and pronotum obscurely metallic; sides of pronotum in front of the hind angles distinctly parallel for a considerable distance, abdominal sternites three to five usually with a single seta-bearing puncture on either side of middle along the posterior margin; length 12-13 mm.; southeastern Alaska (15), British Columbia (1), Washington [Glacier Peak (15), Mt. Rainier, Olympic Mts.], Oregon (Mt. Hood); (*columbiana* Csy.) *kincaidi* Schwarz
- 42 (41) Head and pronotum not metallic; sides of pronotum curving out almost directly from the hind angles; abdominal sternites three to five usually with two seta-bearing punctures on either side of middle along the posterior margin; length 12-13.5 mm.; British Columbia [Selkirk Mts. (15), Lyman Glacier], Washington (Mt. Adams, Mt. Rainier, Olympic Mts.), Oregon (Mt. Hood); (*kincaidi* Bänn., *columbiana* Van Dyke, *vandykei* Darl.) *paradisi* Darl.

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COLLECTING AND DISTRIBUTIONAL NOTES ON SOME CALIFORNIA WEEVILS

(Coleoptera, Curculionidæ)

Rhynchites velatus Lec., which heretofore has been exceedingly rare in collections, was taken in great numbers on *Prunus andersonii* Gray, "Desert Peach," (host identified by Willis H. Wheeler) at Coleville, Mono County, California, on May 27, 1939, by M. A. Cazier, T. H. G. Aitken, Anthony Downes, and the writer. Additional specimens were collected by Stewart Lockwood and A. Showler on the same host at Peavine, Sierra County, California, on June 9, 1939. This striking species was described in 1880 by LeConte merely from Sierra Nevada, California. To the best of the writer's knowledge the species remained unknown except for the type specimen for over thirty years until R. S. Woglum collected a few larvæ and adults at Palm Springs, Riverside County, California, on May 15, 1914, in the fruit of *Prunus fremontii* Wats. (*Prunus eriogyna* Mason), "Desert Apricot." Later, on April 25 and April 4, 1915 and 1925, Dr. E. C. Van Dyke collected four more specimens at Palm Springs, California. Since one of the hosts, *Prunus andersonii* is known to occur as far north as Modoc County, California, *Rhynchites velatus* probably occurs along the western margin of the Great Basin for nearly a thousand miles.

Crocidema californica Van Dyke, type locality Idyllwild, Riverside County, California, was collected at Coleville, Mono County, California, by Mr. W. E. Simonds on July 9, 1933, and again at the same locality on May 27, 1939, by M. A. Cazier, T. H. G. Aitken, Anthony Downes, and the writer. This species, or a variety of the same, was also collected at Cedarville, Modoc County, California, on May 29, 1939, by the four latter collectors. The preferred host at the Coleville and Cedarville localities appeared to be *Purshia tridentata* DC.—P. C. Ting.

NOTES ON THE TAXONOMY OF NOCTUID LARVÆ
(Lepidoptera)

BY N. STAHLER

University of California, Berkeley

The difficulties involved in the taxonomy of lepidopterous larvæ are well known. The work of Forbes, Dyar, Smith and others has led to the useful identification of the supra-generic categories in the order and has clarified many phylogenetic relations that could not have been understood from a study of the adults alone. But so similar are the great number of caterpillars that in only a few families have adequate generic and specific characters been found. In one of the largest and most economically important families, the Noctuidæ, the taxonomy of the larvæ has proceeded so slowly that relatively few of the 4000 or more species of North American noctuid larvæ can be positively identified. One may often compare the larvæ of two distinct species, segment by segment and part by part, without finding an applicable diagnostic character.

The purpose of this paper is to briefly illustrate some structural variations which are of taxonomic value in the study of noctuid larvæ by use of two closely related species in the genus *Heliothis*. The writer has recently been engaged in extending the work of Lange and Michelbacher (1) in the separation of *Heliothis obsoleta* (Fabr.) from *H. phloxiphaga* G. and R. in the larval, pupal and adult stages. The moths often occur together in the tomato fields of central California, although only the corn earworm can pass its life cycle on tomato. In these areas *H. phloxiphaga* larvæ feed chiefly on *Hemizonia congesta* (tarweed) and *Grindelia robusta*. The adults are easily separated, the pupæ less so, but the larvæ are sometimes almost indistinguishable.

Color and size are the most obvious characters, but they must be employed with caution. The color pattern of some noctuid larvæ varies greatly, depending on the stage of larval development, the host plant or plant part attacked and perhaps the temperature and season. The size attained by full grown caterpillars may depend on the nature and abundance of food.

H. obsoleta ranges in color from green, pink or brown to slate gray with white bands. It has been observed in this lab-

oratory that on corn the larvæ tend to be yellow and pale brown, on alfalfa dark green, on lettuce pale brown and on tomatoes brown with red and green hues. *H. phloxiphaga* varies from slate gray with prominent white stripes on tarweed to dark green on *Grindelia*. In the laboratory these caterpillars may be successfully reared on lettuce and tend to be dark green in color. Other noctuid larvæ, such as *Autographa californica* (Speyer), show less range in color pattern.

Sixth instar larvæ of *obsoleta* are larger than those of *phloxiphaga* in the corresponding stage. In young larvæ, however, there is no difference in size. The stage of larval development and the environmental conditions should be taken into consideration in using color and size as specific characters.

The pigment pattern of the cuticle is not destroyed by ordinary reagents. It is composed of a more or less definite arrangement of small oval or round areas. In *phloxiphaga* these maculations are more numerous in the dark sub-dorsal bands than they are in the same areas of the corn earworm. In early stages these differences do not obtain. The microscopic structure of the cuticle offers generic characters. In *Heliothis* the skin is thickly beset with minute, sharply conical spinules. It is quite likely that in some genera the structure of the cuticle may be of specific value.

The size of the primary setæ and setigerous tubercles is of value. Typically, *phloxiphaga* is spinose with dark sub-conical tubercles, while *obsoleta* is rather smooth and has smaller, paler tubercles. But those factors influencing color may often cause changes in the appearance of the setæ. Dark larvæ tend to appear more spinose than pale individuals.

The arrangement of the primary setæ of noctuid larvæ is so uniform that they offer no satisfactory taxonomic characters. The form and number of the crochets on the abdominal legs and the shape or size of the spiracles are as yet of minor systematic importance. In the two species of *Heliothis* referred to, the shape and size of the tarsal claws are similar, but this structure can often be used for the separation of genera in the family. The shape and size of a sclerotized area is of fundamental importance in a study of this kind and no such region should be neglected.

It is probably in the larval head that the most valuable diagnostic characters can be located. It will be desirable first to

enumerate a few structures which are similar in *obsoleta* and *phloxiphaga*, but have been used to separate other noctuid species. (1) the arrangement of ocelli, (2) the size and shape of the adfrontals and clypeus, (3) the length of the epicranial stem (the dorso-median suture of the head), (4) the mandibular dentes and basal processes, (5) the shape and relative size of the sclerotized areas of the antennæ and labium and (7) the palpi and their setæ.

The cuticular coloration of the head frequently offers specific characters. In many species the vertex is darker than the rest of the head. *H. phloxiphaga* may conveniently be distinguished from the corn earworm by the reticulate, fuscous, sub-median arcs of the head.

The internal, or posterior, face of the labrum presents several characters of value—the epicranial setæ, the epicranial shield (the thickened area on the ventral margin) and the labral notch. In *obsoleta* the epicranial shield is somewhat larger and the notch relatively shallower than in *phloxiphaga*. The epicranial setæ are similar in the two species, although slightly larger in full grown corn earworms.

Ripley (2) has shown that the labro-hypopharyngeal complex which forms the spinneret and its supporting structures in lepidopterous larvæ is of great value in taxonomic work, although the homologies of this area are not clearly understood. The spinneret is located on the mesal portion of the membrane between the palpigers. The proximal sclerite of the spinneret varies in shape and secondary chitinization within the family. In the Noctuidæ the palpigers form an incomplete ring, ending dorsally at the labial palpi. The sensorium on either side of the median ventral line is partially surrounded by a chitinized extension of the palpiger, differing in shape within the family. In *Heliothis* the hypopharynx is covered with numerous, short, stout setæ which are longer at the lateral margins.

The two species of *Heliothis* studied are so closely related that, of the above characters, only the palpigers are of specific value and even then, just in mature larvæ. In *obsoleta* the palpigers are narrower and the dorso-cephalic angle is more produced than in *phloxiphaga*. In addition, the proximal sclerite of the labial palpi is usually larger in the former species.

The taxonomic value of the spinneret and its allied structures

has perhaps not yet been realized. These structures are of particular significance in those cases in which the more obvious characters are not conclusive. A systematic arrangement of noctuid larvæ can only result from a more detailed morphological examination of all larval structures. Such progress should be of special importance to lepidopterists and agricultural entomologists.

The writer wishes to acknowledge the assistance and cooperation extended by Dr. A. E. Michelbacher.

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NOTES ON NORTH AMERICAN SPECIES OF MEGARHYSSA

(Hymenoptera, Ichneumonidæ)

BY CHARLES D. MICHENER

University of California, Berkeley

The genus *Megarhyssa* Ashmead has recently been placed by Roman (1933:38) in synonymy with *Pimpla* Fabricius on the basis of a supposed type designation by Fabricius. However, as pointed out by Richards (1937:117), Fabricius did not designate genotypes in the sense of the present code of nomenclature; he merely described one species in most of his genera more fully than any of the others. For this reason, it seems that *Megarhyssa* should not be considered a synonym of *Pimpla*.

Although several authors have given keys to our four species of *Megarhyssa*, identification of certain specimens has remained difficult because of the great color variation in some species. In the keys here given, therefore, an attempt has been made to use structural characteristics in separating the species.

KEY TO THE NORTH AMERICAN SPECIES OF MEGARHYSSA

FEMALES

1. Middle of posterior margin of heavily sclerotized portion of first sternite distinctly behind a vertical line through posterior end of first abdominal spiracle; ovipositor about one and one-half times as long as body; length of sclerotized part of

- seventh tergite on middorsal line nearly equal to length of sixth tergite middorsally.....*greenei* Viereck
- . Middle of posterior margin of heavily sclerotized portion of first sternite anterior to a vertical line through posterior end of first abdominal spiracle; ovipositor nearly twice to nearly three times as long as body; length of sclerotized part of seventh tergite on middorsal line less than one-half length of sixth tergite middorsally.....2
2. Malar space nearly as long as basal width of mandibles; face black with broad yellow lateral marks; tergites three to five with conspicuous, yellow, round, lateral spots; posterior lateral angles of abdominal tergites three to five but little produced, about right angular, although rounded.....*nortoni* (Cresson)
- . Malar space shorter than basal width of mandibles; face largely yellow, or at least with some yellowish medially; tergites three to five without round yellow spots on sides.....3
3. Posterior lateral angles of abdominal tergites three to five but little produced, obtuse, rounded; body almost entirely black; ovipositor nearly three times as long as body.....*atrata* (Fabricius)
- . Posterior lateral angles of abdominal tergites three to five produced, right angular or acute, although narrowly rounded; body brown or blackish, often with extensive yellow markings; ovipositor about twice as long as body.....*lunator* (Fabricius)

MALES

1. Middle of posterior margin of heavily sclerotized portion of first sternite behind a vertical line through posterior end of first abdominal spiracle by distance equal to that from anterior end of first abdominal spiracle to anterior end of first tergite.....*greenei* Viereck
- . Middle of posterior margin of heavily sclerotized portion of first sternite on or only slightly posterior to a vertical line through posterior end of first abdominal spiracle.....2
2. Malar space longer than apical width of mandibles; face black with broad, yellow, lateral marks; posterior lateral angles of tergites three to six produced and acute, although narrowly rounded.....*nortoni* (Cresson)
- . Malar space as long as apical width of mandibles; face largely yellow, or at least with some yellowish medially.....3
3. Posterior lateral angles of abdominal tergites three to six but little produced, right angular or slightly acute, although rounded*atrata* (Fabricius)
- . Posterior lateral angles of abdominal tergites three to six produced, very acute.....*lunator* (Fabricius)

MEGARHYSSA GREENEI Viereck

Although Rohwer (1920:426) agrees with Viereck in stating that the female of this species has a cloud below the stigma, specimens of both sexes from Ithaca, New York, June 25, 1917, collected by Dr. E. C. Van Dyke have clear wings. Dr. G. Stuart Walley writes that a majority of the specimens in the Canadian National collection have immaculate wings, although a few females have a spot behind the stigma.

MEGARHYSSA NORTONI (Cresson)

This is the only known species in the far west, where it is quite common; but it is also found in the east, although apparently rarely. Dr. Walley sends records of specimens from as far east as Grand River, Nova Scotia, and points out that in eastern specimens the abdomen is more brownish than in western ones, and the mesocutum usually brownish instead of black as in western individuals.

NEW YORK: Buffalo, October, 1900 (E. P. Van Duzee). UTAH: Aspen Grove, Mt. Timpanogos, July 6, 1935 (E. C. Van Dyke); Park City, July 3, 1922 (E. P. Van Duzee). BRITISH COLUMBIA: Nanaimo Biological Station, June 26, 1920 (E. C. Van Dyke); Trinity Valley, Lumby, September 2, 1937 (K. Graham). WASHINGTON: Steven Pass, Cascade Mountains, July 14, 1930 (E. C. Van Dyke). OREGON: Fremont National Forest, Klamath County, June 18, 1922 (E. C. Van Dyke). CALIFORNIA: Shasta Springs, June 5, 1920 (C. L. Fox); Mt. Shasta, July 30 (Graham Held); Meadow Valley, Plumas County, 4000 to 5000 feet, June 1 to 7, 1924 (E. C. Van Dyke); Cisco, June, 1910 (G. Von Geldern); Zenia, June 19, 1935 (H. J. Rayner); Fallen Leaf Lake, Lake Tahoe, July 9, 1915 (E. C. Van Dyke); Echo Lake, July 23, 1933 (E. C. Zimmerman); Yosemite Valley, July 8, 1921 (E. C. Van Dyke); San Mateo County, June 20, 1936 (G. E. Bohart); Carmel, June 10, 1908 (F. X. Williams); Huntington Lake, Fresno County, 7000 feet, July 4 (E. P. Van Duzee); Rock Creek Lakes, Inyo County, 9700 feet, July 19 to 21, 1934 (G. E. Bohart); Giant Forest, Tulare County, July 24, 1922 (C. L. Fox). The specimens recorded above are in the collection of the California Academy of Sciences.

MEGARHYSSA LUNATOR (Fabricius)

This is a widely distributed and highly variable species. Although specimens from any one locality exhibit a rather broad range of variation in size and coloration, a study of individuals from the entire distribution of the species shows that there are several well defined geographic forms, as described below.

MEGARHYSSA LUNATOR LUNATOR (Fabricius)

Ground color usually rather light brown; antennæ brown basally, yellower apically; face yellow with brown markings; wings clear, almost always with dusky area behind apex of stigma; stigma darker apically than basally; first tergite of female with apical yellow fascia; tergites three to seven of female each with a narrow V-shaped or curved yellow line on each side; first and second tergites of male each with small, apical, yellow fascia.

This form is found from the Atlantic coast to the eastern side of the Rocky Mountains, although apparently replaced by *phaeoptila* in parts of the southern states.

The dark area on the fore wings is frequently reduced in size in the males, and in one specimen from Ithaca, New York, collected by E. C. Van Dyke it is entirely missing. Also a female from Schuyler County, New York, August 28, 1878 (A. J. Burner) lent from the National Museum collection through Mr. R. A. Cushman has the dark areas of the wings inconspicuous and pale yellowish. Possibly it is a teneral or in some way bleached specimen.

Megarhyssa lunator phaeoptila Michener, new subspecies

Female: Ground color of body dark brown; antennæ yellowish brown; face largely brown; wings dark brown, with a clearer area behind base of stigma; stigma darker apically than elsewhere; first tergite with small yellow apical fascia; tergites three to seven each with a very narrow V-shaped or curved subapical yellow line on each side, these lines broken on sixth tergite.

Holotype (U. S. N. M. Type number 53193): Victoria, Texas, October 15, 1910, on oak tree in river bottom (J. D. Mitchell). Paratype: New Orleans, Louisiana (F. O. Minor). These specimens were lent to me by Mr. Cushman from the National Museum collection, to which they will be returned.

This is evidently a southern form of *lunator*, from which it may most easily be distinguished by its almost entirely dark

brown wings (the wings are clear with a dark spot in typical *lunator*). Also the yellow lines on the sides of abdominal tergites three to seven of the female are narrower in *phaeoptila* than in *lunator*.

Two additional female specimens from Austin, Texas, October, 1900 (A. L. Melander collection), kindly lent me by Mr. R. D. Shenefelt of Washington State College, have the wings a little clearer basally and subapically than in typical *phaeoptila*, the ground color of the body not as dark brown as in the types, and the lateral yellow lines of the abdomen broader, as in typical *lunator*. Thus it is evident that *phaeoptila* intergrades with *lunator*.

Megarhyssa lunator icterosticta Michener, new subspecies

Ground color of body light brown; antennæ yellowish; face almost entirely yellow; wings light golden brown, with clearer area behind base of stigma in female, slightly darker area behind apex of stigma in male; stigma evenly brown throughout; first abdominal tergite of female without apical yellow fascia; tergites three to seven of female with broad yellow lateral areas, those of third tergite broad crescentic marks with lower arms longer than upper; fourth and fifth tergites yellow except for the margins and a middorsal band, narrowed posteriorly; sixth tergite yellow except for margins, seventh yellow except for posterior margin and area around spiracles; tergites one and two of male without apical yellow fasciæ.

Holotype, female, No. 4761, Calif. Acad. Sci., Ent., allotype, male, No. 4762, Calif. Acad. Sci., Ent., and thirteen paratypes from Durango, Colorado, collected on July 9, 1933, by my friend, Mr. K. L. Maehler. Females were ovipositing in a log. Additional specimens are from Ft. Douglas, Utah, June 15, 1933 (O. H. Swezey, Calif. Acad. Sci.), Salt Lake City, Utah, June 8, 1938 (Bill Higley); Beaver Canyon, Utah, August (U. S. N. M.); Oak Creek Canyon, Utah, July 12, 1930 (L. F. Clarke) and June 14, 1937 (L. R. Jeppson); Roosevelt, July 17, 1938 (G. F. Knowlton, F. C. Harmston); Grantsville, Utah, July 5, 1938 (L. L. Hansen); Tooele, June 21, 1930 (G. F. Knowlton, M. J. Janes); and Las Vegas, New Mexico (F. Springer, U. S. N. M.). Although these specimens are darker than most of the Durango specimens, especially in ground color, and some females have the yellow marks of the sides of the fourth tergite reduced to broad cres-

cents like those of the third tergite, none approach the coloration of typical *lunator*. Nearly all specimens have the yellow markings of the thorax more extensive than in *lunator*. Paratypes will be placed in the collections of the United States National Museum, Colorado State College, University of Kansas, K. L. Maehler, and the author.

This is a very distinct subspecies of *lunator*, if it is not a distinct species. It occurs in the eastern part of the Great Basin region, on the western slope of the Rocky Mountains, and east into central New Mexico at least as far as Las Vegas. It is most noticeably separated from *lunator* by the light brown wings and the extensive yellow areas on the sides of the abdomen of the female. The absence of yellow apical fasciæ on the first two abdominal tergites of the male and the first tergite of the female in this otherwise strongly maculated form may lend weight to the idea that this is a distinct species.

MEGARHYSSA LUNATOR subspecies(?)

