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A REVISION OF THE GENUS RHEXIDIUS CASEY
(Coleoptera: Pselaphidae)
ROBERT O. SCHUSTER AND ALBERT A. GRIGARICK
University of California, Davis

The genus *Rhexidius* was proposed by T. L. Casey in 1887 for a single species, *R. granulosus*, described from specimens collected at Alameda County, California. A second California species, *R. asperulus*, was proposed for specimens from San Francisco and Santa Cruz Counties by Casey in 1893. A number of eastern species included in *Rhexidius*, if congeneric with *R. caniculatus* LeConte, have been erroneously placed in the genus. The species described by LeConte differs markedly in the structure of the aedeagus and the postantennal apodemes, and in possessing glandular setae on the dorsal surface of the head. These eastern species, therefore, are not included, and this revision is restricted to the genus as intended by Casey. Also doubtful is the placement of two species from Mexico.

The species thus far discovered are restricted in distribution to the Coast Range of California. Their occurrence north of the 40th Parallel is considered unlikely since the area has been well collected. The southernmost limit of distribution is presently near Point Sur, but it should extend further south into the Santa Lucia Range, an area that has not been collected. Insofar as the genus apparently does not occur in the extreme north of California or in the Sierras, it may not have been present in the Arcto-Tertiary faunal intrusion, and might therefore be considered to have recently evolved, in its present location, from *Oropus* ancestry.

*Rhexidius* is closely related to *Oropus*, differing mainly in the structure of the median lobe of the aedeagus. It also differs in the structure of the postantennal apodemes, and in the pronotal margins which are entirely crenulate and lack basolateral teeth. The characters most useful for specific determination, as in *Oropus*, are the sulci and setal patches of visible tergite IV. These characters are absent in the female. In *Rhexidius*, the aedeagi have sufficient character to be of value in distinguishing species.

Assuming the small atrium in the base of the aedeagus always to be ventral, the structure shows a sinistral or dextral orientation. The form in which the large paramere is sinistral to the median
lobe is the most common. There is no basis in morphology or distribution to indicate the coexistence of sinistral and dextral species which are identical in other respects. When a species is predominantly dextral, it is easily separated from sinistral species with which it occurs by the shape of the aedeagus and by external characters. Exact mirror images have been noted in the aedeagi of the same species but the frequency of occurrence is very low.

Specimens of *Rhexidius* are red-brown, the legs not as dark as the body, and the palpi, antennal club and tarsi are frequently yellow.

Measurements of head length are made from the clypeus to where the tempora join the neck and those of head width are taken immediately behind the eyes but not including any facets. The tergites are numbered as they appear, disregarding the first actual tergite. Within a species, the mesocoxal cavities can be broadly confluent or completely closed. Of value as a specific character is the placement of the postcoxal apodemes which may be directed to posterior or which may extend forward along the mesocoxal cavities. In slide preparations, the tergites should be separated from the sternites to facilitate the study of tergite IV. The aedeagus is best isolated and mounted under a separate cover glass.

In the distributional data, collectors’ names are abbreviated as follows: S. F. Bailey (SFB), D. J. Burdick (DJB), W. C. Bentinck (WCB), J. S. Buckett (JSB), E. E. Gilbert (EEG), J. R. Hefler (JRH), S. M. Fidel (SMF), H. B. Leech (HBL), D. D. Linsdale (DDL), C. D. MacNeill (CDM), G. A. Marsh (GAM), C. W. O’Brien (CWO), V. D. Roth (VDR), R. O. Schuster (ROS), N. A. Walker (NAW), and M. S. Wasbauer (MSW).

The holotypes of all new species are slide-mounted males and are deposited in the California Academy of Sciences, San Francisco. Large paratypic series will be distributed among the University of California at Davis, the California Insect Survey, and the collection of Dr. Orlando Park. Small series are retained by the authors.

**Key to Point-mounted Males**

1 Metasternum with setate tumosity between metacoxae.......................... 2
   —Metasternum lacking setate tumosity between metacoxae.................. 4

2 (1) Sulcus of tergite IV median, the microstetigerous area developed as a median tubercule.............................. *aggestus* Schuster & Grigarick
   —Sulcus of tergite IV otherwise; microsetigerous area not produced
as a tubercle.........................................................3

3 (2) Sulcus of tergite IV deeply impressed along base of segment

........................................................................... 3

-Sulcus of tergite IV weakly and obliquely impressed each side of center ........................................... granulosus Casey

4 (1) Tergite IV lacking obvious sulcus................................................................. 5

-Tergite IV with sulcus.................................................................................. 6

5 (4) Eyes with about 30 facets, tergite IV appearing very short and transverse ............................................... impensus Schuster & Grigarick

-Eyes with less than 15 facets; occurring south of 38th Parallel incompus Schuster & Grigarick

-Eyes with less than 15 facets; occurring north of 38th Parallel

...................................................................................... cuspidatus Schuster & Grigarick

6 (4) Sulcus of tergite IV deep, polished, oblique each side of center, or sinuate if base of segment exposed.......................... asperulus Casey

-Sulcus of tergite IV somewhat variable but more basal in position; most of tergite IV glabrous.......................... hispidus Schuster & Grigarick

-Sulcus of tergite IV shallow, transverse; basal half of tergite IV glabrous.................................................. glareosus Schuster & Grigarick

**Rhexidius granulosus** Casey

(Figs. 7, 8, 17)

*Rhexidius granulosus* Casey, 1887.

**Male** (slide). Head 198µ long x 259µ wide; eyes with 5 or 6 peripheral facets; vertexal foveae on line through posterior fourth of eyes; length antennal segment X 36µ, XI 136µ. Pronotum 319µ long x 319µ wide. Brachypterous. Elytra 353µ long. Profemural line 101µ long. Mesocoxal cavities confluent, the postcoxal apodemes directed posteriorly; metasternum with setate tumosity between metacoxae. Tergite I 182µ long x 381µ wide; median basal impression of tergite I 141µ wide. Tergite IV 136µ long x 290µ wide, evenly setate except for narrow sinuate area at base; microsetigerous area 118µ wide. Pitting of sternite V 272µ wide. Sternite VI 77µ long x 225µ wide. Aedeagus 277µ long x 132µ wide, sinistral. **Male** (point-mount). Eyes with about 15 facets. Tergite IV appears as long as III and is slightly impressed each side of center; microsetigerous area visible beneath tergite III. Tumosity of metasternum obvious. Sternite VI weakly impressed medially.

**Female.** Resembles male except: Lacking setate tumosity of metasternum and sternite VI is shorter and not impressed medially.

**Distribution.**—Alameda Co.: Oakland (or Hills Back of), 1♀ II-5-53 (ROS), 4♂, 6♀ II-8-53 (ROS), 3♂ 1♀ II-12-53 (ROS), 7♂ II-13-53 (WCB), 1♂ II-16-53 (ROS), 4♂, 5♀ III-8-53 (ROS), 2♂ I-9-54 (GAM, ROS), 1♂ V-26-55 (NAW). Contra Costa Co.: Mt. Diablo, 1♂ II-15-53, oak litter (GAM); Redwood Park, 5♂, 4♀ V-18-53, redwood litter (EEG, ROS), 10♂, 3♀ V-29-53 (EEG); Redwood Peak, 1♂ I-9-54 (ROS). San Mateo Co.: 6 miles S.E. Half Moon Bay, 18♂, 23♀ XII-5-53 (VDR), 1♂ VI-1-57 (ROS), 2♂, 2♀ VII-21-57 (ROS), 7♂, 6♀ IV-26-59 (ROS); Santa Cruz Co.: Big Basin, 1♂ XII-23-53 (VDR).

The aedeagus of the holotype is comparable to the aedeagi of
glareosus

Figs. 1-5, *Rhexidius glareosus*. 1, head; 2, labium and maxilla; 3, pronotum; 4, elytron; 5, meso- and metathorax.
Fig. 6, dorsal aspect of *Rhexidius* sp.; Figs. 7-16, aedeagi, species as indicated.
specimens from Alameda County (Fig. 7) from which the re-description was made. In populations from San Mateo and Santa Cruz Counties, the left side of the median lobe shows a wider area of sclerotization (Fig. 8). These populations are considered to be conspecific with the Alameda population as the magnitude of the difference between the aedeagi, although consistent, is not great. The aedeagus (Fig. 8) of a specimen from San Mateo County is dextral, the only exception noted for this normally sinistral species.

**Rhexidius crenatus** Schuster and Grigarick, new species  
(Figs. 9, 18)

*Male* (slide):—Head 202μ long x 279μ wide; eyes with 6 peripheral facets: vertexal foveae on line through posterior fifth of eyes; length antennal segment X 33μ, XI 136μ. Pronotum 323μ long x 340μ wide. Brachypterous. Elytra 360μ long. Profemoral line 118μ long. Mesocoxal cavities slightly confluent, the postcoxal apodemes directed forward; metasternum with setate tumosity between metacoxae. Tergite I 163μ long x 363μ wide; median basal impression of tergite I 136μ wide. Tergite IV 104μ long x 296μ wide, setate in distal half except laterally where setae extend to base; microsetigerous area 118μ wide. Pitting of sternite V 275μ wide. Sternite VI 77μ long x 246μ wide. Aedeagus 286μ long x 118μ wide, sinistral. *Male* (point-mount).—Eyes with about 20 facets. Tergite IV appears as long as III and is deeply impressed in middle three-fifths; microsetigerous area visible beneath tergite III. Tumosity of metasternum obvious. Sternite VI weakly impressed medianly.

*Female.*—Resembles the male except: Eyes with 15-16 facets. Lacking sulcus of tergite IV and setate tumosity of metasternum. Sternite VI is shorter.

**Holotype male** and five paratype males are from two miles south of Olema, Marin County, California, November 1, 1953 (R. O. Schuster). Additional specimens not included in the type series were from: same locality, 11♀. Santa Cruz County; Big Basin, 1♂, December 23, 1953 (VDR).

This species is distinguished from *R. granulosus* by the shorter tergite IV, by the deep transverse sulcus, and by the postcoxal apodemes which are transverse or point forward along the coxal cavities. The single specimen from Big Basin is distinguishable from the specimens taken at Olema and its conspecific status is questionable.

**Rhexidius aggestus** Schuster and Grigarick, new species  
(Figs. 10, 19)

*Male* (slide).—Head 188μ long x 255μ wide; eyes with 4 or 5 peripheral facets; vertexal foveae on line through posterior sixth of eyes; length antennal segment X 44μ long, XI 131μ long. Pronotum 312μ long x 322μ wide.
Figs. 17-25. fourth tergites of males, species as indicated.
Brachypterous. Elytra 322μ long. Profemoral line 101μ long. Mesocoxal cavities confluent, the postcoxal apodemes directed posteriorly, overlapping; setate tumosity of metasternum reduced. Tergite I 184μ long x 380μ wide; median basal impression of tergite I 136μ wide. Tergite IV 134μ long x 306μ wide, microsetigerous area 57μ wide; distal half of tergite IV covered by normal setae, a greater area laterally. Pitting of sternite V 249μ wide. Sternite VI 64μ long x 222μ wide. Aedeagus 185μ long x 101μ wide; sinistral. Male (point-mount). —Eyes small with 10-11 facets. Tergite IV basally with procurred, deep, polished sulcus with a median setate tubercle. Sternite VI very short, apparently not impressed. Setate tubercule between metacoxae very reduced or obsolete on some individuals.

Female unknown.

Holotype male and 17 paratype males are from BOULDER CREEK, SANTA CRUZ COUNTY, CALIFORNIA, December 23, 1953 (V. D. Roth). Additional paratypes were from: Santa Cruz County: Big Basin, 19♂ March 28, 1951 (JRH); Ben Lomond, 1♂ January 22, 1955 (MSW). San Mateo County, 6 miles southeast Half Moon Bay, 2♂; April 26, 1959 (ROS), 18♂, December 5, 1953 (VDR). On additional male, not a paratype, from Mt. Madonna, Santa Clara County, January 2, 1954 (DJB).

The occurrence of the microsetigerous area as a central tumosity distinguishes this species. These microsetae are of a different thickness at some localities and the setate tumosity of the metasternum is weakly developed at the Half Moon Bay locality.

Rhexidius incomptus Schuster and Grigarick, new species
(Figs. 11, 20)

Male (slide).—Head 208μ long x 282μ wide; eyes with 5 peripheral facets; vertexal foveae on line through posterior fourth of eyes; length antennal segment X 55μ, XI 150μ. Pronotum 349μ long x 336μ wide. Brachypterous. Elytra 370μ long. Profemoral line 114μ long. Mesocoxal cavities contiguous, the postcoxal apodemes directed forward along inner edge of coxal cavities; metasternum lacking setate tumosity between metacoxae. Tergite I 409μ wide, median impression of tergite I 154μ wide. Tergite IV 135μ long x 353μ wide; tergite IV lacking microsetigerous area, uniformly covered by normal setae. Pitting of sternite V 310μ wide; VI unknown. Aedeagus 385μ long x 185μ wide, dextral. Male (point-mount). —Eyes small, nearly circular, with 10 or 11 facets. Tergite IV lacking sulcus and microsetigerous area. Metasternum shallowly impressed, lacking setate tumosity. Sternite VI medianly impressed.

Female.—Resembles the male except: Eyes with about 9 facets.

Holotype male and five paratypes (2♂, 3♀) are from SEVEN MILES SOUTH POINT SUR, MONTEREY COUNTY, CALIFORNIA, December 22, 1953 (V. D. Roth). One additional female from Big Sur State Park, Pfeiffer, Monterey County, August 30, 1956 (NAW).
On the basis of key characters, this species is similar only to R. cuspidatus. Rhexidius incomptus occurs at the southern extent of the generic range, R. cuspidatus at the northern extent. R. incomptus is a slightly larger species, the aedeagus is distinctive in shape and is dextral. There is less deflection of the abdomen as compared with R. cuspidatus. Two males were slide-mounted. In one, the aedeagus was sinistral, and in the other it was dextral.

**Rhexidius asperulus** Casey

(Figs. 12, 21)

*Rhexidius asperulus* Casey, 1893

**Male** (slide).—Head 206μ long x 289μ wide; eyes with about 8 peripheral facets; vertexal fovea on line through posterior fourth of eyes; length antennal segment X 37μ, XI 134μ. Pronotum 345μ long x 349μ wide. Brachypterous. Elytra 386μ long. Prefemoral line 124μ long. Mesocoxal cavities narrowly confluent, the postcoxal apodemes directed forward along inner edge of coxal cavities; metasternum lacking setate tumosity. Tergite I 202μ long x 417μ wide; median basal impression of tergite I 168μ wide. Tergite IV 124μ long x 326μ wide, the first row of setae in sinuate pattern; microsetigerous area 178μ wide. Sternite V with row of pits 252μ wide. Sternite VI 74μ long x 252μ wide. Aedeagus 276μ long x 128μ wide, sinistral.

**Male** (point-mount).—Eyes with 35-40 facets. Tergite IV with deeply impressed, polished sulcus; microsetigerous area visible beneath tergite III. Metasternum not tuberculare. Sternite VI not appreciably impressed.

**Female**.—Resembles male except: Eyes smaller, with 15-17 facets. Sulcus and microsetigerous area lacking.

**Distribution**.—Marin Co.: Alpine Lake, 1♂, 1♀ VI-18-53 (CDM, ROS); Hicks Mountain, 2♂, 8♀ VI-29-58 (JSB); Mill Valley, 1♀ VI-14-52 (HBL), 2♂, 2♀ IX-2-53 (GAM, ROS); Samuel P. Taylor State Park, 12♂, 11♀ X-24-53 (VDR), 15♂, 25♀ XI-1-53 (GAM, VDR, ROS), 1♂, 2♀ XI-6-53 (VDR, ROS), 2♂ VII-5-59 (CWO), 1♀ XII-6-58 (CWO), 2♂ XII-13-58 (CWO), 1♀ I-17-59 (CWO); 2 miles south Olema, 1♀ XI-1-53 (ROS); Woodacre, 1♂ XI-1-53 (ROS); Napa Co., Mt. St. Helena, 1♀ XII-31-53 (GAM, VDR, ROS). San Mateo Co.: Kings Mtn., 1♀ IX-1-58 (ROS); 6 miles southeast Half Moon Bay, 7♂ VI-1-57 (ROS). Santa Clara Co.: Stevens Creek, 2♂, 7♀ VI-2-57 (ROS), 4♂, 2♀ VII-27-57 (GAM); Holy City, 8♂, 10♀ III-27-54 (JRH); Mt. Madonna, 5♂, 4♀ II-7-59 (DJB). Santa Cruz Co.: Big Basin, 1♀ XII-23-52 (VDR); Ben Lomond, 2♂ I-22-55 (MSW); 12 miles north Boulder Creek, 2♂, 7♀ I-22-55 (DJB); Mt. Hermon, 1♂, 3♀ III-6-55 (DJB); Santa Cruz, 1♂ XII-23-53 (VDR), 3♂, 2♀ III-27-54 (JRH), 6 miles north Santa Cruz, 2♂ III-27-54 (JRH); 9 miles northeast Soquel, 6♂, 15♀ XII-31-56 (SMF).

The males of this species are distinguished by the large eyes, by the absence of a metasternal tumosity and by the large, sinuate tergal sulcus. The redescription was based on specimens from Santa Cruz County. The aedeagi of these specimens are comparable to that of the Casey holotype.
Rhexidius glareosus Schuster and Grigarick, new species  
(Figs. 1-5, 13, 22)

**Male** (slide).—Head 202 μ long x 276 μ wide; eyes with about 8 peripheral facets; vertexal fovea on line through posterior fourth of eye; antennal segment X 44 μ long, XI 134 μ. Pronotum 322 μ long x 339 μ wide. Winged. Elytra 430 μ long. Profemoral line 104 μ long. Mesocoxal cavities contiguous, the postcoxal apodemes directed forward along inner edge of coxal cavities. Median basal impression of tergite I 151 μ wide. Tergite IV with microsetigerous area 124 μ wide; distal half of tergite IV uniformly covered by normal setae. Sternite V with pitting 285 μ wide; VI 71 μ long x 235 μ wide. Aedeagus 164 μ long x 84 μ wide, sinistral.

**Male** (point-mount).—Eyes with about 20 facets. Tergite IV with weak sulcus; basal half of tergite IV glabrous, the microsetigerous area not apparent. Tergite VI slightly impressed medianly.

**Female.**—Resembles the male except: Eyes with about 15 facets. Tergites III and IV of subequal length. Sternite VI without, or with very slight median impression.

**Holotype male** and 122 paratype males are from **Samuel P. Taylor State Park, Marin County, California, November 1, 1953** (G. A. Marsh, V. D. Roth, and R. O. Schuster). Additional specimens not considered paratypes were from: Marin County: Samuel P. Taylor St. Park, 42 ♂, 59 ♀; X-24-53 (VDR), 136 ♀ XI-1-53 (GAM, VDR, ROS), 18 ♂, 59 ♀; XI-8-53 (VDR, ROS), 1 ♂, 1 ♀ XII-13-54 (JRH), 14 ♂, 14 ♀ VII 5-56 (EEG), 1 ♀ II-3-58 (JRH), 1 ♂, 5 ♀ I-17-59 (CWO); Alpine Lake, 5 ♂, 22 ♀ VI-18-53 (CDM, ROS) 2 miles west Alpine Lake 2 ♂, 9 ♀ VII-18-53 (ROS) Mill Valley, 7 ♂, 12 ♀ IX-2-53 (GAM, ROS) Sonoma County: Armstrong Redwoods St. Park, 1 ♀ III-14-54 (JRH); Mark West Resort, 1 ♀ III-4-54 (JRH), 2 ♀ I-22-58 (ROS); Mark West Springs 5 ♂, XII-31-53 (GAM, VDR, ROS); Petrified Forest, 4 ♂ XI-21-53 (JRH). Napa County: Calistoga, 1 ♀ IV-23-57 (SFB); Mt. St. Helena, 7 ♂, 23 ♀ XII-31-53 (GAM, VDR, ROS), 7 ♂, 6 ♀ II-7-55 (JRH); 2 miles west Oakville, 2 ♂ XII-31-53 (GAM, VDR, ROS).

The males are distinguished by a transverse, shallow sulcus. The depth of the sulcus is much less than that of R. crenatus. R. glareosus lacks the metasternal tumosity of that species. Specimens from Mark West in Sonoma County, appear to be R. glareosus but the anterior part of tergite IV is not as shiny as specimens from the type locality.

Rhexidius cuspidatus Schuster and Grigarick, new species  
(Figs. 14, 23)

**Male** (slide).—Head 192 μ long x 272 μ wide; eyes with 3 or 4 peripheral
facets; vertexal foveae on line with posterior eye margins; length antennal segment X 44μ, XI 155μ. Pronotum 349μ long x 336μ wide. Brachypterous. Elytra 336μ long. Profemoral line 101μ long. Mesocoxal cavities contiguous, the postcoxal apodemes directed forward along inner edge of coxal cavities. Tergite I 168μ long x 363μ wide; median basal impression 127μ wide. Tergite IV 131μ long x 286μ wide, lacking microsetigerous area, rather uniformly covered by normal setae. Sternite V with pitting 212μ wide. Sternite VI 81μ long x 215μ wide. Aedeagus 188μ long x 84μ wide, sinistral. **Male** (point-mount).—Eyes with 13-14 facets. Tergite IV appears as long or longer than III, evenly setate, lacking sulcus and microsetigerous area. Metasternum not tuberculate. Sternite VI medianly longitudinally impressed, tumid each side of center. Abdomen more deflexed than usual for other species.

**Female**.—Resembles the male except: Eyes with 9 or 10 facets. Abdomen not deflexed. Sternite VI not medianly impressed.

**Holotype male** (XII-19-53) and 75 paratype males are from Mendocino, Mendocino County, California, from 1954-1958 (J. R. Helfer). Additional specimens, not paratypes, are from: Mendocino County: Caspar, 58♂, 40♀ III-7-54 (JRH); Comptche, 4♀ VII-29-54 (JRH); Paul M. Dimmick Memorial Grove St. Park, 2♀ IV-10-55 (JRH); Fort Bragg, 7♂, 3♀ VII-3-54 (JRH), 3♀ IV-20-56 (JRH), 3♂, 1♀ I-5-57 (JRH); Little River, 5♂ VIII-4-57 (JRH), 2♂, 1♀ I-9-58 (JRH); Mendocino, 2♀ XII-19-53 (JRH); 9♀ II-14-54 (JRH), 6♀ VII-15-54 (JRH), 1♀ VII-29-54 (JRH), 5♀ XII-19-54 (JRH), I-20-55 (JRH), 10♀ II-23-55 (JRH), 1♀ IV-24-55 (JRH), 2♀ II-27-57 (JRH), 2♀ III-3-57 (JRH), 3♀ VIII-4-57 (JRH), 2♀ VIII-7-57 (JRH), 1♀ X-14-57 (JRH), 1♀ XI-2-57 (JRH), 1♀ XII-26-57 (JRH), 2♀ III-15-58 (JRH); 4 miles west Navarro, 1♀ XII-26-54 (JRH). Napa County: Mt. St. Helena, 3♂ II-7-55 (JRH), 2♂ II-3-59 (ROS); Napa, 2♂ II-3-59 (ROS); Oakville 18♂, 12♀ III-14-54 (JRH). Sonoma County: Kruse Rhododendron Reserve St. Park, 2♂, 2♀ X-9-54 (CDM, ROS), 7♂, 2♀ II-23-55 (JRH).

The small eyes, the lack of sulcus and metasternal tumosity, and the setate, non-sulcate tergite IV separate the point-mounted males of this species from others occurring north of San Francisco Bay.

**Rhexitius hispidus** Schuster and Grigarick, new species

(Figs. 15, 24)

**Male** (slide).—Head 202μ long x 286μ wide; eyes with 6 or 7 peripheral facets; vertexal foveae on line just before posterior margins of eyes; length antennal segment X 44μ, XI 134μ. Pronotum 336μ long x 343μ wide. Brachypterous. Elytra 353μ long. Profemoral line 114μ long. Mesocoxal cavities contiguous; postcoxal apodemes directed forward along inner edge of coxal cavities. Metasternum not tuberculate. Tergite I 175μ long x 403μ
Table 1. Summary of wing condition and aedeagal orientation.

<table>
<thead>
<tr>
<th>Species</th>
<th>No. males</th>
<th>No. females</th>
<th>Condition of wings</th>
<th>Orientation of aedeagus</th>
</tr>
</thead>
<tbody>
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<td>granulosus</td>
<td>62</td>
<td>51</td>
<td>brachypterous</td>
<td>sinistral</td>
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<td>either</td>
<td>sinistral</td>
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wide; median basal impression 163µ wide. Tergite IV 134µ long x 326µ wide; microsetigerous area 121µ wide; tergite IV medially with normal setae only in distal fourth. Sternite V with row of pits 319µ wide; sternite VI 72µ long x 252µ wide. Aedeagus 235µ long x 118µ wide, dextral. Male (point-mount).
—Eyes with about 20 facets. Tergite IV with sulcus; microsetigerous area plainly visible under margin of tergite III; glabrous except laterally and a few setae along distal margin. Sternite VI not, or only vaguely impressed medially.

Female.—Similar to the male except: Eyes with 12-14 facets. Tergite IV lacking sulcus.

Holotype male (X-19-57) and 73 paratype males are from Mendocino, Mendocino County, California, from 1954-1958 (J. R. Helfer). Additional specimens, not paratypes, are from: Lake County: 6 miles northwest Upper Lake, 1♂, 7♀ II-12-55 (DJB). Mendocino County: Anchor Bay, 2♂, 1♀ II-23-55 (JRH); Caspar, 2♀ III-7-54 (JRH), 1♂, 1♀ II-10-56 (JRH); Comptche, 11♂, 10♀ VII-27-54 (JRH); Paul M. Dinnick Memorial Grove St. Park, 11♂, 1♀ VI-10-55 (JRH); Faulkner Park, 10♂, 6♀ X-14-54 (JRH); Fort Bragg, 6♂, 5♀ XII-24-54 (JRH); Mendocino, 1♀ X-14-54 (JRH), 2♀ II-23-55 (JRH), 4♀ IV-24-55 (JRH), 10♀ VI-2-55 (JRH), 14♀ II-27-57 (JRH), 5♀ III-3-57 (JRH), 1♀ VI-6-57 (JRH, ROS) 6♀ VII-6-57 (JRH, ROS), 8♀ X-8-57 (JRH), 35♀ X-19-57 (JRH), 8♀ XII-26-57 (JRH), 2♀ III-15-58 (JRH); MacKerricher Beach St. Park, 2♂, 1♀ III-17-58 (JRH); 4 miles west Navarro, 10♂, 1♀ XII-26-54 (JRH); Richardson Grove St. Park, 3♂ IX-9-58 (LMS). Sonoma County: Armstrong Redwoods St. Park, 2♂, 1♀ III-14-54 (JRH); Plantation, 3♂ II-23-55 (JRH); Seaview, 1♂, 1♀ II-23-55 (JRH); 10 miles west Skaggs Springs, 8♂, 8♀ IX-10-54 (JRH); Stewarts Points, 6♂, 1♀ VI-24-54 (NAW).

Two parallel, sclerotized rods on the median lobe opposite the paramere characterize the aedeagus. The fourth tergite which is predominantly glabrous and the lack of a tumosity on the metasternum identify the point-mounted males.

Rhexidius impensus Schuster and Grigarick, new species
(Figs. 6, 25)

Male (slide).—Head 218µ long x 286µ wide; eyes with about 8 peripheral facets; vertexal foveae on line through posterior fourth of eyes; length antennal segment X 44µ, XI 134µ. Pronotum 336µ long x 363µ wide. Winged. Elytra 436µ long. Profemoral line 121µ long. Mesocoxal cavities contiguous, the postcoxal apodemes directed forward along edge of coxal cavities; Metasternum not tuberculate. Tergite I 212µ long x 470µ wide; median basal impression of tergite I 155µ wide. Tergite IV 148µ long x 403µ wide;
microsetigerous area 269μ wide, recurved, the setae sparse medianly; distal two-thirds of tergite IV uniformly covered by normal setae. Sternite V with a basal row of pitting 336μ wide. Sternite VI 74μ long x 286μ wide. Aedeagus 202μ long x 111μ wide, dextral. Male (point-mount).—Eyes at least 30 facets. Tergite IV appears shorter than III, very wide, giving the abdomen a truncate facies. Sulcus lacking and microsetigerous area not visible beneath margin of tergite III.