Under this heading I treat a single female specimen sent by Mr. Cushman from the National Museum collection. It is from College Farm, Mesilla Valley, New Mexico, April, 1898, collected by C. E. Mead, and from the T. D. A. Cockerell collection. It is similar to *icterosticta*, although its wings are slightly paler than in that subspecies, but the propodeum and first two abdominal tergites are almost entirely yellow, and its yellow markings otherwise are unusually extensive. Furthermore, the lateral angles of tergites three to five are unusually blunt for *lunator*, although there is some variation in this character in other subspecies. A male which is exceptionally pale for *icterosticta* and may belong to this form is from the Baboquivari Mountains, Arizona, September, 1924 (O. C. Poling, Calif. Acad. Sci.).

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EAST ASIAN HISPINÆ AND CASSIDINÆ IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

(Coleoptera, Chrysomelidæ)

BY J. LINSLEY GRESSITT

Lingnan University, Canton, China

This paper is in the nature of a brief report on the hispine beetles and tortoise beetles from eastern Asia in the collection of the California Academy of Sciences in San Francisco. Most of the material is from eastern China, Indo-China, the Philippine Islands and Borneo, while the remainder is from Manchuria, central and southern Japan, Formosa, western China, Hong Kong, the East Indies and Ceylon. Many of the specimens were collected in 1923 by Dr. E. C. Van Dyke, some were taken by Mrs. Dora E. Wright, and the remaining specimens were largely collected by Dr. J. C. Thompson and Albert Koebele. In all, sixty-nine species are enumerated, of which three are described as new to science. Two of the latter are from Borneo and one is from China, all three belonging to the Hispinæ. I am greatly indebted to Mr. E. P. Van Duzee of the California Academy of Sciences and to Dr. E. C. Van Dyke of the University of California for the privilege of studying this material, and to Dr. S. Maulik of the British Museum for comparing certain specimens with types.

SUBFAMILY HISPINÆ

TRIBE ANISODERINI

1. LASIOCHILA BALLI Uhmann, 1930

A single topotype from Kanshirei, S. W. Formosa was collected on March 25, 1909, by Dr. J. C. Thompson.

2. LASIOCHILA FEÆ (Baly), 1888, new combination

One specimen was taken at Riv de Quangtri, Annam, Indo-China, on April 25, 1925, by Mrs. Dora E. Wright. New to Indo-China.

TRIBE CALLISPINI

3. CALLISPA APICALIS Pic, 1924

A specimen was collected at Hangchow, Chekiang Province, E. China, May 19, 1923, by Dr. E. C. Van Dyke.

4. *CALLISPA BOWRINGII* Baly, 1858

A topotype is in the collection, taken on Hong Kong Island, March 1, 1925.

5. *CALLISPI CUMINGII* Baly, 1858

One example was taken on Mt. Pina Tuba, Philippine Island, 5,600 ft. alt., April, 1907, by J. C. Thompson.

6. *CALLISPA FLAVESCENS* Weise, 1911

One specimen was collected at Alabang, Luzon, Philippine Is., June 11, 1930.

7. *CALLISPA FORTUNII* Baly, 1858

Several were taken at Hangchow, Chekiang, E. China, May 23, 1923, by Dr. Van Dyke.

TRIBE LEPTISPINI

8. *LEPTISPA GODWINI* Baly, 1869

A few examples were taken at Hangchow, Chekiang, May 19, 1923, by Dr. Van Dyke.

TRIBE ONCOCEPHALINI

9. *ONCOCEPHALA BICRISTATA* Chapuis, 1876

Seven specimens were collected at Subig Bay, Luzon, May 1907, J. C. Thompson; one was taken at Dolores, Luzon, May 17, 1930.

10. *ONCOCEPHALA QUADRILOBATA* Guerin, 1844 ?

One specimen was taken at Hue, Annam, Indo-China, May 15, 1927, by Mrs. Dora E. Wright.

TRIBE PROMECOTHECINI

11. *PROMECOTHECA CUMINGI* Baly, 1858

A specimen was taken at Manila, Philippine Is., March 1926.

TRIBE GONOPHORINI

12. *Downesia vandykei* Gressitt, new species

Small, very narrow, broadest posteriorly; shiny; reddish brown, posterior four-fifths of elytra pitchy, neck pitchy red above and below, pitchy black at sides, occiput dull reddish brown, pitchy

at sides, antennæ pitchy brown to pitchy black, first two segments reddish brown, eyes blackish with golden-brown markings, first two abdominal segments yellowish brown, remainder reddish brown.

Head rounded anteriorly, nearly as wide as basal margin of prothorax; frons swollen, transverse, punctured, its posterior margin convex; vertex depressed, non-tuberculate; occiput nearly plane, feebly concave behind, finely and sparsely punctured; eyes large, about one-third deeper than wide, strongly convex interiorly; neck shiny, nearly impunctate. Antennæ one-third as long as body, thickened apically, clothed with minute golden-brown hairs, scape nearly glabrous, swollen, barely longer than second segment, which is cylindrical; third nearly as long as second, a little longer than fourth; fourth to sixth subequal; seventh to tenth a little longer, subequal; last longest. Prothorax slightly longer than broad, widened toward apex; sides nearly straight; apical margin convex, basal margin feebly so; surface convex, minutely and irregularly punctulate; base transversely grooved; lateral margins slightly expanded. Scutellum small, slightly concave. Elytra widened toward apex, broadly rounded behind, longitudinally punctured in seven rows anteriorly and in eight rows posteriorly, first row branching a little before middle, three raised lines between pairs of punctures, first broad and depressed on basal half, all distinctly raised apically. Metasternum punctured only along lateral margins; abdomen finely punctulate on apical segments. Length 4.4 mm.; breadth 1.2 mm.

Holotype, No. 4696, Calif. Acad. Sci., Ent., Hangchow, Chekiang Province, East China, May 19, 1923, collected by Dr. E. C. Van Dyke. Named in honor of the collector as a slight token of gratitude for kindness and aid extended by him to the writer.

This species differs from *D. marginicollis* Weise in being about one-half as large, mostly red instead of black, with the elytra red on basal fifth, etc. Differs from *D. tarsata* Baly in having the elytra largely black instead of yellowish, the tarsi brownish instead of black, etc.

13. *Agonia purpurascens* Gressitt, new species

Moderately elongate, nearly parallel. Body metallic reddish purple to purplish brown: head brownish purple; antennæ black with silvery pubescence on apical two-fifths; pronotum bronzy or brownish purple; scutellum blackish; elytra shiny reddish purple; ventral surfaces reddish brown with bronzy or purplish tinges; legs pitchy, greenish and bronzy in part. Dorsal surfaces of body glabrous; borders of abdomen narrowly with short pale oblique hairs.

Head barely as broad as anterior margin of prothorax, smooth, impunctate except on labrum. Antennæ a little more than one-half as long as body, moderately slender; scape about as long as, though thicker than, second segment; third about as long as eleventh, a little shorter than combined length of first two segments; sixth longer than fifth and shorter than fourth; last thickest, subacute apically. Prothorax distinctly broader than long, almost evenly narrowed from base to constriction just before apex; disc impunctate in center, hardly grooved medially, obliquely grooved and punctured at each side of base, concave and densely punctured on each side. Elytra long, subparallel-sided; each with three longitudinal costæ and eight to eleven rows of heavy punctures: third costa subobsolete along central portion, second interspace with three, and in part four, rows of punctures basally, and outermost with one extra row near base each with two rows from before middle to near apex. Ventral surfaces almost impunctate except near apex of abdomen. Length 7.4 mm.; breadth 2.6 mm.

Holotype, No. 4697, Calif. Acad. Sci., Ent., Mt. Murud, Borneo, Mjöberg collection, W. W. Funge bequest.

Differs from *A. jacobsoni* Uhmman in being smaller, in having the prothorax and elytra both nearly unicolorous and lacking black markings, the ventral surfaces purplish brown instead of black, the third antennal segment shorter than fourth and fifth combined, fourth to tenth segments not equal in length and thickness, each elytron with four rows of punctures for a short distance near base of second interstice, etc.

14. AGONIA XANTHOSTICTA (Gestro), 1897

A specimen is in the collection from Kuching, Borneo, Mjöberg collection.

15. AGONIA (AGONIELLA) VANDEPOLLI (Gestro), 1897

Six examples were taken at Subig Bay, Luzon, P. I., May 1907, by J. C. Thompson.

16. GONOPHORA ALBITARSIS Gestro, 1910 ?

Two specimens from the Mjöberg collection labelled "Baram Rov" are in the Academy. These are probably from Borneo.

17. GONOPHORA APICALIS Baly, 1858

One specimen was taken at Dolores, Luzon, P. I., May 17, 1930.

18. *Gonophora borneana* Gressitt, new species

Moderately broad, slightly widened posteriorly. Largely metallic greenish, blue or purplish; head green above, purplish brown on frons and labrum; antennæ greenish black basally, pitchy brown beyond middle and whitish testaceous on last two segments; prothorax green, somewhat bronzy along central portion; scutellum blackish; elytra frosted green along suture and on parts of base, bluish along external margins, bluish black on central portions of discs, and purplish on raised costæ; ventral surfaces purplish black; legs pitchy with greenish or bronzy reflections.

Head convex and slightly uneven above, hardly punctate. Antennæ three-fifths as long as body, slightly thickened beyond middle; scape a little longer and thicker than second segment; third almost as long as preceding two combined and subequal to each of following two; sixth to tenth shorter, subequal. Prothorax not quite twice as broad as long, a narrow transverse groove near apex and base; sides sinuate and feebly dentate, widest just before middle, suddenly constricted before apex; disc impunctate on anterior median portion, narrowly grooved from just before center to near base, deeply impressed in an oblique direction on each side and bearing irregular coarse punctures. Elytra slightly sinuate laterally, each with three costæ, the inner two strongly raised and the third nearly obsolete; punctures in seven rows at middle, last two interspaces merged and with three punctures, second interspace with three rows at base; apices without distinct teeth. Abdominal sternites in part finely punctured. Length 6.5 mm.; breadth 2.65 mm.

Holotype, No. 4794, Calif. Acad. Sci., Ent., Mt. Murud, Borneo, Mjöberg collection; W. W. Funge bequest.

Differs from *G. chalybeata* Baly in being largely green or blue-green above and purplish black beneath, in having the prothorax much broader than long, the elytra with the third costa almost lacking, with three puncture-rows in the last two interstices together, and with the apices practically untoothed.

19. *GONOPHORA HÆMORRHOIDALIS* (Weber), 1801

One specimen is in the Academy from Mt. Poi, Sarawak, Borneo.

20. *GONOPHORA XANTHOMELÆNA* (Wied.), 1823

One specimen was collected at Siborangit, Borneo.

TRIBE HISPINI

21. MONOCHIRUS MÆRENS (Baly), 1874

A large series of specimens was taken at Nanking, Kiangsu Prov., E. China, May 4, June 10, 20 and September 14, 1923, one at Nantung, E. China, May 9, 1932, and several at Unzen Hot Springs, Kyushu, S. Japan, July 8-12, 1923, all by Dr. Van Dyke.

22. MONOCHIRUS SP.

A few specimens were taken on Mt. Pina Tuba, Philippine Is., April 1907, by J. C. Thompson. These may represent the form recorded from Luzon as *M. callicanthus* (Bates), but they appear to differ at least subspecifically from typical Formosan material.

23. RHADINOSA NIGROCYANEA (Motsch.) 1861

Several specimens were collected at Nikko, Honshu, Japan, July 30, 1923, by Dr. Van Dyke, and one at Ikao, Honshu, in August 1909, by Dr. Thompson.

24. DACTYLISPA ANGULOSA (Solsky), 1872

A large series was taken at Nanking, Kiangsu Province, E. China, April 25, 30, May 4; and several at Hangchow, Chekiang, E. China, May 18, 1923, by Dr. Van Dyke; a few examples were taken at Mokan Shan, Chekiang, in August 1927, by Mrs. Dora E. Wright. Some additional specimens are in the Academy from Nagoya, Honshu, Japan, May 15, 1909.

25. DACTYLISPA CLADOPHORA (Guerin), 1841

One example was taken at Alabang, Luzon, P. I., May 29, 1929.

26. DACTYLISPA CORPULENTINA Uhmann, 1927

A few specimens were taken on the Island of Formosa by Dr. J. C. Thompson.

27. DACTYLISPA DIMIDIATA (Gestro), 1885

Two specimens from Kota Tjane (Borneo?) are in the Mjöberg collection.

28. *DACTYLISPA SAUTERI* Uhmann, 1927

Several examples were taken by Dr. J. C. Thompson in Formosa.

29. *DACTYLISPA SUBQUADRATA* (Baly), 1874

Several were taken at Nanking, Kiangsu, E. China, April 30, 1932, E. C. Van Dyke, and Nagoya, Japan, May 15, 1909.

30. *DACTYLISPA VITTUTA* (Chapuis), 1876

Ten specimens were collected at Subig Bay, Luzon, May 1907, and two at Mt. Pina Tuba, 5,600 ft. alt., Luzon, April 1907, by J. C. Thompson.

31. *PLATYPRIA ECHIDNA* Guerin, 1840

A single specimen is in the collection, labelled "Loo Choo, China, May 1910, collected by J. C. Thompson." This is probably from Okinawa Island in the central Ryu Kyu Archipelago. The species is new to the Ryu Kyu Islands, and the genus is new to the Japanese Archipelago.

SUBFAMILY CASSIDINÆ

TRIBE PRIOPTERINI

32. *HOPLIONOTA* SP.

Two specimens are in the collection from Luzon: one from Subig Bay, May 1, 1907, J. C. Thompson, the other from Alabang, June 11, 1930.

33. *CALOPEPLA LEAYANA INSULANA* Gressitt, 1938

A paratype is in the Van Dyke collection, taken at No-kyuchun, Hainan Island, March 22, 1936.

34. *PRIOPTERA ANGUSTA* Spaeth, 1914

One specimen, taken at Kuraru, Koshun, S. Formosa on June 10, 1932, is in the Van Dyke collection.

35. *PRIOPTERA CHINENSIS* (Fabr.), 1798

Several were collected at Hangchow, Chekiang, E. China, May 23, 1923, by Dr. Van Dyke.

36. *PRIOPTERA IMMACULATA* Wegener, 1881

One specimen was taken at Alabang, Luzon, P. I., June 11, 1930.

37. *PRIOPTERA MACULIPENNIS REDUCTA* Gressitt, 1938

One specimen collected by the writer at Ta-hian, C. Hainan Id., June 12, 1935, is in the Van Dyke collection.

38. *PRIOPTERA SINUATA* (Olivier), 1790?

A specimen was taken at Alabang, Luzon, P. I., June 11, 1930.

39. *PRIOPTERA WHITEI TRABEATA* Fairmaire, 1888

Mokan Shan, Chekiang; Cha-yuan, Chekiang.

40. *MEGAPYGA COERULEOMACULATA* Boheman, 1850

One example was collected at Alabang, Luzon, P. I., June 11, 1930.

41. *MEGAPYGA TERMINALIS* Boheman, 1862

One specimen from Alabang, Luzon, June 11, 1930, is in the collection.

TRIBE ASPIDOMORPHINI

42. *ASPIDOMORPHA DIFFORMIS* (Motsch.) 1860

Specimens were taken at Hangchow, Chekiang, E. China, May 19, and Weisohn, August 31, and Chin San, September 10, Manchuria, 1923, by Dr. E. C. Van Dyke; additional specimens were collected at Mokan Shan, Chekiang, September 9, 1927, by Mrs. Dora E. Wright.

43. *ASPIDOMORPHA DORSATA* (Fabr.), 1787

One specimen is in the Van Dyke collection, taken at Ta-hian, Hainan Id., June 17, 1935, by J. L. Gressitt.

44. *ASPIDOMORPHA FURCATA* (Thunb.) 1789

A few were taken at Riv de Quangtri, Annam, Indo-China, April 14-15, 1927, Mrs. Dora E. Wright; one was collected on Hong Kong Id. in October 1895; one at Kandy, Ceylon, by Albert Koebele; and another at Chung-kon, Hainan Id., July 19, 1935, J. L. Gressitt.

45. *ASPIDOMORPHA FUSCOPUNCTATA* Boheman, 1854

Riv de Tchepone, Annam; Subig Bay, Luzon; Liamui, Hainan Island.

46. *ASPIDOMORPHA INDICA* Boheman, 1854

One specimen was taken at Riv de Quangtri, April 14, and another at Hue, May 15, Annam, Indo-China, 1927, by Mrs. Dora E. Wright.

47. *ASPIDOMORPHA MILIARIS* (Fabr.), 1775

One example was taken at Riv de Hue, Annam, Indo-China, May 16, 1927, Dora E. Wright; another at Ta-hian, Hainan Id., June 19, 1935, Gressitt; six at Buitenzorg, Java, April 8, 1908, E. Cordier; four at Djirak, near Palembang, Sumatra, April 1929, G. W. Heid; three at Subig Bay, Luzon, May 1900, J. C. Thompson; and three at Manila.

48. *ASPIDOMORPHA SANCTÆ-CRUCIS* (Fabr.), 1792

One specimen is in the Academy labelled merely "India, Koebele collection"; two were taken on Hainan Id. by the writer: one at Tai-pin (Dwa-bi), July 22, and one at Liamui, August 1, 1935; three specimens, perhaps from Borneo, are from the Mjöberg collection.

49. *ASPIDOMORPHA SANCTÆ-CRUCIS FRATERNA* Baly, 1863

Two specimens were collected at Hue, Annam, Indo-China, May 15, 1927, by Mrs. Dora E. Wright.

50. *LACCOPTERA QUADRIMACULATA BOHEMANI* Weise, 1910

Specimens were taken at the following localities: Hangchow, Chekiang, May 23, 1923, E. C. Van Dyke; Mookan Shan, Chekiang, September 9-23, 1927, Dora E. Wright; Foochow, Fukien, 1926, C. R. Kellogg; Hong Kong, J. Koebele; Taipeh (Taihoku), Formosa, May 9, 1909, J. C. Thompson; Riv de Hue, Annam, Indo-China, March 16, 1927, Dora E. Wright.

51. *LACCOPTERA QUATUORDECIMNOTATA* Boheman, 1855

Two specimens were collected on Ceylon by Albert Koebele.

52. *LACCOPTERA TRIDECIMPUNCTATA* (Fabr.), 1801

Three specimens were taken at Subig Bay, Luzon, P. I., by Dr. J. C. Thompson, May 1907.

53. *LACCOPTERA VIGINTISEXNOTATA PUNCTICOLLIS* Gressitt, 1938

Six specimens were taken at Riv de Quangtri, Annam, May 3-5, 1927, by Mrs. Dora E. Wright.

TRIBE COPTOCYCLINI

54. *THLASPIDA JAPONICA* Spaeth, 1914

Specimens were taken at Hangchow, Chekiang, May 19, 1923, E. C. Van Dyke; Mogan Shan, Chekiang, August 20-September 23, 1927, Dora E. Wright; Kwanhsien, Szechuan, W. China, July 11, 1928; Nikko and Miyanoshita, Honshu, Japan, August 1895, Albert Koebele; Unzen Hot Springs, Kyushu, July 8-12, E. C. Van Dyke; Taipeh (Taihoku), Formosa, May 2-9, 1909 and Keelung (Kiirun), Formosa, April 21, 1909, J. C. Thompson.

55. *METRIONA CIRCUMDATA* (Herbst), 1799

Four were collected on Yakushima, south of Kyushu, Japan, April 1912, and several on Ishigaki Id., S. Ryu Kyu Is., May 1910, J. C. Thompson; one is labelled "Keelung, China, 1910, coll. by Victor Kuhne" (probably Kiirun, Formosa); several were taken at Swatow, S. China, and one on Hong Kong, by Albert Koebele; one at Riv de Tchepone, April 9, and one at Riv de Quangtri, April 14, Annam; three from Manila were presented by R. Hopping; and one was collected at Manila on February 19, 1929, by E. G. Linsley.

56. *METRIONA SIGILLATA* (Gorham), 1885

One was taken at Miyanoshita, Honshu, Japan, June 1, 1895, A. Koebele; another is labelled "Japan; Koebele"; and one was taken at Mogan Shan, Chekiang, E. China, September 24, 1927, Dora E. Wright.

57. *METRIONA THAIS* (Boheman), 1862

Several were collected at Hangchow, Chekiang, May 19-June 2, 1923, E. C. Van Dyke; and one at Mogan Shan, August 28, 1927, Dora E. Wright.

TRIBE CASSIDINI

58. *CASSIDA* (*DELOYALA*) *VESPERTINA* Boheman, 1862

Five were taken at Mokan Shan, Chekiang, August 25, September 24-28, 1927, Dora E. Wright; one at Hangchow, Chekiang, May 25, 1932, E. C. Van Dyke; and another at Kwanhsien, Szechuan, W. China, July 10, 1928.

59. *CASSIDA* (*CASSIDA*) *FUSCORUFA* Motsch., 1866

Several were taken at Nanking, April 30, May 4, June 2 and 25, and a few at Hangchow, May 19, 1923, by Dr. E. C. Van Dyke; one is labelled "Japan; Koebele".

60. *CASSIDA* (*CASSIDA*) *JAPANA* Baly, 1874

One example was collected at Nagasaki, Japan, July 6, 1923, by Dr. Van Dyke.

61. *CASSIDA* (*CASSIDA*) *LINEOLA* Creutzer, 1799

Several were taken at Moji, Kyushu, July 7, and Kyoto, July 16, Japan, 1923, E. C. Van Dyke; one at Harada, Kobe, Japan, June 13, 1911, J. E. A. Lewis; one at Tunglu, China, March 30, 1926, and two at Mokan Shan, Chekiang, September 16 and 28, 1927, Dora E. Wright.

62. *CASSIDA* (*CASSIDA*) *MONGOLICA* Boheman, 1854

One was collected at Tung-ko Forest Station, Kiangsu, China, June 11, 1923, E. C. Van Dyke.

63. *CASSIDA* (*CASSIDA*) *NEBULOSA* Linn., 1758

One specimen was taken at Otaru, Hokkaido, Japan, August 1910, J. C. Thompson, and another at Mukden, Manchuria, August 14, 1923, E. C. Van Dyke.

64. *CASSIDA* (*CASSIDA*) *OBTUSATA* Boheman, 1854

Three examples were collected on Hong Kong Id., October 1895, Albert Koebele; two were taken at Riv de Tchepone, Annam, April 9, 1927, Dora E. Wright; one is labelled "China, Koebele"; one was collected at Manila in February 1926; and one was taken at Alabang, Luzon, June 11, 1930.

65. *CASSIDA* (*CASSIDA*) *PIPERATA* Hope, 1842

A few were taken at Nanking, Kiangsu, May 4 and June 19, 1923, E. C. Van Dyke; one was taken at Kobe, Japan, in February 1909, J. C. Thompson.

66. *CASSIDA* (*CASSIDA*) *TRIANGULUM* (Weise), 1897

One example was taken at Riv de Quangtri, Annam, Indo-China, April 14, 1927, Dora E. Wright.

67. *CHIRIDA* *PUNCTATA* (Weber), 1801

Several specimens were collected at Riv de Tchepone, April 9, two at Riv de Quangtri, April 14, and one at Riv de Hue, March 16, 1927, Dora E. Wright. One was collected at Kota Tjane, Borneo(?), Mjöberg collection, W. W. Funge bequest.

68. *CHIRIDA* *SCALARIS* (Weber), 1801

A single specimen was collected at Riv de Hue, Annam, Indo-China, March 16, 1927, by Mrs. Dora E. Wright; two were taken at Djirak, near Palembang, Sumatra, April 1929, by G. W. Heid.

69. *HEBDOMECOSTA* *REITTERI* Spaeth, 1915

One specimen was collected at Hangchow, Chekiang Prov., E. China, May 19, 1923, by Dr. E. C. Van Dyke.

APHIDS ON SPIRÆA

(Homoptera, Aphididæ)

The fact that aphids may indirectly be the cause of much annoyance in the house was recently observed in the case of the green citrue aphid, *Aphis spiræcola* Patch on its native host, the bridal wreath shrub, *Spiræa*, which is commonly planted around houses in Los Angeles. Many species of flying insects are attracted to the honey dew, including the house fly, the stable fly, the green bottle fly, fruit fly and numerous others. It has been observed several times that if the bridal wreath shrub was not cared for, the inhabitants of the house suffered no little discomfort from these household pests.—N. Stahler.

THE PUGET SOUND ENTOMOLOGICAL SOCIETY

Entomological workers in western Washington gathered at the University of Washington, Seattle, on Friday, March 10, 1939, and organized The Puget Sound Entomological Society. The objectives of the society are to promote the study of insects, arachnids, and terrestrial arthropods in western Washington, and to promote the mutual welfare of the members through the exchange of ideas at meetings and field trips. Membership is open to persons of good character who are engaged in entomological activities. The society will hold two regular meetings annually, in February and October, the precise time and place to be determined by the Executive Committee which is composed of three elective officers. The present officers are: Professor Trevor Kincaid, University of Washington, president; Mr. S. E. Crumb, Entomologist, Bureau of Entomology and Plant Quarantine, vice-president, and Dr. E. P. Breakey, Entomologist, Western Washington Experiment Station, secretary-treasurer. Special meetings may be called by the Executive Committee at such time and place as it may determine.

The Organization of the Puget Sound Entomological Society was the result of a movement initiated in the fall of 1938 by Dr. Breakey. Thirty-two persons with entomological interests, both professional and hobby, gathered in Puyallup on November 18, 1938. Many spent the afternoon visiting the Western Washington Experiment Station, and the U. S. Bureau of Entomology and Plant Quarantine Field Stations in Puyallup and Sumner. In the evening the group gathered for dinner, after which a discussion was held on the desirability of forming a permanent organization. Dr. Breakey was elected provisional chairman and Mr. Charles F. Doucette, Bureau of Entomology and Plant Quarantine, Sumner, provisional secretary. The chairman appointed a committee on organization: Prof. Melville H. Hatch, University of Washington, chairman, to present a constitution and by-laws for discussion and approval at the next meeting. A nominating committee, Mr. W. W. Baker, Bureau of Entomology and Plant Quarantine, chairman, was also appointed.

The October meeting is to be held in Puyallup. A program is being formulated and some good papers are anticipated.—E. P. Breakey, Secretary-Treasurer.

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San Francisco, California

1939

THE PAN-PACIFIC ENTOMOLOGIST

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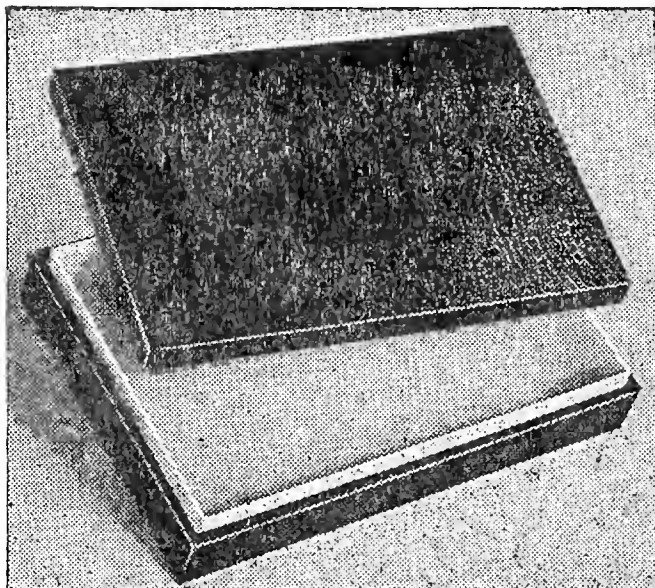
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NEW WESTERN EPHEMEROPTERA

BY VELMA KNOX MAYO

Goldfield, Nevada

During the spring and summer of 1938 I collected Mayflies in the Sierra Nevada of California, particularly in the Mother Lode region. All the material has not been completed for publication. The Ephemerella, which were found to be most common, are to be discussed in a subsequent paper along with several other new species.

Male imagos of *Callibaetis californicus* Banks were taken at Jackson, California, April 22, 1938. A male imago of *Siphonurus occidentalis* Eaton was taken from Dry Creek near Dry Town, California, May 30, 1938. *Rhithrogena flavianula* McDunnough, male and female imagos, were abundant on the Middle Fork of the Consumnes River in the Pi Pi Valley, Sierra Nevada (altitude 4000 ft.) on May 29, and June 5, 1938.

Among the new species collected, the following are here described: *Siphonurus maria*, n. sp., *Ameletus amator*, n. sp., and *Paraleptophlebia placeri*, n. sp.

I wish to acknowledge the kindness of Dr. James G. Needham of Cornell University in supplying paratypes of the western species in the Cornell collection. Dr. J. McDunnough, Chief, Division of Systematic Entomology, Ottawa, Canada, has contributed material and advice which have been indispensable in this work.

Siphonurus maria Mayo, new species

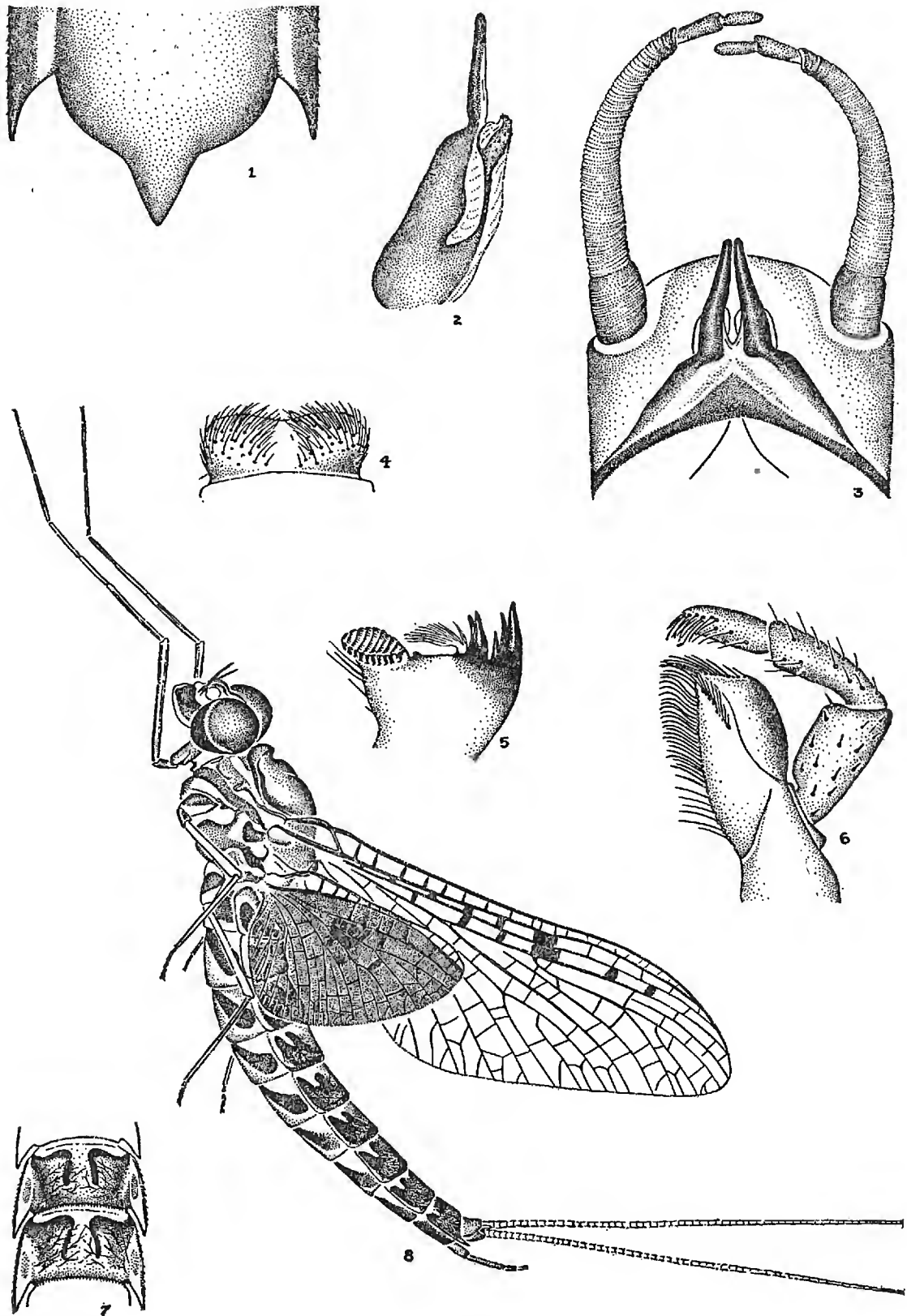
(Plate I)

Male (Figure 8). A dark, reddish-brown species. Head yellow with wide red-brown band across median carina. Basal segment of antenna light brown, pale apically. Ocelli milky white. Eyes with a white oblique band dividing the light brown portion above from the black portion below. Thorax brown; sutures tinged with olive green; posterior part of scutum yellowish near midline. Pleural sclerites reddish-brown, unsclerotized areas white. Prosternal sclerites tinged with pink; mesosternum reddish-brown; metasternum dark brown anteriorly, washed to olive. Fore legs shorter

than body, yellowish-brown. Anterior coxal sutures bright reddish-brown. Femora washed with light brown, fine dark spines along upper margins, joinings tinged with smoky gray; tibiae with heavier spines, lighter color toward apex; tarsi faintly tinged with light brown; fine black line at apex of tarsal segments. Middle and hind femora streaked with light reddish-brown, no spines; tibiae yellowish; tarsal segments tinged with light brown, the last segments darker. Wings as in figure 8. Hind wings coffee brown. Abdominal tergites brown, marked with dark tracheations. Segments one to seven light brown except for bright reddish-brown lateral triangles and sub-median spots which are connected to form a reddish-brown band on the posterior margin of each segment. Lateral margins and anterior triangles yellowish-white. Segments eight to ten darker; the lateral triangle on ninth segment blackish; postero-lateral spines present on tergite nine. Sternites pale yellowish-white except for the prominent reddish-brown oblique bands which are united anteriorly to form the usual U-shaped marks. Sternite nine dark reddish-brown except for small pale antero-lateral triangles. Forceps and forceps base purplish; forceps not angulate. Ventral lobes of penes smoky at tip; both lobes heavily sclerotized. Unsclerotized portions white, membranous (Figure 3). Distinct spines on dorsal lobes (Figure 2). Tails reddish-brown at base, white apically, joinings brown. Length: body 14 to 17 mm., tails 15 to 18 mm., wing 12 to 13 mm.

Female. Head yellowish; brown band across median carina. Median brown band between eyes; no oblique line across eyes as in male. Thorax as in male. Both wings with dark brown patch; in fore wing below bulla, in hind wing in radial space. Hind wing not darkened with amber as in male. Abdominal tergites more strikingly marked in female. In the living specimen the eggs give a fresh green tinge to segments one to seven. Reddish-brown lateral triangles and submedian spots as in male; on either side of mid-line are brown spots that become more prominent on tergites seven to ten, and appear as reddish-brown streaks on segments nine and ten. Segment nine with postero-lateral spines. Sternites as in male, with prominent reddish-brown U-shaped markings. Tails as in male. Sub-anal plate with a median spine (Figure 1). Length: body 15 to 20 mm., tails 15 to 20 mm., wing 14 to 17 mm.

Nymph. Mottled brown species. Thorax spotted, legs banded. Gills double on first two abdominal segments only. The pattern on tergites is bright reddish-brown (Figure 7). On fourth tergite a distinct white medial spot is conspicuous in the living specimen. Ventral pattern of the imago is prominent on sternites. The cast skin does not have the U-shaped marks, however. Mouthparts as in figures 4-6. Dark band across tails, slightly beyond middle. The male can readily be distinguished from the female by its smaller



Siphonurus maria Mayo, new species: Figure 1, sub-anal plate of female; 2, male genitalia, dorsal view showing two lobes of penis; 3, male genitalia; 4, labrum of nymph; 5, right mandible of nymph; 6, maxilla of nymph; 7, dorsal abdominal segments seven and eight of nymph; 8, male imago.

size and by the position of the eyes which almost touch medially. Length: body 16 to 20 mm.

Holotype, male imago (in alcohol), Jesus Maria Creek, Jesus Maria, California, May 26, 1938. Altitude 1800 ft. Reared from nymph. Allotype, female imago (in alcohol), same locality, May 29, 1938. Reared from nymph. Paratypes: four male imagos, Jesus Maria Creek, May 19, 1938; Dry Creek, near Dry Town, California, altitude 1500 ft., May 12, 22, 1938; nine female imagos, Jesus Maria Creek, May 24, 1938, and Dry Creek, May 7, 10, 18, 21, June 12, 1938. Also there were fourteen male subimagos taken as follows: Jesus Maria, May 10, 15, 22, 28, 1938; Dry Creek, May 11, 12, 14, 20, 22, 1938. Five female subimagos were taken from Dry Creek, May 7, 20, June 12, 1938.

Nymphal type, male (in alcohol), Dry Creek, near Dry Town, California, May 1, 1938; female (in alcohol), Dry Creek, May 30, 1938; nymphal paratypes, eighteen specimens, Jesus Maria Creek, Jesus Maria, California, April 6, May 10, 1938.

This species is related to *S. spectabilis* Traver in type of genitalia. However, the two species may readily be distinguished. *S. spectabilis* Traver is a pale species while *maria* is dark reddish brown. The wings of *maria* are more prominently speckled than those of *spectabilis* Traver. The dark brown hind wings in the male of *maria* are a distinct contrast to the pale hind wings in the male of *spectabilis* Traver. Moreover, *maria* has a prominent oblique band across the eye, whereas the eye of *spectabilis* Traver has no such oblique band. The forceps of *maria* are much longer than those of *spectabilis* Traver; the apical margin of forceps is not concave. Spines on the dorsal lobes of penes of *maria* are larger and more prominent than those of *spectabilis* Traver.

S. maria, n. sp., cannot be confused with a third western species, *S. occidentalis* Eaton. *Occidentalis* Eaton is a large, brown species, but has hyaline wings, no oblique band on eye, and a different type of genitalia.

Only two other species, *S. marshalli* Traver, and *S. mirus* Eaton have darkened hind wings in the male. Neither of these species has the prominent abdominal markings of *maria* nor is there a similarity in genitalic structure.

Ameletus amator Mayo, new species

(Plate II)

Male (Figure 12). Head dark brown; bases of antennæ white. Ocelli white, eyes greenish in living specimen. Pronotum blackish-brown laterally, lighter along midline. Mesonotum lighter; prescutum dark brown bordered anteriorly by unsclerotized areas of bright yellow. Scutum light reddish-brown tinged with olive along sutures. Scutellum bright yellow medially, blackish-brown laterally. Scutellum of metanotum distinctly yellow medially and blackish-brown laterally. Pleuron with striking color contrasts: episternum blackish; pleural trochantin light reddish-brown; some of unsclerotized areas tinged with rose; white around spiracles and wing base. Basisternal sclerite of prosternum blackish; cervical membrane distinctly white; furcisternum deep rose. Meso- and metasterna dark brown. Fore femur purplish brown; tibia and tarsus lighter brown. Middle and hind legs yellowish; femur and tarsal joinings tinged with light reddish brown. Wings speckled; longitudinal veins reddish brown; cross veins distinct and margined with smoky brown (Figure 12). First segment of abdomen dark brown laterally; medially and along posterior margin light brown with dark ganglionic markings; segments two to six yellow with postero-lateral triangles of reddish brown, these connected by reddish brown bands in the posterior half of each segment; with a small triangular marking on either side of midline which, on segments seven to ten, is extended as a brown line almost to the anterior margin. Segments seven to ten darker; lateral triangles blackish brown. Dark tracheations prominent on all tergites. Sternite one brown; two, lighter, with a patch on either side of midline. Sternites three to six semi-hyaline. On segment three the brown patches on either side of midline near anterior margin are very much smaller than on preceding segment, and on sternites four to six they gradually become indistinct and scarcely discernible. Sternites seven to nine bright reddish brown except for semi-hyaline triangular areas on anterior lateral margins. Sternite nine blackish laterally. Forceps and forceps base reddish brown with a purple tinge. Fourth segment of forceps very light. Penes light brown. Tails dark brown basally, light distally. Length: body 12 to 13 mm., wing 11 mm., tails 14 mm.