Female.—Similar to the male except: Eyes with only 14-16 facets. Wings not developed. Tergite IV lacking microsetigerous area.

Holotype male and 32 paratypes (7♂, 25♀) from Mt. George, 7 miles east of Napa, Napa County, California, February 14, 1954 (Wm. E. Ferguson). This species also has been taken from the Putah Creek drainage west of the Berryessa Reservoir but the specimens are not included in the type series.

The large eyes of the male, and the wide fourth tergite distinguish this species from R. cuspidatus, the only other species found north of the 38th parallel which also lacks a sulcus on tergite IV.

The approximate numbers of each sex, condition of wings on males and orientation of the aedeagus are summarized in table 1.

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Casey, T. L.

A HOST OF PYRIA INAEQUIDENS (DAHLBOM)
(Hymenoptera: Chrysididae)

A number of specimens of Rygchium foraminatum scutellaris (Sauussure) (Vespidae) were reared from old mud nests of Sceliphron caementarium (Drury) (Sphecidae) at Davis, California in November of 1960 by the authors. Fourteen male and sixteen female specimens of R. f. scutellaris emerged from the series of nests. One of the cells was occupied by a female of Pyria inaequidens (Dahlbom). The chrysidid was in the bottom cell of a two cell series.

Bodenstein1 lists no host for P. inaequidens and apparently this is the first known host record. The authors are indebted to R. M. Bohart for the identification of the wasps.—C. G. Moore and F. D. Parker, University of California, Davis.

NEW STONEFLIES AND RECORDS FROM THE PACIFIC COAST OF THE UNITED STATES

STANLEY G. JEWETT, JR.

Portland, Oregon

Since publication of my two papers (Jewett, 1959, 1960) covering the Pacific Coast stoneflies, new distributional and taxonomic data have been accumulated. This paper includes such information for fifteen species, five of which are described as new.

I very much appreciate the kindness of the following individuals for sending material for study: Miss Hilary A. Hacker, of San Francisco, Mr. Hugh B. Leech, California Academy of Sciences, and Dr. Dana L. Abell, Dartmouth College.

Financial support for the research upon which this paper is based came from the National Science Foundation (grant NSF-G12858).

The material recorded is in my collection (SGJ) or that of the California Academy of Sciences (CAS).

Nemoura cornuta Claassen

This species, common British Columbia and Oregon, is added to the known Californian stonefly fauna with the following record: Shasta Springs, head of Sacramento River, Siskiyou County, June 24, 1960, S. G. Jewett, Jr., 1 male, 4 females (CAS).

Leuctra purcellana Neave

The following record extends the range of this species from British Columbia to northeastern Oregon: Wallowa River above Wallowa Lake, Wallowa County, May 31, 1960, S. G. Jewett, Jr., female (SGJ).

Capnia confusa Claassen

This species, common in the Rocky Mountains from Alberta to Wyoming, is now recorded from Oregon: Pine Creek, near Halfway, Baker County, March 12, 1961, S. G. Jewett, Jr., 4 males, 2 females (SGJ).

Capnia disala Jewett, new species

Female.—Length of body (female holotype) 5.5 mm. Similar in general morphological features, including sternal sclerotization, to most other species in genus except aterous. Body and appendages heavily sclerotized, dark brown on upper surfaces, lighter below. Broad, unsclerotized stripe across tergites 2 through 8. Posterior portion of eighth sternite modified to form well-sclerotized broad subgenital plate, Figure 1, that occupies about $\frac{3}{4}$
width of sternite and extends beyond lateral borders. Ninth sternite unmodified and heavily sclerotized.


This species is distinguished from other described members of the genus by the combination of the shape of the female subgenital plate and in being apterous. Apparently it is unique also in having complete sclerotization of the first abdominal tergite.

**Capnia ensicala** Jewett, new species

- **Male.**—Length of body (male holotype) 6.5 mm. Similar in general morphological features, including sternal sclerotization, to most other species in the genus except that it is apterous. Body and appendages heavily sclerotized, dark brown on upper surfaces, lighter below. First eight abdominal segments without special modification; ninth sternite without lobe; no humps or knobs on any tergites; medially shallow, lightly-sclerotized groove across tergites 8 and 9. Supra-anal process, Figure 2, reflexed, long, pointed, rather heavily built, and reaching to posterior border of eighth tergite, 1.3 mm. in length.

**Holotype male.**—**BOSTON HARBOR, NINE MILES NORTH OF OLYMPIA, THURSTON COUNTY, WASHINGTON**, January 3, 1959, Hilary A. Hacker.

In my key (Jewett, 1959: 43) to the males of *Capnia* occurring in the Pacific Northwest, this species would go to *zukeli* Hanson from which it differs in being apterous and in having a more heavily built supra-anal process.

While searching for Carabid beetles Miss Hacker found this and the foregoing species crawling near the edge of small streams.

**Pteronarcella badia** (Hagen)

This species, common in the Rocky Mountains, is added to the known stonefly fauna of the Pacific Northwest with the following records: Mouth of North Pine Creek, near Halfway, Baker County, Oregon, May 11-14, 1959, S. G. Jewett, Jr., 2 males, 3 females (SGJ). Near mouth, Wildhorse River, Adams County, Idaho, May 26, 1959, S. G. Jewett, Jr., 2 males, 3 females, 5 exuviae (SGJ).

**Arcynopteryx picticeps** Hanson

Previously known from British Columbia and Oregon, this species is now recorded for central California: Lee Vining, Mono

**Explanation of Figures**

Fig. 1, *Capnia disala* Jewett, subgenital plate of holotype female. Fig. 2, *Capnia ensicala* Jewett, male genitalia of holotype, lateral view. Fig. 3,
Isoperla acula Jewett, head and pronotum; 3A, eighth sternite of male; 3B, subanal lobe of male. Fig. 4, Isoperla adunca Jewett, eighth sternite of male; 4A, subanal lobe of male; 4B, aedeagal structure; 4C, subgenital plate of female. Fig. 5, Isoperla rainiera Jewett, subgenital plate of female. Fig. 6, Alloperla pastina Jewett, head; 6A, male genitalia, lateral view; 6B, dorsal view of tip of supra-anal process; 6C, subgenital plate of female.
County, June 1, 1936, Harry P. Chandler, female (CAS).

Rickeresa sorpta (Needham and Claassen), new combination
1952. Isogenus sorpta, Ricker, p. 131.

Study of additional material of Rickera venusta indicates that it is a synonym of Perla sorpta Needham and Claassen. Dr. William E. Ricker kindly compared Oregon material in my collection with the type of sorpta and agrees that it is conspecific. In Ricker's illustrations for this species (1952: 129), the head pattern is similar to specimens which I have examined, but the broad central stripe of the prothorax is normally of the same yellow color as the head. Female specimens which I have studied have subgenital plates like that illustrated by Needham and Claassen (1925: 341) for the type of sorpta.

**Isogenus (Isogenoides) Frontalis Colubrinus Hagen**

As anticipated, this species, common to the northward, has now been taken in California: Bank of Sacramento River, near Red Bluff, Tehama County, April 12, 1960, S. G. Jewett, Jr., male, 11 exuviae (CAS).

**Isogenus (Cultus) Pilatus (Frison)**

Another species, common from British Columbia to southern Oregon, is now known to occur in California: American River, at Kyburz, El Dorado County, June 19, 1960, S. G. Jewett, Jr., male (CAS); Richardson Springs, Glenn County, April 4, 1957, S. G. Jewett, Jr., female (CAS); Truckee, Nevada County, June 19, 1927, Helen Van Duzee, 2 females (CAS).

**Isoperla acula** Jewett, new species

Male:—Length of wing tips 12 mm. Length of body 10 mm. General color brownish yellow with distinctive head and pronotal color pattern, (Fig. 3A). Median posterior area of ninth tergite with patch of short bristles. Subanal lobes reflexed, long, cylindrical, sharply pointed, (Fig. 3B). Aedeagus with longitudinal, apparently cylindrical sclerotized structure that is difficult to observe because of light pigmentation.

*Holotype male* and two paratype males.—Dry Creek, Seven Miles Northeast of Academy, Elevation 800 Feet, Fresno County, California, April 19, 1955, D. L. Abell. An additional male paratype with the same data except April 16, 1955. Holotype
deposited in the collection of the California Academy of Sciences, paratypes in my collection.

This species differs from described members of the genus in the combination of the head and pronotal color pattern, the shape and sclerotization of the lobe on the eighth sternite, and in other details of the male genitalia. The subanal lobes are similar to those of *Isoperla marmorata* (Needham and Claassen), but the species is readily differentiated by the wholly hyaline wings.

**Isoperla adunca** Jewett, new species

General color of body, appendages, and wings yellow brown, abdomen lighter. Head and pronotum without distinctive pattern, generally pigmented brown, darkest in ocellar area. Wings uniformly brownish.

**Male.**—Length to wing tips 9-10 mm. Length of body 8-9.5 mm. Eighth sternite with distinctive lobe, (Fig. 4), similar to that of *Isoperla denningi* Jewett. Hairs on tergites 8 and 9 unmodified. Subanal lobes strongly reflexed, blunt tips cylindrical, almost curled. Aedeagus with small distinctive sclerotized process, (Fig. 4B), less than 0.3 mm. in length.

**Female.**—Length to wing tips 9-10.5 mm. Length of body 8-9.5 mm. Similar to male in general features, somewhat larger. Subgenital plate, (Fig. 4C), extended about length of eighth sternite, well sclerotized, distal border broadly notched. Sternites 9 and 10 conspicuously less sclerotized than eighth.

**Holotype male**, allotype female and 4 male and 7 female paratypes, **FIVE MILES EAST OF MT. HAMILTON, SANTA CLARA COUNTY, CALIFORNIA, MAY 31, 1949**. An additional male specimen, not included in the type series, has the following data: Trail, Jackson County, Oregon, July 2, 1941, RMY. Holotype, allotype, and paratypes in the collection of the California Academy of Sciences, paratypes in my collection.

**Isoperla rainiera** Jewett

This species occurs commonly in a small stream near timberline on Mt. Hood, Oregon, where I have taken a series of both sexes and the nymphs.

The female may be described as follows: Similar in color and other morphological features to the male, but somewhat larger in size. The subgenital plate (Fig. 5) is extended about half the length of sternite 8, evenly rounded.


This species is close in appearance to *Isoperla sordida* Banks, both usually being quite dark with the interocellar area blackish.
The last two abdominal segments of fresh material of *sordida* is yellowish, of *rainiera*, brownish like the other segments. The subgenital plates of the females are similar but that of *rainiera* is longer.

**Utaperla sopladora** Ricker  
This rarely-collected but rather widespread species is now recorded from Oregon: Pine Creek, near Halfway, Baker County, May 27, 1959, S. G. Jewett, Jr., male (SGJ).

**Alloperla (Sweltsa) pastina** Jewett, new species  
General color yellow brown. Head, (Fig. 6), with distinctive dark pattern, a large dark area occupying the ocellar area and extending anteriorly across most of clypeus. Pronotum margined in black and with many dark rugosities. Abdomen with dorsal stripe medially on tergites 1 through 9. Body with considerable brown pigment, especially appendages.  
*Male.*—Length to wing tips 8.5 mm. Length of body 7 mm. Supra-anal process arising from deep groove in tenth tergite, strongly reflexed, thin in lateral view, tip broad, flattened horizontally, forming pair of stubby horns distally, (Fig. 6A and 6B). Terminal tergites without knobs.  
*Female.*—Length to wing tips 8 mm. Length of body 6 mm. Subgenital plate, (Fig. 6C), produced medially to narrow, rounded tip, distinctly sclerotized, rather heart-shaped with small triangular sclerotized area either side basally.

**Holotype male** and two paratype males, **Savage Rapids Dam, near Grants Pass, Josephine County, Oregon, May 4, 1959, S. G. Jewett, Jr. Allotype female and paratype female, near mouth of Rogue River, Curry County, July 3, 1949, S. G. Jewett, Jr. Holotype and allotype deposited in collection of the California Academy of Sciences, paratypes in my collection.**

This species differs from other described members of the genus in the distinctive head pattern and in details of the genitalia of each sex.

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**Ricker, W. E.**  
NOTES ON THE DISTRIBUTIONS OF SOME BUMBLEBEES OF WESTERN NORTH AMERICA
(Hymenoptera: Apidae)

Robbin W. Thorp
University of California, Berkeley

In recent research on some western species of bumblebees, I have found a number of geographic records which contribute significantly to the distributional knowledge of these species as summarized by Stephen (1957). These include the first California, Nevada and New Mexico records of Bombus (Pryobombus) sylvicola Kirby, the first California records of B. (Alpinobombus) balteatus Dahlbom, and confirmation of the occurrence of B. (Callumanobombus) rufocinctus var. henshawi Franklin in the San Francisco Bay Area.

Bombus (Pryobombus) sylvicola Kirby

The distribution of B. sylvicola is listed by Burks (1951: 1252) as Pacific Coast, Oregon to Alaska; Rocky Mountain States, south to Colorado, Canada. The varieties of B. sylvicola and their distributions are listed by that author as: var. gelidus, Alaska; var. johanseni, North West Territories, Baffin Island; var. sculleni, Oregon; and var. lutzi, Arizona.

Stephen (1957: 127) states: “Before me is a long series of queens from the higher elevations of eastern California, determined as sylvicola and bearing striking resemblance to that species. The absence of males prevents a positive species association, but on the basis of the known range of sylvicola it is very unlikely that these females belong to that species. It appears that sylvicola is strictly a Boreal form and is sparingly distributed along the Cascades as far south as Three Sisters, Oregon.” I have examined this material through the kindness of Dr. Stephen and have also studied several other collections from California which include males, thus allowing me to make a positive assignment of these specimens to the species sylvicola. Material examined is from the following localities:


Fresno Co.: Sixty-Lake Basin, 10,000 ft., 1 ♀, VIII-29-44 (E. I. Schlinger, W.P.S.).

1 The abbreviations for the collections are as follows: California Academy of Sciences, San Francisco (C.A.S.); California Department of Agriculture, Sacramento (C.D.A.); California Insect Survey, University of California, Berkeley (C.I.S.); R. W. Thorp, Berkeley; (R.W.T.) University of California, Davis (U.C.D.); and W. P. Stephen, Oregon State, Corvallis (W.P.S.). Specimens without these abbreviations are in the possession of their collectors.


SHASTA Co.: Hat Lake, Lassen Nat. Park, 1 ø, VI-14-41 (P. D. Hurd, W.P.S.).


TUOLUMNE Co.: Bird Lake, 3 ø, VII-21-32 (Isabel McCracken, C.A.S.).


I have also examined a worker of this species collected at
Truchas Peaks, Mora County, New Mexico, VIII-2-03 (W. P. Cockerell), in the collection of the Illinois State Natural History Survey, and I have two workers from Nevada as follows:


The above cited specimens exhibit variation in colorational pattern. In the populations from the central Sierra Nevada there is a tendency for replacement of the reddish hairs on the second and third metasomal terga by black hairs. Some males in these populations lack reddish hairs on these terga and phenotypically resemble males of *B. bifarius nearcticus* Handlirsch, which occur in many localities with *B. sylvicola*. However, males of these two species may be readily distinguished by genitalic characters (Stephen, 1957). The females usually have some reddish hairs, at least on the apico-lateral margins of the second metasomal tergum. The reddish hairs on specimens from the Sierra Nevada populations vary from a bright orange-red to a dark ferruginous.

The workers and queens from the White Mountains of California and the workers from the Ruby Mountains of Nevada possess bright reddish hairs on the second and third metasomal terga and thus more closely resemble specimens from the Rocky Mountains of Colorado, than they do the Sierra Nevada populations.

All of the specimens I have seen from the principal cordilleran systems of the western United States (Sierra Nevada, Great Basin Mountains and Rocky Mountains) have shorter and less shaggy pile than specimens from Point Barrow, Alaska and Fort Churchill, Manitoba.

The correct taxonomic status of *B. sylvicola* has not been satisfactorily determined. For convenience, I am following the consensus of American workers over the past 50 years in calling this species *B. sylvicola*. Many European authors consider *B. sylvicola* to be a color form, race or subspecies of the Palaearctic *B. lapponicus* Fabricius (Friese, 1902; Skorikov, 1937; Pittioni, 1942, 1943 and Lindroth, 1957). Consequently, these European authors accord *B. lapponicus* a circumpolar distribution.

**Bombus (Alpinobombus) balteatus** Dahlbom

The North American distribution of *B. balteatus* is listed by Burks (1951: 1253) as Rocky Mountain States, Canada and Alaska, with the varieties *arizonensis* and *alexanderi* occurring in Arizona. Franklin (1913) records this species from Truchas Peak,
New Mexico, and I have examined a male from this locality in the collection of the Illinois State Natural History Survey, collected on August 2, 1903 by W. P. Cockerell. Richards (1927) in a review of the subgenus *Alpinobombus* also records this species from Greenland, Norway, Lapland, Novaya Semlya, and Kareginski Is., Kamchatka. However, Pittioni (1942) says that the Greenland and Novaya Semlya records pertain to *B. arcticus* Kirby and not to *B. balteatus*. The lists of color forms and synonymies for this circumpolar species are extremely long and complex (Friese & Wagner, 1912; Richards, 1927; Pittioni, 1942) and will require thorough evaluation before the relationships of this and other species of the subgenus *Alpinobombus* are understood.

Dr. W. P. Stephen has informed me in personal correspondence that he did not include *B. balteatus* in his paper (Stephen, 1957) because “all of the *balteatus* I have or have examined, occur from middle British Columbia into the Arctic Tundra.”

California specimens of this species were found to be extremely rare in collections; I have seen only seven specimens as follows:


The males were identified by means of the genitalic characters figured by Richards (1927). The slight color variation which exists among the above cited specimens seems to reflect age and wear rather than phenotypic variation.

**Bomhus (Cullumanobombus) rufocinctus var. henshawi** Franklin

Franklin (1913) originally described *B. henshawi* from two queen cotypes, one from San Francisco and one from Palo Alto, California. He stated at that time “This species is very closely allied to *B. rufocinctus* Cress., and it possible that extensive collecting will show that it should be considered either a subspecies or a color variant of that species.” Burks (1951: 1248), working from manuscript notes of T. H. Frison, synonymized *henshawi* as a color variety of *rufocinctus*. However, Stephen (1957) says: “The broad gap between known California records of *rufocinctus* and *henshawi*, and the fact that extensive collecting in the Bay
Area has not produced any specimens resembling *rufocinctus* or *henshawi*, make me somewhat skeptical of Frison's synonymy, *rufocinctus var. henshawi*.”

I have seen many males, workers and some queens of *rufocinctus* which were recently collected in the San Francisco Bay Area. Although I have not been able to study the cotype queens of *henshawi*, in spite of an intensive search for the one deposited at Stanford University, several of the queens before me fit the description given by Franklin (1913). The queen of *henshawi* is distinct from other color variants of *rufocinctus* in that it lacks yellow pubescence on the first and second metasomal terga. Of the seven queens examined, three possess some yellow pubescence on these terga, and four are typical *B. henshawi* Franklin. Among the workers only one specimen fits the typical *henshawi* color pattern. The other worker specimens exhibit the typical color pattern of *rufocinctus* as redescribed by Franklin (1913). The males from the Bay Area population show much variation in color, fitting the color variants 1, 5 and 8 described by Franklin (1913).

*Bombus rufocinctus* Cresson exhibits polychromatic variation throughout its geographic range. Several color forms may be found in one nest (Stephen, 1957). The range of color variation evident in the Bay Area specimens together with their morphological agreement with other color forms of *B. rufocinctus* lead me to accept Frison’s synonymy of *B. rufocinctus var. henshawi*. The collection data for the material I have examined are:


Discussion.—*B. balleatus* and *B. sylvicola* have been considered as typically boreal species by most authors and the additional records I have found in California, Nevada and New Mexico also support this idea. However, varieties of both of these species have been described by Frison (1923) from the Patagonia Mountains, Arizona. I have studied the types of *B. sylvicola var. lutzi* (Frison), and agree with Frison as to their species assignments. I also concur with his statement that males are needed to decide definitely the taxonomic status of these “varieties.” The Patagonia Mountain area contains other apparently incongruous species representa-
tives in other insect groups (Dr. P. D. Hurd, Jr., *in litt.*) and is in need of further investigation.

It has been my experience that *B. sylvicola* and *B. balteatus*, although belonging to different subgenera, have similar distributional patterns and the two have been collected together at many localities, especially in the United States. This is probably due to the similarity in the ecological requirements of the two species. Lutz and Cockerell (1920) have reviewed the North American distributions of these species and additional records may be found in Buckell (1951), Frison (1926, 1929), Henriksen (1937) and Neave (1933). For Palaearctic records see the references to European authors under the species headings.

Frison (1923) advanced the hypothesis that *B. sylvicola* at least “probably occurs in most of the high mountain ranges of the western United States.” The new records listed above give support to this hypothesis and show that it also pertains to *B. balteatus*. However, there exist many distributional gaps for these two species in California, Oregon, Nevada and Washington. Doubtless, their rarity at some localities is due to the lack of extensive collecting in the higher elevations of these states. Collections, particularly of males, in these areas and in Arizona will prove very useful in solving the apparent distributional complexities of these species. There is also a need for a comparative morphological and colorational study of the evident variations throughout the geographic ranges of these species. This should help to determine the correct taxonomic positions of the numerous variations. However, this will not be practical until large series, especially nest samples, from many areas, are available. Also needed is a comparative study of the biologies of widely separated populations (Alaskan vs. Arizonan, Sierran vs. Rocky Mountain, and Nearctic vs. Palaearctic) in order to understand something of the evolution within these species.

Similarly, extensive nest studies are needed on *B. rufocinctus* Cresson throughout its range to determine the basis of the polychromatic variability in this species, which may be due to simple genetic alleles (Stephen, 1957), environmental influences (e. g. temperature and moisture), or a more complex pattern involving both of these possibilities.

Acknowledgments.—I wish to thank Dr. W. E. Ferguson, whose material initiated this study; the following people for the loan of specimens from the collections which follow their names, Dr.
C. D. MacNeill (California Academy of Sciences), Mr. A. T. McClay (University of California, Davis), Dr. J. Powell (California Insect Survey, University of California, Berkeley), Dr. M. S. Wasbauer (California Department of Agriculture) and Dr. W. P. Stephen for the loan of material in his possession; the numerous individuals who gave or loaned specimens from their private collections; and Mrs. L. K. Gloyd, for permission to examine the Frison types and other material in the collection of the Illinois State Natural History Survey.

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Stephen, W. P.

BOOK NOTICES


An erudite treatment of a difficult group, for a region previously without a major work on the subject. There is a list of the aphids of the Middle East, two pages of definitions of the (many specialized) terms in aphid morphology, physiology and ecology, and over 150 pages of detailed ecological treatment. The keys to families, genera and species, with related figures, comprise pp. 179-241, and are followed by a valuable annotated systematic list of the species (245-332) and a list of host plants (335-350).


A strongly bound and well printed book with over 2,000 entries covering 18 orders of insects and 26 orders of birds, from the literature of the past 150 years. Pages 17-330 cover the entomological check-list, pages 331-594 the ornithological, and there is a 78 page bibliography. Entries are alphabetical in each of the two classes, from ordinal names down. Undetermined insects and nests have separate listings.


A popularized retelling, in dramatic and at times anthropomorphic language, of the activities of some interesting insects and spiders.—Huch B. Leech, California Academy of Sciences, San Francisco.
A NEW SPECIES OF TRIPLAX FROM ARIZONA
(Coleoptera: Erotylidae)

W. WAYNE BOYLE

Pennsylvania State University, University Park

The following new species belongs with those in species group thoracica that have the elytra distinctly margined basally. It is apparently more closely related to wehrlei than any other Nearctic species and may be placed immediately thereafter in the putative phylogenetic sequence of species in the author's revision (Boyle, 1956). The more obvious diagnostic characters of thompsoni are as follows: It differs from a) wehrlei in having the mesothorax and metathorax entirely black and the dorsal pubescence less distinct, b) flavicollis in having the outer edges of the postmandibular lobes straighter and more parallel and in geographical range, c) both these species in having much coarser cephalic and pronotal punctures, d) mesosternalis in having the mesothorax entirely piceous or black and the prothorax entirely reddish yellow or ferruginous, e) all three of the preceding in having shorter antennae with the club abruptly three segmented, and f) other Nearctic species of similar color pattern in having the elytra basally margined. In the author's key to Nearctic species of Triplax (op. cit., p. 100), thompsoni keys out to flavicollis, from which it can be distinguished as noted above.

Triplax thompsoni is apparently another of the several species of Erotylidae that are basically Neotropical but range as far north as Arizona. In the genus Triplax alone, this appears to be true for two other species—marcescens and wehrlei (three, if one includes mesosternalis, which is known also from Colorado, New Mexico and Kansas). This description of thompsoni brings to nineteen the total number of known Triplax species for America north of Mexico.

Triplax thompsoni Boyle, new species

Color piceous to black, the following reddish yellow to ferruginous: head, prothorax, and appendages except antennal clubs, which tend to be fusco-piceous, and hind coxae. Head and pronotum coarsely punctured, latter somewhat less densely so; each puncture bearing a tiny but distinct seta that slightly exceeds the puncture. Pronotum widest before base, sides arcuately convergent anteriorly. Elytra margined basally (i.e., with subbasal striae), somewhat more strongly nitidous that rest of body, striae rather deeply impressed and formed of coarse punctures, intervals distinctly punc-

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1 Authorized for publication on July 24, 1961 as paper No. 2382 in the journal series of the Pennsylvania Agricultural Experiment Station.
tulate. Antennae short, scarcely longer than half the width of pronotal base, club three segmented. Postmandibular lobes with outer edges essentially straight and parallel to feebly divergent posteriorly, undersid of head otherwise similar to that of wehrlei (Boyle, 1956, fig. 84).

*Measurements of type (in mm.):* length, 3.04; maximum pronotal width, 1.41.

*Variation:* The observed size range, in millimeters, is 2.82 long by 1.35 maximum pronotal width (female paratype) to 3.38 long by 1.63 maximum pronotal width (the other female paratype).

*Male genitalia:* The distinctive lyre-shaped anterior end of the internal sac of the holotype is shown in figure 1. This structure, as is usual for Triplax species, bears scant resemblance to that of any other species (cf. Boyle, 1956, figs. 88-99).

![Fig. 1. Triplax thompsoni Boyle, holotype male: anterior end of internal sac, antero-dorsal view.](image)

*Holotype male,* labelled "CAVE CREEK CANYON, CHIRICAHUA MTS., ARIZONA, 23-VIII-1959, W. W. Boyle, 5400 ft; Holotype Triplax thompsoni Boyle."—John Hands Picnic Ground, Cave Creek Canyon, Chiricahua Mountains, Cochise County, Arizona. The type (to be deposited in the United States National Museum) and paratypes were all taken on a small white gill fungus growing on fallen oak limbs.

Two female paratypes labelled "25 mi. E. Payson [Gila County, near Kohls Ranch], Arizona, 2-VIII-1959, W. W. Boyle, 6500 ft." are in the author’s collection.

This species is nominally dedicated to Mr. D. Wayne Thompson, close friend and camping companion of the author.

**Literature Cited**

Boyle, W. Wayne

NOTES AND DESCRIPTION OF THE PREVIOUSLY UNKNOWN MALE OF SIREX LONGICAUDA
MIDDLEKAUFF
(Hymenoptera: Siricidae)
WOODROW W. MIDDLEKAUFF
University of California, Berkeley

When Sirex longicauda was first described (Middlekauff, 1948), no male was available. It has remained unknown until a recent series of collections by R. C. Hall have made possible the association of reared males and females.

A number of extensive forest fires in the Sierra Nevada of California during three successive years (1959, 1960, 1961) have left behind thousands of acres of fire-killed and damaged timber. The Camptonville and Foresthill burns in 1959 and the Truckee burn in 1960 each destroyed an estimated 6 to 8 million board feet. It has also been estimated that, as a consequence, the Tahoe National Forest has lost ten per cent of its merchantable timber volume.