Female. More uniformly colored than male. Head brown with dark tracheations; white around bases of antennæ; blackish brown at bases of ocelli; pale yellow around eyes with reddish brown stripe at midline between them. Thorax lighter than that of male. Prothorax reddish brown with dark tracheations. Mesonotum light brown washed with olive along sutures. Prescutum dark brown bordered with bright yellow as in male. The rounded posterior humps on the scutum dark reddish brown bordered medi-

ally by light yellow. On either side of midline in this area is a red patch. Scutellum yellow with dark tracheations; laterally not as dark as in male. Fore legs brown; tibiæ and tarsi dark brown; middle and hind legs yellowish; femora washed with light reddish brown, with several dark tracheations; tibiæ yellow, tarsi light brown. Wings speckled but not as prominently as those of male. All abdominal segments reddish brown; first segment darker; lateral triangles and posterior borders of segments reddish; all segments with dark tracheations. Sternite one reddish brown, sternites two to six lighter brown and segments seven to nine dark reddish brown. Indistinct brown patches on either side of midline near anterior margin on segments two to six. Tails dark brown basally, whitish distally. Length: body 12 mm., wing 11 mm.

Nymph (Figure 9). The nymph has prominent dark reddish brown markings dorsally. The head and thorax mottled with brown. Legs washed with brown; not banded. Abdominal tergites marked as in figure 9. Sternites one to three pale; four and five marked with a wide, brown band extending almost to the lateral margins; anterior lateral triangles pale. Sternites six and seven pale except for prominent medial spots. Sternites eight and nine largely dark brown. Sternite eight with a prominent black ganglionic area. Tails with a wide, brown band medially. Length: body, male 10 mm., tails 5 mm.; female 13 mm., tails 6 mm.

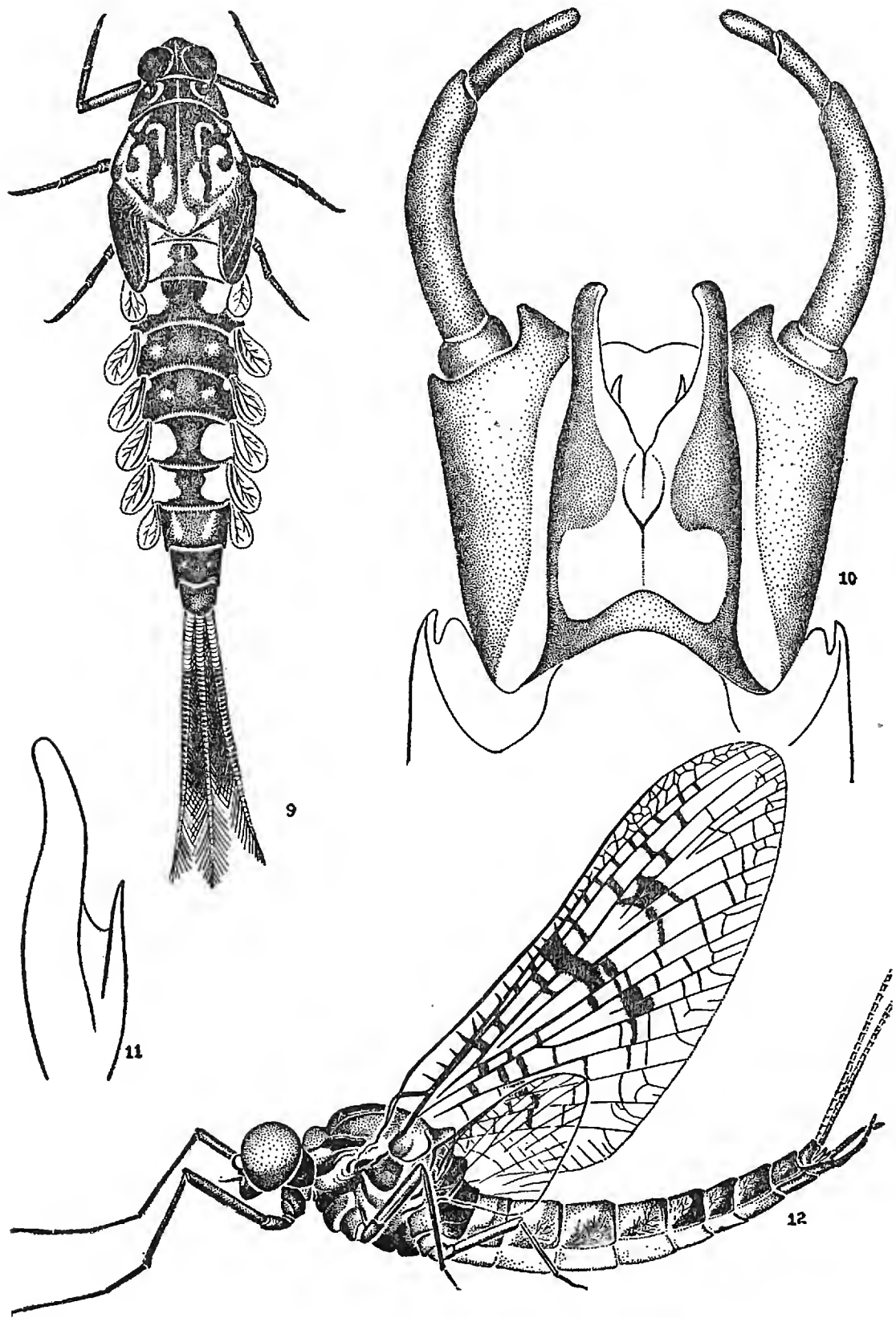
Holotype, male imago (in alcohol), Dry Creek near Dry Town, California, May 23, 1938. Reared from nymph. Allotype, female imago, same data as holotype.

Paratypes, six male imagos, Dry Creek, April 23, 1938, and May 3, 1938, and ten female imagos: Dry Creek, April 23, 1938; Dry Creek, May 5, 1938; Rancherea Creek near Amador, California May 7, 1938; American River, Sierra Nevada, altitude 4200 ft., July 26, 1938.

There were also forty-eight male subimagos and twenty-nine female subimagos taken from the same localities.

Nymphal type, male (in alcohol), Dry Creek, May 3, 1938, female same data as male, paratypes, six nymphs, Dry Creek, April 23, 1938. Cast skins from Jackson Creek, near Jackson, California, April 19, 1938; Rancherea Creek, May 5, 1938, and the American River, altitude 4200 ft., July 26, 1938.

This species is allied to *A. æquivocus* and *A. falsus* McDunnough. However, *amador* may readily be distinguished by the wings which are distinctly marked with dark patches (Figure 12). The wings of both *A. æquivocus* and *A. falsus* McD. are hyaline. *Amador* is considerably larger than either *A. æquivocus* or *A. falsus* McD. As in *æquivocus* McD., there are no dark



Ameletus amador Mayo, new species: Figure 9, mature nymph; 10, male genitalia; 11, lateral view of penis; 12, male imago.

ganglionic marks on sternites. The genitalia more nearly resemble those of *A. æquivocus* McD. but differ in structural details of the penes (Figure 10).

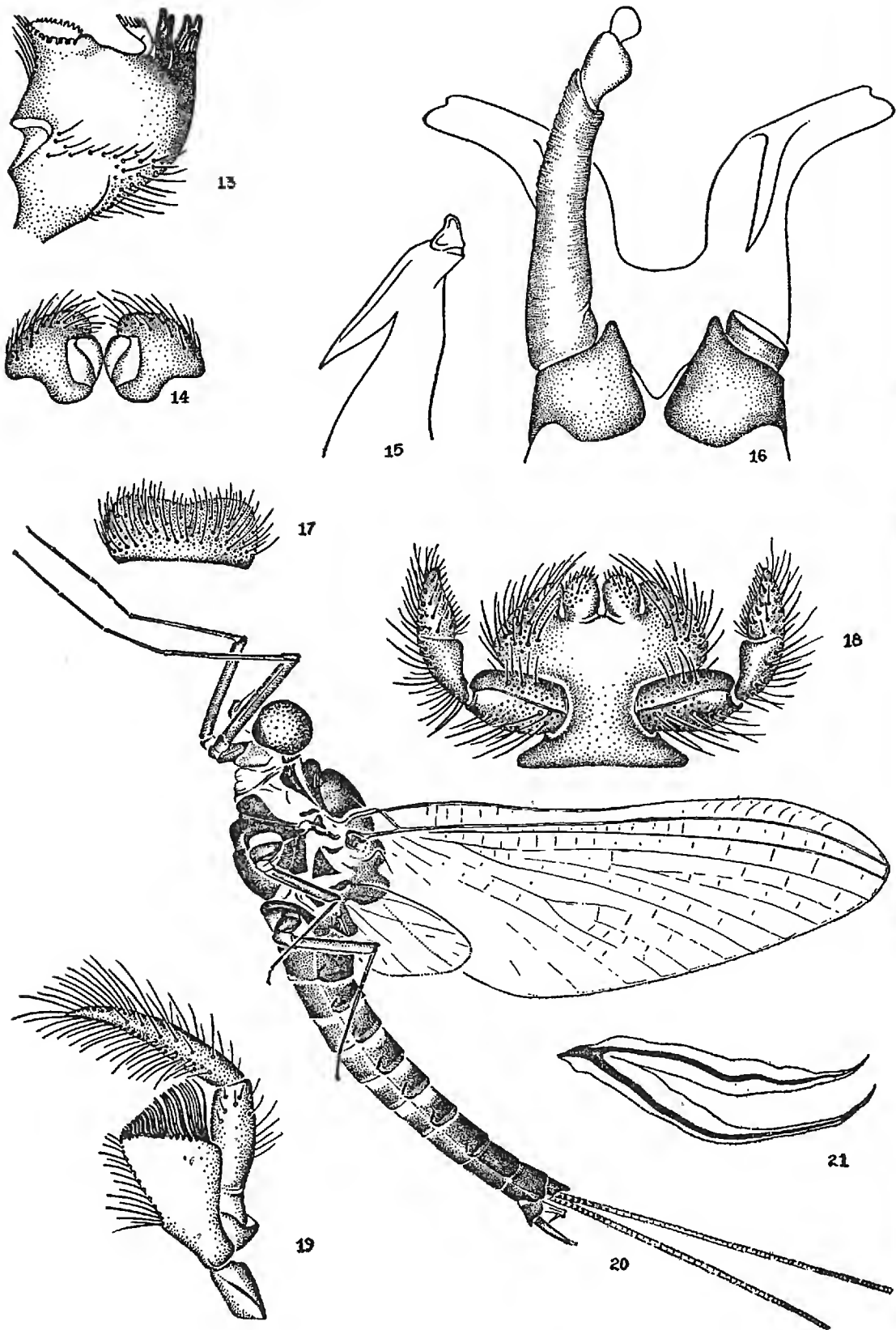
Paraleptophlebia placeri Mayo, new species

(Plate III)

Male (Figure 20). Blackish brown species. Head blackish; ocelli white, upper eyes light orange; base of antennæ yellowish brown. Median furrow and parapsidal grooves of mesoscutum deep; all thoracic sclerites blackish brown; unsclerotized areas reddish brown. Legs reddish brown at base, lighter apically. Femora deep reddish brown, fore tibiæ lighter, joinings smoky, tarsi whitish. Tibiæ of middle and hind legs washed with brown at base, whitish apically. Middle and hind tarsi tinged with light reddish brown. Wings slightly milky, particularly in stigmatic area. Longitudinal veins in costal area amber colored. Pleural wing recess dark brown. Segment one of abdomen reddish brown. Segments two to seven washed with deep brown, but distinctly semi-hyaline along anterior borders. Middle segments of abdomen therefore apparently annulate. Mid-dorsal line light brown with darker brown areas on either side. A fine black penciling along postero-lateral margins of tergites one to seven joins a distinct black oblique streak on pleural fold. Segments eight to ten dark reddish brown. Mid-ventral ganglionic areas marked with reddish brown. Basal joints of forceps reddish brown, distal joints whitish. The genitalia (figures 15-16) are somewhat similar to those of *P. californica* Traver, but there are marked differences. The penes are separated by a wide U-shaped notch. There are no projections from the penes into this notch as in *P. californica* Traver. The lateral apical processes are very long and a distinct contrast to those of *P. californica* Traver. The long reflex spur is wide at base and acute at tip. Tails light brown at base, whitish distally. Length: body 8 to 9 mm., wing 7.5 mm.

Female. More uniformly brown than male. Prothorax yellowish brown, darker laterally. Fine penciling along mid-dorsal line of pronotum. Mesoscutum reddish brown; not blackish as in male. Pleural sclerites reddish brown, unsclerotized areas yellowish brown. Legs yellowish brown. Wings slightly milky, venation more prominent than in male. Veins amber colored in costal area. All abdominal segments opaque, reddish brown. Light tracheations laterally on tergites. Tracheations surrounded by a brown granulated area which extends to the anterior margin of each tergite. As in male there is a fine black penciling along postero-lateral margins of tergites one to seven and an oblique streak on pleural fold. Tails brown at base, lighter distally. Length: body 8.5 mm., wing 8 mm.

Nymph. Brown species distinctly spotted on head, thorax and abdomen. Mouthparts as in figures 13, 14, 17-19. Lateral spines



Paraleptophlebia placeri Mayo, new species: Figure 13, right mandible of nymph; 14, hypopharynx of nymph; 15, male genitalia, reflex spur; 16, male genitalia; 17, labrum of nymph; 18, labium of nymph; 19, maxilla of nymph; 20, male imago; 21, gill of nymph.

on segments eight and nine. No branchlets on gill tracheæ (Figure 21). Legs banded with darker brown. Tails light brown. Length: body 8 to 10 mm.

Holotype, male imago (in alcohol), Dry Creek near Dry Town, California, May 12, 1938. Reared from nymph. Allotype, female imago (in alcohol), same data as holotype.

Paratypes, two male imagos, Jackson Creek near Jackson, California, May 21, 1938, and Amador Creek near Amador, California, May 28, 1938, reared from nymphs, and one female imago, Dry Creek, May 12, 1938, reared from nymph. Also one male subimago, Amador Creek, May 25, 1938; four female subimagos, Dry Creek, May 12, 1938; Amador Creek, May 29, 1938.

This species resembles *P. californicus* Traver, but may be distinguished chiefly by the annulated appearance of the abdomen, the milky wings, and the marked genitalic differences.

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AN ANCIENT BEETLE

Mr. Wayne K. Davis has recently presented me with a living specimen of *Buprestis aurulenta* L. which, with several others, emerged May 28, 1939, from a built-in sideboard on the premises of Mrs. Frank Cook, 1831 Tenth Avenue, Oakland, Calif. This sideboard was installed in the home when it was built over thirty years ago. Undoubtedly the eggs were laid some time previous to the milling of the wood and the building of the sideboard so that this beetle and its companions had spent a period of over thirty years before reaching maturity. I have known of several cases of retarded development for this same species, of from twelve to twenty years, but none quite so long as this.—Edwin C. Van Dyke.

NEW SPECIES OF ANDRENID BEES FROM CALIFORNIA

(Hymenoptera)

BY E. GORTON LINSLEY

University of California

The following descriptions, with one exception, are offered at this time in order that the names may be available for use by Messrs. G. E. Bohart and J. W. MacSwain in their studies of the habits of California Aculeata.

***Andrena nigroclypeata* Linsley, new species**

Female. Robust; black; pubescence dark brownish, that of dorsum of thorax and propodeum bright fulvous. Head dull; antennæ black, obscurely brownish beneath, first segment of flagellum nearly as long as the following three segments together; face rather densely clothed with erect brownish and black hairs; foveæ broadened above and occupying at least three-fourths of space between lateral ocellus and eye, moderately broadly rounded below and extending below level of base of clypeus; clypeus dull, moderately finely, closely punctured, without a smooth median impunctate line; process of labrum broad, polished, feebly transversely rugulose, about four times as broad as long, apex about one-half as wide as base, rotundate-truncate; cheeks rather broad, subangularly rounded, densely clothed with long black or brownish hairs; malar space small. Mesoscutum dull, tessellate, moderately finely punctured, densely clothed with long, erect, bright fulvous hairs which are a little thinner on disk; tegulæ reddish, finely punctate; mesoscutellum tessellate, punctation similar to that of mesoscutum, pubescence long, erect, fulvous, dense at sides, disk subglabrous or thinly pubescent; metanotum opaque, densely clothed with erect, fulvous hairs; propodeum dull, thinly clothed with long, fulvous hairs, triangular area poorly defined, not bounded by a carina, not rugulose or carinulate; mesepisterna opaque, thinly clothed with long, erect, dark brown hairs; wings lightly infuscated, veins dark brown; legs black, clothed with dark brownish and black hairs, tibial scopa dark brown, dense, moderately compact, flocculus of posterior trochanters moderately long, curved, nearly perfect. Abdomen black, tergites one to four shining, tessellate, obscurely punctured, thinly clothed with erect, black or dark brown hairs, apex with a distinct, impressed, shiny margin; fifth tergite opaque, distinctly but not closely punctured, apical fimbria dark brown; sternites shining, sparsely punctured and subglabrous at base, distinctly punctured apically and thinly clothed with erect black hairs, apical margin fringed with a row of very long, erect black hairs. Length: 12-13 mm.

Male. Slender; black, shining; pubescence thin, black, that of thorax mostly fulvous. Head much wider than thorax; pubescence of face long, erect, black, that of occiput and ventral surface fulvous; antennæ black, first segment of flagellum less than one and one-half times as long as second; frons dull, with a polished band along eye margin; clypeus large, black, polished, finely punctured, punctures one to several widths apart, pubescence sparse, erect, black, mostly basal; process of labrum smooth, polished, about twice as wide as long, apex at least one-half as wide as base, distinctly but shallowly notched; mandibles long, slender, lying one above the other in repose; cheeks nearly right-angular; malar space short. Thorax thinly clothed with long, erect, fulvous hairs, longest on metanotum; mesoscutum, scutellum, metanotum, and propodeum dull, tessellate, punctation obscure; propodeum with triangular area poorly defined, not bounded by a carina, neither rugulose nor carinulate; wings lightly infuscated, veins brownish; legs slender, thinly clothed with long, fulvous hairs, anterior trochanters without a finger-like process. Abdomen black, shining, tergites very finely, sparsely, obscurely punctured, sparsely clothed with short, suberect, black hairs; sternites sparsely clothed with short, suberect, black hairs, posterior margins with a fringe of longer, erect, fulvous hairs. Length: 10 mm.

Male minor. Clypeus smaller, dullish, finely and very densely punctured, pubescence very dense, uniform. Length: 9 mm.

Holotype male (No. 4847, Calif. Acad. Sci., Ent.), allotype female (No. 4848), and eleven paratypes, six male and five female, from Murietta Caves, Alameda County, California, April 2, 1939, collected by G. E. Bohart and J. W. MacSwain. The females were collecting pollen from *Platystemon californicus*. Four paratypes will be retained in the collection of the writer, the remainder returned to Messrs. Bohart and MacSwain.

This fine species is related to *Andrena macrocephala* Cockerell and *A. berberidis* Cockerell but the male is easily distinguished from both by the black clypeus and shorter first flagellar segment which is at most only one and one-third times as long as the second. The female differs from *macrocephala* in its slightly larger size, darker wings and wing veins, and the shape of the process of the labrum which is short and broad with the apex rotundate-truncate rather than subtriangular with the apex feebly tuberculate. From *berberidis* the female may be separated by the fulvous notal pubescence, the broader facial foveæ, more finely punctured clypeus, and the smooth triangular area of the propodeum (in *berberidis* there are a few basal rugæ). In the struc-

ture of the head and antennæ, these three species agree rather well with the group of *A. porterae* Cockerell (subgenus *Dactyl-andrena* Viereck), differing slightly in the longer facial foveæ and smaller malar space. However, in the type species of *Dactyl-andrena*, *A. maura* Viereck (= *A. caliginosa* Viereck), the malar space is large in the male and small in the female. The subgenus *Conandrena* Viereck was distinguished by the elongate face in the female and the absence of a finger-like process on the anterior trochanter of the male. In view of the variation in these characters between the three obviously closely related species, *porterae* Cockerell, *caliginosa* Viereck, and *submaura* Linsley, it is doubtful if *Conandrena* can be recognized on this basis.

Andrena rhodotricha Linsley, new species

Female. Moderately robust; brown; pubescence reddish. Head dull; vertex subglabrous; frons densely clothed with long, erect, reddish hairs, occasionally with an intermixture of dark hairs above antennal bases and along sides of face; antennæ dark brown, first segment of flagellum nearly as long as following three segments together; foveæ moderately wide, broadly rounded above and occupying at least two-thirds of distance between lateral ocelli and eye, moderately narrowly rounded below and extending slightly below level of base of clypeus; clypeus dullish, moderately coarsely, closely punctured, without a well defined, median, longitudinal, impunctate line; process of labrum small, subtriangular, apex feebly tuberculate; cheeks broad, subangularly rounded, densely clothed with long, erect, reddish hairs; malar space small but distinct. Mesoscutum dull, tessellate, moderately finely, obscurely, not closely punctate, moderately densely clothed with long, fine, erect, reddish hairs which do not obscure the surface; mesoscutellum and metanotum similarly sculptured and pubescent; propodeum sparsely hairy at base, otherwise moderately densely clothed with long, erect, reddish hairs which do not obscure the surface, punctation moderately fine, sparse, obscure, triangular area impunctate, finely tessellate, mid-line rough, base with a few short rugæ; mesepisterna dull, tessellate, moderately finely, obscurely, not closely punctured, moderately densely clothed with long, erect hairs which do not obscure the surface; wings lightly infuscated, veins dark brown; legs dark brown, clothed with reddish hairs, tibial scopa short, moderately dense, hairs of dorsal margin denser, less than one-half as long as greatest width of tibia, hairs of lower margin long, recurved; flocculus of posterior trochanters long, curved, nearly perfect. Abdomen brown, dullish, tessellate, tergites one to four moderately finely, sparsely, obscurely punctured except for a narrow, paler, impressed, apical

margin, surface moderately densely clothed with long, erect, reddish hairs which do not obscure the surface; apical fimbria composed of hairs of the same color as the remaining abdominal pubescence; sternites thinly clothed with erect, reddish hairs, those of fringe along apical margin very long. Length: 11-11.5 mm.

Male. Slender; very dark brown; pubescence thin, fulvohreous. Head wider than thorax; pubescence long, erect, fulvohreous with a few dark hairs at sides of face and vertex, very dense on frons and clypeus, sparse on vertex; antennæ very dark brown, first segment of flagellum about one and one-half times as long as second, second segment shorter than third; clypeus moderately finely, densely punctured except for an ill-defined median smooth line, surface nearly obscured by the dense pubescence; process of labrum short and very broad, apex obtusely rounded; mandibles moderately long, slender, apices distinctly crossing over in repose, base with a small median tubercle, posterior margin without a basal tooth; cheeks broad, nearly right-angular, densely clothed with long, erect hairs; malar space short but distinct. Thorax thinly clothed with long, erect, fulvohreous hairs, surface tessellate, obscurely punctate; propodeum with triangular area poorly defined, not bounded by a carina, without rugæ; wings lightly infuscated, veins dark brown; legs slender, thinly clothed with long, erect, fulvohreous hairs. Abdomen dark brown, tergites tessellate, shining, finely, sparsely, obscurely punctured, sparsely clothed with erect, fulvohreous hairs, longer and denser on first tergite; sternites sparsely clothed with erect, fulvohreous hairs, posterior margin with a fringe of longer hairs. Length: 11 mm.

Holotype female (No. 4816, Calif. Acad. Sci., Ent.) and allotype male (No. 4817), from Berkeley, California, March 14, 1939, G. E. Bohart and J. W. MacSwain collectors. One paratype female, Berkeley, California, March 11, 1939 (Bohart and MacSwain) is in the collection of the writer.

Andrena rhodotricha is closely related to *A. albihirta* (Ashmead) and may prove to be merely subspecifically distinct. It differs from Colorado specimens of the latter species (including a specimen in the Timberlake collection determined by Viereck) in the reddish rather than dirty white pubescence, less coarsely punctured clypeus, and brownish veins and stigma. The male of *albihirta* was not available for comparison, but from the related *A. perarmata* Cockerell, *rhodotricha* may be separated by the brown integument, fulvohreous pubescence, and absence of the basal tooth from the mandibles.

Andrena boharti Linsley, new species

Female. Medium sized, moderately robust; dark brown; pubescence fulvous. Head dull; antennæ dark brown, first segment of flagellum about as long as following two segments together; facial pubescence moderately long, fulvous, not dense; vertex opaque, subglabrous, minutely striate; foveæ moderate, broadly rounded above and occupying a little more than one-half of the distance between lateral ocelli and eye, more narrowly rounded below and extending below level of antennal bases but not quite to level of base of clypeus, lower half paler, in some lights appearing ochreous, upper half brownish; clypeus shining, rather coarsely, closely punctured on disk, finer laterally, median smooth line poorly defined; process of labrum suboblong, nearly twice as wide as long, apex about four-fifths as wide as base, feebly emarginate or subtruncate; cheeks broadly rounded, densely clothed with long, fulvous hairs; malar space obsolete. Mesoscutum feebly shining, tessellate, disk evidently but moderately finely punctured, punctures mostly less than two puncture widths apart, pubescence erect, moderately dense, fulvous, shorter than that of pleura, not obscuring surface; mesoscutellum shining, a little less closely punctured than mesoscutum, sparsely pubescent anteriorly; metanotum densely clothed with long, erect, fulvous hairs; propodeum opaque, tessellate, obscurely punctured, thinly clothed with long, erect, fulvous hairs, triangular area poorly defined, base with a few short rugæ; mesepisterna dull, tessellate, obscurely punctured, thinly clothed with long hairs; wings subhyaline, not darker apically, veins and stigma pale brown; legs moderately slender, clothed with fulvochreous hairs, tibial scopa moderately short, not dense, hairs of dorsal margin nearly erect, not as wide as tibiæ, those of ventral margin longer, recurved at apex, minutely plumose; flocculus of posterior trochanters moderately long, thin, curved, nearly perfect. Abdomen shining, tessellate, finely, obscurely punctured, punctures averaging several puncture widths apart, tergites one to four finely, sparsely pubescent, with thin pubescent fasciæ at apices of tergites two to four, broadly interrupted on tergite two, less broadly on three, narrowly on four; apical fimbria golden brown; sternites more closely and distinctly punctured than tergites. Length: 9 mm., anterior wing, 7 mm.

Male. Slender; dark brown, shining; pubescence of dorsal surface fulvochreous, that of ventral surface perceptibly paler. Head wider than thorax; pubescence of face long, erect, fulvochreous, intermixed with darker hairs near eye margins; antennæ dark brown, first segment of flagellum subequal in length to second segment, intermediate flagellar segments longer than broad; vertex and upper frons dull; clypeus shining, coarsely, closely punctured at middle, more finely toward sides, punctures less than one puncture width apart, pubescence long, pendant, dense but not

completely obscuring the surface; process of labrum about twice as wide as long, apex but little narrower than base, shallowly notched, lateral angles rounded; mandibles moderately long, slender, apices lying one above the other in repose; cheeks moderately narrow, rounded posteriorly; malar space obsolete. Thorax loosely clothed with long, erect, fulvohreous hairs, dorsal surface opaque, tessellate; propodeum with triangular area poorly defined, not rugulose or carinate; wings subhyaline, veins and stigma light brown; legs slender, thinly clothed with long, ochreous or fulvohreous hairs. Abdomen dark brown, shining; tergites one to four tessellate, obscurely, sparsely punctured, tergites two to four with a narrow pubescent fascia along posterior margin, broadly interrupted at middle on all three segments. Length: 9 mm., anterior wing, 7 mm.

Holotype female (No. 4814, Calif. Acad. Sci., Ent.), allotype male (No. 4815), and twenty-two paratypes collected at Berkeley, California, February 27, 1939, by G. E. Bohart and J. W. MacSwain. Most of the specimens were taken from their nests before emergence.

Superficially this species resembles a *Platandrena* but the form of the tibiae will exclude it from that group. The male suggests *A. (P.) angustitarsata* Viereck and *A. (P.) opaciventris* Cockerell, but may readily be distinguished by the coarsely punctured clypeus. The female differs from *A. scurra* Viereck, to which it seems to be related, in the short, broadly bilobed process of the labrum, bicolored facial foveæ, reddish pubescence, more finely sculptured area of the propodeum, etc. In comparison with the Coloradan *A. phocata* Cockerell, which has similarly bicolored foveæ and other characters in common, it may be distinguished by the more elongate first flagellar segment (longer than the following two segments together), bilobed process of the labrum, fuscous tinted wings, and color of pubescence and apical fimbria.

Andrena (Opandrena) sphæralceæ Linsley, new species

Female. Moderate sized, robust; black, abdomen red, legs reddish brown, posterior pair dominantly reddish or rufotestaceous; pubescence thin, white. Head black; antennæ dark brown, outer flagellar segments reddish beneath, first segment of flagellum nearly as long as following three together; vertex dull, frons obliquely striate on each side of median carina; foveæ broad, pale brownish, broadly rounded above and occupying most of distance between ocelli and eye, more narrowly rounded below and extend-

ing slightly below antennal bases; clypeus moderately shining, minutely tessellate, disk subglabrous, moderately coarsely, irregularly punctured, punctures smaller, closer laterally; process of labrum short, more than twice as wide as long, apex subtruncate; cheeks rather broad, rounded posteriorly, surface polished, finely, obscurely punctured, thinly clothed with long, white hairs; malar space obsolete. Mesoscutum tessellate, dull, disk slightly shiny; surface moderately finely, distinctly punctured, punctures mostly from one to three puncture widths apart, a little sparser posteriorly; pubescence thin, very sparse on disk; tegulæ reddish brown, minutely, sparsely punctured; mesoscutellum shining, punctures similar to those of mesoscutum but less close; metanotum clothed with long, erect, white hairs; propodeum, including triangular area, dull, triangular area poorly defined, without rugæ or carinæ; wings lightly tinted with yellow, veins and stigma pale yellowish brown; legs thinly clothed with white hairs, posterior femora rufo-testaceous, apex rufo-piceous, posterior tibiæ rufo-testaceous, base rufo-piceous, spurs pale, scopa thin, loose, hairs of dorsal margin about as wide as tibia, posterior metatarsi and tarsi mostly reddish brown, flocculus of posterior trochanters long, curved, white, thin. Abdomen red, shining; tergites finely but distinctly punctured, with a rather broad, nearly impunctate, depressed, apical margin; tergites two to four with a thin, white-pubescent fascia along apical margin, broadly interrupted at middle on tergites two and three, narrowly interrupted on four; apical fimbria whitish or golden depending on the light direction; sternites with apical fringes very long, depressed, white. Length: 8-9 mm.; anterior wing, 6-6.75 mm.

Male. Moderately robust; black, abdomen red basally; pubescence white. Head wider than thorax; facial quadrangle wider than long, clypeus yellow, without lateral face marks; pubescence of face long, white, sparse; frons and vertex opaque, finely tessellate, obscurely punctate; antennæ dark brown, moderately robust, first segment of flagellum a little longer than the following two together, intermediate flagellar segments but little longer than broad; clypeus subglabrous, obscurely, sparsely punctured; process of labrum scarcely more than a narrow, transverse ridge; mandibles long, slender, apices crossing over in repose, a small notch on inner side before apex; cheeks broad, almost right-angular, polished, finely, obscurely, sparsely punctured, thinly clothed with long, white hairs; malar space obsolete. Thorax thinly clothed with long, white hairs; mesoscutum tessellate, feebly shining, moderately finely, distinctly punctured, punctures mostly about two puncture widths apart, sparser and more irregular on posterior disk; mesoscutellum shining, irregularly punctured, subglabrous; metanotum dull, clothed with long, erect, pale hairs; propodeum dull, tessellate, basal and discal areas subglabrous, triangular area scarcely defined, without carinæ or rugæ; wings tinted with yellow, veins and stigma pale yellowish brown; legs

slender, dark brown, shining, thinly clothed with white hair, apex of posterior tibiæ rufo-testaceous. Abdomen with first three segments reddish, remaining segments dark brownish; apical pubescent fasciæ of tergites two to four similar to those of female but less evident. Length: 9 mm.; anterior wing, 6.5 mm.

Holotype female, allotype male, and three female paratypes (Timberlake collection), from Salt Creek, California, March 20, 1927, on *Sphæralcea ambigua*, collected by Mr. P. H. Timberlake. Eight additional paratypes are from the Chocolate Mountains, Riverside County, California, April 4, 1937, also on *Sphæralcea ambigua* (Linsley collection). Since this species was first collected by Mr. Timberlake who recognized it as new, I have selected the type and allotype from his material, and I have also used the name suggested by him for this beautiful species.

A NEW ARIZONA PRIOCERA, WITH A KEY TO SPECIES

(Coleoptera, Cleridæ)

BY MONT A. CAZIER

University of California, Berkeley

The author would like to express his thanks to Mr. P. C. Ting for notes obtained in the eastern United States, to Mr. E. S. Ross for the loan of the allotype and to Dr. E. C. Van Dyke for the use of his extensive library.

Priocera catalinæ Cazier, new species

Small, narrow, elongate; head and pronotum dark-red, elytra with basal half rufous, apical half piceous, quadrately overlapping medially, outer half of elytra piceous slightly anterior to middle, inner half rufous slightly posterior to middle, extreme posterior end of inner rufous projection yellow, small spot immediately anterior to piceous projection faintly yellow. Male. Head with front rugosely punctate laterally around eyes, sparsely clothed with rather long erect hair, occiput nearly impunctate, canthus prominent, convex; clypeus impressed, impunctate; labrum with anterior margin hairy, deeply emarginate medially; eyes separated by their own widths in front, sparsely pilose; terminal segment of labial palpi longer than basal segments, trigonate, inner edge one-half length of outer edge, upper edge widened and deeply excavated for entire length, surface rather densely pilose; antennæ rufous, eleven segmented, extending slightly beyond humeral umbone of elytra,

segments five to eleven wider than first four and shallowly serrate, segments one, three and four equal, second segment two-thirds of third. Pronotum one-half longer than wide, sides rounded and subparallel to basal third, then narrowly constricted to base, approximately one-third narrower than elytra, only slightly narrower than head (eyes included); disc sparsely punctate, punctures separated by three to four times own widths, sparsely pilose, anterior one-third with slight elevated area on either side, between and behind with short, median, narrow striation; sides rugose, sparsely pilose. Elytra narrow, about two-thirds longer than wide, sides parallel to apical sixth and then evenly rounded to apex; surface sparsely clothed with short golden pile interspersed with occasional longer golden hairs, punctures arranged in about nine even rows, extending from base to apical third and separated by about their own widths, each puncture elongate, parallel rows separated by about two and one-half times widths of punctures, apical third very minutely, sparsely punctate; scutellum small; humeral umbones impunctate, rather prominent. Beneath uniformly rufous except for piceous base on each tibia; femora clavate, those of front legs more so than middle or hind pairs, rather sparsely clothed with long and short golden pile, tibiae rugosely punctate, faint indication of longitudinal costæ basally, tarsal claws simple; abdominal segments sparsely clothed with short golden pile, apical segment evenly rounded. Length 5.5 mm., width 1.6 mm.

Female same as male except for larger size and the more bluntly rounded apical abdominal segment. Length 7 mm., width 2 mm.

Holotype, male, in the author's collection, taken at Soldiers Camp on the ridge extending south of Mt. Lemon, Santa Catalina Mountains, Arizona, June 30, 1936, by the author. Allotype, female, No. 4818, Calif. Acad. Sci., Ent., collected at the same locality July, 1936, by Mr. E. S. Ross who generously deposits it in the collection of the California Academy of Sciences.

From the eastern *P. castanea* Newn., *catalinæ* can be distinguished by its lack of the dark band at middle of elytra and the presence of the piceous color on the apical half of the elytra. *P. catalinæ* is probably most closely associated with the California *P. lecontei* Wolcott, but differs by being narrower and smaller, more sparsely pilose, by having elytral apices piceous rather than dull orange, and by having basal half of elytra rufous rather than piceous. *P. pusilla* Kby. does not appear

to be in our fauna and, judging from the brief description, is only remotely related to *catalinæ*. From the recently described *P. chiricahuæ* Knull, *catalinæ* can at once be distinguished by its small size, rufous basal half of elytra, lack of basal yellow spot, shorter hair on legs and venter of thorax and by not having a raised area in the middle of the pronotum in front of the scutellum.

There are several species of *Priocera* from Mexico that could possibly extend into our fauna but these are distinct from *catalinæ*, according to their descriptions, as follows: *P. trinotata* Klug has the lateral elytral striæ obliterated, there are pronounced rows of punctures in *catalinæ*, *trinotata* has a basal spot that is lacking in *catalinæ*; *P. pustulata* Spin. differs by having a small basal pale spot, and by having the apex of the elytra red rather than piceous; *P. stictica* Bates differs by being larger, having the eyes approximate, by having a pale basal spot and the elytral apex yellow; *P. clavipes* Bates appears to be about the same size as *catalinæ* but has the pronotum of a pale color, a dark but interrupted fascia in the middle of the elytra and a pale apical spot preceded by a narrow arcuate fascia.

A temporary key is here given to aid future workers in determining material and it is hoped that it will serve until such time as a more fundamental key can be constructed. The descriptions of members of this genus have been very inadequate in the past and have been, for the most part, descriptions of color and elytral maculations. In all the specimens examined by the author the markings appeared to be relatively constant but it is hoped that some future worker, with adequate material, will put the classification of this genus on a more stable basis.

KEY TO THE SPECIES OF PRIOCERA OF THE UNITED STATES

1. Elytra with a transverse, dark, median fascia.....*castanea*
- . Elytra without transverse, median, dark fascia..... 2
2. Elytral apices dull orange.....*lecontei*
- . Elytral apices piceous to dark brown, not differently colored than apical half of elytra..... 3
3. Basal half of elytra rufous, apical half piceous.....*catalinæ*
- . Elytra uniformly dark-brown except for three small yellow spots on basal half of elytra.....*chiricahuæ*

A NEW NORTH AMERICAN SPECIES OF ASTEIA¹

(Diptera, Asteiidæ)

BY CURTIS W. SABROSKY

Michigan State College

The small family Asteiidæ in North and South America is known at the present time from little more than a dozen seldom recorded species, most of which were described in the genus *Sigalæssa* Loew. The type genus *Asteia*, which includes about two dozen Old World species, has been known from the United States only since 1915 by a single described species, *Asteia beata* Aldrich². The strikingly distinct form described in the present paper adds another species to this small and uncommon genus.