The proclivity of female siricids to oviposit in such dead and injured trees, plus the nearly contiguous burns in the Tahoe National Forest, have resulted in heavy outbreaks of these insects. Much of this timber is salvagable and usable for certain types of construction but the low unit value precludes the somewhat expensive kiln drying process which would kill any siricids present. Bulk fumigation under tarpaulins or in boxcars has not been effective. The presence of these insects in fire-salvaged timber has had serious and far reaching repercussions from mill owners, contractors and home owners. The entire salvage operation is threatened as a consequence. Lumber from these salvage trees is frequently used in home construction for such things as studs, joists and subflooring. The larvae contained in this lumber complete their life cycle and frequently emerge a year or so after the home has been completed. The consternation of the home owner who discovers these large insects emerging through plaster or panel walls, hardwood floors, linoleum or wall-to-wall carpeting can easily be imagined. The powerful mandibles of the adults permit them to cut through very hard materials during emergence.

SIREX LONGICAUDA Middlekauff

Male.—Foresthill, Placer County, California, X-3-61 from fire-salvaged

1 Regional Office, U.S. Forest Service, San Francisco.
Abies concolor (coll. R. C. Hall, C.I.S.). Length 30 mm. Antennae, head, thorax, abdominal segments I, II and VIII entirely, a large triangular area on segment III, a small elongate streak on midline of dorsal segments IV-VII, hind legs except last two tarsal segments, femora, tibiae and tarsi of fore and mid legs, iridescent bluish-black. Remainder of abdomen and legs reddish brown. Apex of fore and hind wings with a distinct, infuscated band.

Several other males lack the dark, elongate spots on the abdomen.

The reddish brown tibiae and tarsi of the fore and mid legs will serve to separate males of longicauda from those of areolatus. Males of S. behrensii have similarly colored legs but usually have the antennae basally, an indefinite area behind the eyes and the apex of the abdomen, reddish brown. The distinct, infuscated band around the apex of the wings, the dark fore and mid femora and apex of abdomen will separate longicauda from cyaneus.

Specimens described are in the collections of the California Insect Survey, Pacific Southwest Forest and Range Experiment Station (Berkeley) and of the author.

California records, in addition to those already reported (Middlekauff 1948, 1960), are as follows:

Nevada Co.: Nevada City, 2 ♂, 4 ♀ ♀, IX-20-61, Abies concolor (R. C. Hall); 4 mi. NE Nevada City, 4 ♀ ♀, X-14-61 (D. L. Wood and D. L. Dahlsten, from log decks with both white and red fir present); Truckee, 1 ♂, X-12-61, Abies magnifica (R. C. Hall).

Placer Co.: Volcano burn, Tahoe National Forest, near Foresthill, 16 ♀ ♀, 2 ♂ ♀, X-3-61, Abies concolor (R. C. Hall); 4 ♀ ♀, IX-22-61, Abies concolor (R. C. Hall).

Yuba Co.: Camptonville, Sierra Mountain Mills, 2 ♂ ♀, X-9-61, from logs of Abies concolor (R. C. Hall).

The Hall specimens all emerged or were removed from fire-salvaged white fir timber or boards.

A considerable number of adult females were reported by Dr. David L. Wood² ovipositing on the shady side of red and white fir logs stacked in the lumber mill yards in Nevada City. No females were ovipositing on the sunny side, nor were they seen ovipositing in cut lumber.

**Literature Cited**

**Middlekauff, Woodrow W.**


² Department of Entomology and Parasitology, University of California, Berkeley.
NEW TRICHOPTERA

D. G. Denning
Moraga, California

Recent examination of caddis fly collections from various parts of North America has revealed several new and interesting species. Six of these new species have been selected for descriptions in this paper. Five of these species, one Chimarra, two Limnephilus and two Lepidostoma represent additions to the already large number of Trichoptera known to occur in western North America. Types are either in the collection of the writer or the California Academy of Sciences.

Grateful acknowledgment is made to Dr. Oliver S. Flint, Smithsonian Institution, U. S. National Museum, who furnished me with a seventh species, Lepidostoma bispinosa (Ulmer), so that it could be compared to a closely related species described herein.

Genus Chimarra Stephens

The genus Chimarra is abundant and widespread with a large number of species known from the tropical and subtropical regions of the world. Twenty-five species are now known to occur in Mexico, the West Indies, and the United States. The number of North American species will increase as more collections become available from Mexico and Latin America.

Chimarra butleri Denning, new species

Although a member of the aterrima group, C. butleri bears very little resemblance to other described species. Distinguishing characters are confined to the clasper, the tenth tergite and the ninth tergum of the male genitalia.

Male.—Length 6-8 mm. Head, body, antenna and appendages uniformly dark brown. Wings dark, pubescence of head and thorax brownish. Palpi dark brown, second segment bearing a tuft of long black setae. Spurs 1-4-4. Genitalia as in fig. 1. Ninth segment with ventral portion slightly wider than remainder, mesal triangular projection not pronounced; dorsal portion narrow, projecting caudad beyond remainder of segment, widely separated on dorsum (fig. 1C). Clasper with base narrow; from lateral aspect, fig. 1A, ventral margin broadly arcuate, apex sub-triangular, dorsal portion truncate; viewed from caudo-ventral aspect fig. 1B, ventral margin dentate, heavily sclerotized. Tenth tergite, lateral aspect, somewhat quadrangular, lightly sclerotized, rounded and narrowed apically; viewed dorsally, fig. 1C, dorsum membranous, lateral lobes narrow, terminating in an acute apex. Aedeagus tubular, a pair of dark sclerotized slender rods present in main body which project beyond tenth tergite plates.

Female.—Length 7 mm. Color and general structure very similar to male. As is characteristic in the genus, genitalic characters are apparently not
sufficient to distinguish this species from other described species.

It is with pleasure that this Chimarra is named in honor of Dr. G. D. Butler, University of Arizona Entomologist who collected this interesting species.

*Holotype male, Kings Canyon National Park, California, Sheep Creek Campground, June 18, 1953, G. D. Butler. Allotype female, same data as for holotype. Paratypes males and females (14♂️♂️, 2♀♀), same data as for holotype. The holotype and allotype are in the collection of the California Academy of Sciences, San Francisco, California.*

**Genus Limnephilus Leach**

Schmid and other workers have proposed the division of *Limnephilus* into: *Anabolia*, *Asynarchus*, *Lenarchus* and *Lenarchulus*. At present, this has not received wide acceptance among the North American workers. Regardless of the future placement of well over 100 species now ascribed to *Limnephilus*, the two species described here are typical members of that genus.

**Limnephilus peltus** Denning, new species

This species belong to the *moestus* group, as shown by the long blade-like clasper and tenth tergite. Within this group, which now consists of seven western species, it bears closest resemblance to *moestus* Banks. The narrower cercus and the basal projection of the tenth tergite will quickly differentiate *peltus* from *moestus* and other related species.

**Male.**—Length 13.15 mm. Color of head, body and appendage yellowish. Fore wings yellowish with irregular dark markings at stigma and near apex. Front basitarsus almost one and one-half times length of second segment. Eighth tergite simple, similar to seventh. Genitalia as in fig. 2. Ninth segment produced dorsad into a high, very narrow bridge; lateral portion merges imperceptibly with clasper. Clasper short, incised distally to form a dorsal digitate-like lobe and a ventral lobe bearing 4-5 long setae. Cercus narrow and long, longer than tenth tergite; mesal surface heavily sclerotized, slightly concave. Tenth tergite lobes massive; a prominent apically circular, protuberance arises from near base which is barely visible from lateral aspect but plainly discernible from dorsal aspect (fig. 2B), or ventral aspect (fig. 2C); viewed laterally, fig. 2A, attenuated distally to an acute apex; distal margin dark, heavily sclerotized. Aedeagus with lateral arm narrowed distally, apical portion angled sharply dorsad.

**Female.**—Length 12.14 mm. General color and structure similar to male. Genitalia (fig. 2D) with cercus long and narrow; tubular tenth tergite narrowly excised, dorsum projecting caudad beyond remainder. Ninth sternum with long narrow digitate protuberance projecting directly caudad beyond remainder.
EXPLANATION OF FIGURES

Fig. 1, *Chimarra butleri*, male genitalia; 1A, lateral aspect; 1B, clasper, caudo-ventral aspect; 1C, tenth tergite, dorsal aspect. Fig. 2, *Limnephilus peltus*, male genitalia; 2A, lateral aspect; 2B, tenth tergite, dorsal aspect; 2C, tenth tergite, ventral aspect; 2D, female genitalia, lateral aspect. Fig. 3, *Lemnephilus tulatus*, male genitalia; Fig. 3A, lateral aspect; 3B, aedeagus, lateral aspect; 3C, female genitalia, lateral aspect. Fig. 4, *Lepidostoma alexanderi*, male genitalia; Fig. 4A, lateral aspect; 4B, tenth tergite, dorsal aspect; 4C, female genitalia, spermatheca and subpenial plate. Fig. 5, *Lepidostoma leechi*, male genitalia; 5A, lateral aspect; 5B, first antennal segment; 5C, tenth tergite, dorsal aspect. Fig. 6, *Lepidostoma acarola*, male genitalia; 6A, lateral aspect; 6B, tenth tergite, dorsal aspect. Fig. 7, *Lepidostoma bispinosa*, male genitalia; 7A, lateral aspect; 7B, clasper ventral aspect; 7C, tenth tergite, dorsal aspect.
Holotype male, Sequoia National Park, California, June 15, 1953, G. D. Butler. Allotype female, same data as for holotype. Paratypes (9♂♂♂; 4♀♀) same data as the holotype; one male, Lassen National Park, California, July 27, 1959, C. P. Alexander. Holotype and allotype deposited in the collection of the California Academy of Sciences, San Francisco, California.

Limnephilus tulatus Denning, new species

This species is closely related to lithus (Milne), a species which has had no other known close relative. L. lithus is known to occur in South Dakota, Texas and the Rocky Mountain area of Colorado, at the present time L. tulatus is known to occur in the arid southern portion of Arizona. The narrow cercus, quadrangular tenth tergite and the slender finger-like process of the clasper will readily separate this species from lithus.

Male.—Length 17 mm. Color of head, body and appendages rufus, wings brownish and darkly irrorate. Front legs with basitarsus about one-third length of second tarsal segment, the mesal surface of femur bearing a linear row of black spinules opposing the tibia. Eighth tergite with an apico-mesal cushion of minute spines. Genitalia as in fig. 3. Ninth segment robust, produced dorsad into a narrow bridge, ventral margin wide, merging imperceptibly with clasper. Clasper with dorsal margin projected dorso-caudad as a long slender digitate apex. Cercus with distal margin deeply emarginate, the structure thus becoming vary narrow and elongate when viewed laterally (fig. 3A) from caudal aspect mesal surface deeply concave, the meso-basal portion produced caudad into a heavily sclerotized process closely appressed to the tenth tergite lobe. Tenth tergite from lateral aspect (fig. 3A) consists of a flattened quadrangular lobe. Aedeagus (fig. 3B) apically blunt, lateral arm sclerotized and of similar width throughout.

Female.—Length 18 mm. Color and general structure similar to male. Ninth segment narrowed dorsally, ventral area broad. Cerci large, subtriangular, fused on meson. Tenth segment with dorsum projected caudad as a dark sclerotized acute process (fig. 3C).


Genus Lepidostoma Rambur

The genus is characterized by pronounced sexual dimorphism, some members of the genus displaying the most bizarre characters known in the Trichoptera. The following three new species will bring to 50 the known North American Lepidostoma. Slightly over
half the described species are known from western North America. Characteristically, many of these species appear to be local in distribution.

**Lepidostoma alexanderi** Denning, new species

This species is a member of the unicolor group of *Lepidostoma*, the predominant group in the genus. It may readily be distinguished from other described *Lepidostoma* by the serrate margin of the tenth tergite.

*Male.*—Length 8-9mm. Wings, legs, antennae rufus. Front and hind wings with no modifications. Maxillary palpus flattened, triangular, mesal surface concave and bearing whitish scales Antennal first segment with mesal surface excavated, bearing dense flattened setae and several tufts of long slender black-tipped scales, otherwise no secondary modifications. Genitalia as in fig. 4. Tenth tergite seen from dorsal aspect, fig. 4B, widely separated on meson; apices attenuated and curved slightly mesad but not confluent. Viewed laterally (fig. 4A), distal margin of tenth tergite serrate, usually with 3 to 4 well-developed teeth and terminating in a long slender dorsad curved spine. Clasper rather short, projecting slightly beyond tenth tergite, it is distinctive in that the apico-dorsal corner is developed into a digitate lobe; baso-dorsal process short and thick. Aedeagus bearing a pair of acuminate rods, closely appressed to dorsal surface of structure.

*Female.*—Length 8 mm. Genitalia as in fig. 4C. Color, size, general appearance similar to male. First antennal segment about twice length of head. No secondary modifications. Spermatheca and subgenital plate as in fig. 4C.

**Holotype made**, SOUTHWESTERN RESEARCH STATION, CHIRICAHUA MOUNTAINS, COCHISE COUNTY, ARIZONA, August 7-12, 1957, C. P. Alexander. Allotype female, same data as for holotype. Paratypes (4♂ 4♀, 1957) same data as the holotype. The Southwestern Research Station of the American Museum of Natural History is near Portal, Arizona.

This new *Lepidostoma* is named in honor of Dr. C. P. Alexander, foremost authority of Tipulidae in the world, who collected this and many other interesting specimens of Trichoptera in North America.

**Lepidostoma leechi** Denning, new species

Only a few *Lepidostoma* are presently known from Mexico. *L. leechi* belongs to the unicolor group with distinguishing characters confined to the tenth tergite and the first antennal segment.

*Male.*—Length 11 mm. Wings, legs, antennae brownish, body black. Maxillary palpus one segmented, elliptical and bearing dark setae; mesal surface concave, only the lower margin bearing a dense group of scale-like setae. First antennal segment greatly elongated, mesal margin bearing a short, thick process (fig. 5B). Spurs 2-4-4. Wing margin not reflexed and with no secondary modifications. Genitalia as in fig. 5. Tenth tergite, from lateral aspect,
with dorso-caudal margin projecting ventro-caudal as a prominent, distinct digitate process; ventral margin broadly arcuate; dorsal portion of structure clothed with sparse, short, spine-like setae. Tenth tergite, from dorsal aspect (fig. 5C), with lateral lobes separated and gradually divergent, nearly acute apically, setae short and sparse. Claspers short and stocky, terminating in a short bifid apex heavily clothed with setae; baso-lateral lobe very long, slender, the lateral lobe short and closely appressed to main body; heavily covered with long setae. Aedeagus arcuate, dorsal rods short, closely appressed to structure.

**Holotype male**, one mile west of La Marquesa, Mexico, approximately 9200 feet elevation (34 kilometers west of Mexico, D.F.), December 8, 1948, H. B. Leech. Type deposited in the collection of the California Academy of Sciences, San Francisco, California.

This species is named in honor of Hugh B. Leech, California Academy of Sciences, San Francisco, California, collector of this and many other interesting caddisflies.

**Lepidostoma acarola** Denning, new species

This species is a member of the unicolor group with distinguishing characters confined to the tenth tergite and other structures of the distinctive male genitalia. This distinctive species does not appear to be closely related to any known species.

**Male.**—Length 9 mm. Body, antennae and appendages light brown. Wings uniformly light brown except for a short black line at base of R. Maxillary palp one segmented, somewhat spatulate, bearing a dense brush of brownish setae. First antennal segment very long but not modified. Wings not reflexed and with no secondary modifications. Spurs 2-4-4. Genitalia as in fig. 6. Tenth tergite, lateral aspect (fig. 6A), separated from ninth tergum by a distinct furrow; ventral corner broadly rounded dorsad to form a prominent curved spur, near dorsal corner a short dorsad-directed spur is barely discernible. When viewed from dorsal aspect, dorsal lobes of tenth tergite (fig. 6B) slightly emarginate, the short dorsal and long ventral spurs distinctly visible. Claspers short, apex constricted distally to a truncate apex; baso-dorsal lobe with lateral lobe long and slender, appressed to dorsal margin of clasper and tapering gradually to an acute apex; dorsal lobe short and slender. A very lightly sclerotized sheath extends from the tenth tergite to the base of the claspers. Aedeagus bearing a pair of heavy flat rods, approximate most of distance, apical portion accumulate and projecting slightly beyond apex of structure.

**Female.**—Length 9-11 mm. Color and general structure identical to male. First antennal segment very long and slender, about twice the length of the head, setation rather sparse. Seventh sternite unmodified except that the apical margin is slightly emarginate. Eighth tergite unmodified, bearing one row of long yellowish setae along the apical margin on each side of the meson; sternite a wide somewhat quadrate sclerotized area. Ninth tergite
consists of a typical short fleshy lobe. To date diagnostic characters are largely lacking for the females in this group.

*Holotype male,* Coconis County, Arizona, Southwestern Research Station, five miles northwest of Portal, August 25, 1960, D. C. Rentz. Allotype female, same data as for holotype. Paratypes (1♂, 1♀) same data as the holotype. Holotype and allotype deposited in the collection of the Academy of Sciences, San Francisco, California.

**Lepidostoma bispinosa** (Ulmer)

This species is a member of the unicolor group of *Lepidostoma.* It is readily distinguished from other described species by the spines of the distal margin of the tenth tergite and the clasper. Especially in the shape of the claspers, *L. alexanderi* Denning bears closest resemblance to *bispinosa* (Ulmer).

**Male**—Length 10 mm. Wings, legs, antennae light brown. Front and hind wings with no modifications. Maxillary palpus flattened, triangular, pubescence fairly heavy. First antennal segment long but with no modifications.

Genitalia as in fig. 7. Tenth tergite, dorsal aspect (fig. 7C) with dorsal and vertical spine plainly discernible as an acute apex, mesal lobes widely separated. Tenth tergite viewed laterally, (fig. 7A) with distal margin developed into a prominent dorsal spine, curved slightly cephalad, and a strong basal spine consisting of three components. Clasper short, extending slightly beyond tenth tergite, dorsal lobe directed posteriorly as a slender digitate process; baso-dorsal process with dorsal lobe short and thick and the lateral lobe slender, truncate and closely appressed to main body; seen from ventral aspect, (fig. 7B), the meso-apical corner projects mesad as a short sub-acute lobe. Aedeagus arcuate possessing a dorsal pair of acuminate rods closely appressed to main structure.

Described from a male collected at Cayuga, Guatemala, Schaus and Barnes. The specimen was identified by Dr. Oliver S. Flint, Smithsonian Institution, U. S. National Museum, who kindly loaned it to the writer for inclusion in this paper.

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**BOOK NOTICES**


This is the third volume in a regional treatment of the immature stages of the Cerambycidae of the world. The text figures, most by Mr. Duffy, are clear and to the point; the plates illustrate chiefly larval work and pupal cells. The identification keys are grouped on pp. 12-41, and preceded by figures and explanations which enable the beginner to use them. This does
not mean that they are easy to use, for the subject is inherently difficult. There are many detailed descriptions, original or from the literature; in other cases what is known of the distribution, host plants, biology, parasites, economic importance and references is reported.


A nicely produced book; unfortunately neither the nomenclature nor the digest of literature appear to be up to date.—Hugh B. Leech, California Academy of Sciences, San Francisco.

BOOK REVIEW

CATALOGUS COLEOPTERORUM FENNOSCANDIAE ET DANIAE.


Students of Coleoptera, and especially of the geographical distribution of beetles, will appreciate this excellent geographical catalogue. The classification adopted is that of Winkler and the species are listed in tables extending over four pages capable of showing their presence or absence in 37 provinces in Norway, 31 in eastern Fennoscandia, 30 in Sweden and 3 in Denmark, as well as their presence or absence in northern Germany and the British Isles. For convenient reference the provinces are superimposed in red on a general map of the region. Thus the extra-territorial user can quickly determine the known distributional range in Scandinavia of any species in which he is interested and the local collector, because of the simple system used, can add records to his own copy with a maximum of ease.

This catalogue, like its predecessor, the 129 page Catalogus Coleopterorum Daniae et Fennoscandiae published in 1939 by the Societas pro Fauna et Flora Fennica, Helsingfors, is an international cooperative venture. Two of the collaborators, the distinguished Danish Coleopterist Victor Hansen, author of the beetle sections of Danmarks Fauna, and his Norwegian counterpart Andreas Strand, author of many taxonomic revisions, participated actively in the preparation of both editions. Both are amateurs, as is Gunnar Stenius of Finland and the two Swedish authors Oscar Sjöberg and Einer Klefbeck. Unfortunately Sjöberg died before the work was completed.

The volume has been beautifully edited by Professor Carl H. Lindroth, Zoological Institute, University, Lund, Sweden and published by the Entomological Society, Lund. Because of the special type of printing required, the costs of publication were unusually high. However, financial support was provided by the Rask-Örsted Foundation (Denmark), the State Board of Natural Science (Finland), the Norwegian Board of General Science, and the Swedish Natural Science Research Council—a model of international cooperation!—E. Gorton Linsley, University of California, Berkeley.
NEW NORTH AMERICAN TABANIDAE. XIV.

An undescribed Apatolestes from the California Coast
(Diptera)

Cornelius B. Philip1 and Wallace A. Steffan2

A male Apatolestes collected on the beach near Davenport, California, by M. T. James, was described and keyed as “sp.B” by the senior author in 1941 and keyed in 1954 as “probably n.sp.” It was not named, however, pending discovery of a female which could be associated, since that sex provides better diagnostic characters in the genus. The locality was revisited subsequently by the senior author and members of the California Academy of Sciences in the appropriate season without acquiring further specimens.

A female related to A. colei Philip and provided in a lot of Tabanidae by Dr. A. T. McClay of the University of California at Davis appears to be properly associated, and the species is here-with described as a new species. Whether this species is precinctive on the California Coast will depend on the accumulation of additional material.

Apatolestes actites* Philip and Steffan, new species

(Fig. 1)

Female.—(Holotype, 16 mm). Eyes bare, with narrow, incomplete, median green band on bronzy ground (relaxed). Post-ocular rim broad, with mostly white and a few black hairs. Front wide and strongly divergent below as in A. colei Phil., slightly wider at the lower, feebly-angled, inner corners of eyes than tall; ash-gray pollinose and with short, sparse dark and pale yellow hairs. Ocelligerous tubercle at vertex rather low, black, and with three plain ocelli; basal callosity small, rounded with a short dorsal extension, dark red, blackish on the disc. Subcallus gray pollinose, rather tall but merging imperceptibly with the frons above and cheeks below (Fig. 1 B). Face and cheeks gray pollinose, and with dense pale yellow to whitish hairs, cheeks expanded and face sunken much as in A. colei (Philip, 1954, Fig. 1 b). Antennae as in A. colei, the pale scape thicker than base of black flagellum, basal vestiture with only an occasional black hair among the white ones. Palpi a little shorter and thicker than A. colei, shaggy white hair obscuring the shallow dorsal grooves. Indefinite pinkish integumental shadows in the middle of the cheeks, narrowly along the proximal ocular margins, and on each side of the ocelligerous tubercle at vertex. Notum, including antealar tubercles and subcallus, subshiny black, with short white and black hairs, and thinly dusted with gray pollen; a narrow, incomplete mid-dorsal gray

2 University of California, Berkeley, California.
* from Latin, shore-dweller.
line. Scutellum densely white pilose on margins. Pleura and coxae ash-gray pollinose, and densely whitish pilose, with a few darker hairs above. Legs pinkish red, darker at the knees, tips of tibiae and tarsi; femora pale-haired, somewhat long and feathered below, but not as noticeably beneath the hind-tibiae as in the male; tibiae with mixed black and pale yellow short hairs; middle and hind tarsi with rust-colored spinules ventrally. Wings clear, veins yellow-brown, spur-vein at base of R₁ longer than stem, very faint clouds on crossveins and fork. Subepaulets bare. Halteres with brown stems, blackish knobs. Abdomen black, black-haired above, the incisures very narrowly paler with narrow, pale-haired fringes dorsally which widen at the sides, entirely pale-haired ventrally except for a few coarse black hairs caudally.

Male.—(14 mm.). Enlarged facets occupy about upper three-fourths of eye. Differs from holotype in the usual sexual characters and in overall shaggier-haired appearance, especially on margins of notum and scutellum and on face, palpi, femora and hind tibiae. Palpi obscured by bushy hairs, not truncated as in some species but elongate and rather pointed as in A. colei Philip.

Holotype female from Goleta, Santa Barbara County, California, 22 June 1959 (F. D. Parker) is deposited in the California Academy of Sciences. The collector and one of us (Steffan), collecting together report that the specimen was probably taken in the vicinity of the beach. The allotype is from Davenport, California (14 June 1940, M. T. James) and is in the collections of the U.S. National Museum. A female, additional to the holotype, of A. colei from Oro Grande, California, 20 June 1931, in the collection of L. L. Pechuman, agrees closely with the holotype. The
callosity is shaped like a thin upright dagger with a narrow, lateral, basal projection on each side.

Only the female of *A. colei* Philip has frons as wide as the above, from which *A. actites* would quickly separate at couplet 10 (in key, Philip, 1954) on blackish rather than hoary-gray appearance, practically unlined notum, legs reddish rather than yellow, and a larger, darker, more ovoid callosity. The males differ as keyed in couplet 23; that of *A. actites* at once distinguished by its much darker appearance; however, the cheeks are swollen to about the same degree n both. No eye stripe was revivable in *A. colei* female. In addition to being larger, the male of *A. actites* differs from that of *A. comastes* var. *fulvipes* Philip in hyaline costal cell, bushier appearance, and palpal integument not darkened.

**Literature Cited**


**RECENT LITERATURE**

(The following titles are all from the serial “University of California Publications in Entomology,” available from the University of California Press, Berkeley 4, California.)


**A TAXONOMIC AND BIOLOGICAL STUDY OF THE GENUS XYELA DALMAN IN NORTH AMERICA.** [Hymenoptera: Xyelidae]. By D. J. Burdick. 17 (3): 285-356, pl. 49, 83 text figs., 3 maps, 5 charts. February 16, 1961. $1.50.—H. B. L.
ZOOLOGICAL NOMENCLATURE

Notice of Proposed Use of Plenary Powers in Certain Cases (A. (n.s.) 50)

In accordance with a decision of the 13th International Congress of Zoology, 1948, public notice is hereby given of the possible use by the International Commission on Zoological Nomenclature of its plenary powers in connection with the following cases, full details of which will be found in Bulletin of Zoological Nomenclature, Vol. 18, Part 5 to be published on 10 November 1961:

(1) Emendation to Scatophaga of Scatophaga Meigen, 1803 (Insecta, Diptera). Z.N.(S.) 191;
(3) Validation of andersoni (Dermacentor) Stiles, 1908 (Acarina). Z.N.(S.) 260;
(4) Designation of a type-species for Dendroctonus Erichson, 1836 (Insecta, Coleoptera). Z.N.(S.) 467;
(7) Validation of germanica (Blatta) Linnaeus, 1767 (Insecta, Dictyoptera). Z.N.(S.) 680;
(8) Designation of a type-species for Xenostegium Walcott, 1924 (Trilobita). Z.N.(S.) 914;
(11) Validation of bicinctus (Crabro) Rossi, 1794 (Insecta, Hymenoptera). Z.N.(S.) 1440;
(12) Validation of Aphanus Laporte, 1833 (Insecta, Hemiptera). Z.N.(S.) 1469;
(13) Designation of a type-species for Blissus Burmeister, 1835 (Insecta, Hemiptera). Z.N.(S.) 1471;
(14) Validation of HETEROGASTRINAE Stal, 1872 (Insecta, Hemiptera). Z.N.(S.) 1474;
(15) Validation of Scolopostethus Fieber, [1860] (Insecta, Hemiptera). Z.N.(S.) 1475;

Any zoologist who wishes to comment on any of the above cases should do so in writing, and in duplicate, as soon as possible, and in any case before 10 May 1962. Each comment should bear the reference number of the case in question. Comment received early enough will be published in the Bulletin of Zoological Nomenclature. Those received too late for publication will, if received before 10 May 1962, be brought to the attention of the Commission at the time of commencement of voting.