Asteia multipunctata Sabrosky, new species

Slender, pale yellow species, strikingly marked with round, black spots on the ocellar tubercle, front, face, halteres and abdomen, and a variable pattern on the mesonotum.

Male. Head shining yellow, only the arista, the cephalic bristles, round spot encompassing the ocelli, and a pair of spots on the anterior third of the front, one above each antenna, black. Front shining, slightly wider than an eye (see figure). Occiput concave, a slightly infuscated spot below each pair of vertical bristles. Face moderately concave, receiving the pendant antennæ, the lower margin subrounded, projecting slightly between the vibrissæ. Eyes bare, the long axis oblique. Cheeks subequal in height to the third antennal segment and about one-fourth the vertical height of an eye. A few fine black hairs are set in punctures along the lower portion of the cheek. Vibrissal angle rounded, not produced. Oral opening longer than broad, with the prominent clypeus elongated and developed as a narrow projecting flange along the length of the opening. Palpi small, inconspicuous. Third antennal segment slightly longer than wide. Arista with four short, alternating rays on each side. Bristles long and strongly developed: one pair of inner and one of outer verticals, oral vibrissæ, and one pair of frontals, the latter erect and directed slightly outward and backward, situated close to the orbits and nearly midway on the front. One pair of proclinate divergent ocellars present, but short and

¹ Journal Article No. 359 (n.s.) from the Michigan Agricultural Experiment Station.

² Aldrich, J. M. 1915. New American species of *Asteia* and *Sigalæssa*. *Psyche*, XXII, pp. 94-98, 2 figs.

slender. A few short black hairs on the front and a longer erect black hair on each second antennal segment. A pair of short, almost indistinguishable hairs behind the ocelli and below the rim of the vertex, possibly representing the post-verticals. Thorax and scutellum yellow, the metanotum shining black and the mesonotum with variable black to reddish-black markings. Four pairs of spots and the supra-alar vittulæ black and distinct. The eight spots represent darkened areas in four indistinct mesonotal stripes (see figure). In some specimens (e. g., the holotype), the intervening areas are slightly darker, generally orange, making the stripes more evident. Only the spots are colored in paler specimens and the mesonotal striping is therefore indistinct. In either case, the posterior median spots are separate from the others. A narrow dark line extends along the lower margin of each humerus and notopleuron, and sometimes there is a slightly infuscated area on the sternopleuron. Thoracic bristles black, long: two pairs of posterior dorsocentrals, 1 + 1 notopleurals and one pair of apical scutellar bristles. One pair of short, pale subapical scutellar bristles present but very inconspicuous. Each sternopleuron bears two long, erect bristles which are easily overlooked because they are pale yellow and concolorous with the pleuron. A few pale, indistinct hairs are present on the thorax. Mesonotum distinctly longer than broad. Scutellum broad, much shorter than its basal width. Abdomen yellow, with a pattern similar to that described for *Asteia beata*. There appear to be three rows (a median and two lateral) of round black spots on the dorsum, each row composed of spots on segments two to five. There is also a spot on the lower side of segments three and four, not visible from above. Wings clear, veins yellow. The venation corresponds well with figure 3 on page 328 of Curran's manual of "The Families and Genera of North American Diptera," except that the third vein is nearly straight and the fourth vein is slightly more concave. Halteres yellow, the convex surface of the knob with a conspicuous oval black spot. Legs slender, pale yellow, with black claws. Length, 1.5-1.75 mm.

Female. The type series, though small, is sufficient to indicate a distinct sexual dimorphism in one character. In the males, the face is entirely yellow, whereas in the females, the face is marked with two round black spots which are subequal in size to the frontal spots, each situated below and partially hidden by the antennæ.

Holotype, male, Challis, Idaho, July 9, 1926 (R. W. Hægele; alt. 5280 feet). Allotype, Watson, Utah, July 27 (F. M. Carpenter; alt. 5300 feet). Paratypes: Male, same data as holotype; male, Whitehall, Montana, July 11, 1917 (H. G. Dyar); female, Kalispell, Montana, June 16, 1916 (W. H. Larrimer); male and female, Chama, New Mexico, July 18, 1929 (labeled

“*A. retroflexus*”); female, Antelope, Utah, July 1, 1931 (R. H. Beamer); female, Hope, B. C., Canada, August 1, 1931 (M. W. Sanderson). The allotype is in the Museum of Comparative Zoology, Harvard University, and the paratypes from Utah and British Columbia are in the Snow Entomological Collection at the University of Kansas. The holotype and the remaining paratypes are in the U. S. National Museum.

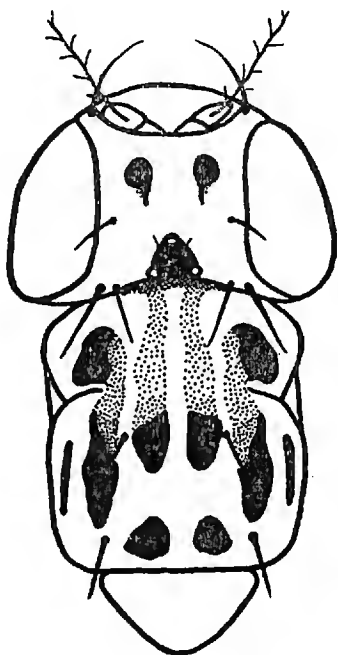


Fig. 1. Dorsal aspect of the head and thorax of *Asteia multipunctata* Sabrosky, new species.

The type series indicates a rather wide distribution (B. C. to N. Mex.) in the western United States, whereas *Asteia beata* Aldrich was described from Massachusetts and has since been recorded from Maine, New York, and Indiana. The latter is decidedly different in appearance, with shining black mesonotum, face with silver crossband margined above and below with black, and larger size.

The species appears to be similar to *A. elegantula* Zett., as described by Duda in his monograph of the Palæarctic Asteiidæ (Deutsch. Ent. Ztschr., Jahrgang 1927, pp. 113-147). *Elegantula* belongs to the group of species of *Asteia* which have the face crossed by a broad white band, narrowly margined above with black, whereas in *multipunctata* the face is entirely yellow in the males, and yellow with two round black spots in the females. Likewise, in *elegantula* the sternopleura and hypopleura are black spotted, and there are other differences.

A NEW SPECIES OF THRIPS FROM THE MOJAVE DESERT

BY STANLEY F. BAILEY

University of California, Davis

The discovery of another new species of *Dactuliothrips* makes it advisable to review the present status of the family *Melanthripidae*. Bagnall (1913a, and 1913b) created the sub-family *Melanothripinae* to include *Melanthrips* Haliday, 1836 and *Ankothrips* D. L. Crawford, 1910. In 1915 the same writer described the genus *Cranothrips* in this group. Later, in 1926, Bagnall raised this sub-family to the rank of a family including the three above-mentioned genera and the fossil genera *Eocranothrips* Bagn., *Opadothrips* Pr., and *Archankothrips* Pr. Again, in 1928 (see also Bagnall, 1930) Bagnall further elevated the *Melanthripidae* to the status of a super-family and wrote that "The genus *Opadothrips* Pr. (fossil), has had to be removed to the *Heterothripoidea*."

Two additional genera in the *Melanthrips* group were described in 1931, namely, *Dorythrips* Hood and *Dactuliothrips* Moulton. Therefore, at present, there are five non-fossil genera in the *Melanthripidae* as defined by Bagnall. Concerning *Dorythrips* Hood stated, "Its affinities are decidedly with *Melanthrips* Haliday, of which it is merely an elaboration." At the time Moulton described *Dactuliothrips spinosus* he erected a new family, *Dactuliothripidae*, for it and placed it in the super-family *Melanthripoidea*. It is true that *D. spinosus* does not have the dagger-like scoop (or flattened spurs) at the apex of the fore tibia as in *Melanthrips*, nor does it have the projected vertex as in *Dorythrips*, or basal antennal joints produced, as in *Cranothrips* and *Ankothrips*. However, in *D. spinosus*, as well as in *D. boharti* Bailey and *xerophilus* Bailey to a lesser extent (Bailey, 1937), there are two strong spines at the apex of the fore tibia. All other characters place these species in *Melanthripidae*. Now, with the discovery of *D. diversus* Bailey, new species, which has two very strong spurs at the tibial apex, though not flattened to the extent exhibited in *Melanthrips*, the affinities of these two genera are well established. It is interesting to note that in *diversus* the femoral spurs are lacking. This latter character apparently does not constitute a consistently good basis for generic separation. Therefore, it seems unnecessary to retain Moulton's family *Dactuliothripidae*.

With the small number of species so far described in *Dactuliothrips* it has not been necessary to use the chaetotaxy of the pronotum to separate species. In *Melanthrips* this character, together with the sensory areas on antennal segments III and IV, furnish a reliable basis for species differentiation (Priesner, 1936). A study of the genus *Ankothrips* (as yet unpublished) by the writer has shown that the sensoria of the antennæ, the chaetotaxy of the pronotum, together with shape of the projection of the vertex and the serrations on the second antennal segment, offer excellent specific characters. By way of further comparison, it should be mentioned that the antennal sensoria in *Dactuliothrips* show practically no variation. *Dorythrips* and *Cranothrips* are each represented by only one species, the former showing the development of a projection on the vertex, and the latter lacking the cephalic armature but exhibiting the antennal projection.

KEY TO THE FIVE KNOWN, NON-FOSSIL, GENERA OF MELANTHRIPIDÆ

- 1 (4) Antennæ with projections.
- 2 (3) Antennal segment I produced ventrally and apically as a tooth. Type of sensory areas on III and IV unknown. W. Australia.....*Cranothrips* Bagnall, 1915
- 3 (2) Antennal segment II produced ventrally and apically as a tooth. Sensory area on III and IV as a transverse area, varying in width, and partly or almost entirely encircling the segment near tip. South Africa, Europe, North America.
.....*Ankothrips* D. L. Crawford, 1909
- 4 (1) Antennæ without projections.
- 5 (6) Head with a cephalic projection on vertex between base of antennæ. Sensoria as a narrow, transverse area encircling segments III and IV near tip. Chile, South America.....
.....*Dorythrips* Hood, 1931
- 6 (5) Head without a cephalic projection.
- 7 (8) Fore tarsi without claws. Sensoria on antennal segments III and IV variable, usually as a narrow, angular line, nearly encircling the segments near tip; never as separate, oval areas. Europe, Africa, Spain, Mediterranean region.....
.....*Melanthrips* Haliday, 1836
- 8 (7) Fore tarsi with claws. Sensoria on antennal segments III and IV as two small, oval areas on each segment, near tip. W. North America.....*Dactuliothrips* Moulton, 1931

REVISED KEY TO THE SPECIES OF DACTULIOTHRIPS

- 1 (4) Spurs on inner margin of fore femora absent or weak; when present, one to four in number, usually one or two. Spines on body prominent but slender.

- 2 (3) Fore tibiae with two stout distal spurs (fig. 2); fore femora without spurs. Claw on fore tarsus with strong basal tooth (fig. 2). Antennae uniformly dark brown.....
.....*D. diversus* Bailey, n. sp.
- 3 (2) Fore tibiae without distal spurs; fore femora with 1 to 4 (usually 1 or 2) weak spurs on inner margin. Claw on fore tarsus simple or with a very weak tooth near base. Third and basal three-fourths of antennal segment IV yellow, remainder brown.....*D. xerophilus* Bailey
- 4 (1) Spurs on inner margin of fore femora strongly developed, two to nine in number. Spines on body dense and strongly developed.
- 5 (6) Claw on fore tarsus simple and knobbed. Fore femora with 4 to 9 spurs on inner margin. Antennae uniformly blackish-brown.....*D. boharti* Bailey
- 6 (5) Claw on fore tarsus with small tooth below tip. Fore femora with 2 to 5 spurs on inner margin. Antennae dark brown with third segment yellow.....*D. spinosus* Moulton

Dactuliothrips diversus Bailey, new species

Female: Color uniformly dark brown with faint red body pigment evident by transmitted light. Wings uniformly grayish brown with veins dark brown, including scale at base of fore wing. Hind wing nearly clear, fuscous, antennae and legs uniformly dark brown.

Head slightly longer than wide; narrowest at base. Cheeks very slightly curved. Eyes protruding slightly. Three ocelli. Head transversely reticulate on dorsum. Mouth cone short. Antennae slender, the two basal segments widest. Distinct annulations present on all antennal segments, faint on segment I. Two circular sensory areas on each of segments III and IV.

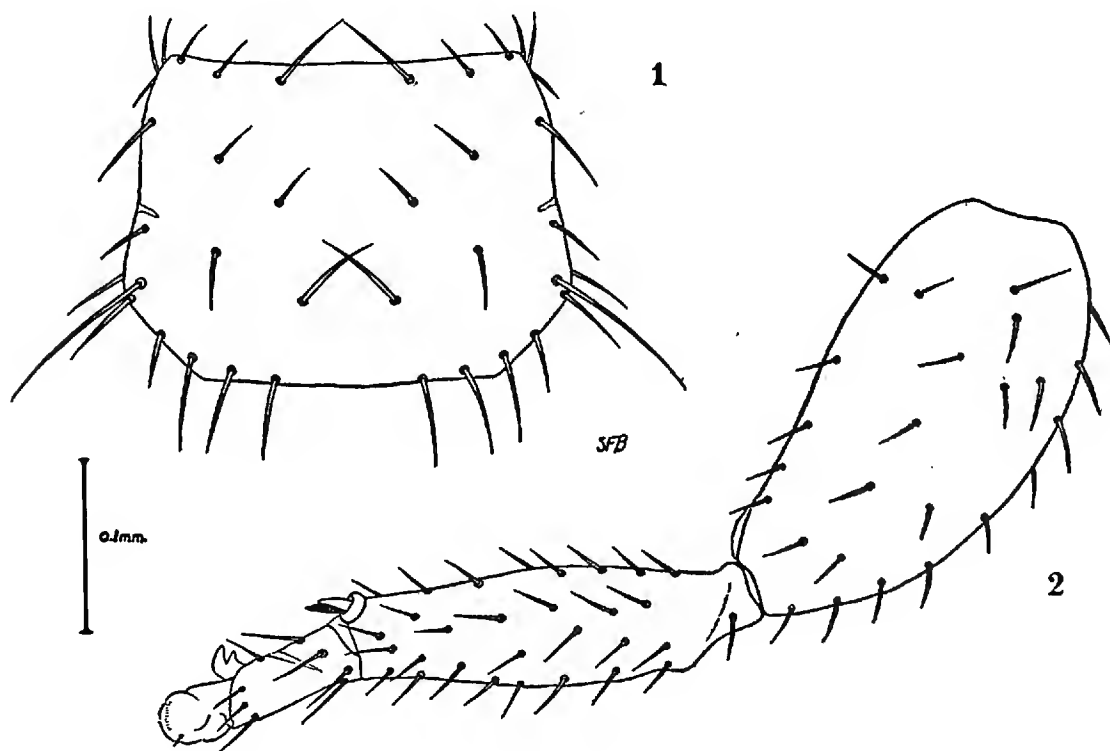
Prothorax (fig. 1) about one-third wider than long. Chaetotaxy of pronotum similar to *xerophilus*. Spines not as strongly developed as in *spinosus* and *boharti*. Legs irregularly covered with spines. Fore femora thickened and without spurs. Fore tibiae with two stout spurs at tip. Hind tibiae with several stout spines at tip. Fore tarsi with a strong claw which has a basal tooth reaching more than half the distance to tip of claw (fig. 2). Entire surface of both wings covered with very minute setae. Fore wing broadly rounded at tip and distinctly narrowing to base.

Fore wings with four cross veins placed as in other members of the genus. The number of regularly spaced bristles on fore vein of fore wing is from twenty to twenty-six and on the hind vein eighteen to twenty-four. Hind wing clear with a thickening on costal margin near base which supports a row of short bristles, the distal one being the longest.

Abdomen broadly ovate, tapering to tip. Dorsum of segments faintly reticulated.

Measurements of holotype: Total length of body 2.01 mm.; head, length, 0.20 mm., width, 0.18 mm.; prothorax, length, 0.18 mm., width, 0.24 mm.; mesothorax, width, 0.31 mm.; abdomen, greatest width, 0.46 mm. Length of antennal segments in mm.: I, 0.036; II, 0.049; III, 0.069; IV, 0.069; V, 0.056; VI, 0.052; VII, 0.049; VIII, 0.041; IX, 0.046; total length, 0.467. Length of spines: interocellar, 0.049 mm.; postocular (outer), 0.059 mm.; (median), 0.033 mm.; posterior-lateral marginals (pronotum), 0.092 mm.

Male: Smaller and more slender than female. Total body length of allotype 1.46 mm.



Dactuliothrips diversus Bailey, n. sp., fig. 1, pronotum, fig. 2, left fore leg (excluding coxa and trochanter).

Described from twenty-seven females and eight males collected by B. E. White on *Oenothera dentata parishii* at Hinkley (San Bernardino County), California, on April 15, 1938. Type locality, Hinkley, California. Female holotype (slide T 14) and male allotype (slide T 15) in author's collection. In addition to the type series, J. A. Downes collected two females and three males on *Oenothera contorta* and *Coreopsis*, on April 13, 1938, at Hi-Vista (near Lancaster), California.

This group of thrips appears to be limited to the desert area east of the Sierra and Siskiyou mountains. Assiduous collecting in the spring in this area, particularly in eastern Oregon and Washington and the desert areas of western North America will

doubtless bring to light additional species. The larvæ of *Dactuliothrips* are as yet unknown. Based on life history studies of other genera in the *Æolothripoidæ* in California, this genus has all the characteristics of the cocoon spinning species thus far reared. Also, there is probably only one generation a year, correlated with the blooming of the native flowers and shrubs.

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CALIFORNIA APHIDS OF THE GENUS PHORODON

BY W. W. SAMPSON

University of California, Berkeley

Genus PHORODON Passerini

Passerini, 1860, *Gli Afdi*, p. 27.

Head of alate forms with distinct antennal tubercles projecting somewhat inward; first antennal segment gibbous; fore wings with media twice-branched, hind wing with both media and cubitus; cornicles cylindrical; cauda nearly acutely conical, not as long as cornicles. Antennal tubercles in apterous forms with prominent projections extending forward; the first antennal segment with a projecting process. (All measurements in following descriptions in millimeters.)

KEY TO THE SPECIES OF PHORODON

1. Cornicles cylindrical throughout, not heavily imbricated.....2
- . Cornicles constricted before tips, heavily imbricated.....*phloxæ*
2. Spur of sixth antennal segment shorter than four times base
.....*humuli*
- . Spur of sixth antennal segment longer than four times
base*menthæ*

PHORODON HUMULI (Schrank)

Schrank, 1801, *Fauna Boica*, II:110 (*Aphis*).Swain, 1919, *Univ. Calif. Pub. Ent.*, III:79.Essig, 1926, *Insects of Western North America*, p. 254.

Apterous viviparous female. Light uniform yellowish green; cauda pale; cornicles and tibiæ dusky; antennæ dusky except base of third antennal segment. Frontal tubercles each with a finger-like process. Body 1.1 to 2.3 long; antennæ .95 to 1.05. Rostrum reaching between second and third coxæ.

Alate viviparous female. Light yellowish green, with dorsal dusky bands and lateral areas; rest of body coloration as above. Body 1.7; antennæ 1.68 to 1.85. Rostrum reaching the second coxæ. Hairs blunt on all forms.

Collections on *Prunus* species in winter and spring, on hop in summer. Rather common.

PHORODON MENTHÆ (Buckton)

Buckton, 1875, Monogr. Brit. Aphid., I:120 (*Siphonophora*).

Theobald, 1926, Aphid. Gr. Brit., I:278.

Bartholomew, 1931, Ann. Ent. Soc. Amer. XXV:727.

Apterous viviparous females. Yellow green to apple green, with darker mottlings. Cauda, cornicles, tibiæ pale; wing veins somewhat heavy. Body 1.4 to 1.7; antennæ 1.5 to 1.6. Rostrum reaching between second and third coxæ.

Alate viviparous females. Head and thorax brown; rest of coloration as above. Body length 1.5 to 1.6; antennæ 1.9 to 2.13. Rostrum reaching between second and third coxæ. Hairs blunt in both forms.

Collections on *Mentha* species, during most months of the year. Fairly common.

Phorodon phloxæ Sampson, new species

Alate viviparous female. Antennæ and head dusky; thorax black; abdomen and rest of body light apple green; dusky dorsal patches may be present on the abdomen. Tarsi and tips of the tibiæ black. Cornicles slightly yellowish to dusky, with orange patches at bases; swollen at about three-quarters the length and constricted before the tips. Wings clear, stigma dark, veins very heavy. Both cauda and cornicles may be dusky. Antennæ dusky except base of third segment. Tip of rostrum black. Hairs blunt to slightly capitate.

Length of body between 1.4 and 1.8; of antennal segments, I, .09, II, between .05 and .07, III, between .48 and .51, IV, between .30 and .34, V, .29 and .32, VI, between .74 and .80 (base, .15). Rostrum between .34 and .46 long, reaching to the tips of the second pair of coxæ. Wings between 2.47 and 2.86. Cornicles between .31 and .37; cauda between .15 and .17. Eleven to twenty secondary sensoria on antennal III, with an average of fifteen; none to six on antennal IV, generally none; none on the rest.

Apterous viviparous female. Body light apple green. Antennæ dusky to light apple green. Cauda dusky. Tips of cornicles black; a slight inflation followed by a constriction before the tips. Rest of coloration as in winged females.

Length of body between 1.5 and 1.79; of antennal segments, I, .09, II, .07, III, between .39 and .43, IV, between .26 and .27, V, between .54 and .58 (base, .12); rostrum between .36 and .48, reaching the extremities of the second pair of coxæ; cornicles between .32 and .44; cauda .17. No secondary sensoria on antennal segments. Hairs blunt to slightly capitate.

Specimens collected on the campus of the University of California from *Phlox subulata*, on March 8, 21, 23 and 28, 1938. Holotype, alate viviparous female, No. 4846, C.A.S., Ent. Paratypes, 41 slides in the collections of Professor E. O. Essig and the author.

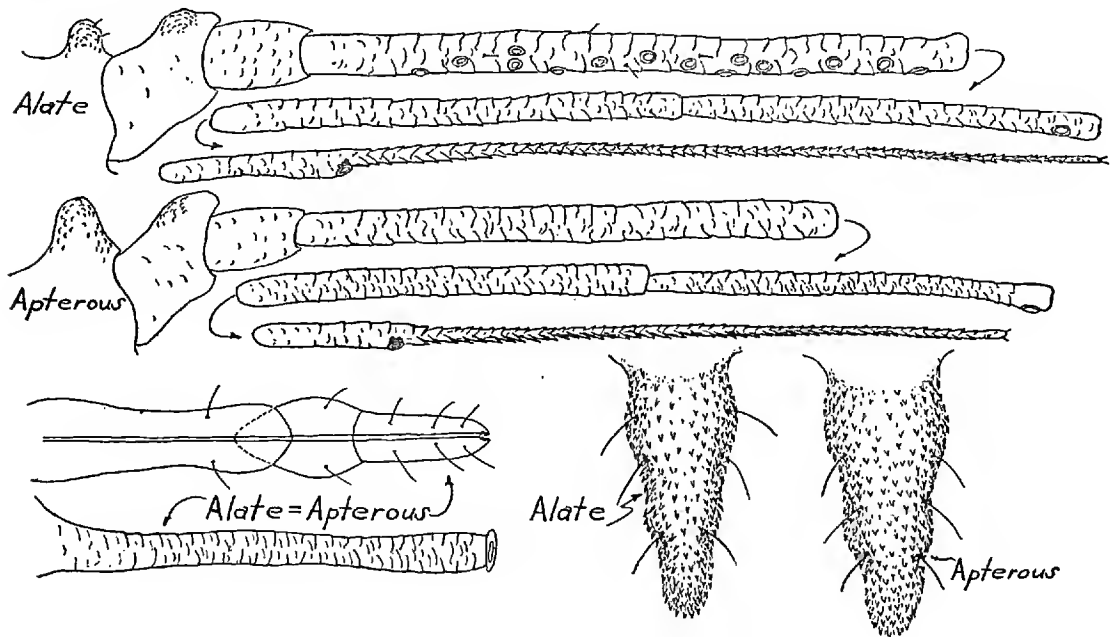


Fig. 1 *Phorodon phloxæ* Sampson

This species appears to be related in some degree to *Ph. menthæ*, from which it differs in having a smaller number of sensoria on the third and fourth antennal segments, in the shorter rostrum, and in the shape of the cornicles. The projecting process on antennal I is less strong in *Ph. phloxæ* than in *Ph. menthæ*; the projection of the frontal tubercles is also less strong.

A CONTRIBUTION TO THE KNOWLEDGE OF THE APHIDIDÆ OF NEVADA

BY E. A. DREWS

University of California, Berkeley

A review of the literature reveals but few references to the aphids of Nevada. It seems that the first paper on the aphids occurring in Nevada was of an economic nature (Hillman, 1890) wherein he recorded some species found on apple. In the present paper the few previously known species are listed together with their hosts and other data, and a number of new records from the writer's personal collecting, particularly from western Nevada, have been added. Genera and species are alphabetically arranged.

Judging from published records and personal observation it would appear that species of this family are less abundant in Nevada than in other states.

Aphis cardui Linn. Dayton, Nevada, May 31, 1938. Collected on thistle, mostly on the tip of the plant.

Aphis filifoliae Gillette and Palmer. Holbrook, Nevada, October 13, 1938. Taken on *Artemesia tridentata* sparingly. Attended by ants.

Aphis hilechrysi Kalt. Recorded from Nevada by Essig (p. 236 1926).

Aphis incognita Hottes and Frison. Holbrook, Nevada, August 1938. Taken on *Symphoricarpos rotundifolius*.

Aphis pomi DeGeer. Recorded from Nevada on apple as *Aphis mali* by Hillman (1890).

Aphis rosea (Baker). Recorded from Nevada on apple as *Aphis malifoliae* by Hillman (1890).

Amphorophora nervata (Gillette). Idlewild Park, Reno, Nevada, May 20, 1938. Abundant on cultivated rose. Taken later on wild rose, Holbrook, Nevada, May 31, 1938.

Brevicoryne brassicae Linn. Recorded on cabbage by Hillman (1897) as *Aphis brassicae*. Also collected by the author about 15 miles south of Yerington, Nevada, along the West Walker River, September 26, 1938, on *Cleome lutea*.

Capitophorus ribis (Linnaeus). Recorded on currant by Hillman (1897). Collected by the writer approximately 15 miles south of Yerington, Nevada, along the West Walker River, September 26, 1938, on *Ribis aureum*. Males present.

Capitophorus rosae (Linnaeus). Holbrook, Nevada. May 31, 1938. On wild rose.

Cinara edulis (Wilson). Taken near Gardnerville, Nevada, October 13, 1938. On one tree observed, eggs were so abundant upon the needles that the tree appeared black rather than green.

Clavigerus bicolor (Oestlund). Collected on willow at Holbrook, Nevada, May 31, 1938. Not common.

Clavigerus smithiae (Monell). Collected at Idlewild Park, Reno, Nevada, May 20, 1938. Not plentiful on the stems of willow.

- Eriosoma lanigerum* (Hausemann). Recorded from apple by Hillman (1890) (1892) as *Schizoneura lanigerum*. Also collected by the writer on the Highway Building Grounds, Carson City, Nevada, June 1938, on elm.
- Essigella californica* (Essig). Found near Minden, Nevada, June 1937, on pinon pine. Not common.
- Euceraphis gillettei* (Davidson). Collected at Spooner, Nevada, June 1938, on *Alnus* sp.
- Fullawaya saliciradicis* Essig. Found at Holbrook, Nevada, May 31, 1938, on the base of willow. Attended by a large red ant which placed a considerable quantity of soil, leaves and other material about the aphids, covering them completely. Insofar as is now known this is the third collection of this species, previous records being from Colorado. Apterous forms only.
- Lachnus rosæ* Cholodkovsky. Collected along the West Walker River near Yerington, Nevada, September 26, 1938. Abundant but very spotted in distribution on wild rose.
- Lachnus salignus* (Gmelin). Collected at Wellington, Nevada, along the West Walker River, September 26, 1938, on *Salix* sp.
- Macrosiphum atripes* Gillette and Palmer. Taken at Holbrook, Nevada, October 13, 1938, on *Aster canescens*.
- Macrosiphum creelii* Davis. Recorded from Lovelock and Fernley, Nevada, by Davis (1914). Host: Alfalfa.
- Macrosiphum pisi* (Kaltenbach). Recorded from Minden and Fallon, Nevada, as *Illinois pisi* by the Nevada Agricultural Experiment Station (1934). On alfalfa.
- Macrosiphum rosæ* (Linn.). Recorded by Hillman (1897) as *Aphis* sp. on rose. This is undoubtedly the species Hillman meant from the description he gave. Also collected by the writer at Idlewild Park, Reno, Nevada, May 20, 1938, on cultivated roses and at Holbrook, Nevada, May 31, 1938, on wild rose.
- Macrosiphum solanifolii* (Ashmead). Collected at Holbrook, Nevada, May 31, 1938. Abundant on the tips of nettle. Also collected sparingly on Honey Locust, Carson City, Nevada, June 1938.

- Mordwilkoja vagabunda* (Walsh). Recorded from Nevada by Essig (p. 259, 1926). Hosts listed are poplar, aspen and cottonwood.
- Myzocallis ulmifolii* (Monell). Taken on the grounds of the old U. S. Mint Building, Carson City, Nevada, June 1938. Very abundant on Elm.
- Myzus cerasi* (Fabricius). Recorded from Nevada by Essig (p. 251, 1926), on Sweet Cherry.
- Myzus persicæ* (Sulzer). Taken near Yerington, Nevada, September 26, 1938, on *Cleome lutea*.
- Pemphigus populi-transversus* Riley. Recorded by Hillman (1897) as *Pemphigus* sp. on poplar. Collected by the writer along U. S. Highway 50, Lake Tahoe, Nevada, July 1937, and at Lake Topaz, Nevada, June 1938, on poplar.
- Rhopalosiphum prunifoliæ* (Fitch). Recorded from Nevada on apple by Hillman (1897) as *Aphis prunifoliæ*. Collected by the author in Idlewild Park, Reno, Nevada, May 20, 1938, on the same host.
- Tamalia coweni* (Cockerell). Recorded from Nevada by Essig (p. 231, 1926), on manzanita.
- Toxoptera graminum* (Rondani). Recorded from eastern central Nevada by Webster and Phillips (1912) on wheat.

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TWO NEW SPECIES OF ACMÆODERA FROM CALIFORNIA

(Coleoptera, Buprestidæ)

BY P. H. TIMBERLAKE

*University of California, Citrus Experiment Station, Riverside**Acmaeodera perlanosa* Timberlake, new species

A member of the trisinate group, closely allied to *A. fenyesi* Fall, but differing in being usually immaculate and in having a denser and longer, almost entirely dull white woolly pubescence.

Moderately robust, subdepressed, black, rather feebly bronzed. Pronotum and elytra immaculate. Clothed above and beneath with unusually long, dense, somewhat curly, dull white hair, with only a few fuscous hairs intermixed at the base of elytra, on anterior part of pronotum and on the frons. Head closely punctured, the carina on vertex feeble. Clypeal margin weakly emarginate. Antennæ serrate beginning with the fifth joint. Pronotum about twice as wide as long, subtruncate at apex. Sides slightly converging from base to middle, then rounded to apex (not subdilated before the base, as is often the case in *fenyesi*). Apical angles subacute. Side margins distinct throughout, but not visible from above. Disk weakly impressed medially, moderately impressed on each side, the lateral impressions sometimes ending in a weak fovea near base. Punctures of pronotum moderately fine and close on middle of disk, becoming dense and coarser at the sides. (Puncturation on middle of disk a little closer and finer than in *fenyesi*). Elytra subdepressed, as wide at base as prothorax. Sides of elytra feebly converging from base for two-thirds of the length, then more rapidly and arcuately to the rounded apex. Lateral margins of apical half rather finely serrate. Umbone moderate. Striæ, punctures and intervals of elytra as in *fenyesi*. Under surface moderately closely, rather finely punctured like *fenyesi*, the punctures becoming much coarser on sides of the first ventrite toward the base. Under surface of pronotum coarsely punctured. Anterior margin of prosternum with two distinct blunt cusps. Crest of last ventrite rounded or subangulate. Length, 9-9.5 mm., width, 3.5-3.7 mm.

Holotype male and three paratypes (sex uncertain), taken on *Eriodictyon crassifolium*, Andreas Canyon, near Palm Springs, California, April 24, 1932 (Timberlake), in collection of the

Citrus Experiment Station; two paratypes in collection of the California Academy of Sciences, one from Paraiso Springs, California, May 15, 1912 (L. S. Slevin), the other from Palm Springs, in April (A. Fenyés). Also twenty-seven paratypes from Sunset Valley, Santa Barbara County, on *Eriodictyon traskiæ*, July 4, 1938 (B. E. White), in the collection of Mr. White.

The paratype from Paraiso Springs has the punctures of the pronotum like *fenyesi*, and the Fenyés specimen from Palm Springs has three marginal reddish dots on each elytron.

ACMÆODERA FENYESI Fall

This species is moderately common at Riverside and is found most frequently on *Lotus scoparius*, which I presume may be the food plant.

ACMÆODERA JOCOSA Fall

A. jocosa is one of the rarer species of Southern California. Personally I have taken only three specimens, at Lytle Creek Wash and near Devore, San Bernardino County, June 6 and 23, at flowers of *Adenostoma fasciculatum*. These have been compared with the series in the Academy collection at San Francisco. In rearranging my collection I noted these unexpected characters in *jocosa*: Under surface of thorax and abdomen with long, dense, white hairs, fully as conspicuous as in *A. fenyesi*. Antennæ widened beginning with the fourth joint. In the male the fourth joint is triangularly widened from the base, being fully twice as wide as the third joint, but hardly more than two-thirds as wide as the fifth, which like the following joints is strongly serrate. The surface of the dilated joints is dull and very minutely and densely punctulate. In the female the antennæ are much less dilated and serrate, with the surface of the joints rather shiny and not distinctly punctulate. The fourth joint widens toward the apex, where it is distinctly wider than the third, but considerably narrower than the fifth. The antennæ of *jocosa* are remarkably similar to those of *A. cribricollis* Horn and *A. larreæ* Fall, and the occurrence of such a structure in a member of the trisinate group is decidedly novel.

Acmaeodera palmarum Timberlake, new species

This is a small, densely squamose species, allied to *A. gemina* Horn and *A. insignis* Horn in general structure, but having the antennæ abruptly widened after the fourth joint. From other more or less squamose species, with similar antennæ, such as *A. varipilis* Van Dyke and *A. junki* Thery (*squamosa* Van Dyke), it differs in the very small size, weakly emarginate clypeus and entire lack of side margins on the prothorax. Only the male is known, and the female possibly may have the long silky hair on terminal segments of venter as in *junki*. This, however, may not prove to be the case, as the difference in general structure and in the type of squamiform pubescence may indicate that it belongs in a little group of its own.

Male. Small, subcylindrical, with the general form and structure of *gemina*. Head, prothorax and under surface bronzed black. Elytra a light testaceous yellow tinged with brown (pale tan color), agreeing with the light color in *gemina*. Umbones dark, slightly bronzed. Outer margin of elytra very narrowly darkened, especially in apical half, with brown or blackish. Elytra otherwise immaculate, although the brown shading is slightly intensified in certain small areas. Head closely punctured, the sculpture concealed by pubescence. Anterior margin of clypeus broadly arcuate, very weakly emarginate. Antennæ serrate beginning with the fifth joint. Pronotum not quite twice as wide as long, strongly convex and unicolorous. Apex barely narrower than the subtruncate base, with the anterior margin broadly arcuate and produced moderately in middle over head. Disk widest somewhat behind the middle, the sides being strongly arcuate. Both anterior and posterior corners broadly rounded, and side margins entirely obliterated. Surface shining, entirely without median impression or lateral foveæ and coarsely punctured, the punctures dense at sides, slightly separated in middle, and not at all cribrate. Elytra at humeri slightly narrower than widest part of thorax, narrowed between humeri and middle, and arcuately narrowed in apical third to rounded apex. Margins finely serrate behind the middle and more coarsely at apex. Surface very convex, the lateral margins visible only apically in dorsal view. Striæ all similar, hardly impressed, very coarsely punctured, the punctures mostly about one-half their diameter apart (some contiguous, others fully a diameter apart, the contiguous ones mostly in the fifth and sixth striæ). Intervals all very narrow, slightly convex, uniseriately and minutely punctate. Anterior margin of prosternum arcuately retracted, practically as in *gemina*. Apical

segment of venter simple at apex. Sculpture of under surface almost entirely concealed by the dense squamiform pubescence, but is about as follows as seen through slight abrasions: Prosternum and under surface of pronotum coarsely punctured. First ventrite rather coarsely and closely punctured, the following segments apparently very finely and densely punctured. Pubescence white, squamiform, appressed and very dense on entire under surface and on femora, frons and sides of the pronotum broadly. Squamæ about as broad as long, except on the frons where they are considerably longer than wide. Squamæ on the sides of pronotum and in a narrow strip across basal margin are broad, otherwise they gradually change into coarse flattened appressed setæ, which cover the middle half of disk, those on sides being directed inward. Setæ of elytra all set in the fine punctures of the intervals, in the form of scales considerably longer than wide, not appressed, but bent over from the base and directed backward, those on and near the umbones becoming broader and appressed. Length, 4.5 mm., width, 1.4 mm.

Described from one male (holotype) in collection of the Citrus Experiment Station, taken June 8, 1930, five miles south of Palm Springs, California (Timberlake).

The specimen was found on *Dicoria canescens*, but as the day was extremely hot it may have been merely resting in the shade, along with many Hymenoptera and other kinds of insects.

ACMÆODERA INSIGNIS Horn

I have one specimen of this species collected June 8, 1930, six miles south of Palm Springs, California. It was swept from *Eriogonum trichopes*. *Insignis* was described from Lower California and has been recorded from Arizona, but this is, I believe, the first definite record from California.

PACHYBRACHYS HYBRIDUS SUFFR. AS A PEST OF HEATHER

(Coleoptera, Chrysomelidæ)

Specimens of *Pachybrachys hybridus* Suffr. identified by Mr. B. E. White were collected at San Carlos, California, on May 30, 1939, where they were observed doing serious damage to the growing tips of young heather plants. Many of the tender tips had been eaten half way through and had wilted or fallen over.—P. C. Ting.

A NEW ANGITIA, PARASITIC ON THE ARTICHOKE PLUME-MOTH

(Hymenoptera, Ichneumonidæ)

BY R. A. CUSHMAN

*U. S. Department of Agriculture, Bureau of Entomology
and Plant Quarantine.*

The following description is published at this time in order to make the name available for a projected paper on the host insect, an important pest of artichoke, *Cirsium edule*, in California.

Angitia platyptiliæ Cushman, new species

Distinguished at once from *Angitia pterophori* (Ashm.), another western species parasitic on pterophorid larvæ, by its much broader temples, black front and middle coxæ, and almost entirely ferruginous, exannulate hind tibia.

Female. Length 7.0 mm., antenna 4.5 mm., ovipositor sheath 2.0 mm.