All communications on the above subject should be addressed as follows: The Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, LONDON, S.W. 7, England.—W. E. CHINA, Assistant Secretary to the International Commission on Zoological Nomenclature.
A NEW SPECIES OF SPHECODOGASTRA ASSOCIATED WITH OENOTHERA IN EASTERN UTAH, NEW MEXICO AND WESTERN TEXAS
(Hymenoptera: Halictidae)
E. G. Linsley and J. W. MacSwain
University of California, Berkeley

Sphecodogastra Ashmead (1899) has been variously treated as a distinct genus (Mitchell, 1960), a subgenus of Halictus (Stevens, 1920) and a subgenus of Lasioglossum (Michener, 1951). The type species, Sphecodes texana Cresson (1872), collects pollen after sunset from the flowers of such Onagraceae as Oenothera (Megapterium) missouriensis, Oenothera (Anogra) spp., Oenothera (Oenothera) strigosa, Oenothera (Raimannia) rhombipetala (Graenicher, 1911; Stevens, 1920) and as a result of its nocturnal habit, females are often attracted to light. Morphologically, the species is remarkable for the enlarged ocelli which nearly fill the vertex between the summits of the compound eyes, the greatly reduced pollen collecting structures of the hind legs (which consist of a row of erect simple hairs on the trochanters, a row of erect hooked hairs on the lower margin of the femora, and loose, erect and suberect plumose hairs on the inner side of the tibia), and the ferruginous abdomen, a feature unusual in non-parasitic North American halictines.

Although Ashmead established Sphecodogastra as a monobasic genus, several other species have been subsequently added which share with S. texana one or more adaptive features associated with the collection of pollen from Onagraceae, including Halictus aberans Crawford, Halictus galpinsiæ Cockerell, Halictus lusorius Cresson, and Halictus (Evylaeus) oenotherae Stevens. However, these added species are crepuscular or matinal bees, or both, not truly nocturnal, and as pointed out by Hurd (see Linsley, 1958), they are closely related to species included in Lasioglossum, subgenus Evylaeus by Michener (1951). We prefer to see them assigned to that group, since they agree with Evylaeus in basic characters and in general facies. They also share with species in Evylaeus and most of the other subgenera of Lasioglossum a distinct lateral carina on the propodeum, which is lacking in the subgenus Sphecodogastra as here restricted.

1 The authors express appreciation to the National Science Foundation for support of research on bees associated with Onagraceae through NSF Grant G-7193.
The species described below agrees with *L. (S.) texana* in having enlarged ocelli, a simple propodeum, similarly formed scopae of the posterior legs and a ferruginous abdomen. Like *L. (S.) texana* it is a nocturnal species, flying after dark and collecting pollen from large, white flowered evening primroses (*Oenothera*).

**LasioGLOSSum (Sphecodogastra) noctivaga**
Linsley & MacSwain, new species

*Female*: Integument black, antennae, legs, tegulae, wing veins and abdomen ferruginous; pubescence white. *Head* wider than long (12:10); antennae relatively long, flagellum twice as long as scape, segments beyond the second pale rufotestaceous; ocelli very large, diameter of median ocellus equal to one-third of shortest distance between summits of compound eyes; eyes with inner margins not converging below, lower lobes more widely separated than upper lobes; vertex obscurely, finely punctate; face above antennae moderately closely, finely, deeply punctate, punctures separated by one diameter or less; supraclypeal area feebly shining, finely, not densely punctate; clypeus short, apex broad, three times as wide as distance between antennal insertions, projecting slightly less than one-third below suborbital line, surface feebly shining, finely, sparsely, irregularly punctate; mandibles elongate, slender, apex extending beyond tooth for one-third of total length, reaching to base of opposing mandible in repose. *Mesosoma* with decumbent plumose hairs near margins of terga, and longer, erect hairs otherwise; mesoscutum shining, feebly reticulate, punctures distinctly separated, irregularly spaced in discal area, denser laterally, scutellum more finely punctate, punctures denser medially and near margins; propodeum irregularly rugulose at base; wings hyaline; legs darker basally, scopae of posterior legs consisting of a row of erect simple hairs on trochanters, a row of erect and apically hooked hairs on lower margin of femora, and loose, erect and suberect plumose hairs on inner side of tibiae. *Metasoma* shining, terga obscurely punctate laterally, pubescence sparse on disc, longer, denser, plumose toward sides and posterior margins. Length 12 mm., anterior wing 9.5.

*Holotype female* (California Academy of Sciences, Entomology) and three female paratypes from Roosevelt, Duchesne County, Utah, June 15, 1956 (J. L. Eastin). Additional paratypes; two females from Ojo Caliente, Taos County, New Mexico, taken at light between 8:30 p.m. and 9:00 p.m., July 11, 1959 (E. G. Linsley), one female from Pinedale, McKinley County, New Mexico, July 22, 1948 (L. C. Wyman), and one female from 9.5 miles south of Monahans, Ward County, Texas, collecting pollen from *Oenothera hartwegii*, May 11, 1959 (D. P. Gregory). The paratype from Pinedale, New Mexico is in the United States National Museum; the remainder are deposited in the collections of the California Insect Survey, University of California, Berkeley.
This species superficially resembles *Lasioglossum (Sphecodogastra) texana* (Cresson), but the average size is somewhat larger and the anterior wings are proportionally longer. The most striking differences involve characters of the head and females differ in this respect as follows:

Antennae with flagellum twice as long as scape; eyes not converging below; ocelli larger, diameter of median ocellus equal to one-third of distance between eyes; clypeus broad, short, projecting less than one-third of its length, apex with about 12 long setae; mandibles with apex extending one-third of total length beyond tooth, reaching to base of opposite mandible. *noctivaga*

Antennae with flagellum distinctly less than twice as long as scape; eyes converging below; ocelli a little smaller, diameter of median ocellus equal to about one-fourth of distance between the eyes; clypeus more elongate, projecting more than one-third of its length, apex with about 24 long setae; mandibles less than one-fourth of total length beyond tooth, reaching just beyond opposite apical lateral angle of clypeus. *texana*

In distribution, known records suggest that *noctivaga* occurs generally west of the range of *texana* but the two are not wholly allopatric, having been taken on the same plants in Ward County, Texas.

**Literature Cited**

**ASHMEAD, W. H.**

**CRESSON, E. T.**

**GRAENICHER, S.**

**LINSLEY, E. G.**

**MICHENER, C. D.**

**MITCHELL, T. B.**

**STEVENS, O. A.**
ZOOLOGICAL NOMENCLATURE

NOTICE OF PROPOSED USE OF PLENARY POWERS IN CERTAIN CASES (A. (n.s.) 51)

In accordance with a decision of the 13th International Congress of Zoology, 1948, public notice is hereby given of the possible use by the International Commission on Zoological Nomenclature of its plenary powers in connection with the following cases, full details of which will be found in Bulletin of Zoological Nomenclature, Vol. 18, Part 6 to be published on 17 November 1961:

1. Validation of the generic name Naucoris Geoffroy, 1762 (Insecta, Hemiptera). Z.N.(S.) 608;
2. Suppression of certain unidentifiable specific name in the family Tetrigiidae (Insecta, Orthoptera). Z.N.(S.) 673;
3. Validation of the generic name Ceratosolen Mayr, 1885 (Insecta, Hymenoptera). Z.N.(S.) 1479;
4. Notice of proposed use of plenary powers in certain cases.

Any zoologist who wishes to comment on any of the above cases should do so in writing, and in duplicate, as soon as possible, and in any case before 17 May 1962. Each comment should bear the reference number of the case in question. Comment received early enough will be published in the Bulletin of Zoological Nomenclature. Those received too late for publication will, if received before 17 May 1962 be brought to the attention of the Commission at the time of commencement of voting.

All communications on the above subject should be addressed as follows: The Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, LONDON, S.W. 7, England.—W. E. CHINA, Assistant Secretary to the International Commission on Zoological Nomenclature.

RECENT LITERATURE


NEW SPECIES OF ONAGRANDRENA ASSOCIATED WITH OENOTHERA IN CALIFORNIA, NEVADA AND WYOMING
(Hymenoptera: Andrenidae)

E. G. LINSLEY AND J. W. MACSWAIN
University of California, Berkeley

The three species of *Andrena* (subgenus *Onagrandrena*) described below are named at this time in order to permit reference to them in ecological studies to be reported elsewhere.

**Andrena (Onagrandrena) boronensis**
Linsley & MacSwain, new species

*Female*: Integument black; pubescence black. *Head* with clypeus convex, densely punctate, without indication of a median longitudinal smooth line; labrum with apical process as broad as long, apex depresso-emarginate; vertex punctate between ocelli and compound eyes; antennae with first flagellar segment, measured along anterior margin, slightly shorter than second and third combined, flagellar segments, except the first two, reddish-brown. *Mesosoma* with mesoscutum dullish, closely punctate, the punctures mostly less than one diameter apart, interspaces finely reticulate, areas enclosed by reticulations oval, impressed; mesoscutellum more densely punctate than mesoscutum; mesopleura, a little more coarsely, densely punctate than mesoscutum; propodeum coarsely rugoso-punctate, basal enclosure coarsely, more or less regularly and longitudinally rugose; wings very lightly tinted with blackish; legs with scopae of posterior tibiae about as wide as tibia, moderately dense, suberect. *Metasoma* moderately slender, shining, second tergum with most anterior hairs long, predominantly simple, finely punctate, most punctures separated by at least three to five diameters; terga two to four with apical impressed margin shining but distinctly, though finely, sparsely punctate. Length approximately 12 mm., anterior wing 9 mm.

*Male*: Integument black; pubescence of head long, erect, predominantly yellowish-white, except along sides of face, upper face above antennal insertions, and vertex, which is black, that of clypeus densely plumose; thoracic pubescence long, erect, yellowish-white; pubescence of legs and abdomen black, except on first and second metasomal terga. *Head* with apical process of labrum emarginate, bilobed; antennae with flagellum black, first segment about as long as second. *Mesosoma* with mesoscutum opaque, densely punctate, punctures mostly separated by less than one diameter; mesoscutellum more densely punctate; propodeum sculptured much as in female. *Metasoma* with punctures of second tergum mostly separated by from three to five or more diameters, terga with a distinct impunctate apical margin. Length approximately 10 mm., anterior wing 8 mm.

**Holotype female** (California Academy of Sciences, Entomology) from Boron, Kern County, California, April 3, 1959, at flowers.

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1 The authors express appreciation to the National Science Foundation for support of research on bees associated with Onagraceae through NSF Grant G-7193.
of *Oenothera dentata*, 7:03 a.m. (J. W. MacSwain), allotype male, same locality and date, at flowers of *Coreopsis bigelovii* between 7:50 and 8:00 a.m. (E. G. Linsley) and 79 paratypes (California Insect Survey, University of California, Berkeley), all from the same locality, as follows: Seven males, two females, March 27, 1959 (E. G. Linsley, J. W. MacSwain); two males, eight females (three with pollen) from *Oenothera dentata*, April 2, 1959, between 7:23 and 8:58 a.m. (E. G. Linsley, J. W. MacSwain); two males, nine females (five with pollen) from *Oenothera dentata*, April 3, 1959, between 6:20 and 7:28 a.m. (E. G. Linsley, J. W. MacSwain); 5 males, three females (none with pollen) at flowers of *Coreopsis bigelovii*, April 3, 1959, between 7:50 and 9:00 a.m. (E. G. Linsley, J. W. MacSwain); one female, sunning, on April 2, 1960, at 10:15 a.m. (E. G. Linsley); one male at flowers of *Oenothera clavaeformis clavaeformis*, April 9, 1960, at 5:32 p.m. (E. G. Linsley); twenty-three females (seventeen with pollen) from *Oenothera dentata*, April 10, 1960, between 6:45 and 8:06 a.m. (E. G. and Juanita M. Linsley); one male, ten females (none with pollen) at flowers of *Layia glandulosa* between 8:10 and 8:50 a.m. (E. G. Linsley).

Additional material, not designated paratypic, is represented in early morning collections from *Oenothera dentata* in the following localities from the Mojave Desert or its western edge: San Bernardino County: 7 miles west of Salt Wells, Apple Valley, and Kramer Hills; Los Angeles County: 1 mile west of Little Rock; and Kern County: 6 miles east of Mojave, Red Rock Canyon, and Short Canyon, 6 miles west of Inyokern.

This species belongs to the pale winged group of typical *A. (O.) oenotherae* Timberlake and *A. (O.) rozeni* Linsley and MacSwain. Both sexes differ from *oenotherae* and *rozeni* in the more finely, sparsely punctate second metasomal tergum, with the punctures mostly separated by from three to five or more diameters, rather than two or three diameters. The male superficially resembles that of *rozeni* but has extensive areas of black pubescence on the vertex, at the antennal bases, and the sides of the face. The three species occur together at several localities but differ ethologically, *rozeni* taking pollen from *Oenothera clavaeformis* in the late afternoon, *boronensis* and *oenotherae* from *Oenothera dentata* in the early morning. However, *boronensis* begins storing pollen a week or more earlier in the season than *oenotherae* and
starts collecting pollen a half hour or more earlier in the morning.

**Andrena (Onagrandrena) thorpi**

Linsley & MacSwain, new species

*Female:* Integument black; pubescence black. *Head* with clypeus convex, densely punctate, without indication of a median longitudinal smooth line; labrum with apical process heart-shaped, slightly longer than broad, widening toward the apex which is shallowly notched; vertex punctate between ocelli and compound eyes; antennae with first flagellar segment, measured along anterior margin, slightly shorter than the second and third combined, flagellar segments black. *Mesosoma* with mesoscutum opaque, densely and more or less subcontiguously punctate, interspaces finely reticulate, reticulations subcircular; mesoscuteellum closely punctate; mesopleura a little more coarsely punctate than mesoscutum, punctures contiguous; propodeum coarsely, subcontiguously, reticulate-punctate, basal enclosure coarsely and somewhat regularly, longitudinally, medially rugose, lateral margins not distinctly elevated; wings tinted with blackish; legs with scopa of posterior tibiae slightly wider than tibia, moderately loose and suberect. *Metasoma* moderately slender, shining, second tergum with most anterior hairs long, predominantly plumose, surface moderately coarsely punctured, most punctures separated by from one to three diameters, terga two to four without a broad, impunctate apical band, impressed apical margin densely punctate. Length approximately 13 mm., anterior wing 10 mm.

*Holotype female* (California Academy of Sciences, Entomology) from 11 MILES NORTH OF WINNEMUCCA, HUMBOLDT COUNTY, NEVADA, June 8, 1961, gathering pollen from *Oenothera deltoides piperi*, 6:55 a.m. (J. W. MacSwain). *Paratypes:* two females collected at 6:48 and 7:27 a.m. respectively (J. W. MacSwain). An additional specimen, collected at 6:34 a.m. (R. W. Thorp), contains three female *Stylops*. This last individual was not taking pollen.

This species belongs to the dark-winged group containing *A. (O.) vespertina* Linsley & MacSwain and *A. (O.) chylismiae* Linsley & McSwain. The female may be distinguished from that of each of these by the apically widened, heart-shaped process of the labrum and the shorter first segment of the antennal flagellum which is not as long as the two following segments together, and the longer, looser, tibial scopa. From *vespertina* it differs further in the subcontiguously punctate mesoscutum, the more coarsely rugose basal enclosure of the propodeum which has poorly developed lateral margins. The propodeal enclosure is more regularly rugose than in *chylismiae* and the abdomen is more slender, but the two appear to be closely related.
Andrena (Onagrandrena) stagei
Linsley & MacSwain, new species

Female: Integument black; pubescence black. Head with clypeus convex, densely punctate, without indication of a median longitudinal smooth line; labrum with apical process parallel-sided, a little longer than broad; vertex punctate between ocelli and compound eyes; antennae with first flagellar segment, measured along anterior margin, as long as second and third segments combined, flagellar segments, except the first two, reddish-brown. Mesosoma with mesoscutum dullish, finely, closely punctate, punctures separated but mostly less than a diameter apart, interspaces finely reticulate, areas enclosed by reticulations elongate, narrowly impressed; mesoscutellum closely punctate; mesopleura a little more coarsely, densely punctate than mesoscutum; propodeum coarsely, subcontiguously reticulate-punctate, basal enclosure very coarsely, longitudinally, and obliquely rugose, median ridges very prominent, lateral margins not sharply defined; wings tinted with blackish; legs with scop of posterior tibiae about as wide as tibia, moderately dense. Metasoma moderately slender, shining, second tergum with most of the anterior hairs long, predominantly plumose, surface finely punctate, most punctures separated by at least three to five diameters; terga two to four with a moderate impunctate apical band but more than half of the width of impressed margin finely, sparsely punctate. Length approximately 12 mm., anterior wing 9.5 mm.

Holotype female (California Academy of Sciences, Entomology) from Little America, 22 miles west of Green River, Sweetwater County, Wyoming, June 25, 1960, collecting pollen from Oenothera trichocalyx at 8:15 a.m. (G. I. Stage). Paratypes: two females, same site, collecting pollen at 6:43 and 7:10 a.m.

This species also belongs to the dark-winged group of A. (O.) vespertina Linsley & MacSwain, A. (O.) chylismiae Linsley & MacSwain, and A. (O.) thorpi Linsley & MacSwain. It appears to be most closely related to the first of these, differing primarily in the broader apical process of the labrum and the coarsely, obliquely rugose basal enclosure of the propodeum which also has less well defined lateral margins.

XVI INTERNATIONAL CONGRESS OF ZOOLOGY

The Sixteenth International Congress of Zoology will convene in Washington, D.C., in 1963 at the Sheraton-Park and adjacent Shoreham Hotels. Additional information may be obtained from the National Academy of Sciences, National Research Council, 2101 Constitution Avenue, Washington 25, D.C.
NOTE ON THE SLEEPING HABITS OF MALES OF MELISSODES ROBUSTIOR COCKERELL
(Hymenoptera: Apoidea)

JOHN A. CHEMSAK AND ROBBIN W. THОРР
University of California, Berkeley

The sleeping habits of solitary bees have been of interest to bee workers for some time. Those of males of Melissodes spp. have been reported by various people. Banks (1902) observed M. bimaculata (Lepeletier) grasping grass stems and leaves with all six legs as well as the mandibles, with the head oriented up. Cockerell (1915) has described a resting cluster of M. cressonii (Dalla Torre) (as Xenoglossa brevicornis Cresson) as observed by the Rev. G. Birkmann. These bees grasped the petioles of the leaves of mesquite with their mandibles. Sleeping males of M. perplexa Cresson were found on floral spikes of Verbena stricta by Mathewson and Daly (1955) in Kansas. These occurred singly and in clusters of up to six, clinging closely to the spikes in horizontal and face-downward positions. The greatest number of bees were found on a “focal clump” of spikes to which many individuals subsequently returned. Evans and Linsley (1960) mention the sleeping habit of Melissodes sp. near confusa Cresson and M. paroselaæ Cockerell on Melilotus alba in Arizona. The first of these curled about the stem, which it grasped with its mandibles, while M. paroselaæ grasped the plant with the mandibles and hung with the legs free. Additional observations were made by Linsley (1961) on the sleeping habits of M. paroselaæ and M. tristis Cockerell on dry plants of Heterotheca in Arizona.

Although a variety of sleeping sites have been recorded for males of the genus Melissodes, none has been reported as sleeping on fresh flowers. However, observations made in Berkeley, California during the latter part of August and September, 1961, indicate that the males of M. robustior used only the fresh flowers of the ornamentals, Cosmos bipinnatus and Scabiosa atropurpurea (det. H. K. Sharsmith and R. Bacigalupi respectively) as sleeping quarters.

During the initial part of the observations, the bees were found to use the flowers of Scabiosa both as a nectar source and sleep site. As the season progressed, the number of bees on Scabiosa gradually decreased and the Cosmos became the primary resting place. The bees slept singly or in clusters of up to three.
The sleeping position of the *Melissodes* on *Cosmos* was usually with the body across the floral disk with the head down and the mandibles grasping an edge of a ray petal or the base of a tubular flower (Fig. 1). The legs were partially spread out and the tarsal claws appeared to be grasping the surface of the floral disk.

Observations on marked males indicated that individuals tended to remain within the same area for both sleeping and diurnal activities. The same flowers were subsequently found to be a pollen source for the females.

**Explanation of Figure**

Fig. 1. Sleeping position of males of *Melissodes robustior* Cockerell on flowers of *Cosmos bipinnatus*. 
It is interesting to note that the males showed a decided preference for the flowers of Cosmos about the time females were first observed gathering pollen from them. This change in male behavior may indicate that the flowers of the Cosmos also serve as a mating site (although no mating was observed) or, as Kullenberg (1956) found in Macropis, that the females’ scent marked the flowers which they visited. Activity of both sexes of Melissodes had greatly diminished by the beginning of October.

Banks, N.

Cockerell, T. D. A.

Evans, H. E. and E. G. Linsley

Kullenberg, B.

Linsley, E. G.

Mathewson, J. A. and H. V. Daly

BOOK NOTICE

“This book was not written for specialists in the fields of economic entomology and the chemistry of insecticides. Rather it is intended to provide a general but reasonably comprehensive insight into the why’s and wherefore’s of the modern insecticides and acaricides, problems of their use, and problems from their use... The modern pesticides at the moment are essential to man’s existence. The encouragement of interest, tolerance, and understanding of the situation is the objective of this book.” (preface).

The text is up to date; many of the illustrations are striking or spectacular, and most of them new to entomological books. Appendix A (pp. 256-259) is a listing of “Approximate mammalian toxicities of insecticidal and acaricidal compounds mentioned in the text, in terms of LD₅₀ values.”—H.B.L.
EMERGENCE OF STROMATIUM LONGICORNE (NEWMAN) FROM AN IMPORTED CYPRESS CHEST

(Coleoptera: Cerambycidae)

WOODROW W. MIDDLEKAUFF
University of California, Berkeley

On June 15, 1960 a female Stromatium longicorne (Newman) emerged from a cypress wood chest which had been made in Formosa (Taiwan) and brought to the United States over two years previously. This is a new host record for this cerambycid.

This beetle is widely distributed in the South Pacific having been recorded by various authors (Beeson & Bhatia, 1939; Stebbing, 1914; Duffy, 1953 and Yashiro, 1940) from Amboina, Assam, Bengal, Burman, Malay Peninsula, Philippines, Tonkin, Formosa, South China, Borneo, Celebes, Ceram, Batchian, Thailand (Siam), Hong Kong, Tenijo, and Loochoo Island.

Duffy (1953) reported the host of this species as Cassia fistula, cashew. According to Beeson & Bhatia (1939), Stebbing (1914) erroneously reported it from Tectona grandis, teak.

Yashiro (1940) reported it as most damaging in seasoned timber and in some types of wood is almost confined to seasoned timber. He reports it taking 2-3 years to complete larval growth. If the chest from which the present female emerged was made shortly before it was brought to the United States, the developmental period was normal. Linsley (1938) reported the European Stromatium fulvum emerging from furniture ten, twelve and thirteen years after having been imported into the United States from Italy. Other records reported by Duffy (1953) list a number of cases where cerambycid larvae have emerged from furniture or timbers 20 or more years after infestation.

REFERENCES

LINSLEY, E. G.
DUFFY, E. A. J.

STEBBING, E. P.

BEESON, C. F. C. AND B. M. BHATIA

YASHIRO, H.

Identified by Dr. E. G. Linsley and John Chemssk, University of California, Berkeley. Chest imported by David S. Winkler.
SYNONYMICAL NOTES ON THE GENUS CERCERIS—IV
(Hymenoptera: Sphecidae)

Herman A. Scullen
Oregon State University, Corvallis

January, 1962

Further studies of type material of the genus Cerceris have revealed the following instances of synonymy.

Cerceris compar geniculata Cameron, new status


*Cerceris feralis* Cameron, 1890. Biol. Cent.-Amer., Hym. 2:113-4. ♂. Mexico

New synonymy.

The holotype female of *C. geniculata* Cameron is in the British Museum (No. 21.1,366). The holotype male of *C. feralis* Cameron is in the British Museum (No. 21.1,372). I consider *geniculata* to be a Mexican race of *compar* Cresson of the eastern United States.

Cerceris compar orestes Banks, new status


The holotype female of *C. orestes* Banks is in the Museum of Comparative Zoology, Harvard, (No. 27637). I consider *orestes* to be a southwestern race of *compar* Cresson.

Cerceris cribrosa Spinola


New synonymy.


A female apparently determined by Spinola as *C. cribrosa* Spinola is in the Institute e Museo di Zoologia, Torino, Italy. This was selected and labeled a neotype by the present author. The holotype female of *C. pullatus* F. Smith is in the British Museum, (No. 21.1,409). The original cotype series of *C. albimana* Taschenberg consisted of two females. The first of the two was selected and labeled "Lectotype" by the present author. These types are in the Zoologisches Institut, Martin-Luther-University, Halle (Saale), East Germany.

Cerceris dilatata Spinola


₁ These studies are being financed by grants from the National Science Foundation and General Research administered by the Graduate School, Oregon State University. Published with the approval of the Monographs Publication Committee, Oregon State University. Research paper No. 417, Department of Entomology.


A male subsequently determined by Spinola as Cerceris dilatata Spinola is in the Instituto e Museo di Zoologia Turin (Torino), Italy. It has been designated as the neotype by the present author since the type specimen is no longer extant. A female of the original cotype series of three of Cerceris contracta Taschenberg has been selected and labeled a lectotype by the present author. This series of types of the latter species are at the Zoologisches Institut, Martin-Luther-University, Halle (Saale), Germany. The holotype female of Cerceris olymonis Strand is at the Zoologisches Museum, Humboldt University, Berlin.

Cerceris insolita Cresson

Cerceris insolita Cresson, 1865, Proc. Ent. Soc. Phil. 5:129. ♀. III.


The holotype male of C. insolita Cresson is in the Philadelphia Academy of Natural Sciences (No. 1954). The holotype female of C. intractibilis Mickel is in the University of Nebraska, Department of Entomology.

Cerceris morrae Strand


The holotype females of both species are at the Zoologisches Museum, Humboldt University, Berlin.

Cerceris rustica Taschenberg


The type female of C. rustica Taschenberg is at the Zoologisches Institut, Martin-Luther-Universität, Halle (Saale), Germany. The holotype female of C. asuncionis Strand is at Zoologisches Museum, Humboldt University, Berlin.

Cerceris simplex larvata Tashenberg, new status


The holotype female of C. simplex F. Smith (Cat. Hym. Brit.
Mus. 4:462, 1856) from Santarem, Brazil, is in the British Museum (No. 21.1,438). The type male of C. larvata Taschenberg is at the Zoologisches Institut, Martin-Luther-University, Halle (Saale), Germany. I consider that larvata is only subspecifically distinct from simplex.

NOTES ON THE BIOLOGY AND DISPERSAL OF MELANOPHILA
(Coleoptera: Buprestidae)

WILLIAM G. EVANS
University of Alberta, Edmonton

There have been many accounts of the attraction of several species of Melanophila to smoke and fire. Linsley (1943) summarized the pertinent literature and concluded that beetles of the subgenus Melanophila are normally attracted to forest fires and that they oviposit in scorched coniferous wood. Because these insects fly to smoke and are stimulated by heat, they are often attracted to several sources of smoke and heat, other than forest fires, such as oil fires (Van Dyke, 1926), burning sawdust and slash (Van Dyke, 1928), cement plants (Linsley, 1957; Linsley and Hurd, 1957), smelter plants (Linsley, 1933), tar extraction plants (Champion, 1918) and to sugar mills (Van Dyke, 1928). According to Linsley (1943) these insects appear to be attracted over long distances to these sources of fires (up to 60 miles in some cases), and there seems to be no doubt that normally they are able to detect smoke many miles away from forest fires and are able to fly great distances to the burnt over areas. In this manner dispersal takes place over a very large area.

The habit of flying to sources of heat and smoke is found in several species of Melanophila. Sloop (1937) separates the genus into three subgenera with the subgenus Melanophila characterized by the presence of a distinct pit contiguous to the lateral margin of the middle coxal cavity; and he reports that it is only those species with mesosternal pits that fly to fires. Although Sloop lists six of these species in North America, there are references to other species flying to fires in other parts of the world. Beeson (1941) mentions that in India the adults of M. coriacea Kerremans and M. picta indica Théry are attracted to forest fires and burnt trees, and Champion (1918) found specimens of M. ignicola Champion attracted to the heat and smoke from a tar extracting
plant in the Indian region of Kumaun. It is interesting to note that Poulton (1915-16) reports that another buprestid genus, *Merimna atrata* Hope, is attracted to bush fires in Australia, though an examination of specimens of this species shows that no pits are present on the mesothorax.

A method of dispersal of these insects, other than by flight, was observed at Edmonton, Alberta, during the summer of 1960. A plywood manufacturing plant was visited in June for the purpose of determining whether any species of *Melanophila* (which are widely distributed in Alberta) were attracted to the smoke emitted by a large kiln. Several adult specimens of *Melanophila acuminata* DeGeer were found and closer examination revealed that they were emerging from a large pile of spruce logs which had just been transported in from near the town of Chisholm, approximately 100 air miles north of Edmonton. Beetles continued to emerge from the logs throughout the summer and early fall in such numbers that several thousand were taken to the laboratory for use in various experiments. From these observations it may be inferred that, at least *acuminata* may be transported over long distances in logs to lumber yards and pulp mills and that its presence in areas where conifers do not grow does not necessarily indicate that it flew to these areas.

The specimens of *acuminata* taken to the laboratory were kept in half pint fruit jars with screen lids. The jars contained water and pieces of spruce bark for the beetles to walk on. About twenty specimens were kept in each jar, and it was observed that as soon as any died and were on their backs, they were attacked and eaten by the others. Freshly killed larvae of *Tribolium destructor* were then put in the jars and these were soon consumed, but when living larvae were put in they were not attacked as long as they were able to move. When dead insects such as *Tribolium* larvae, *Tenebrio* larvae, *Musca* adults and *Melanophila* adults were eaten the integuments were torn open and the blood and soft inner parts consumed, leaving the hard cuticle. All captured specimens of *M. acuminata* which were brought to the laboratory and supplied with water and freshly killed *Tribolium* larvae lived from two to three weeks. Craighead (1950) states that buprestid adults generally feed on pollen, foliage or the tender bark of trees, but species of *Melanophila* probably feed on dead insects which are quite prevalent in forest areas, especially in freshly burnt over areas.
There appeared to be no difference in preference for Tribolium larvae killed by decapitation or by scorching on a hot plate. When M. acuminata is enclosed in a field cage it readily feeds on the many flies and other small insects which get caught on the screen. It is possible that some of these smaller insects are eaten before they are dead, in which case acuminata is a true predator.

Some preliminary work was done on the behavior of acuminata and on the histology of the mesosternal pits during the summers of 1959-60. While the results of this work will be published later, it appears that each pit contains a cluster of olfactory organs of unusual shape, which are capable of detecting smoke in very low concentrations. It also appears that temperature and humidity receptors are present on the antennae. Yet the habit of flying to and depositing eggs in scorched trees is not obligatory for the survival of acuminata, even though it possesses highly specialized sensory organs which enable it to detect fires from considerable distances. Oviposition takes place in conifers cut for lumber and probably in conifers killed by other agencies such as lightning and disease. But a facultative ability to exploit trees killed by forest fires has, no doubt, contributed to the success and wide distribution of these insects.

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SLOOP, K. D

VAN DYKE, E. C.

BOOK NOTICES


This is basically a phylogenetic study, and results in two sets of keys. One lot, to subgenera, groups, subgroups and species is phylogenetic and intended to summarize the principal differences between taxa; a separate artificial key for the ready identification of males and females of the North American species is given on pp. 35-49. The Old World components are studied less fully than ours, because of lack of material, though three of five new subgenera proposed are for them. The Nearctic *Poreospasta* Horn and *Pomphopoea* LeConte are included as subgenera of *Lyta*. For the first time there is an adequate treatment of the variations within the North American species, based in good part on Selander's own extensive field work. Clines are cited, and single character or discordant geographic variation discussed; where there is concordant geographic variation, subspecies are recognized but given only vernacular names.—HUGH B. LEECH, California Academy of Sciences, San Francisco.

The following two items are New York issues, by The Macmillan Company, of volumes from the well-known English series "The New Naturalist Library").

INSECT MIGRATION. By C. B. Williams, xiv + 235 pp., 49 text figs. (chiefly maps and charts), pls. I-XVI in black and white, 1-8 in color. 1958. $6.00.

A stimulating work by a master of the subject. There are introductory chapters on insect migration, four on the evidence of migrations by insects of various orders and in different parts of the world, eight on the many and fascinating problems involved, three on marking live specimens, studying one's findings, and the literature on the subject.

COLLECTING, PRESERVING AND STUDYING INSECTS. By Harold Oldroyd. 327 pp., 135 figs in text, I-XV on un-numbered plates. 1958. $6.00.

A well-written and satisfactorily illustrated book which has a detailed yet broad coverage. For instance it includes a chapter on photographing insects, in which there is much basic information, and explanations of the "why"; while the chapter on the construction and use of keys contains one to the orders of adult insects as an example.—HUGH B. LEECH, California Academy of Sciences, San Francisco.
NOTES ON TWO SPECIES OF SPHECINE WASPS
DESCRIBED BY H. T. FERNALD FROM
SOUTH AMERICA
(Hymenoptera: Sphecidae)

ARNOLD S. MENKE
University of California, Davis

During a recent visit at the Museum of Comparative Zoology, Harvard University, I studied the types of Chlorion davisi and C. simillimum, both described by Fernald in 1907. C. davisi should be assigned to the genus Sphex sensu stricto, and simillimum to Prionyx, species group thomae.

Examination of the unique female type of davisi (MCZ type #14347) reveals that it agrees in every detail with the African species Sphex metallicus Taschenberg, and should be relegated to synonymy. The locality label on Fernald’s type reads Cordova, Argentina. Willink (1951) in his review of the Argentine and Chilean Sphecinae, did not list any material of Fernald’s species and only quoted the original description. It seems safe to assume that the specimen on which Fernald based his description was labeled in error and originated in Africa.

Prionyx (Priononyx) simillimus (MCZ type #14348) was described from three specimens, two males and a female, all labeled cotypes. I am designating one of the males as lectotype, and have placed a lectotype label with the specimen. In his description Fernald stated that sternite VI of the male was deeply emarginate. It is true that one of the males appears to have this feature, but close examination proves that the emargination was caused by the breaking away of part of the sternite. In the other male the sternite is entire. Fernald did not mention the distinct fossulae of the male antenna. In simillimus, flagellomeres III-VI have broad, spiculate fossulae, and VII has a short triangular fossula.

LITERATURE CITED

FERNALD, H. T.

WILLINK, A.
BOOK REVIEW


This remarkable little book is an account of the habits, distributions, and appearances of the large silkmoths, including the Saturniinae and Automeris of the Hemileucineae. In it the authors, who are private collectors living in Iowa, have brought together results of a number of years' study and field work in various parts of the country. Although some aspects of a scientific paper are incorporated, the treatment is primarily popular in approach, enabling freedom in handling of names, literature, etc., without undue anomaly.

The text is divided into two sections, I, "United States Species," and II, "Studies and Experiments." In the former, a discussion for each species includes the following aspects: "Habitat," a general geographical distribution, color variance throughout the range, and associations with other members of a complex; "Breeding Habits," a life history including oviposition, foodplants, etc., as well as adult breeding behavior; "Breeding in Captivity," both rearing larvae and mating adults; and "Collecting." In the second section general discussions are given on population dynamics (primarily protective devices and relation to mortality factors), breeding flights, saturniid parasites, predators, and diseases, breeding Saturniidae and hybrids.

The species treatment fills a gap, in that it provides an accurate, concise discussion of the American large silkmoths that is not readily available elsewhere. Entomologists will find the second section for the most part over-simplified, but probably it will prove informative to others interested in these moths. Many readers will disagree with a number of the unqualified generalizations (e.g., the introduction opens with "The majority of research in entomology is being done in commercial interests and in the field of pest control") and may be bothered by references concerning adaptations which hypothesize impossible alternate situations (e.g., nocturnal oviposition "is a safety factor, since exposure would be too severe if females had to seek out foodplants . . . in the daytime"). In addition, the authors' lack of familiarity with the literature is at times evident. References are cited only sparingly throughout and are usually given in footnotes without dates; and Calosaturnia albofasciata Johnson, 1938, a species not included in McDunnough's 1938 Checklist, is omitted. The common California Hyalophora is designated rubra Behr (possibly following the Bouvier, 1936, revision and treating euryalus Boisdruval as a nomen nudum), thus reversing the decision in McDunnough's Checklist, but without explanation.

The book is clearly printed on heavy paper which is well suited for the interspersing of the 90-plus excellent to fair black and white photographs and two diagrams which comprise about one half the volume. Adults of most species are illustrated, as well as eggs, both young and mature larvae, cocoons, hybrids, cages, etc. The work will be of use to persons interested in collecting and rearing Saturniidae, and to those studying species problems, hybridization, and geographical distribution patterns illustrated by this group of moths.—Jerry A. Powell, University of California, Berkeley.
PACIFIC COAST ENTOMOLOGICAL SOCIETY

P. H. Arnaud, Jr.  K. S. Hagen  F. E. Skinner  R. C. Miller
President  Vice-President  Secretary  Treasurer

PROCEEDINGS

Two Hundred and Seventy-third Meeting

The 273rd meeting was held Saturday, February 25, 1961, at 2:00 P.M., in the Morrison Auditorium of the California Academy of Sciences, San Francisco, with President Arnaud presiding.


The minutes of the meeting held December 16, 1960 were summarized.

One new member was elected: Lee E. Olsen, Loma Linda, California; and Donald J. Burdick, Fresno, California, was reinstated to membership.

President Arnaud appointed a science fair judging committee of H. B. Leech, chairman, Laura M. Henry, and D. D. Linsdale; and an annual field day committee of P. D. Hurd, Jr., chairman, J. G. Edwards, and C. D. MacNeill.

R. L. Doutt displayed specimens of Medetera arnaudi (Harmston) (Diptera: Dolichopodidae), the adults of which are predaceous on Collombola and Psocidae, and presented some observations made on a colony of these flies in El Cerrito, Contra Costa County, California.

C. D. MacNeill called attention to a recently issued book, How to Know the Butterflies, by P. R. Ehrlich, A. H. Ehrlich, and others (Wm. C. Brown Co., Dubuque, Iowa, 262 pp. 1961), which is one of the Pictured Key Nature Series, edited by H. E. Jaques.


H. B. Leech also read a letter from a member of the Italian Entomological Society in Rome who wishes to exchange beetles of various families, and is interested in buying or exchanging literature on beetles, especially Cicindelidae.

Dr. O. W. Richards, University of London, England, currently a visiting Professor of Entomology at the University of California, Berkeley, gave the
first major presentation of the meeting on "Wingless Diptera." Dr. Richards has long been interested in wingless flies, and he discussed the habits, structural modifications, evolutionary trends and taxonomic problems of some groups of these flies on a world-wide basis.

Dr. M. J. Richards, Anti-Locust Research Centre, London, wife of Dr. O. W. Richards, presented the second principal part of the program by discussing "The Role of Pheromones in the Life of the Desert Locust." She spoke about the experimental work being done on hormones excreted to the exterior of the body in relation to the synchronized formation of economically devastating swarms of locusts.

The meeting adjourned to a coffee social in the entomology rooms.

—FRANK E. SKINNER, Secretary.

Two Hundred and Seventy-fourth Meeting

The 274th meeting was held Saturday, April 22, 1961, at 2:00 P.M., in the Lecture Room of the Gleeson Library on the campus of the University of San Francisco, with President Arnaud presiding.


The minutes of the meeting held February 25, 1961 were summarized.

Four new members were elected: Leland Chandler, Lafayette, Indiana; W. W. Ward, Jr., Chico, California; Alexander Panasenko, Berkeley, California; and William Wills, Fresno, California. In addition, Kenneth E. Frick, Berkeley, California, was re-instated to membership.

J. A. Powell reported that the annual field day committee had not yet decided on a location for the spring picnic.

H. B. Leech announced that the Society's science fair judging committee for the Eighth Annual Bay Area Science Fair, held April 8-13, 1961, at the California Academy of Sciences, had found no exhibit which would fully qualify for the Society's annual award. However, the collection of Brent Du Boc Rourke, Grade 7, Colma School, Colma, California, Mr. Thomas Joyce, Adviser, was deemed worthy of an award of a copy of E. S. Ross's book, Insects Close Up, and 300 insect pins.

J. W. Tilden exhibited specimens of balloon flies of the genus Empis. Swarms of males carrying preyless balloons, one male with two balloons, were found on April 16, 1961 (7:30 A.M.) at El Portal, Mariposa County, California (elevation 2,100 feet). He noted that this is the first North American record of a balloon fly making a vesicular balloon without prey.
J. A. Powell showed photographs of moth eggs of the genus Ethmia, and presented the following note:

“During the past two weeks, living adults of Ethmia brevistriga Clarke and E. arcticostaphylella (Walsingham) were obtained with the assistance of C. D. MacNeill. Subsequent oviposition in the laboratory revealed that the eggs are deposited singly on the host. Those of E. brevistriga, shown in the photograph, were laid on the upper parts of Phacelia distans between the dense, stiff hairs. Eggs of Ethmiidae apparently have not previously been reported, at least in North America.”

W. E. Ferguson presented a talk on “Biological Observations on Mutillid Wasps,” illustrated with a series of color slides, boxes of specimens, and an assortment of soil-nesting bee cells in which mutillids had developed.

E. S. Ross gave an extensive picture story of “An Entomologist in Madagascar,” based on his fine color photographs, which depicted the general features of the island and also the insects and other creatures distinctive of this region.

Refreshments following the meeting were generously provided by courtesy of the Jesuit Fathers of the University of San Francisco.—Frank E. Skinner, Secretary.

Two Hundred and Seventy-fifth Meeting

The 275th meeting, the annual field day, was held Saturday, May 27, 1961, at the Upper Mitchell Canyon Park, north of Mount Diablo, near Clayton, Contra Costa County, California.


Visitors (51): Yvonne Arquette, Laura, Philip and Rose Bonhag, F. R. Brace, R. M. Brown, Barbara and Diane Daly, H. V. Davis, Alice and Jane Edwards, Rick, Robin and Stephenie Ferguson, Patricia Jenna, Ann, Bruce, Evelyn and Greg Langston, Jane Lawrence, Bill and Robin Leech, Grace, Daren, Linn and Nora MacNeill, John and Nancy MacSwain, M. Marquis and son, Phyllis Middlekauff, S. Nagasawa and family, Bill, Priscilla and Rick Nutting, Carrie and Frances Powell, M. J. and O. W. Richards, Clark and Wilda Ross, David, Jean, Roger and Susan Skinner, Edna Tanada and children.

All of the facilities of this private recreational area were reserved for exclusive use of the Society, including picnic tables, swimming pool, wading pool, and baseball field. The diversified ecological situations, ranging from a wooded running stream to the higher slopes of the chamise and digger pine areas, provided good collecting. An outstanding item of interest was E. S. Ross’s new expedition truck, which was designed especially for his forthcoming trip to the Orient.—Frank E. Skinner, Secretary.

Two Hundred and Seventy-sixth Meeting

The 276th meeting was held Friday, November 3, 1961, at 7:30 P.M., in
the Morrison Auditorium of the California Academy of Sciences, San Francisco, with Secretary Skinner presiding.


The minutes of the meeting held April 22, 1961 and of the annual field day held May 27, 1961 were summarized.

Fourteen new members were elected: John R. Anderson, Berkeley, California; Lois R. Breimeier, Berkeley, California; John S. Buckett, Petaluma, California; Warren R. Cothran, Dos Palos, California; John Drew, Berkeley, California; George I. D'Souza, Davis, California; Roy Earl Eastwood, San Jose, California; Donald A. Eliason, Davis, California; Roberto H. Gonzalez, Davis, California; Michael E. Irwin, Davis, California; Dean Wm. Jamieson, Santa Clara, California; Urbain Kinet, San Francisco, California; Chester G. Moore, Jr., Davis, California; Nancy Twomey, Berkeley, California.

The Society regretfully noted the death of Dr. M. A. Stewart on October 16, 1961 in Berkeley, California. Dr. Stewart was Professor of Parasitology and Dean of the Graduate Division of the University of California at Berkeley. A Society member from 1935 until 1950, he served as President in 1944, and was a member of both the Program and Publication Committees from 1943 to 1950.

It was announced that President Arnaud left in June of 1961 to spend a year at the American Museum of Natural History, New York, and that Vice-President Hagen would leave November 4, 1961 to spend a year in Greece.

Appointments to two committees were made: nominating, R. L. Doutt, chairman, H. B. Leech, and J. A. Powell; and auditing, E. L. Kessel, chairman, W. E. Ferguson, and C. D. MacNeill.

D. C. Rentz exhibited a striking specimen of a five-inch long grasshopper, Tropidacris sp., taken in June of 1961 in San Francisco on a ship from Ecuador, where the grasshopper is a common pest.

R. P. Allen presented the following note on a host record of two Buprestidae, and displayed specimens of the beetles:

"Suaeda fruticosa (L.) Forsk., sometimes known as alkali blite, is a
low, woody perennial xerophytic shrub common to some alkaline flats in the San Joaquin Valley. Adults of two species of Buprestisidae (det. P. D. Hurd, Jr.) have been reared from the heavy basal portion of the branches.

"Hippomelas pacifica" Chamberlin 1938 was described from four adults taken in Fresno and Kings Counties, and to the writer's knowledge has not been collected in the open since. Three adults have been obtained by rearing larvae found in S. fruticosa. These larvae have been noted occasionally in host material from Tulare, Fresno and Kings Counties. The plant is more widespread.

"Acmaeodera nigrovittata" Van Dyke 1934 has been reared in large numbers from the same shrub. No previous host record is known."

J. G. Edwards gave the following note and showed specimens:

"A very large specimen of Bombomima grossa" (Fabricius) was collected on August 19, 1961 near Hillsboro, Ohio. This extremely robust, hairy, yellow-and-black asilid fly bears a remarkable resemblance to a bumblebee. Nearby was another large asilid, of a different genus, feeding upon a small bumblebee."

The principal speaker was Dr. R. M. Bohart, Vice-Chairman of the Department of Entomology and Parasitology, University of California, Davis, who recently journeyed to Europe to study Linnaean and Fabrician type specimens of wasps. He discussed the current conditions of some of the important Western European entomological collections, the personalities of their curators, and the facilities for study which are available to visiting entomologists. A series of color slides provided a fascinating study of the places and people of which he spoke.

A coffee social in the entomology rooms followed the meeting.—FRANK E. SKINNER, Secretary.

Two Hundred and Seventy-seventh Meeting

The 277th meeting was held Saturday, December 16, 1961, at 2:00 P.M., in the Morrison Auditorium of the California Academy of Sciences, San Francisco, with Secretary Skinner presiding.


The minutes of the meeting held November 3, 1961 were summarized.
Two new members were elected: James Litsinger, Berkeley, California, and Philip Lounibos, Petaluma, California; and John A. Chemsak, Berkeley, California, and Victor Stompler, Sacramento, California, were reinstated to membership.

R. C. Miller presented the treasurer’s report, and C. D. MacNeill, of the auditing committee, reported that the financial records of the past year were in order. Both reports were accepted by the Society.

It was announced that a gift of $250.00 had been made to the Society by E. R. Leach, whose membership dates from 1916, and the only one in the Society who is both a Life Member and Honored Member.

It was also announced that the Executive Board had appointed R. L. Doutt and R. L. Usinger to three year terms on the Publication Committee, and R. M. Bohart to a one year term to fill the vacancy left by E. O. Essig, who asked to be relieved of duties on this committee.

R. L. Doutt, chairman of the nominating committee, presented the names of the nominees, and the following people were elected as Society officers for 1962: President, Richard M. Bohart; Vice-President, Laura M. Henry; Secretary, Howell V. Daly; Treasurer, Robert C. Miller.

W. E. Ferguson exhibited a portable illuminator, for use with a stereoscopic microscope, which consists of a pen-light bulb (of the type that produces a concentrated spot of light) attached to a two-cell flashlight by means of a length of flexible wire.

J. A. Powell presented the following note, exhibited the specimens concerned, and showed color slides of the bristlecone pine:

“The widespread pine-feeding cerambycid, Callidium antennatum hesperum Casey (det. J. A. Chemsak), was reared from a fallen limb of Pinus aristata, bristlecone pine, collected near the Crooked Creek Laboratory, at an elevation of 10,150 feet, in the White Mountains, Mono County, California, on July 4, 1961. Included in the series, which emerged during late November and early December, was a teratological specimen, having one curiously malformed hind tibia. The endemic P. aristata is a previously unrecorded host for Callidium.”

A. Panasenko, of the Kaiser Foundation Research Institute, Laboratory of Medical Entomology, Richmond, California, gave an illustrated talk on “The Experimental Induction of Mosquito Bite Sensitivity In Guinea Pigs by Low Molecular Weight Compounds Obtained From an Extract of Aedes aegypti.” His abstract is as follows:

“A saline extract of whole mosquitoes, Aedes aegypti (Linnaeus), was fractionated by gel filtration using a “Sephadex G-25” column. The fractionation was followed by optical density determinations of the eluates at 280 mu. Six fractions were obtained, of which one was of high molecular weight (greater than 4000) and five of low molecular weight (less than 4000). The activity of the fractions related to mosquito bite hypersensitivity was assayed on guinea pigs by intradermal injections of the fractions in combination with Freund’s complete adjuvant, and subsequent challenges with bites of mosquitoes. Mosquito bite hypersensitivity was induced by several
of the low molecular weight fractions indicating that some of the substances responsible for mosquito bite hypersensitivity are haptenic in nature.

"These findings correlate with those obtained in our laboratory which showed that flea bite hypersensitivity could be induced by low molecular weight fractions obtained from fleas. In addition to the above similarity between flea bite and mosquito bite hypersensitivity it was found that hypersensitivity to mosquito bites is first manifested by delayed skin reactions which are later accompanied by immediate reactivity."

H. E. Stark introduced a film on "Plague in Sylvatic Areas," produced by the Communicable Disease Center, U. S. Public Health Service, Frank M. Prince, Technical Adviser (Film No. M440), a 25 minute color film with sound, which covers a subject of great importance to California and other western states during this period of great population growth and urban development.

The final part of the program was the narration by R. P. Allen of a short film on the Japanese beetle, showing control efforts against the recent infestation in Sacramento, California.

The meeting adjourned to a coffee social in the entomology rooms.

—FRANK E. SKINNER, Secretary.

MORRIS ALBION STEWART
1902-1961

The death of Morris A. Stewart on October 16, 1961, brought to a close a distinguished academic, scientific and administrative career. He was a native of Bath, Maine and obtained his early training in entomology at the University of New Hampshire, receiving the B.S. degree in 1924. Subsequent work in entomology and parasitology at Cornell University culminated in the M.S. degree in 1926 and the Ph.D. degree in 1929.

Dr. Stewart evinced an early interest in the systematics of Siphonaptera, and became known as a world authority on their classification. It is a tribute to the breadth and depth of his interests that he is even better known for his research on the health of man and animals as affected by parasites. He pioneered in studies on myiasis-producing flies which attack man and livestock and in the control of numerous other insect pests. He was active also in research on internal helminth parasites of mammals and published many scientific papers on their biology and control.

He began his teaching career as an Instructor of Biology at the University of Rochester, followed by several years on the staff of the Rice Institute, where he worked with Dr. A. C. Chandler in parasitology. In 1935 he joined the faculty of the University of
California as Assistant Professor, and rose to Professor of Parasitology and Entomologist in the Experiment Station in 1947. In addition to his other duties he served as Assistant Dean of the Graduate Division, starting in 1945, and was appointed Dean in 1956.

Despite the many administrative responsibilities of later years, teaching remained of vital interest to Dr. Stewart. His lectures, always scholarly, drew upon an extraordinary wealth of personal experience and an encyclopedic knowledge of his subject. The marked warmth and human understanding which characterized his relations with students stimulated an esprit de corps and united with a common bond graduates since scattered throughout the world.

Dr. Stewart was an active member of many scientific societies. In 1943 and 1944 he was vice-president and president, respectively, of the Pacific Coast Entomological Society. Additionally he served as chairman or member of several important committees of this organization. He was a fellow of several societies, including the Entomological Society of America and the American Association for the Advancement of Science.

In addition to his teaching and purely professional services, Dr. Stewart participated in a truly astounding number and variety of activities. He was a leading member of the Association of Graduate Schools in the Association of American Universities. He was past president of the Leonardo da Vinci Society of San Francisco, a society fostering the appreciation and understanding of Italian culture. His work in the field of international relations brought him two awards from foreign governments in 1960, when he was presented with the Royal Order of the North Star with Rank of Officer by the King of Sweden, and made a Cavaliere of the Order of Merit by the Republic of Italy. His undergraduate alma mater, the University of New Hampshire, awarded him an LL.D. degree in 1958, in recognition of his distinguished attainment in the field of higher education.

Stricken with ill health in the last few years of his life, he continued to carry a heavy burden of responsibility. His courage and unselfish devotion remain an inspiration to those who were fortunate in being able to know and to work with him.—DEANE P. FURMAN, University of California, Berkeley.
ZOOLOGICAL NOMENCLATURE

Notice of Proposed use of Plenary Powers in Certain Cases (A. (n.s.) 52)

In accordance with a decision of the 13th International Congress of Zoology, 1948, public notice is hereby given of the possible use by the International Commission on Zoological Nomenclature of its plenary powers in connection with the following cases, full details of which will be found in Bulletin of Zoological Nomenclature, Vol. 19, Part 1 to be published on 2 February 1962:

1. Validation of *Scolytus* Geoffroy, 1762 (Insecta, Coleoptera). Z.N.(S.) 81;


Any zoologist who wishes to comment on any of the above cases should do so in writing, and in duplicate, as soon as possible, and in any case before 2 August 1962. Each comment should bear the reference number of the case in question. Comment received early enough will be published in the *Bulletin of Zoological Nomenclature*. Those received too late for publication will, if received before 2 August 1962 be brought to the attention of the Commission at the time of commencement of voting.

All communications on the above subject should be addressed as follows: The Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, LONDON, S. W. 7, England.—W. E. CHINA, Assistant Secretary to the International Commission on Zoological Nomenclature.

BOOK NOTICE


Part 2 of this important work has appeared first; four others will follow, while Part 1 containing the introduction, keys to genera, etc., will come last and be paged in Roman figures.

Part 2 covers the Trachypachinae to Trechini of the Carabinae (Lindroth does not differentiate the "Harpalinae" of American authors from the Carabinae). There are keys to the species of all the larger genera treated;
in some cases these are to the Canadian and Alaskan species only, in others (Sphaeroderus, Nebria, Notiophilus, Elaphrus, Loricera, Schizogenius, Patrobus, Diplous) he offers new keys to the North American species. It is interesting to compare his keys with other recent ones covering most of the same species, e.g. Van Dyke (1945) for Carabus, Hatch (1953) for Nebria, etc.

Nine new species are described in Dyschirius, one in Nebria. The text figures are pertinent; in most cases the male genitalia of the Nearctic species have not been illustrated before. There are notes on species erroneously recorded for Canada or Alaska, and on some species related to those which are more fully treated. Data on the ecology and dynamics are given for most species. The somewhat informal listing of synonyms requires careful reading, as several are new here. A great many abbreviations are used; following European practice, an exclamation mark after a locality indicates that the author personally saw specimens so labeled in the designated collection.

An innovation is that where there is no locality given for a type, or where it is very general, dubious or obviously incorrect, Lindroth has designated a definite [new] type locality. He has thus designated type localities for the Thomas Say species he treats.—Hugh B. Leech, California Academy of Sciences, San Francisco.
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<td>80</td>
<td>80</td>
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THE COLLETID PTILOGLOSSA ARIZONENSIS
TIMBERLAKE, A MATINAL POLLINATOR OF SOLANUM
(Hymenoptera)

E. GORTON LINSLEY¹
University of California, Berkeley

The Neotropical colletids of the tribe Caupolicanini are represented in the southeastern and southwestern United States by four nominal species, two each in the genera Caupolicana and Ptiologossa. These large, robust, hairy bees are superficially anthophorid-like and differ from other Diphaglossinae by having the jugal lobe of the posterior wing reaching beyond the apex of the cubital cell, the notauli well developed, the pre-episternal suture present, the first flagellar segment at least nearly as long as the scape, the first M peduncled, and the malar areas very short (Moure, 1945). Ptiologossa have a shining metallic lustre to the abdomen and the outer spur of the hind tibiae of the males is fused to the tibia. Caupolicana lack the metallic lustre to the abdomen and the hind tibial spurs of the males are both free. Caupolicana electa (Cresson) occurs in the sand ridge areas of the coastal plain in southeastern United States from North Carolina to Georgia and Alabama (Mitchell, 1960), C. yarrowi (Cresson) in the arid southwest from Texas to southern Arizona and northern Mexico (Michener, 1951). Ptiologossa arizonensis Timberlake, and Pt. jonesi Timberlake were each described originally from Portal, Arizona (Timberlake, 1946). The type series of both species (77 ♀♀ of the former, 2 ♀♂ of the latter) were collected by W. W. Jones during July and August at flowers of Solanum elaegniolium, although the circumstances of the captures were not recorded. Subsequently, at the Southwestern Research Station, in Cave Creek Canyon, Chiricahua Mountains, 5 miles west of Portal, Dr. M. A. Cazier and his colleagues took a series of males from flowers of Melilotus alba.