Head very finely punctate and mat, in dorsal view transversely suboblong, about twice as broad as greatest thickness; temples extending straight back for most of their length; occiput rather deeply concave; eyes not bulging, parallel and only very faintly emarginate within; face twice as broad as long; clypeus shining, more sparsely and coarsely punctate than face, and more definitely separated from face than usual, with faint indication of a median tooth; malar space nearly as long as basal width of mandible; antenna with about 30 joints, flagellum rather stout, tapering toward apex, basal joint about three times as long as thick, apical ten or more joints submoniliform, each about as thick as long. Thorax stout, fully two-thirds as deep as long, with dense, short pubescence, mostly finely alutaceous and mat; pronotum longitudinally striate in impression; mesoscutum very finely punctate, notaulices faintly indicated; scutellum shining, sparsely punctate; pleura more coarsely punctate and more shining than mesoscutum, speculum polished, sternalix indicated, set off laterally by a slightly elevated, more shining area next to prepectus; sternum subpolished; propodeum punctate basally and laterally, petiolar area transversely rugulose, all the usual carinæ except basal very strong, costulæ more or less evident, areola broadly pentagonal, petiolar area weakly concave. Legs rather stout; inner hind calcarium more than half as long as basitarsus, which is about as long as combined lengths of joints two to four, claws pectinate basally. Wings: Areolet small, oblique, petiolate, postnervulus

broken at about middle; abscissula as long as intercubitella. Abdomen slender, minutely alutaceous and mat; petiolar fossæ distinct though not very deep; tergite two nearly twice as long as its basal width; ovipositor strongly recurved, sheath fully a half longer than first tergite.

Black, this color embracing antennæ, all coxæ, and basal joints of middle and hind trochanters; mandibles, palpi, and legs ferruginous, extreme apex of hind tibia, hind tarsus largely, and other tarsi apically fuscous; tegulæ yellow; wings hyaline, stigma fuscous, veins black, costa pale.

Male. Essentially like female.

Host. *Platyptilia carduidactyla* (Riley).

Type locality. Half Moon Bay, California.

Holotype, allotype, and paratypes, No. 53340, U. S. National Museum and paratypes, California Academy of Sciences and Canadian National Collection.

Described from 19 females and 15 males, all reared by W. Harry Lange. The holotype, allotype, and eight paratypes emerged November 2, 1936; other specimens from the type locality were reared at various dates in December, 1935; August, September, and October, 1936; and May, 1937; while others from Pescadera, Princeton, and Santa Cruz, Calif., were reared in June and July, 1936.

The only variation of note is in size (5-7 mm.) and in the strength of the costulæ.

I have been unable to identify this species as any of those included by Viereck in *Angitia* or in any of the closely related genera or subgenera. That author's "A Preliminary Revision of the Campopleginæ in the Canadian National Collection, Ottawa," which appeared serially in the Canadian Entomologist during the years 1925 and 1926, fell far short of clarifying the group of which it treats. Many of the characters that he used in keying out the genera and subgenera are not dependable, and in some cases Viereck himself did not follow them in placing species. For example, several of the species which he correctly placed in *Angitia* will not run to that subgenus in his key because the second abscissa of the discoidal vein is fully as long as the third; while he placed his own *Idechthis pænerivalis*, an *Angitia* with distinct petiolar fossæ, in *Ischnoscopus*, in which, according to his key, the fossæ are lacking. The last statement is based on my own examination of the type of *pænerivalis*.

ANGITIA PÆNERIVALIS (Viereck) Cushman, new combination

Idechthis pænerivalis Viereck, 1906. Trans. Am. Ent. Soc. 32:216.

Campoplex (Ischnoscopus) pænerivalis Viereck, 1925. Can. Ent. 57:223; 1926, 58:199.

ANIMAL ECOLOGY

Problems of Animal Ecology. F. S. Bodenheimer. London: Oxford Press, 1938, pp. vi + 183, 28 figs. \$4.00.

As the author warns us in his preface, this book is "no easy reading." Within its slender covers, Professor Bodenheimer, the eminent Palestinian entomologist, takes us through many short but thought-provoking excursions into little-known fields of the zoological sciences, particularly entomology. The approach is essentially mathematical and any such attempt to place the complex interrelationships of living things on an exact basis is certain to be met with dissension. For instance, one may question his rigid application of the climograph for estimation of the numerical development of insects or the statistical analysis of the question of longevity.

The author must be given credit for presenting frankly and succinctly his views on such highly controversial subjects as Lamarckism, the animal community and biological equilibrium. He reiterates his stand on biological control, calling for a more rigid examination of the available facts and for further data on the determining factors of successful parasitism. He further pleads for an unprejudiced approach to the problem of environment versus heredity and points the way for a reexamination of Lamarckian theory.

"Problems of Animal Ecology" is recommended for all those entomologists who believe that ecology is more than readings in nature study. Its style is rather terse and many figures and statements suffer from lack of elucidation. A more thorough elaboration would have been welcome.—N. Stahler.

REMARKS ON THE GENUS ELASMOSTETHUS IN
NORTH AMERICA

(Hemiptera, Pentatomidæ)

BY J. R. DE LA TORRE-BUENO

Tucson, Arizona

Up to 1904, when E. P. Van Duzee published his "Annotated List of the Pentatomidæ Recorded from America North of Mexico" (Trans. Amer. Ent. Soc., XXX:1-80), there was known only one species, *Elasmostethus* (then termed *Acanthosoma*) *cruciatus* Say. In this paper, Van Duzee described one species, *atricornis*, and var. *cooleyi* of *cruciatus* Say.

There our knowledge of the American species of *Elasmostethus* rested until 1932, when H. G. Barber in his paper "Two Palearctic Hemiptera in the Nearctic Fauna" (Proc. Ent. Soc. Wash. XXXIV:65-66) synonymized Van Duzee's var. *cooleyi* with *E. interstinctus* Linné, based on specimens from the Mackenzie Delta received by J. R. Malloch from Owen Bryant. I have seen these specimens.

Van Duzee gives very little, other than color, to distinguish his variety, the structural characters falling within the limits of variability of *cruciatus*. There are in my collection two male specimens from Bryant named "var. *cooleyi*" by Barber. These answer to Van Duzee's characterization. There are also two females from the lot from Aklavik, identified as *E. interstinctus* by Barber and Malloch. This determination I have checked in the light of the European keys and descriptions (Fieber, Lameere, Saunders, etc) and by comparison with authoritatively determined European specimens (England, Bohemia, Spain). There are elusive differences, but the male genital segment in the American and the European specimens (by Barber's drawing) and the female segment from specimens from both regions are indistinguishable from each other in either sex, as between specimens. All, European and American, have the "row of black spots on either side of the venter, midway on segments 2 to 6" as stated by Barber.

However, the two specimens determined by Barber as "var. *cooleyi* V.D." have no such rows of black spots, but they agree with Van Duzee's description, *in which no mention is made of ventral black spots*. Now, since the characterization of the variety is but a *meticulous* color description, it is impossible that such a conspicuous color character should be overlooked;

in fact, Van Duzee categorically states: "Beneath pale yellowish *immaculate*" (Italics mine). Consequently, *Elasmostethus cruciatus* Say var. *cooleyi* Van Duzee clearly cannot be *E. interstinctus* L., and it stands as a smaller color variety as described.

On the other hand, *E. interstinctus* is obviously correctly interpreted and is found in America, as recorded.

The following brief key brings out the differences among the three North American species.

KEY TO SPECIES OF ELASMOSTETHUS

1. Antennæ piceous or shining black with the incisures pale (pronotal punctures fine, concolorous on the anterior part of the pronotum and a dark narrow series posteriorly); length, 9-10 mm., width, 5-5.5 mm.....*atricornis* V.D.
- Antennæ pale, except for the more or less darker apical segment2
2. Pronotal punctures coarse, almost like foveoles, widely separated; venter *without* lateral rows of black spots, from ventral segment II to VI; length, 7-11 mm., width, 4.9-6 mm.....*cruciatus* Say (and var. *cooleyi* V.D.)
- Pronotal punctures small, punctiform, fairly close together; ventral segments II to VI each with a lateral black spot on each side; length, 10.6 mm., width, 4.9 mm.....*interstinctus* Linné

VAN DYKE RETIREMENT

After twenty-five years of service with the University of California, Dr. Edwin Cooper Van Dyke retired on June 30, 1939, at the age of seventy years. As a tribute to his years of service as teacher, counselor, philosopher, and friend, a group of one hundred and twenty-five associates gathered at a banquet on Saturday evening, April 29, 1939, at the International House in Berkeley. Dr. W. B. Herms, chief of the division, presided as toastmaster and introduced the following speakers: Dr. S. B. Freeborn, Dr. R. C. Miller, Prof. E. O. Essig, Dr. J. H. Keen, Dr. E. G. Linsley, Mr. H. H. Keifer, and Mr. E. S. Ross. A bound volume of letters and telegrams received from hundreds of friends, far and near, was presented to Dr. Van Dyke and a silver bowl was presented to Mrs. Van Dyke.

Dr. Van Dyke retires as a true entomologist, molting into an instar of even greater activity and productivity unfettered by official duties. His library follows his collection to the California Academy of Sciences where he will carry on his work in the future. For the present and during the next year, however, Dr. and Mrs. Van Dyke are taking a long-anticipated field trip through the south Atlantic states.—R. L. Usinger.

A NEW COLLETES (HYMENOPTERA, APOIDEA) FOUND
ON SANTA CATALINA ISLAND

BY T. D. A. COCKERELL

Boulder, Colorado

Last year my wife and I collected a species of *Colletes* in some abundance at various places and on various flowers on Catalina Island. On comparing it with the collection at the Citrus Experiment Station, it was found to be *C. eriogoni*, which Timberlake had collected on the mainland, and had named in manuscript. Mr. Timberlake very kindly permits me to describe it, as it is an important member of the island bee-fauna. The pubescence varies in color; specimens taken late in the season (September 1) being pale, apparently bleached, and I thought at first there might be two species, but the characteristic abdominal structures are the same.

Colletes eriogoni (Timberlake MS.) Cockerell, new species

♂. (Type). Length about 10 mm.; slender, black, with bright fulvous pubescence, with no dark hairs intermixed; abdomen with five entire bands of tomentum, that on first tergite narrower than that on second; head broad, eyes strongly converging below; mandibles faintly brownish at tip; antennæ black, the flagellum long, reaching scutellum; malar space nearly as long as broad; posterior disc of mesonotum and anterior part of scutellum shining; tegulæ dark brown; wings hyaline, stigma and nervures brown; legs black; first tergite with small inconspicuous punctures. Lobes of eighth ventral plate very large and broad, of the general style of *C. scopiventer* Swenk, with no lateral process, the apical part broader than in *C. scopiventer*, conspicuously ciliate on the margin, and the inner face near the base conspicuously fimbriate. Volsella dark, bilobed, the lobes minutely denticulate on inner face. Stipites with the apical portion flattened, very slender in one view, strongly fringed at base and along sides as well as at apex, somewhat in the style of *C. spectabilis* Morawitz. Sagittæ strap-shaped, strongly curved, truncate, rather in the style of *C. cinerascens* Morawitz, but with very long hairs on the concave side. Apical lobe of eighth ventral plate broadened, dark, hairy. Sixth ventral plate with conspicuous lateral tufts of hair on tubercles, rather as in *C. daviesanus* Smith.

♀. Length about 10.2 mm., anterior wing 7 mm.; black, with pale ochreous-tinted pubescence, dense and rather brightly colored on thorax above, with no dark hairs; antennæ black; mandibles very faintly brownish at apex; head broad, clypeus exposed,

glistening, coarsely striate; malar space fully twice as broad as long; mesonotum mainly dull, but posterior disc shining, with sparse large punctures; scutellum shining anteriorly; base of metathorax with the transverse plicæ well spaced; tegulæ small, very dark brown; wings hyaline, nervures and stigma dark brown; legs black, hind tarsi with very long hairs posteriorly; abdomen shining on first two tergites, duller and very minutely punctured beyond; tergites one to five with broad apical bands of ochreous-tinted tomentum; the band on first is narrow, but looks broad because it is contiguous with a broad band at base of second tergite.

The type has the genitalia extended, but for more minute study I boiled up part of the abdomen of a male from Fisherman's Cove, on *Calochortus*, and mounted the parts in balsam. The type (male) is from San Bernardino Mountains, California, 7000 feet on trail to the Dobbs cabin, August 2, 1936, at flowers of *Eriogonum fasciculatum* Benthem, collected by P. H. Timberlake. On Santa Catalina Island, in 1938, my wife and I collected it as follows: Avalon, June 5, many females; near road at Summit (highest point on the automobile road), September 1, at flowers of *Eriogonum giganteum* Watson, both sexes; Pebbly Beach, June 4, females; Cape Canyon, at flowers of *Opuntia littoralis* (Engelm.), both sexes; Fisherman's Cove, June 9, at flowers of *Calochortus* and *Sinapis*. The description of the female is made from a specimen collected at Avalon, June 5.

In a manuscript table of Californian *Colletes* the female is distinguished by the absence of black hair on thorax above, the bright tawny yellow hair of head and thorax, and the very distinct abdominal bands. The male is distinguished from all others by the abdominal structures.

THE HOUSE CENTIPEDE (*SCUTIGERA FORCEPS* RAF.)
IN WASHINGTON

A specimen of *Scutigera forceps* Raf., the house centipede, was received recently from Yakima, Washington, taken in a warehouse. Several years ago an example of the same species was sent in from Spokane. The species thus apparently occurs at least in the eastern portion of the state, although perhaps only adventitiously.—Melville H. Hatch, University of Washington.

TWO NEW SPECIES OF PASADENUS

(Homoptera, Cicadellidæ)

BY R. H. BEAMER

*Lawrence, Kansas***Pasadenus bicolor* Beamer, new species

Resembling *P. margaritæ* Ball, but vertex much sharper, male plates extending but slightly past pygofers. Length: 5-5.5 mm.

Vertex flat, slightly more than a right angle, rounded to face. Elytra longer than abdomen, broadly rounded, flaring, but few more than typical number of cells in apices.

Color like that of *P. pasadenus*; vertex and anterior two-thirds of clavus ivory yellow; pronotum and scutellum dark; corium hyaline except broad band of fuscous bordering clavus and two crossbands, one near middle, the other at apex fuscous; venter yellow except middle portion of last ventral segment of female black.

Genitalia: Last ventral segment of female about three times as long as preceding, with lateral angles broadly rounding to mediumly deep excavated middle portion. Valve of male obtusely angled; plates narrower at base than valve, almost twice as long as wide, but slightly narrowed at apices, tips turned up, inner margin ending in black spine; pygofer almost as long as plates, a very small spine on dorsal margin almost at tip, usually not visible until dissected; ædeagus in dorso-ventral view broad at base, narrowing to outer third, widening into flat spade-like apex with retrorse process on either side as long as width of shaft at narrowest place, another shorter, outward-projecting spine at each outer corner.

Holotype male, allotype female, and 15 pairs of paratypes, Idyllwild, San Jacinto Mountains, California, July 29-30, 1938, R. H. Beamer. Swept from *Arctostaphylos pringlei drupacea* Parry. Types in Snow Entomological Collection, Lawrence, Kansas. Specimens are at hand from the same locality, but taken from *A. glandulosa* and also from Mt. Springs, California, taken from *A. glauca*. These vary slightly from the types in the internal structures.

Pasadenus anzanus Beamer, new species

Resembling *P. margaritæ* Ball but vertex definitely sharper, plates of male diverging on inner margin at apices and ædeagus

*Contribution from the Department of Entomology, University of Kansas.

with a long tube beyond the bifurcate lateral processes. Length, 6-6.5 mm.

Vertex sharp, slightly more than a right angle, disc flat; elytra quite reticulate on outer half.

Color ivory white marked with fuscous and lemon yellow. Vertex and basal two-thirds of clavus lemon yellow; pronotum and scutellum infuscated, band of irregular spots on anterior margin of pronotum darker; corium hyaline with median and apical brown cross bands, also broad brown border to clavus.

Genitalia: Last ventral segment of female about four times as long as preceding, posterior margin broadly bilobed with median notch about one-fourth as deep as length, with prominent median Y-shaped black mark. Male valve almost twice as long as preceding segment, broadly angular; plates narrower at base than valve, extending about half their length beyond pygofer, slightly separated on mesal margin, at base, and more so at tip, medium dorsally curving spine on inner margin at apex; pygofer almost lacking usual spine at tip, apices triangular, turned dorsally, ædeagus in dorsal view broad at base narrowing to outer third, widening into a pair of lateral bifurcate processes, the shorter turning basally, the other apically; duct extending on, much narrowed, with a pair of shorter lateral processes near tip, to end about even with other processes.

Holotype male, allotype female, six male and three female paratypes, Anza, California, July 29, 1938, R. H. Beamer and R. I. Sailer. Swept from *Arctostaphylos pungens* H.B.K.

THE ANOPHELES MACULIPENNIS COMPLEX OF WESTERN AMERICA

(Diptera, Culicidæ)

BY THOMAS H. G. AITKEN

University of California, Berkeley

Much controversy has been waged as to the exact status of *A. maculipennis* Meig. in North America. Studies carried on by the writer suggest the presence of three subspecies in our fauna. Typical *maculipennis* Meig. is considered not to occur in this country, because *occidentalis* (D.&K.), our only form resembling it in the silvery patch of scales at the wing apex, differs in having non-banded eggs and distinct terminalia. The two remaining forms, *aztecus* Hoff. and *freeborni* new subspecies, have unicolored wings.

Anopheles maculipennis freeborni Aitken, new subspecies

Female. Similar to *maculipennis*¹ except for unicolorous wing scales.

Male terminalia. External claspette spine acute.

Egg. Uniformly dark grey, unbanded, columellæ relatively far apart; floats smooth, 12-13 chambers.

Holotype, male, No. 4889, allotype, female, No. 4890, Calif. Acad. Sci., Ent., and 23 paratypes, "Davis, Calif. XI-6-37. T. Aitken."

Discussion. *Freeborni* differs from the European *maculipennis* complex² (*maculipennis*, *messeæ* Fall., *melanoon* Hack., *subalpinus* Hack. & Lew., *labbranchiæ* Fall., *atroparvus* v. Th. and *elutus* Edw.) by its unicolored wings and unspotted eggs (exception *elutus*). In the egg of *elutus* the floats are rudimentary or wanting (cross-lined when present); the columellæ of the chorion (dorsum) in *freeborni* are small with relatively large intervening spaces, giving a dark effect.

The status of *occidentalis* in America has been greatly confused, due to the fact that the type series (U. S. N. M.) is a mixture. It includes at present 78 specimens; 64 (including type, No. 10,028) from Stanford University and one from Portland, Ore., are the true "silver-tipped" *occidentalis*; the others (Thrall and Sisson, Calif.; Portland, Ore.; Revelstoke, B. C.; Boise, Idaho; and Lehi, Utah) are all the unicolored inland form, *freeborni*.

Besides the "silver-tipped" wing, *occidentalis* has an egg similar to that of *freeborni*, but the columellæ are larger and closer together giving the egg a pale grey appearance. *Occidentalis* may have a predilection for impounded water in contrast to the fresh, irrigation water preference of *freeborni*. *Occidentalis* is restricted to a narrow strip along the west coast from the region of San Luis Obispo, Calif., north to the Canadian Northwest Territory and across the continent along the international boundary to New England. *Freeborni* occurs throughout those regions west of the Continental Divide, appearing on the coast in Southern California. *Aztecus*³ is found in the Valley of Mexico. Like *freeborni* it has unicolored wings, but the egg has rough floats with 25 chambers. Its breeding habits appear to be different.

¹ Freeborn, S. B., Univ. of Calif. Publ. Ent., 3:448, 1926. (*freeborni* nec *maculipennis*).

² Hackett, L. W., Quart. Bull., Health Org., League of Nations, 6:1-16, 1937.

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