In late July and early August of 1961 I had an opportunity

¹The writer wishes to express appreciation to the authorities of the American Museum of Natural History, and especially to Dr. M. A. Cazier, Resident Director, Southwestern Research Station, Portal, Arizona, for providing facilities for this and a number of related studies, to Professor Charles M. Rick, of the Department of Vegetable Crops, University of California, Davis, for making observations on the behavior of Solanum pollinators in Wisconsin, and to Robbin Thorp, Department of Entomology and Parasitology, University of California, Berkeley, for aid in the analysis and identification of pollen.
small grains containing protoplasm (determined by staining with acid fuchsin). Both types of pollen were also found in anthers of herbarium specimens of this species. The existence of aborted grains of pollen in *Solanum* spp. has been discussed by Stow (1927), who found a correlation between their presence in *S. tuberosum* L. and high temperatures, and by Jørgensen (1928), who found a high proportion of bad pollen grains in experimentally produced euploid and aneuploid forms. However, since Heiser & Whitaker (1948) found that California specimens of *S. elaeagnifolium* had the chromosome number n=12, and were therefore diploid, the aborted pollen may have been the result of hybridization, as in the *S. nigrum* complex (Stebbins and Paddock, 1949), or possibly, may have been produced by an adverse environment.

Counts of pollen grains in a series of transects across a slide prepared from pollen collected by a female *Ptiloglossa* revealed that "good" pollen composed only 36 per cent of the total. The equatorial diameter of the pollens of this species are: bad grains—25.7μ, (range 23.7μ to 29.0μ); good grains—34.4μ, (range 31.7μ to 37.0μ). Pure loads of *Solanum* pollen were present on three specimens of *Bombus* and two of *Ptiloglossa*. Mixed loads of *Solanum* and liliaceous pollen were present on two *Ptiloglossa*. The other three *Ptiloglossa* had pure loads of liliaceous pollen. The observed high proportion of aborted pollen in *Solanum elaeagnifolium* is not only of interest from the botanical viewpoint, because of the reduced potential for fertilization, but also from the entomological standpoint, since only 36 per cent of such pollen stored by the bees will provide a source of protein for the larvae.

Table I.—Pollen types carried by a sample of bees collected from flowers of *Solanum elaeagnifolium* between 5:09 and 5:34 A.M.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time (A.M.)</th>
<th>Bee Species</th>
<th>Pollen Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 25, 1961</td>
<td>5:18</td>
<td><em>Pt. arizonensis</em></td>
<td><em>Solanum</em> + <em>Liliaceae</em></td>
</tr>
<tr>
<td></td>
<td>5:32</td>
<td><em>Bombus morrisoni</em></td>
<td><em>Solanum</em></td>
</tr>
<tr>
<td>July 26, 1961</td>
<td>5:13</td>
<td><em>Pt. arizonensis</em></td>
<td><em>Liliaceae</em></td>
</tr>
<tr>
<td></td>
<td>5:24</td>
<td><em>B. morrisoni</em></td>
<td><em>Solanum</em></td>
</tr>
<tr>
<td></td>
<td>5:26</td>
<td><em>B. sonorus</em></td>
<td><em>Solanum</em></td>
</tr>
<tr>
<td>July 27, 1961</td>
<td>5:09</td>
<td><em>Pt. arizonensis</em></td>
<td><em>Solanum</em></td>
</tr>
<tr>
<td></td>
<td>5:14</td>
<td><em>Pt. arizonensis</em></td>
<td><em>Liliaceae</em></td>
</tr>
<tr>
<td>July 28, 1961</td>
<td>5:15</td>
<td><em>Pt. arizonensis</em></td>
<td><em>Liliaceae</em> (small load)</td>
</tr>
<tr>
<td></td>
<td>5:22</td>
<td><em>Pt. arizonensis</em></td>
<td>*Liliaceae + <em>Solanum</em></td>
</tr>
<tr>
<td></td>
<td>5:34</td>
<td><em>Pt. arizonensis</em></td>
<td><em>Solanum</em></td>
</tr>
</tbody>
</table>
On most mornings *Bombus* appeared between 5:20 and 5:30 a.m. and continued to collect pollen until the supply was exhausted or the flowers began to wilt at mid-morning. However, it took the first arrivals much longer to obtain a pollen load when the flowers were first opening than it did an hour later. No other bees worked *S. elaeagnifolium* at this site, but *Exomalopsis solani* Cockerell visits it and other purple-flowered species elsewhere. This is a small bee and its method of extracting pollen has not been reported. At Sonoita Creek near Patagonia, Arizona, P. H. Timberlake found the heavy bodied *Protoxaea gloriosa* (Fox), and the medium sized *Psaenythia mexicanorum* (Cockerell) and *Nomia tetrazonata* Cockerell taking pollen from *Solanum rostratum* (Buffalo-bur), an annual, yellow-flowered species.

In Paraguay, Schrottky (1907) reported that a male of *Ptiloglossa matutina* Schrottky (1904) entered his room at 4 a.m., "attracted doubtless by the shining lamp". He also stated that "*Ptiloglossa eximia* (Smith)?" had been observed on the wing after sunset and before sunrise, but never after seven o'clock in the morning. He concluded from the early flight of *Pt. matutina* that on warm nights the *Ptiloglossa* are flying all night long. He also referred to their rapid flight but indicated that they were not rare in nature, even though scarce in collections. "If one knows their food-plants, they may at times be seen by thousands, as I found in Brazil in the case of *eximia* and in Paraguay with *matutina"*. These food plants he had recorded earlier as *Solanum balbisi* and *S. juciri* (Solanaceae), *Tradescantia dimetica* (Commelinaceae) and *Eriobotrya japonica* (Rosaceae) (Schrottky, 1906). Matinal species of *Ptiloglossa* have also been observed in Mexico by Michener (Linsley, 1958).

That some *Ptiloglossa* do, indeed, fly all night is indicated by observations reported by Vesey-Fitzgerald (1939) for *Pt. fulvipilosata* Cameron of Trinidad. This species "may be heard buzzing 'round certain flowering trees during the night but directly the first light of dawn shows over the horizon they, with one accord, return to their burrows and are not seen again all day". Vesey-Fitzgerald also records matinal pollen collecting activity for *Epicharis* spp. (Anthophoridae: Centridini), some of which are visitors of *Solanum. E. lateralis* Smith visits *Byrosonima trinitatis* (a member of the Neotropical family Malpighiaceae) before dawn,

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2Presumably referring to the species subsequently described as *Pt. dubia* Moure (1945).
and *E. rustica flav*a not only takes pollen from *Byrosonima* and *Solanum*, but was also found nesting deep in a mine near the limit of penetration of daylight.

The first record of matinal activity of a colletid known to me is that of Cockerell and Porter (1899), who reported the capture of "an excellent series" of *Caupolicana yarrowi* (Cresson) at La Cueva, Organ Mountains, New Mexico, alt. 5300 ft., September 5, at flowers of *Datura meteloides* before sunrise (5:15-6:15 a.m.). Two additional specimens, also taken before sunrise, were at flowers of *Lippia wrightii*, but it is not recorded whether pollen was gathered in either case. Linsley and Hurd (1959) observed males of *C. yarrowi* taking nectar at dawn from *Larrea divaricata* at Granite Pass, Hidalgo Co., New Mexico, in August, and Linsley (1960) reported similar activity before sunrise at flowers of *Meliolotus alba*, near Portal, Arizona. The same or a related species was collected repeatedly in Mexico by P. D. Hurd and H. E. Evans at flowers of *Eysenhardtia* in the late afternoon (before and after sunset) and early morning (before and after sunrise) (Hurd, in litt.). Mitchell (1960) noted that both sexes of *Caupolicana electa* (Cresson) have been collected at *Trichostema dichotemnum* around sunrise and males also in the late afternoon or at dusk visiting *Trichostema* and *Aureolaria*. *Trichostema* spp., known as blue-curls, are strong-scented Labiatae with long, exserted stamens and stigma.

Finally, it may be mentioned that *Colletes stepheni* Timberlake (1958), the largest known North American species of the genus, collects pollen before sunrise from *Larrea divaricata* and *Cercidium floridum*. At Hopkins Well, 18 miles west of Blythe, Riverside County, California, Hurd and Powell (1958) reported females gathering pollen, as early as 4:20 a.m., although the height of the provisioning period judged by observations at the nest site, was between 5:00 and 6:30 a.m.

From these fragmentary observations it may be concluded tentatively that (1) matinal pollen collecting activity is characteristic of species in several genera of colletids, (2) the species involved tend to be large, fast flying, wide ranging bees, in some cases with enlarged lateral ocelli, (3) at least a portion of them appear to be restricted to plants which present their pollen during the night or shortly after dawn, and (4) some species exhibit adaptations for collecting pollen from plants with particular floral and/or pollen characteristics.
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ZOLOGICAL NOMENCLATURE
NOTICE OF PROPOSED USE OF PLENARY POWERS
IN CERTAIN CASES (A. (n.s.) 53)

In accordance with a decision of the 13th International Congress of Zoology, 1948, public notice is hereby given of the possible use by the International Commission on Zoological Nomenclature of its plenary powers in connection with the following cases, full details of which will be found in Bulletin of Zoological Nomenclature, Vol. 19, Part 2, to be published on 23rd March, 1962.


Any zoologist who wishes to comment on any of the above cases should do so in writing, and in duplicate, as soon as possible, and in any case before 23rd September, 1962. Each comment should bear the reference number of the case in question. Comment received early enough will be published in the Bulletin of Zoological Nomenclature. Those received too late for publication will, if received before 23rd September, 1962, be brought to the attention of the Commission at the time of commencement of voting.

All communications on the above subject should be addressed as follows: The Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, LONDON, S.W. 7, England.—W. E. CHINA, Assistant Secretary to the International Commission on Zoological Nomenclature.
A REVIEW OF THE GENUS PERIPLOCA WITH DESCRIPTIONS OF NINE NEW SPECIES
(Lepidoptera: Gelechioidea)

RONALD W. HODGES
Cornell University, Ithaca, New York*

Braun proposed *Periploca* for the new species *purpuriella* in 1919. An examination of the genitalia of the type of *Elachista concolorella* Chambers, 1875, has revealed that *concolorella* and *purpuriella* are conspecific. Furthermore, *Stagmatophora ceanothiella* Cosens and *Laverna (?) gleditschiaeella* Chambers have proved to be congeneric with *P. concolorella*, not *Stagmatophora heydeniella*, the type of *Stagmatophora*. This brings the number of described species of *Periploca* to three; in addition nine new species were found among the undetermined specimens in various collections.

I wish to thank the following persons for allowing me to study the specimens under their care (the abbreviations following the name of the person or institution are used to indicate the location of the material): Dr. Annette F. Braun (AFB); Dr. C. D. MacNiell, California Academy of Sciences (CAS); Mr. G. T. Okumura, California Department of Agriculture, Sacramento (CDA); Mr. M. O. Glenn (MOG); Mr. C. P. Kimball (CPK); Dr. A. B. Klots (ABK); Dr. J. A. Powell (JAP); and Dr. J. F. Gates Clarke, United States National Museum (USNM). Specimens in the Cornell University Collection are denoted by (CU) and those in my collection by (RWH).

Genus *Periploca* Braun

(Fig. 1)


Head: smooth-scaled; tongue scaled, moderate in length; maxillary palpus folded over base of tongue; labial palpus recurved, reaching beyond vertex, second and third segments subequal except for *P. ceanothiella* and *concolorella* in which third segment is one-half length of second, apex of third segment acute; antenna two-thirds to three-fourths length of forewing, simple, pecten composed of one or two cilia, scape broad, flattened. Forewing: lanceolate, apex acute; 11 or 12 veins present; lb furcate basally; 2 from before angle of cell, evanescent; 3 from angle of cell; 5, 6, 7, and

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*Now at Entomology Research Division, A.R.S., U.S. Department of Agriculture, Washington, D.C.*
8 stalked; 9 from angle of cell; 10 opposite 2 in female, from three-fourths of cell in male; 11 from two-fifths of cell. *Hindwing*: sublinear, apex acute; a series of scales on costal margin at one-fourth; 7 veins present; 1 absent; 2, 3, and 4 parallel; 6 and 7 stalked. *Male genitalia*: usually symmetrical; vinculum broad, often bifid medially; saccus somewhat developed tegumen narrow; uncus absent; valvae simple or with sacculus produced as a separate lobe; aedeagus long, symmetrical or asymmetrical, armed with spines or unarmed. *Female genitalia*: bursa copulatrix membranous or lightly sclerotized; signa absent or double; ductus bursae membranous or sclerotized posteriorly; ostium bursae on seventh sternum; apophyses anteriores and posteriores subequal in length.

**Key to Species Based on External Characters**

1. Scales of forewings bronze; margins of scales fuscous or bronze-black ................................................................. 2

   Scales of forewings not bronze ......................................................................................................................... 4

2. Alar expanse greater than 8 mm. ....................................................... concolorrella (Chambers) 3

   Alar expanse less than 7 mm. ............................................................................................................................... 3

3. Third segment of labial palpus one-half length of second segment .............................................................. ceanothiella (Cosens)

   Third segment of labial palpus as long as second segment ..................................................................................

4. Antenna unicolorous, blackish .................................................. funebris Hodges

   Antenna blackish basally, greasy-buff distally .................................................................................................. 5

5. Apices of prothoracic tarsal segments pale .............................................................. 8

   Prothoracic tarsal segments unicolorous ........................................................................................................ 6

6. Inner surface of second segment of labial palpus gray-brown ............... 7

   Inner surface of second segment of labial palpus fuscous-black ......................................................................

7. Outer surface of metathoracic tibia unicolorous .......... laeta Hodges

   Outer surface of metathoracic tibia pale apically .......... gulosas Hodges

8. Outer surface of metathoracic tibia pale buff or fuscous-buff; outer tibial spurs darker ........................................... 11

   Outer surface of metathoracic tibia fuscous; if fuscous-buff, outer tibial spurs paler ........................................... 9

9. Scape unicolorous ......................................................................................

   Apex of scape pale ........................................................................ mimula Hodges

10. Outer metathoracic tibial spurs paler than outer surface of metathoracic tibia ........................................................................ fessa Hodges

   Outer metathoracic tibial spurs not paler than outer surface of metathoracic tibia ........................................... cata Hodges

11. Basal three or four segments of shaft fuscous-black, remainder greasy-buff ............................................. 12

   Shaft fuscous-black to one-third, gradually becoming greasy-buff ................................................................

**Key to Species Based on the Male Genitalia**

1. Aedeagus concave dorsally .......................................................... concolorrella (Chambers)

   Aedeagus convex dorsally ......................................................................................................................... 2

2. Valvae symmetrical ........................................................................ 3
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Valvae asymmetrical ........................................... gulos a Hodges
3. Vinculum smooth-margined posteriorly ........................................... 4
Vinculum emarginate posteriorly ............................................... 7
4. Vinculum produced to a point ventrally (Fig. 4) .......... fessa Hodges
Vinculum not produced to a point ventrally (Fig. 6) ............... 5
5. Valvae triangular (Fig. 6) ........................................... ceanothiella (Cosens)
Valvae not triangular (Fig. 11) ........................................... 6
6. Apex of valva smooth-margined (Fig. 11) ........ atrata Hodges
Apex of valva bifid (Fig. 9) ........................................... gleditschiaeella (Chambers)
7. Aedeagus armed (Figs. 8, 10, and 12) ...................... funebris Hodges
Aedeagus armed laterally ............................................. 9
Aedeagus armed on right side .......................................... 10
Aedeagus armed on left side ........................................... 11
8. Aedeagus armed on right side ........................................... cata Hodges

Partial Key to Species Based on Female Genitalia
1. Ductus bursae sclerotized before ostium bursae ......................... 5
Ductus bursae not sclerotized before ostium bursae ................. 2
2. Posterior margin of sixth sternum with two rounded projections
   (Fig. 14) .......................................................... concolorella (Chambers)
Posterior margin of sixth sternum even .................................. 3
3. Ostium bursae a simple hole on anterior margin of seventh
   sternum .................................................................... 4
Ostium bursae at middle of seventh sternum .... ceanothiella (Cosens)
4. Ovipositor and seventh segment of abdomen two-thirds to
three-fourths length of segments one through six of abdomen
   ................................................................. atrata Hodges
Ovipositor and seventh segment of abdomen three-halves length
   of segments one through six of abdomen .... gleditschiaeella (Chambers)
5. Posterior margin of eighth abdominal segment with numerous
   setae (Fig. 22) ....................................................... 6
Posterior margin of eighth abdominal segment with few setae
   (Fig 15) ................................................................ 7
6. Ductus bursae extending beyond wall of seventh sternum
   (Fig. 22) ............................................................ junebris Hodges
Ductus bursae not extending beyond wall of seventh sternum
   (Fig. 20) ............................................................ facula Hodges
7. Ostium bursae at middle of seventh sternum .... mimula, nigra Hodges
Ostium bursae before anterior fourth of seventh sternum .......... 8
8. Ductus bursae heavily sclerotized on posterior third .... lacta Hodges
Ductus bursae heavily sclerotized immediately before ostium
   bursae ................................................................. cata Hodges
PERIPLOCA CONCOLORELLA (Chambers), New combination
(Figs. 3, 14, and 23)


Food plant: unknown.

Types: concoleorella, Museum of Comparative Zoology; purpuriella, Collection of Annette F. Braun.

Type localities: concoleorella, Bosque County, Texas; purpuriella, Fredalba, California.

Specimens examined: Arizona: 13♀, 5♂, Madera Canyon, 4880 feet, Santa Rita Mountains, Santa Cruz Co., July 7 through August 3, 1959 (R. W. Hodges), [CU. RWH]; same locality except for elevation, 5600 feet, August 1, 1959 (R. W. Hodges), [RWH]. California: 2♀, 6♂, Fredalba, San Bernardino Co.; August 19 through September 2, 1912 (G. R. Pilate), [USNM, RWH]; 2♀, 8♂, Oroville, Butte Co., March 12, 1928 (H. H. Keifer), [CAS, RWH]. New Mexico: 1♀, Mesilla (no date given), (C. N. Ainslie), [USNM]. Texas: 1♀, Bosque Co. (no date given), [MCZ].

PERIPLOCA CEANOThIELLA (Cosens), New combination
(Figs. 6 and 16)


The maculation of ceanothiella is the same as that of concoleorella except that the purple reflections are absent or not as intense. Male genitalia: as in figure 6 (R.W.H. slide no. 1124). Female

EXPLANATION OF FIGURES

Fig. 1, venation of Periploca concoleorella (Chambers); figs. 2-6, male genitalia of Periploca; 2, P. gulosa Hodges; 3, P. concoleorella (Chambers); 4, P. jessa Hodges; 5, P. mimula Hodges; 6, P. ceanothiella (Cosens).
genitalia: as in figure 16 (R.W.H. slide no. 1149). Alar expanse: 9-12 mm.

Food plant: Ceanothus spp. A gall former in the branches and twigs.
Type: location unknown.
Type locality: Toronto, Ontario, Canada.

Specimens examined: California: 1 ♂, ex Ceanothus gall, Burbank, Los Angeles Co., emerged January 11, 1960 (R. W. Hodges), [RWH]; 1 ♀, Grass Lake, El Dorado Co., June 29, 1957 (J. Powell), [RWH]; 4 ♂, 1 ♀, on Ceanothus, Los Angeles, May 1929 (L. E. Myers) [USNM]; 1 ♂, Mt. Lowe, Los Angeles Co., June 6, 1924 [LACM]; 3 ♀, reared from Ceanothus thyrsiflorus, Glendale, Los Angeles Co., collected March 13, 1934, emerged May 16, 1934 (Tower), [USNM]. Kansas: 1 ♂, reared from Ceanothus gall, Manhattan, collected April 22, 1928, emerged May 27, 1938 (R. H. Painter), [ABK]. New York, 1 ♀, Ithaca, June 6, 1939 (A. B. Klots), [ABK]; 1 ♂, Rochester, June 22, 1932 (A. B. Klots), [ABK]. Texas: 2 ♂, 1 ♀, Dallas, collected April 7, 1909, emerged April 12 through 19, 1909 (E. S. Tucker), [USNM]. Ontario, Canada: 1 ♂, 4 ♀, gall maker on Ceanothus, Toronto, collected 17.06, emerged June 23 through 26, 1907 [USNM]; 6 ♂, 5 ♀, same locality, emerged May 27 through 30 (no year or host given), [USNM, AFB].

PERILOCA GLEDITSCHIAEELA (Chambers), New combination
(Figs. 9 and 21)


Stigmatophora gleditschiaeella, Barnes and McDunnough, 1917, Check List of the Lepidoptera of Boreal America, 153; McDunnough, 1939, Mem. S. California Acad. Sci., 2: 64.

The maculation of gleditschiaeella is the same as that of ceanothiella. Male genitalia: as in figure 9 (R.W.H. slide no. 1147). Female genitalia: as in figure 21 (R.W.H. slide no. 1148). Alar expanse: 8-13 mm.

Food plant: Gleditsia sp. and Robinia sp. A borer in the thorns.
Type: Lectotype; present designation, male, left wings absent, bearing the following labels: 1) type, 1373. 2) Kentucky, Chambers. 3) Laverna (Anybia) Gleditschiaeella Cham. In Museum of Comparative Zoology.
Type locality: Kentucky.
Specimens examined: Kentucky: 15 ♂, 6 ♀, reared from thorns of

EXPLANATION OF FIGURES

Figs. 7-13, male genitalia of Periloca; 7, P. facula Hodges; 8, P. junebris (lateral view); 9, P. gleditschiaeella (Chambers); 10, P. cata Hodges; 11, P. atrata Hodges; 12, P. nigra Hodges; 13, P. laeta Hodges.
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7. P. facula

8. P. funebris

9. P. gleditschiaeella

10. P. cata

11. P. atrata

12. P. nigra

13. P. laeta
Robinia, (no further locality given), emerged February 1903 (A. Busck), [USNM], 1 ♀, (no further locality given), (Chambers), [USNM]. Maryland: 3 ♂, reared from honey locust, Williamsport, June 14, 1917 (P. R. Myers), [USNM]; 4 ♂, 4 ♀, same locality, reared from honey locust, collected May 11, 1916, emerged May 22 through 26, 1916 (W. R. McConnell), [USNM]. Ohio: 5 ♂, 14 ♀, Cincinnati, dates from May 20 through June 13 (Annette F. Braun), [AFB, USNM, RWH].

**Periploca atrata** Hodges, new species

(Figs. 11 and 19)


*Food plant*: *Juniperus* spp. Reared from the fruits.


**Explanation of Figures**

Figs. 14-19, female genitalia of *Periploca*; 14, *P. concolorrella* (Chambers); 15, *P. mimula* Hodges; 16, *P. ceanothiella* (Cosens); 17, *P. cata* Hodges; 18, *P. laeta* Hodges; 19, *P. atrata* Hodges.
Periplaca mimula Hodges, new species
(Figs. 5 and 15)


Food plant: unknown.

Holotype male, MADERA CANYON, 4880 FEET, SANTA RITA MOUNTAINS, SANTA CRUZ COUNTY, ARIZONA, August 4, 1959 (R. W. Hodges), (R.W.H. slide no. 1074), [Cornell University Type No. 3828]. Paratypes: 9 ♂, 5 ♀, same locality as holotype, with date range from July 8 through October 11, 1959 (R.W.H. slide nos. 1073, 1075, 1125, 1126, 1128-1130, 1134, 1137, 1138, 1143-1145), [CU, USNM, RWH]; 2 ♀, Peña Blanca Canyon, Santa Cruz County, Arizona, August 7 and September 1, 1959 (R. W. Hodges), (R.W.H. slide nos. 615, 1146), [CU, RWH].

Periplaca laeta Hodges, new species
(Figs. 13 and 18)


Food plant: Juniperus spp. feeding beneath bark of stems.

Holotype male, MONTICELLO, FLORIDA, ex juniper, February 15, 1961 (R. H. Miller), (R.W.H. slide no. 1081), [Cornell University Type No. 3820]. Paratypes: 3 ♂, 2 ♀, same locality as holotype, emerged February 15, 18, and 24, 1961 (R.W.H. slide no. 1082), [CPK, RWH]; 1 ♂, Madera Canyon, 4880 feet, Santa Rita Mountains, Santa Cruz County, Arizona, July 22, 1959 (R. W. Hodges), (R.W.H. slide no. 614), [RWH]; 1 ♂, Plummer's
Island, Maryland, June 1903 (Aug. Busck), (R.W.H. slide no. 10004), [USNM].

**Periploca cata** Hodges, new species
(Figs. 10, 17, and 24)


*Food plant*: reared from “cedar apples” of *Gymnosporangium* sp. It is

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20. *P. facula*

21. *P. gleditschiaeella*

22. *P. funebris*

**Explanation of Figures**

Figs. 20-22, female genitalia of *Periploca*; 20, *P. facula* Hodges; 21, *P. gleditschiaeella* (Chambers); 22, *P. funebris* Hodges.
not known whether the larva feeds on the tissues of the host, *Juniperus*, or of the parasite.

**Holotype male**, Putnam County, Illinois, reared from "cedar apple" emerged May 30, 1960 (collected by M. O. Glenn, reared by R. W. Hodges), (R.W.H. slide no. 1154), [Cornell University Type No. 3824]. Paratypes: 13 ♀, 24 ♂, same data as holotype, date range from May 9 through June 3, 1960 (R.W.H. slide nos. 574, 575, 1153, 1155), [CU, RWH]; 16 ♂, 9 ♀, same locality as holotype, date range from January 25 through June 30 (collected and reared by M. O. Glenn), [MOG, USNM, CU].

**Periploca nigra** Hodges, new species

(Fig. 12)


*Food plant*: *Juniperus* spp. A twig girdler, feeding on the cambium.


The specimens from Plummer’s Island are labeled with what appears to be a Busck manuscript name.
Periploca fessa Hodges, new species
(Fig. 4)


Alar expanse: 7-7½ mm.

Food plant: unknown.

Holotype male, Siesta Key, Sarasota County, Florida, April 6, 1957 (C. P. Kimball), (R.W.H. slide no. 658), [Cornell University Type No. 3822]. Paratype: 1 ♂, Plummer's Island, Maryland, May 1903 (Aug. Busck), (R.W.H. slide no. 10036), [USNM].

Periploca gulosa Hodges, new species
(Fig. 2)


Food plant: unknown.

Holotype male, Madera Canyon, 4880 feet, Santa Rita Mountains, Santa Cruz County, Arizona; fig. 24, Periploca cata Hodges, Putnam County, Illinois.

EXPLANATION OF FIGURES

Fig. 23, Periploca concolorrella (Chambers), Madera Canyon, Santa Rita Mountains, Santa Cruz County, Arizona; fig. 24, Periploca cata Hodges, Putnam County, Illinois.
Periploca facula Hodges, new species
(Figs. 7 and 20)


Alar expanse: 9-10 mm.

Food plant: Juniperus spp.

Holotype male, Madera Canyon, 4400 feet, Santa Rita Mountains, Pima County, Arizona, October 6, 1959 (R. W. Hodges), (R.W.H. slide no. 1076), [Cornell University Type No. 3821]. Paratypes: 2 ♂, same locality as holotype, October 10, 1959 (R.W.H. slide nos. 1127, 1133), [RWH]; 1 ♀, Eureka, Humboldt County, California, 6-6 (H. S. Barber), (R.W.H. slide no. 10005), [USNM]; 2 ♂, Jacumba, San Diego County, California, ex Juniperus californica, emerged December 7, 1915 (F. P. Keen), (A.B. usck) slide, 14 Jan., 1935), [USNM].

Periploca funebris Hodges, new species
(Figs. 8 and 22)


Food plant: Juniperus spp.

Holotype male, Madera Canyon, 4880 feet, Santa Rita Mountains, Santa Cruz County, Arizona, October 12, 1959 (R. W. Hodges), (R.W.H. slide no. 1072), [Cornell University Type No.
3818]. Paratypes: 2 ♂, 1 ♀, same locality as holotype, July 9 and August 23, 1959 (R.W.H. slide nos. 1131, 1132, 1135; [CU, RWH]; 1 ♀, same locality as holotype except for elevation, 5600 feet, (R.W.H. slide no. 1101), [RWH]; 1 ♂, same locality as holotype except for elevation, 4400 feet, Pima County (R.W.H. slide no. 1069), [CU]; 1 ♂, Garden of the Gods, El Paso County, Colorado, ex Juniperous (sic) monosperma, July 27, 1915 (J. H. Pollack), (A. B.[usck] slide, June 14, 1935), [USNM].

Grateful acknowledgment is made to the Grace H. Griswold Fund of the Department of Entomology of Cornell University for assuming the cost of engraving the plates.

NEW DISTRIBUTION AND HOST RECORD OF BAREOGONALOS CANADENSIS (HARRINGTON)
(Hymenoptera: Trigonalidae and Vespidae)
GERALD I. STAGE AND C. N. SLOBODCHIKOFF
University of California, Berkeley and
California Academy of Sciences, San Francisco

Townes (1956) listed four genera of trigonalid wasps known from the Nearctic Region, each represented by a single species: Orthogonalys pulchelli (Cresson), Poecilogonalos costalis (Cresson), Lycogaster pullata (Shuckard), and Bareogonalos canadensis (Harrington). The first two species have been recorded only east of Indiana. Lycogaster pullata is polytypic with the typical subspecies known from the Atlantic Coast west to the 100th meridian and the second subspecies, L. p. nevadensis (Cresson), known from Nevada, New Mexico, Colorado, and North Dakota. Bareogonalos canadensis has been recorded only from British Columbia.

A single female Bareogonalos canadensis (identified by G. I. S.) was obtained from a Vespula nest collected at Cazadero, Sonoma County, California, by Mr. James DeWeese on June 24, 1961. The nest, containing Vespula (Dolichovespula) arenaria (Fabricius) in all stages of development, was given to one of us (C. N. S.) who placed it in a closed terrarium to trap all that might emerge. On July 12, 1961, the trigonalid was found. The specimen has been deposited at the California Academy of Sciences.

Published records of B. canadensis are: 1 ♀, Victoria, B. C., September, 1893 (Harrington, 1896); 1 ♂, 1 ♀, British Columbia, October 21 and 25, 1897 (Townes); 23 ♂, 4 ♀, Gabriola
Island, B. C., October 21 to 27, 1898 (Taylor, 1898); 1 $, British Columbia Biological Station, Departure Bay, B. C., October 24, 1908 (Townes). Thus the California record represents a considerable increase in the known range of this infrequently collected species.

Wasps of the family Trigonalidae are all parasitoids. Townes briefly reviewed the life history of several species. The minute eggs are laid randomly on foliage and later eaten by lepidopterous or sawfly larvae in which they hatch. Here they may develop, but more often they develop as secondary parasitoids in dipterous or other hymenopterous parasitoids that also attack these caterpillars. Predaceous vespid wasps apparently become parasitized by provisioning their young with parasitized prey. For a more thorough discussion of the biology of trigonalids see Clausen (1940).

The only trigonalids associated with social vespid wasps are those in the genus Bareogonalos. According to Clausen, Van der Vecht recorded two species of Vespa as hosts of the Japanese species, B. jezoensis (Uchida). On Gabriola Island, British Columbia, a large series of B. canadensis was collected on the nest of Vespula (Vespula) pensylvanica (Saussure), apparently emerging from it (Taylor, 1898). In addition Harrington stated that his specimen from Victoria, B. C., was found in a vespid cell probably belonging to V. pensylvanica. Now V. (Dolichovespula) arenaria can be added to the list of hosts. Thus far Bareogonalos has been associated only with social vespids.

The authors wish to express their appreciation to Dr. Henry Townes, University of Michigan, Ann Arbor, for confirmation of the trigonalid determination and to Dr. Richard M. Bohart, University of California, Davis, for the vespid determination.

**Literature Cited**

**Clausen, C. P.**

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**Taylor, G. W.**

**Townes, H.**
NOTES ON HESPEROTYCHUS
(Coleoptera: Pselaphidae)

A. A. GRIGARICK AND R. O. SCHUSTER
University of California, Davis

When the genus *Hesperotychus* was proposed (Schuster & Marsh, 1958), it included ten species represented by 54 specimens. Eight of the species considered were based on a study of less than six specimens each and four of the species on single specimens. One additional species was described from Oregon by Park and Wagner (1961). It, too, was described from a single male.

Additional specimens of this genus have been collected in California and, in general, they substantiate the species as previously proposed. *Hesperotychus tantillus*, Schuster & Marsh, however, may eventually be shown to be a variant of *H. aculeatus* S. & M. For each of the new distribution records, a male has been slide-mounted and the aedeagus examined. The degree of variation in this structure is considerable but its general form is basic with minor displacements or changes in relative size of its parts.

**Hesperotychus stangei** Grigarick and Schuster, new species

*Male* (slide): Head 275u long x 270u wide (excluding eyes); pronotum 295u long x 330u wide; elytra 568u long. Dark brown to nearly black; legs, palpi, antennal clubs and elytra lighter and somewhat reddish. Eyes of five distinct peripheral facets; tempora slightly rounded; right mandibular ramus with four teeth, left with five teeth of which the distal three are largest; carina of apical declivity on ventral surface of head nearly obsolete. Pronotum with median basal fovea and three smaller punctures on each side. Winged. Mesosternal carina extending one-half distance to anterior margin of meso-coxal cavities. Pro- (fig. 2) and metatrochanter (fig. 3) spined; subapical spine of protibia small, that of mesotibia apparently lacking and that of metatibia large, about as long as width of tibia. Sternite VI emarginate with a number of glandular setae clustered near emargination. Aedeagus 290u long, as illustrated (fig. 1).

Female resembles male except lacking secondary sexual characters.

The *holotype male* and one paratype male were collected at *Davis, Yolo County, California*, in the Entomology Building, January 24, 1960, by L. Stange. They were presumably attracted to lights. Sixty-nine paratype males were collected in a black-light trap at Davis near the University Airport between March 19, and April 4, 1960, by F. E. Strong. Not included in the type series were 34 females, taken with the males on March 19, and one male, March, 1936, Moraga, Contra Costa County, California, by E. S. Ross.
This species is related to *H. aspersus* Schuster & Marsh by the long spines on the pro-and metatrochanter and the similarity of the aedeagi. In *H. aspersus* the central structures of the dorsal lobe are thin and staright. In *H. stangei* this structure is broad basally, constricted at about half its length, and then expanded into a leaf-like form at right angles to the base. The macrosetae of the metatrochanteral spine are on the spine in *H. stangei* while they are on the trochanter proper in *H. asperus*.

The females of two other species collected in the same trap were separated from those of *H. stangei* as follows: *H. stangei* and *H. aculeatus* are smaller than *H. macclayi*, Schuster & Marsh and *H. aculeatus* tends to have elytra with a brownish tinge, whereas in *H. stangei* the color is a more pronounced red. The females are winged in all three species.

One male examined represented a probable cross *H. aculeatus* × *H. stangei*. This specimen had the larger trochanteral spines of *H. aculeatus* but the aedeagus, although aberrant, was that of *H. stangei*.

**New Records**


*H. aspersus* S. & M. Davis, Yolo Co., California, 1 ♂ III-19-60 (F. E. Strong).


*H. macclayi* S & M . Nine miles south of Monticello, Napa Co., California, 1 ♂ XII-13-57 (R. O. Schuster); Davis, Yolo Co., California, 12 ♂, 8 ♀ III-19-to IV-4-60, light trap. (F. E. Strong).


*H. aculeatus* S. & M. Davis, Yolo Co., California, 26 ♂, 9 ♀ IV-4-60, light trap, (F. E. Strong).
EXPLANATION OF FIGURES


LITERATURE CITED

Park, O. and J. Wagner

Schuster, R. O. and G. A. Marsh

ZOLOGICAL NOMENCLATURE

NOTICE OF PROPOSED USE OF PLENARY POWERS IN CERTAIN CASES (A. (n.s.) 54

In accordance with a decision of the 13th International Congress of Zoology, 1948, public notice is hereby given of the possible use by the International Commission on Zoological Nomenclature of its plenary powers in connection with the following cases, full details of which will be found in Bulletin of Zoological Nomenclature, Vol. 19, Part 3 to be published on 28th May, 1962.

(2) Validation of the specific name caricae (Cynips) Linnaeus, 1762 (Insecta, Hymenoptera). Z.N.(S.) 1087;

(4) Designation of a neotype for Gryllus campestris Linnaeus, 1758 (Insecta, Orthoptera). Z.N.(S.) 1485;

(5) Validation of the specific name alveafrons (Dasiops) McAlpine, 1961 (Insecta, Diptera). Z.N.(S.) 1492;

(10) Suppression of Dahl's "Coleoptera und Lepidoptera", 1823. Z.N.(S.) 398;


Any zoologist who wishes to comment on any of the above cases should do so in writing, and in duplicate, as soon as possible, and in any case before 28th November, 1962. Each comment should bear the reference number of the case in question. Comment received early enough will be published in the Bulletin of Zoological Nomenclature. Those received too late for publication will, if received before 28th November, 1962, be brought to the attention of the Commission at the time of commencemen of voting. All communications on the above subject should be addressed as follows: The Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, LONDON, S.W. 7, England.—W. E. China, Assistant Secretary to the International Commission on Zoological Nomenclature.
NEW NORTH AMERICAN SPECIES OF ELAPHIDIONINE 
CERAMBYCIDAE 
(Coleoptera) 

JOHN A. CHEMSAK 
University of California, Berkeley 

The following new species of Elaphidionini are described to make the names available for other studies. This work was performed during the course of a National-Science-Foundation-sponsored study on North American Cerambycidae (Grant no. G-9899). The author is grateful to E. G. Linsley for the use of his unpublished manuscript on the tribe and for his helpful advice. Material was borrowed for study from the following: M. A. Cazier, Southwestern Research Station of the American Museum of Natural History; J. D. Lattin, Oregon State University; H. B. Leech, California Academy of Sciences; A. T. McClay, University of California, Davis; F. S. Truxal, Los Angeles County Museum; and F. G. Werner, University of Arizona.

Anelomorpha minuta Chemsaek, new species 

Male: Form small, narrow, elongate; color piceous to reddish brown; pubescence grayish, short, sparse, depressed and suberect. Head coarsely, closely punctate; sparsely pubescent; impression between antennal tubercles fairly broad, deep; palpi unequal, last segment scarcely expanded; antennae usually extending about two segments beyond elytral apices, segments three to five spinose at apex, spine of third segment long, prominent, spines of segments four and five short, segments three to nine distinctly carinate dorsally, basal segments densely, coarsely punctate, shining, sparsely pubescent except for long erect internal cilia, distal segments not densely clothed with very short pubescence; third segment longer than fourth, slightly longer than fifth, eleventh segment appendiculate. Pronotum distinctly longer than broad, sides impressed basally; surface densely, closely, but separately punctured, punctures not confluent or rugose appearing, smaller than punctures on elytral base, disk usually with a distinct glabrous callus behind middle; pubescence sparse, depressed and suberect, not at all obscuring surface; prothorax not impressed, evenly concave, densely, coarsely punctate, rather sparsely pubescent, intercoxal process broadly expanded at apex, coxal cavities closed or only slightly open behind; meso-and metasternum densely, shallowly punctate, rather sparsely pubescent. Elytra well over 3.5 times longer than broad; surface coarsely, densely punctate, punctures separated, larger than discal pronotal ones, becoming finer apically, pubescence sparse, depressed, with few longer erect hairs interspersed, especially at base; apices truncate to emarginate-truncate, angles often dentiform. Legs short, slender, rather sparsely pubescent, femora coarsely, shallowly punctate, tibiae carinate. Abdomen finely, shallowly, densely, punctate, moderately clothed with short appressed pubescence with few longer
erect hairs interspersed; apex of fifth sternite subtruncate. Length, 8-11 mm.

**Female:** Form more robust; antennae extending almost to elytral apices; apex of fifth abdominal sternite rounded, slightly emarginate medially. Length, 10-13 mm.

**Holotype male,** BROWNS CANYON, BABOQUIVARI MTS. ARIZONA, 3800 ft., VII-28-49 (F. Werner, W. Nutting); allotype female, Browns Canyon, VII-18-49, at light (F. Werner); paratypes as follows: 5 δ δ, Browns Canyon, VII-18-49, at light (F. Werner); 11 δ δ, Browns Canyon, 3800 ft., VII-28-49 (F. Werner, W. Nutting); 3 δ δ, Browns Canyon, VIII-4-61 (F. Werner, W. Nutting); 1 δ, Browns Canyon, VII-29-52 (H. B. Leech, J. W. Green); 3 δ δ, 2 ♂ ♀, Baboquivari Canyon, VII-25-52 (H. B. Leech, J. W. Green); 5 δ δ, Forestry Cabin, Baboquivari Mts., Pima County, Arizona, 3500 ft., VII-22-51 (W. S. Creighton); 2 δ δ, 1 ♀, Sabino Canyon, Santa Catalina Mts., Arizona, 5000 ft., VIII-6-48 (G. E. Ball); 2 δ δ, Sabino Canyon, VIII-8-55 (F. Werner, G. D. Butler); 1 δ, 1 ♂, Tucson, Pima County, Arizona, VII-18-53 (G. M. Bradt); 2 δ δ, Tucson, 2500-2700 ft., VII-11-49, VII-10-50 (G. M. Bradt); 16 δ δ, 3 ♂ ♀, Tucson, VIII-26-35, VIII-5-37 (Bryant); 1 δ, Tucson, VII-17-34 (E. D. Ball); 1 δ, Tucson, VII-13-57 (C. W. O’Brien); 2 δ δ, Baboquivari Canyon, W. slope, Baboquivari Mts., Arizona, VII-17-49 (F. Werner, W. Nutting); 1 δ, Continental, Pima County, Arizona, VII-29-48 (G. E. Ball); 1 δ, 10 miles E. Continental, VII-18-61 (F. Werner, W. Nutting); 1 δ “Santa Kits Mts.”, Arizona, VII-12-50 (R. H. and L. D. Beamer); 1 δ, Tucson Mts., Desert Museum, Arizona, VII-19-55 (G. Butler, F. Werner); 2 δ δ, Picture Rock Pass, Tucson Mts., Arizona, VII-25-61 (F. Werner, W. Nutting); 1 δ Madera Canyon, Santa Rita Mts., Arizona, VIII-4-47 (L. Martin); additional specimens not designated as paratypes include; 1 δ, Calabasas Canyon, W. of Nogales, Arizona, VII-28-48 (F. Werner, W. Nutting); 1 ♂, Huachuca Mts., Arizona; 1 δ, Cochise Stronghold, Dragoon Mts., Arizona, VII-16-58 (C. W. O’Brien); 1 δ, Santa Rita Mts., Arizona, VII-24-47 (P. A. Readio).

Types are deposited in the California Academy of Sciences. Paratypes are in the collections of the following institutions: University of Arizona, American Museum of Natural History, University of Kansas, Los Angeles County Museum, California Insect Survey, and California Academy of Sciences.

*A. minuta* is characterized by its piceous color, small, slender
form, sparse, depressed pubescence, and the distinctly punctate, non-rugose appearing pronotal disk.

Adults are attracted to both white and ultraviolet light. No definite host association is indicated in the type series but a number of specimens bear the names "sycamore-oak-mesquite" on their labels. This would suggest that these plants were the dominant types in the area of collection, and one of these is the probable host of *A. minuta*.

**Aneflomorpha linsleyae** Chemsak, new species

**Male**: Form elongate, subparallel; color testaceous, pubescence short, golden, suberect, not depressed. Head densely, coarsely punctate, sparsely pubescent; impression between antennal tubercles deep; palpi unequal, last segment not broadly expanded; antennae extending less than two segments beyond elytral apices, segments three to six spined at apex, seventh with very small tooth, spine of third segment long, blunt and recurved, spines of following segments gradually decreasing in length, segments three to eight distinctly carinate dorsally, carina of ninth segment faint, basal segments shining, short pubescence sparse, long erect hairs numerous internally, distal segments rather sparsely clothed with very short golden pubescence, third segment longer than fourth, subequal to fifth, fourth subequal to sixth, eleventh segment curved, scarcely appendiculate. Pronotum slightly longer than broad, sides impressed apically, medially, and basally, giving a sinuate appearance; surface coarsely, densely, separately punctate, punctures subequal in diameter to basal elytral ones, not rugose appearing, impunctate. Discal callus present behind middle; pubescence dense, fine, erect and suberect, not depressed, few long erect hairs present, surface not obscured; prosternum shallowly impressed, densely, coarsely punctate at basal one-half, pubescence moderate, fine, intercoxal process broadly expanded at apex, coxal cavities distinctly open behind by much less than width of apex of prosternal process; meso- and metasternum densely, shallowly punctate, pubescence moderately dense, mostly suberect. Elytra less than 3.5 times longer than broad; surface coarsely, densely, closely but separately punctate, punctures becoming finer apically, pubescence moderately dense, short, erect, not depressed, hairs mostly subequal in length throughout; apices emarginate, internal angle slightly dentate. Legs slender, sparsely pubescent, femora very shallowly punctate, tibiae carinate. Abdomen almost impunctate, sparsely pubescent; apex of fifth sternite shallowly emarginate-truncate. Length, 11 mm.

**Female**: Form more robust; antennae not extending beyond elytral apices; apex of fifth abdominal sternite broadly rounded. Length, 14 mm.

**Holotype male**, Southwestern Research Station of the American Museum of Natural History, 5 miles W. Portal, Cochise County, Arizona, VII-25-60, at light (Juanita M. Linsley); allotype female, same locality, VIII-4-59 (E. G. Linsley). Types are deposited in the California Academy of Sciences.
This species is quite striking in appearance and differs from all other members of the genus by its short, uniform, suberect, golden pubescence. No depressed hairs are present. The punctuation of the pronotum and elytra are also distinctive.

I take pleasure in naming this species in honor of Mrs. Juanita M. Linsley who collected the type and has assisted in numerous field collections of Cerambycidae.

**Aneflomorpha werneri** Chemsak, new species

*Male*: Form small to moderate sized, rather robust; color reddish brown with paler elytra; pubescence pale, erect and suberect, not depressed. *Head* densely, rather finely punctate, sparsely pubescent; interantennal depression deep; palpi unequal in length, last segment scarcely expanded; antennae extending slightly more than one segment beyond elytral apices, segment three with moderate spine which is about as long as second segment, segment four with minute dentule, remaining segments not toothed or spined, segments three to six vaguely, not prominently carinate dorsally, segments from third densely clothed with very short, appressed, golden pubescence, third to sixth with numerous long, erect hairs, third segment slightly longer than fourth, subequal to fifth, eleventh segment scarcely appendiculate. *Pronotum* distinctly longer than broad, sides slightly impressed apically and basally; surface densely, closely but not rugosely punctate, punctures larger than those on base of elytra, disk with distinct elongate, glabrous callus, two shallow impressions present at middle, one on each side of callus, pubescence sparse, fine, erect and suberect, not at all obscuring surface; prosternum impressed, basal half transversely rugose, pubescence sparse; intercoxal process broadly expanded at apex, coxal cavities slightly open behind; meso-and metasternum moderately densely punctate, sparsely clothed with subdued pubescence. *Elytra* about 3 times longer than broad; densely, moderately coarsely punctate, punctures well separated, becoming finer apically, pubescence moderately dense, fine, suberect and erect, not depressed nor obscuring surface; apices subtruncate, outer angles not produced, inner angle dentate. *Legs* long, rather sparsely pubescent, femora finely, densely punctate, tibiae carinate. *Abdomen* finely, densely punctate, moderately densely clothed with subdued hairs; apex of fifth sternite emarginate-truncate. Length, 10-16 mm.

*Holotype male*, Big Bend National Park, Chisos Mts., Texas, VII-9-48 (F. Werner, W. Nutting); paratypes as follow: 1 δ, Big Bend National Park, VII-9-48 (F. Werner, W. Nutting); 1 δ, Big Bend National Park, 5400 ft., VIII-24-54 (R. M. Bohart); 1 δ, Juniper Canyon, Chisos Mts., Texas, VII-17-28 (F. M. Gaige); 1 δ, Davis Mts., Texas, VI-28-46.

The type is deposited in the California Academy of Sciences. Paratypes are in the collections of the University of Arizona, the University of California, Davis, and the California Insect Survey.
This species is closely related to *A. seminuda* Casey but differs by the short spine of the third antennal segment, absence of a spine on segment five, and carinate antennae. The characters enumerated in the above description should readily separate *werneri* from other *Aneflomorpha*.

*A. werneri* is named in honor of F. Werner of the University of Arizona.

**Aneflomorpha cazieri** Chemsak, new species

*Male:* Form small, slender, elongate; color dark brownish testaceous to reddish brown; pubescence dense, appressed and short, long and suberect. *Head* densely, confluent punctate, moderately densely clothed with fine depressed and suberect pubescence; interantennal impression narrow, fairly deep; antennal tubercles prominent, spines produced; palpi unequal, last segment scarcely produced; antennae thin, extending 2 or 3 segments beyond elytral apices, third segment with very long, blunt spine at apex, spine of fourth segment short, fifth segment with minute tooth, remaining segments unarmed, segments not carinate dorsally, basal segments shining, long flying hairs abundant, distal segments moderately densely clothed with very short pubescence, third segment distinctly longer than fourth, fourth subequal to fifth, eleventh segment curved, slightly appendiculate. *Pronotum* distinctly longer than broad, sides subparallel, slightly inflated a little behind middle; disk densely, moderately coarsely, contiguously, but not rugously, punctate except for callus slightly behind middle, punctures smaller than basal elytral ones; pubescence moderately dense, subdepressed and suberect, not obscuring surface; prosternum scarcely impressed, densely, coarsely punctate before coxae, intercoxal process broadly expanded at apex, coxal cavities slightly open behind; meso-and metasternum densely, shallowly punctate, densely pubescent. *Elytra* about four times longer than broad; basal punctures very coarse, subcontiguous, dense, becoming finer and shallower apically; pubescence moderately dense, subdepressed with longer suberect hairs numerous basally, pubescence not obscuring surface; apices truncate to emarginate, angles usually dentate. *Legs* slender, clothed with numerous, long-flying hairs, femora sparsely, shallowly punctate, tibiae carinate. *Abdomen* finely, moderately densely, shallowly punctate, densely clothed with depressed and suberect pubescence; apex of fifth sternite broadly truncate. Length, 8.13 mm.

*Female:* Antennae about as long as body; apex of fifth abdominal sternite broadly rounded. Length, 9.13 mm.

**Holotype male,** Southwestern Research Station of the American Museum of Natural History, 5 miles W. Portal, Cochise County, Arizona, VIII-1-59 (E. G. Linsley); allotype female, same locality, VIII-2-58 (R. H. James); paratypes as follows: 1♀♂, S. W. Research Station, VII-17-60, at light (J. M. Linsley), VII-20-60, at light (J. M. Linsley), VII-22-56 (C. and M. Cazier), VII-26-61, “malt-water bait” (L. J. Bottimer), VIII-1-59 (E. G. Linsley), VIII-2-61 (J. F. Lawrence, J. M. Linsley),

The types are deposited in the California Academy of Sciences. Paratypes are in the collections of the University of Arizona, the Los Angeles County Museum, the California Academy of Sciences, the University of California, Davis, the American Museum of Natural History, and the California Insect Survey.
A. cazieri can be readily differentiated from the other members of the genus by its narrow, elongate form. The elongate, blunt spine at the apex of the third antennal segment separates this species from the bulk of other Anefiomorpha. It differs from the other species possessing such a spine as follows. The elongate antennae will separate A. delongi (Champlain and Knll) from cazieri while the coarsely punctate elytral base with the punctures larger than those of the pronotum differentiate it from A. aculeata (LeConte). A. tenuis (LeConte) is much stouter, piceous, and with heavier, suberect pubescence.

While most of the type series were collected at light, one specimen was obtained while beating Quercus and others taken in an “oak-pine-juniper zone” and “pine zone with Robinia”. This may indicate that this species utilizes one or more of the deciduous trees within the area as its host.

This species is named for M. A. Cazier of the Southwestern Research Station.

Neaneflus brevispinus Chemsak, new species

Male: Form moderate sized, fairly stout; color piceous; pubescence dense, depressed and suberect. Head densely, rugosely punctate, moderately densely clothed with depressed hairs; interantennal depression shallow; palpi not very unequal in length, last segment not broadly expanded; antennae only slightly extending beyond elytral apices, spine of third segment very short, fourth segment at most with very small tooth at apex, segments three to nine carinate dorsally, carinæ not prominent, segments from third densely clothed with very short pubescence, suberect long hairs sparse, outer segments expanded apically, flattened, segments three to nine subequal in length, ten and eleven shorter. Pronotum about as long as broad, sides broadly rounded; surface densely, confluentlv, moderately coarsely punctate, punctures subequal to basal elytral ones in diameter, disk usually with a linear callus behind middle; pubescence dense, depressed, suberect hairs very sparse; prosternum shallowly impressed, densely punctate before coxae, transversely rugose at apical half, pubescence moderately dense, short, depressed, intercoxal process only slightly expanded apically, coxal cavities wide open behind; meso- and metasternum finely, densely punctate, moderately densely pubescent. Elytra slightly less than three times longer than broad; surface densely, moderately coarsely punctate, punctures well separated, becoming finer apically; pubescence dense, appressed, partially obscuring surface, longer suberect hairs sparsely interspersed; apices with outer angle rounded, sutural angle dentiform. Legs slender, densely pubescent, femora densely, moderately coarsely punctate, tibiae carinate. Abdomen finely, shallowly punctate, densely pubescent; apex of fifth sternite broadly emarginate-truncate. Length, 11-16 mm.
Female: Antennae shorter than body; apex of fifth abdominal sternite broadly rounded. Length, 11-14 mm.

Holotype male, allotype female and 19 paratypes (17♂♂, 2♀♀)
Pyramid Peak, Dona Ana County, New Mexico, VII-18-30 (F. R. Fosberg); additional paratypes as follows: 4♂♂, Mesquite, New Mexico, VIII-1-30, VIII-3-30, VIII-4-30, VII-5-30; 1♀, Jemez Springs, Sandoval County, New Mexico, VII-10-54 (Cazier and Gertsch); 1♂, Globe, Arizona (Duncan); 2♂♂, Parker Ranch, Sixshooter Canyon, Globe, Gila County, Arizona, VIII-22-52 (H. B. Leech, J. W. Green); 1♂, Saginaw Canyon, New York Mts., San Bernardino County, California, IX-8-50; 1♂, Tornillo Flat, Chisos Mts., Texas, VII-13-48 (F. Werner, W. Nutting); 1♂, Sheffield, Pecos County, Texas, VI-30-48 (C. and P. Vaurie); 2♂♂, 15 Km. E. Sombrerete, Zacatecas, Mexico, VII-28/31-51 (P. D. Hurd).

The primary types are deposited in the Los Angeles County Museum. Paratypes are in collections of the Los Angeles County Museum, the University of Arizona, the California Insect Survey, the American Museum of Natural History, and the California Academy of Sciences.

This species is very suggestive of Micraneflus imbellis (Casey) but can be readily differentiated by the spined, carinate antennae, distinctly carinate tibiae, subequal length of the antennal segments, and piceous color. The much smaller size, shorter spine of the third antennal segment, vaguely carinate outer antennal segments, and shorter sutural spine of the elytra separate N. brevispinus from N. fuchsii (Wickham).

Anelaphus dentatus Chemsak, new species

Female: Form robust, subcylindrical; integument dark reddish brown; pubescence short, suberect with irregular patches of dense, white, appressed pubescence scattered over elytra. Head coarsely, confluentely punctate between eyes, more finely on vertex; pubescence sparse, fine, subdepressed, antennal tubercles with small tufts of depressed yellowish hairs; antennae shorter than body, not carinate dorsally, segments three to nine spinose internally, segments from five to ten with small teeth externally, segments expanded, flattened, basal segments sparsely clothed with fine subdepressed hairs, longer suberect hairs sparse, distal segments densely clothed with very fine, short, golden pubescence, segments one to four densely, coarsely punctate. Pronotum slightly longer than broad, sides broadly rounded; disk with an irregular glabrous callus behind middle, punctuation coarse, dense, confluent, giving a somewhat rugose appearance; pubescence fine, moderately dense, subdepressed, a tuft of dense, pale, depressed hairs
present on each side a little before middle; prosternum transversely impressed, coarsely, rugosely punctate before coxae, pubescence moderately dense, intercoxal process expanded at apex, coxal cavities open behind; meso- and metasternum densely, shallowly punctate, moderately densely pubescent; scutellum clothed with dense appressed pubescence except for longitudinal median line. Elytra less than three times longer than broad; basal punctures moderately coarse, well-separated, smaller than pronotal ones; patches of dense, whitish, depressed pubescence irregularly interspersed over surface, short, golden, suberect hairs sparse, long hairs absent; apices subtruncate, inner angle with short spine. Legs slender, moderately densely pubescent; middle and hind femora arcuate, densely, rather finely punctate; tibiae carinate. Abdomen finely, sparsely punctate, moderately densely pubescent; apex of fifth sternite rounded. Length, 16-18 mm.

_Holotype female_ and one paratype (female), COCHISE STRONGHOLD, DRACOON MTS., ARIZONA, VII-10-55 (G. D. Butler and F. G. Werner).

The type is deposited in the California Academy of Sciences. The paratype is in the collection of the University of Arizona.

This species superficially resembles _A. debilis_ (Le Conte) but can be readily separated by the irregular discal callus of the pronotum, reduced pubescence, and coarser pronotal punctures.

The shape of the pronotal callus, coarse punctuation, short suberect hairs interspersed among the irregular patches of dense depressed hairs, and apical spines of segments three to nine characterize _A. dentatus_ and will separate it from other _Anelaphus_.

**Peranoplium piceum** Chemsak, new species

_Male:_ Form subparallel, moderately robust; integument piceous, antennae and tarsi lighter; pubescence dense, whitish, subdepressed, with finer suberect, golden hairs interspersed. _Head_ coarsely, densely, confluentely punctate between eyes and on front, more finely on vertex; pubescence moderately dense, subdepressed; antennae shorter than body, third segment with very small spine, fourth, at most with minute tooth, third segment subequal in length to fourth, fifth a little longer than third, basal segments rather densely clothed with pale subdepressed hairs, distal segments densely clothed with very fine, short pubescence, eleventh segment appendiculate. _Pronotum_ as wide as or slightly wider than long; sides feebly rounded, surface coarsely, contiguously, shallowly, alveolately punctate, moderately densely clothed with subdepressed hairs, longer, finer, erect hairs sparse at sides; prosternum transversely impressed, coarsely punctate, rather sparsely pubescent, front coxal cavities closed behind; meso- and metasternum densely, coarsely punctate, rather sparsely pubescent; scutellum densely clothed with white recumbent pubescence. _Elytra_ less than three times longer than broad; basal punctures moderately coarse, separated, becoming coarser at basal one third then finer apically; pale pubescence dense, subdepressed with finer suberect, golden hairs interspersed, indistinct costae.
forming vague longitudinal stripes; apices rounded. Legs densely pubescent, densely, moderately coarsely punctate; tibiae carinate. Abdomen finely, shallowly punctate, moderately densely pubescent; apex of fifth sternite truncate. Length, 11-12 mm.

Female: Antennae attaining second abdominal segment; apex of fifth abdominal sternite rounded at apex. Length, 9-12 mm.

Holotype male, Tucson, Arizona, May, 1961; (E. Madden); allotype female, Globe, Arizona, VI-19-57 (G. Butler, F. Werner); paratypes as follows: 1♂, Tucson, IV-10-57 (Flake); 1♂, Tucson, V-10-58 (E. B. Gould); 1♂, Pearce, Arizona, IV-23-57, “mesquite” (G. Butler, F. Werner); 1♂, San Bernardino Ranch, 13 mi. E. Douglas, Cochise County, Arizona, VI-12-59 (L. A. Stange); 1♂, Sixshooter Canyon, Pinal Mts., Arizona, VII-4-40 (J. J. duBois); 1♂, Santa Rita Range Res., Pima County, Arizona, IV-29-58, “swept from mesquite” (G. D. Butler); 1♀ Browns Canyon, Baboquivari Mts., Arizona, VI-17-57.

The types are deposited in the California Academy of Sciences. Paratypes are in the collections of the University of Arizona and California Insect Survey.

This species differs from P. simile (Schaeffer) by its piceous color, thicker subdepressed pubescence, lack of condensed pubescent white patches on the elytra, and subequal third and fourth antennal segments. The pubescent white fasciae and partially open front coxal cavities separate subdepressum (Schaeffer) from piceum while the small size, pale color, and reduced antennal spines distinguish tuckeri (Casey). P. hoferi (Knoll) differs by its smaller size, paler color, and non-impressed prosternum.

BOOK REVIEW

A MANUAL OF COMMON BEETLES OF EASTERN NORTH AMERICA.

The Dillons have made a fortunate choice of publisher. Their book has a good solid feeling in the hand, is strongly bound, printed on a suitable paper, and shows the care given to page make-up. There is clarity at a glance. The identification keys are nearly always complete on one page or on two facing pages. There are remarkably few typographical errors and the price is surprisingly low. It is a pleasure to find this book dedicated to Henry Dietrich of Cornell University.

The text is much harder to assess. No one can fail to appreciate the years of work it took to produce the 544 text figures and the 1201 others com-
prising the plates; these alone should ensure a good sale for the book. Yet a few additions would make it a great deal more useful, especially to beginners, and there are errors which cannot be overlooked. In anticipation of future editions and a long life for the manual, this review is frankly critical.

As its title states, the Dillons have written a work on the common beetles of the eastern half of North America north of Mexico. But the practicing entomologist is frequently amazed at the rarities turned up by the veriest tyros; for this reason the authors of a reliable manual must have in mind all the species known from the area covered, when drawing up their keys. Having decided upon which species to include, they face the very difficult task of wording the keys so that the excluded species will fail to “run” satisfactorily. The reader should be warned of the need for care and further search by a comment such as “Four more species of this genus are known from the region treated.” In the key to families, an asterisk at the point to which a specimen of an excluded family would trace, and a footnote reference, would be very helpful. But perhaps the most useful addition to the book would be one or more plates illustrating at least one typical representative of each family known from the area but omitted from the text. To obtain this the authors might sacrifice some of the colored plates, despite their sales appeal.

A book for the tyro should be as free as possible of errors and ambiguities, for it is only the experienced worker who can recognize them and make corrections. It is easier to learn than to unlearn, so a high standard should be set at the beginning.

There are irregularities in the nomenclature, resulting no doubt from the length of time the text was in preparation. For instance Tetracha Hope and Platynus (ascribed to Say) are still used in place of Megacephala Latreille and Agonum Bonelli, while Lepidotus Stephens in Elateridae and Boreades Parsons in Nitidulidae reflect current usage. Omophron is given family status as Omophronidae, though in another equally recent book the genus is placed in a tribe of the subfamily Carabinae of the Carabidae. Ostomatidae is used in preference to Ostoimidae; and Byturus is still cited as a dermestid, though the family Byturidae is not even in the same superfamily as is the Dermestidae. Some nomenclatorial changes are admittedly controversial and it may be hard to make a choice for a general work; but others are clear cut, well established, and should be adopted for the next edition of this manual.

Since the book is certain to have wide use in western North America too, the family characteristics cited should be those which apply equally well to eastern and western species. Professional entomologists are likely to use the book chiefly for the keys and the summaries of generic characters, so these latter should not be based on just the common eastern forms.

Following are some comments which occur to one on leafing through the book.

Color plate B.—Cotinus should be Cotinis.

Introduction.—The 23-page Introduction contains a wealth of information
for the beginning collector, supplemented by the excellent end-paper figures of beetles with the parts named in full, and by the 9-page glossary. A simplified key to the larvae such as that by Blair, as given in the latest edition of Brues and Melander's "Classification of Insects," would be an especially valuable addition. Also helpful would be figures, with parts named, of the genitalia of a male and of a female beetle. Surprisingly, there is no mention of collecting beetles directly into 70% or 80% alcohol. And it is a curious thing that one often sees printed references today to Schmidt boxes (p. 9) though the originator was John Schmitt (see his advertisement in "Entomological News" for February 1893, for instance, or catalogues by the present makers, Ward's Natural Science Establishment).

Page 129.—The legs of halipids are said not to be fringed with hairs for swimming, yet on pp. 26 and 35 they are said to be fringed, and fig. 31 correctly shows the fringe.

Page 141.—The "Ilybiosoma bifarius (Kirby)" of p. 143 will not trace to Ilybiosoma in the key to genera on p. 141, nor does it agree with fig. 127. Actually, it is not congeneric with the Californian I. regularis (LeConte), type of Ilybiosoma, but belongs in Apator Semenov. In a 1942 paper both concepts were shown to be synonyms of Agabus s. lat.

Plate XV.—In figs. 1, 2, 6, 7, 8 and especially 11, the hind tarsi are disproportionally short. The female shown in fig. 11 cannot be Dytiscus fasciventris Say, as the elytra of females of that species are always sulcate.

Page 158.—Couplet 3 of the key to subfamilies is inaccurate; the pronotum is not appreciably narrower than the base of the elytra in Helophorus (see pl. XVI, figs. 7, 8), while it is decidedly so in Hydrochus (pl. XVI, figs. 9, 10 and statement on p. 162). In the summary of family characters the tarsi of the Hydrophilidae are said to be 5-segmented; this is too inclusive: the middle and hind tarsi of Helocombus and Cymbiodyta are 4-segmented (see couplet 10 in the key on p. 163), as are those of Helochaeres and Helobata.

Plate XVII.—By their lengths and segmentation the head appendages in fig. 2 are not correct for palpi or for antennae. Fig. 10 will do for Cymbiodyta fimбриata (Melsheimer), but cannot serve for Helocombus bifidus (LeConte) whose obvious generic character is its long slender maxillary palpi. Similarly, fig. 11 represents C. blanchardi Horn but not Laccobius agilis (Randall), which latter has narrow curved hind tibiae and a very different body outline.

Page 265.—It is a surprise to read that the larvae of some Melyridae occur on dead animals. Perhaps the authors had in mind the larvae of Necrobia spp., Cleridae.

Page 273.—The legend for figs. 211-213 should read clerids, not melyrids.

Page 403, Family Languridiidae.—The key to genera simply will not work; used for Languria trifasciata Say and Acropteroxys gracilis Newman, both illustrated on pl. XL, it will group them by sexes but not by genera. Vaurie published an excellent revision in 1948, as listed in the Bibliography, p. 841.

Plate XL.—Either figs. 4 and 5, or the text references on pp. 415 and 416 should be reversed. And surely fig. 6 does not depict Schizotus cervicalis Newman?
Pages 435-436.—In the second part of couplet 2 of the key, the body is said to be glabous, and one is led to couplet 6; the second part of that calls for a pubescent body!

Pages 450-451.—It seems unfair to describe the beetles of all four genera (Adalia, Mulsantia, Anatis, Neomyzia) equally as “small.”

Page 525.—The reader with a specimen of Diplotaxis at hand will have trouble with the key to the tribes of the subfamily Melolonthinae, and to the one on p. 529 to the genera of the Melolonthini. To reach Melolonthini on p. 525 he must refuse to trace Diplotaxis through the first part of couplet 2 “Anterior coxae conical, prominent . . . 3,” yet must place it under “Procoxae prominent, conical . . .” on p. 529!

Plate LXXIX.—Fig. 3 is not an accurate portrayal of Hypha punctata (Fabricius).

Page 791.—It is not correct to say that the larvae of Cryptorhynchus lapathi (Linné) are bark borers. They breed in living willows and poplars, most of which have very thin bark, and actually they tunnel into the cambium till nearly full grown, then into the heartwood.

Bibliography, pp. 824-865.—The important section of the book is full of surprises. It is the most extensive recent bibliography on North American Coleoptera available, other than the Leng and Blackwelder catalogues, and cites some papers issued as recently as 1958. It is arranged for quick and easy reference, lists a number of rare and obscure items, omits some major works—and has the greatest number of errors, large and small, per page, of any bibliography seen! Many titles are accurately quoted, some leave out one or more words, some are catch titles, and still others appear to have been made up for the occasion. Despite this it is extremely useful.

It is impossible to give even a small part of the list of corrections in a review. The following are picked almost at random, by sectional headings. General: the major omission is the book “The natural classification of the families of Coleoptera,” by R. A. Crowson (Nathaniel Lloyd & Co., London, 1955. [8+] 187 pp., 212 figs. The title of the Leng Catalogue and its first three supplements is incorrectly cited in each case. Dryopidae: the Sanderson reference should be deleted; it is correctly given under Elmidae. Dytiscidae: Fall’s paper on Agabus has 36, not 20 pages. Haliplidae: Wallis’ paper was published in 1933. The pages for Chandler’s article should be 154-158. Melasidae: the paper on Melasis is by George R., not Ralph Hopping. Canada: the 1951 Brimley paper on Mordellidae is in vol. 83, pp. 278-279, not 43: 179-278.

The Dillons’ Manual will undoubtedly do more to popularize beetle collecting and study in North America than any previous single work. It should entice a host of newcomers, and can be afforded by most amateurs. Because of its basic good features it will surely receive the many laudatory reviews it merits, and for this reason in part the present reviewer has chosen to be critical. He also realizes that its faults are offset by a preponderance of assets, and that for a long time to come coleopterists and many other entomologists will owe a great debt to the energies of Elizabeth and Lawrence Dillon.—HUGH B. LEECH, California Academy of Sciences, San Francisco.
TWO HOSTS OF LOMACHAETA VARIEGATA MICKEL
(Hymenoptera: Mutillidae)

Hollow stems of Eriogonum elatum Dougl. were collected during
the winter of 1960-61 at Verdi, Nevada, by the author. Cocoons
extracted from the stems were placed in rearing boxes and gave
rise to twenty males and two females of Solierella similis (Brid-
well) as well as eleven males and five females of Lomachaeta
variegata Mickel. Also in the stems were seven cocoons of Solierella
blaisdelli (Bridwell) from which three males of this wasp and
two pairs of Lomachaeta variegata emerged. Previous biological
records of this small velvet ant were by Mickel (1940, Two new
species of Lomachaeta, with a key to the described species. Pan-
Pacific Ent. 16:127-132) who listed the host as Larrinae in twigs,
and by Krombein (1958. Family Mutillidae. Hymenoptera of
America north of Mexico, synoptic catalog. U.S. Dept. Agr.,
Agr. Monog. no. 2, first supplement, pp. 101-107) who listed
the host as Solierella sp. Identification of the mutillid was made
by C. E. Mickel and of the Solierella by F. X. Williams.—F. D.
Parker, University of California, Davis.

DIRECTORY OF ZOOLOGICAL TAXONOMISTS

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bondale, Illinois, U.S.A.—Richard E. Blackwelder
April, 1962] BOHART—TACHYTES PEPTICUS GROUP 117

THE TACHYTES PEPTICUS GROUP IN NORTH AMERICA
(Hymenoptera: Sphecidae)

RICHARD M. BOHART
University of California, Davis

Since Nathan Banks' revisional paper in 1942 ("Notes on the United States species of Tachytes", Bull. Mus. Comp. Zool. Harvard 89:395-436), little has been published on the systematics of these interesting Larrine wasps. The pepticus group dates from 1837 when Thomas Say described its namesake from Indiana. The principal distinguishing feature of the group is the broadening in the male of one or more of the last five flagellar segments or flagellomeres. Other characters are the essential absence of outstanding hair ventrally on the hind femur, moderately long spines on the female hind tibia, abdominal tergite IV with a distal band of bright pubescence, male fore coxa simple, and male flagellomere I at least as long as II. Furthermore, most of the members have the basal two or three abdominal segments red, a character occurring in several other groups, also. Antennal and genitalic structure of the males are practically diagnostic. The females are difficult to distinguish, however, and correct association with males is sometimes problematical. This difficulty led Banks and other workers into a number of errors, and created a certain amount of synonymy. A useful feature shared by both sexes is the distribution of bright appressed pubescence anteromedially on the scutum. Its bright reflection is best seen from above and slightly to the front.

Holotypes will be deposited in the California Academy of Sciences, San Francisco. Paratypes will be distributed to other museums insofar as possible.

Symbols used for type repositories of previously described species are: MCZ, Museum of Comparative Zoology, Harvard; ANSP, Academy of Natural Sciences, Philadelphia; AMNH, American Museum of Natural History.

Key to Males of the Tachytes Pepticus Group in North America

1. Abdominal segments with dark ground color ........................................ 2
   Abdominal segments I-II or I-III extensively red ................................ 5

2. Flagellomeres VIII-IX but not VII broadened, IX and tip of VIII sharply edged; clypeus completely punctate above lip; anteromedian scutal depression with bright appressed pubescence as distinct, though
not always so dense, as pretergular patch; gonostyle slender, volsella with subbasal pilose prominence ........................................... 3
Flagellomere VII broadened and sharply edged; clypeus somewhat shiny above lip; volsella without subbasal prominence................................. 4
3. Occupying the Indiana-Illinois area, associated with females .................................................. pepticus pepticus Say
Occupying southern and midwestern U. S., associated with females with all dark ground color............................................. pepticus sericus Cresson
4. Anteromedian scutal depression with bright appressed pubescence as distinct, though not always so dense, as pretergular patch; flagellomere IX usually broader than VIII and sharply edged; gonostyle moderately broad, ventral tuft not extending basad to lateral edge of gonobase .................................................. fulviventris rossi R. Bohart
Anteromedian scutal depression without bright appressed pubescence; flagellomere IX usually not so broad as VIII nor sharply edged; gonostyle moderately slender, ventral tuft extending basad to lateral edge of gonobase .................................................. pennsylvanicus Banks
5. Flagellomeres VII-IX slightly broadened, X-XI not so; tergites I-III customarily red .................................................. 6
Flagellomeres VII, VIII or IX conspicuously broadened, or with X-XI broadened; tergites I-II and sometimes extreme base of III red.................. 7
6. Flagellomeres VIII-IX sharply edged; anteromedian scutal depression with bright appressed pubescence as distinct, though not always so dense, as pretergular patch; gonostyle moderately broad, ventral tuft without special long spines................................................. sculleni R. Bohart
Flagellomeres VIII-IX not sharply edged; anteromedian scutal depression without bright appressed pubescence; gonostyle slender, ventral tuft with one or more long curved spines distally............................................. nevadensis R. Bohart
7. Flagellomeres X-XI broadened, X not narrower than VIII; gonostyle slender .................................................. 8
Flagellomere X distinctly narrower than VIII, gonostyle rather broad... 9
8. Flagellomere XI about two-thirds as broad as long; ventral tuft of gonobase continuous .................................................. spatulatus Fox
Flagellomere XI about one-half as broad as long; ventral tuft of gonobase divided into a basal group of dark bristles attached to edge of gonobase, and a group of reddish setae near base of gonostyle .......................................................... basirufus Rohwer
9. Anteromedian scutal depression without bright appressed pubescence; flagellomeres VII-IX broadened and sharply edged; gonostyle very broad .................................................. californicus R. Bohart
Anteromedian scutal depression with bright appressed pubescence as distinct, though not always so dense, as pretergular patch; gonostyle moderately broad .......................................................... 10
10. Flagellomeres VII-IX broadened and sharply edged; clypeus shiny above lip .................................................. fulviventris fulviventris Cresson
Flagellomeres VIII-IX broadened, IX and apex of VIII sharply edged; clypeus punctate above lip.................................................. pepticus chelatus R. Bohart
KEY TO FEMALES OF TACHYTES PEPTICUS GROUP IN NORTH AMERICA

1. Pygidium with dull, dark coppery reflection; anteromedian scutal depression without bright appressed pubescence comparable with that of pretegular patch .................................................. 2

2. Pygidium with coppery to nearly silvery reflection; anteromedian scutal depression with bright appressed pubescence as distinct, though not always so dense, as that of pretegular patch .................................................. 4

Ground color of abdomen all dark.............................................. pennsylvanicus Banks

Ground color of abdominal segments I-III extensively red .................. 3

3. Appressed pubescence of scutum silvery or whitish...nevadensis R. Bohart

Appressed pubescence of scutum brownish or brownish yellow ......
.......................................................................................... californicus R. Bohart and spatulatus Fox

4. Tergite V with appressed pubescence partly pale, at least laterally ...... 5

Tergite V with appressed pubescence all dark .................................. 7

5. Pygidium bright golden to nearly silvery.................................... sayi Banks

Pygidium with a coppery reflection ............................................. 6

6. Flagellomere II fully twice as long as broad; pygidium reflecting rather dark coppery......................................................... basirufus Rohwer

Flagellomere II a little less than twice as long as broad; pygidium reflecting rather light, bright coppery.................................. sculleni R. Bohart

7. Ground color of abdomen all dark.............................................. pepticus sericatus Cresson

Ground color of abdomen reddish on tergites I-II, at least ............... 8

8. Pygidium silvery, yellowish apically; tergites I-II dull reddish........
.......................................................................................... cressoni Banks

Pygidium with a coppery reflection; tergites I-II and base of III red... 9

9. Occupying Indiana-Illinois area, associated with dark males........

Occupying a more southerly and westerly area; associated with red-marked males.................................................. pepticus chelatus R. Bohart

.............................................................. and fulviventris fulviventris Cresson

TACHYTES PEPTICUS PEPTICUS (Say)


Male.—As described for subspecies chelatus but facial pubescence usually yellower, and ground color of abdomen dark. Scutal bright pubescence sometimes more golden.

Female.—As described for subspecies chelatus but ground color of basal three abdominal segments usually dull red and sometimes restricted mostly to I and II.

Material examined.—One male, INDIANA: Lafayette (neotype male, and female paratype of inferioris); 8 females, ILLINOIS: Algonquin, “N. Ill.”, Urbana.

The typical subspecies seems restricted to the Illinois-Indiana area, and is characterized by the dark male and reddish female.
Banks reported both sexes from Lafayette, Indiana, but he failed to associate them, presumably because of the sexual dimorphism.

**Tachytes pepticus chelatus** R. Bohart, new subspecies

*Male.*—Length 12 mm. black, tarsi partly and abdominal segments I-II and most of III red, wings lightly stained. Pubescence of face, thorax, and apical bands on tergites I-IV as well as all of VI, off-silvery; bright pubescence of scutum and mesopleuron abundant, tinged with yellow. Median lobe of clypeus entirely punctate except for lip; flagellomere VIII broadened and with a fairly sharp distal edge, IX broader and sharply edged (fig. 5); sternite VII with a semicircular incision between almost pointed teeth (fig. 6); gonostyle long and slender, ventromedian tuft with many partly fulvous hairs and several distal bristles, volsella with a subbasal tuft of hairs on a prominence (fig. 7).

*Female.*—Length about 14 mm., basal three abdominal segments clear red. Appressed pubescence of tergite V all dark; pygidium with a rather bright coppery reflection.

*Holotype male,* **WILLCOX, ARIZONA,** August 14, 1958, (R. H. James). Paratypes, 13 males, July and August, all from ARIZONA: Pearce (Butler-Werner), Willcox (R. R. Dreisbach, R. M. Bohart, C. W. O’Brien), Hotevilla, Coconino Co. (Rehn, Pate, Rehn), Benson (P. H. Timberlake), Kayenta (S. Bee), near Douglas (H. A. Scullen), Dragoon (J. Bequaert). Metatypes, 1 male, 3 females, Zion National Park, Utah; Hotevilla, Arizona; near Prescott, Arizona; and 10 miles west of Gray Mt., Coconino Co., Arizona.

The extensively red abdomen of the male distinguishes this subspecies. From other red forms the male differs especially by the flagellum, punctate clypeus, and the diagnostic tufted subbasal prominence of the volsella. The extensive bright pubescence of the scutum, dark tergite V, and coppery pygidium distinguish the female from all except *fulviventris* which seems to occupy a different area. One weak structural difference seems to be that the clypeus of female *chelatus* is less polished above the lip.

**TACHYTES PEPTICUS SERICATUS** Cresson

*Tachytes sericatus* Cresson, 1872. Trans. Amer. Ent. Soc. 4: 216. Lectotype ♂, Texas, ANSP.

*Male.*—As in the typical subspecies.

*Female.*—As in subspecies *chelatus* but ground color of abdomen dark.

*Material examined.*—50 males, 16 females, from the following states: FLORIDA: Levy Co., Gainesville, Welaka, Miami, Cocoa, Myakka River State Park, Welaka, Sanford; GEORGIA: Darien, Tifton, Okefenokee Swamp, Spring Creek; NORTH CAROLINA: Southern Pines, New River; ALABAMA: Theodore; TEXAS: Bexar Co., Austin, Fedor, Conlen; KAN-
Figs. 1, 5, 8, 12, flagellomeres VI-XI of male in profile; figs. 2, 9, pedicel and flagellomeres I-II of female in profile view; figs. 3, 6, 10, 13, sternite VIII of male; figs. 4, 7, 11, 14, left volsella and gonostyle of male genitalia, ventral and slightly flattened view. Figs. 5-8, 10-11 are of holotypes.

This is the commonest and most widespread form of the species, and the only one with all-dark ground color in the female. Occasional females show a reddish tint at the apex of tergites I and II.

**TACHYTES PENNSylvANICUS** Banks


*Male.*—Body ground color dark. Pubescence of face and thorax fulvous. No median bright pubescence on scutum, none obvious on pleuron. Median lobe of clypeus a little polished above lip. Flagellomeres VII-VIII broadened and each with a sharp inner edge, IX also broadened but usually less so than VIII and often without a distinct sharp edge (fig. 24); sternite VII with less than a half-circle incision between stout teeth (fig. 25); gonostyle medium narrow, ventral tuft extending from stout distal setae through fulvous-tipped hairs to a basal setigerous ridge attached to sharp edge of gonobase (fig. 26).

*Female.*—Facial pubescence off-silvery, silvery tergal bands weaker than in other species of the group, appressed pubescence of tergite V dark reddish, pygidium with a dark bronze reflection.

*Material examined.*—111 males, 33 females from the following states: Virginia, New York, Tennessee, Illinois, Arkansas, Wisconsin, Iowa, Minnesota, North Dakota, South Dakota, Nebraska, Kansas (Manhattan), Colorado (Loveland, Burlington, Roggen), New Mexico (Albuquerque), Idaho (Teton, Teton Co.), Oregon (Corvallis), and British Columbia (Vernon).

The all-dark ground color of this species has led to a confusion with *pepticus* s.s. and *pepticus sericatus*. It was synonymized with *pepticus* by Banks (1942) even though he pointed out certain valid differences. In addition to the shape of the flagellum and eighth sternite of the male, the absence of median scutal, bright pubescence in both sexes of *pennsylvanicus* is sufficient for separation.

**TACHYTES FULVIVENTRIS FULVIVENTRIS** Cresson


*Male.*—Basal two abdominal segments red. Pubescence of face and thorax off-silvery to somewhat fulvous, scutum and mesopleuron with abundant bright pubescence. Median lobe of clypeus partly polished. Flagellomeres VII-IX broadened and each sharply edged; sternite VIII with a semicircular incision between narrowly rounded teeth; gonostyle moderately broad, similar to that of *californicus* but not so stout, ventral tuft fairly compact and uniform, its hairs distally creamy. Structural details about as in figs. 18-20.
Explanation of Figures

Figs. 15, 18, 21, 24, flagellomeres VI-XI of male in profile; figs. 16, 19, 22, 25, sternite VIII of male; figs. 17, 20, 23, 26, volsella and gonostyle of male genitalia, ventral and slightly flattened view. Figs. 15-17 are of a paratype from Antioch, California; figs. 18-23 are of holotypes.
Female.—Basal three abdominal segments red; facial pubescence and upright hair of thorax off-silvery; median bright pubescence of scutum off-silvery to coppery, extensive, that of mesopleuron conspicuous, off-silvery; appressed pubescence of tergite V all dark; pygidium with a bright coppery reflection.


The moderately broadened male gonostyle, the abundant scutal and pleural bright pubescence, and the three expanded and sharply edged male flagellomeres are characteristic. The female can be confused with the red forms of pepticus, in which, however, the clypeus is more evenly sculptured toward the lip. Also, the geographical ranges seem to be distinct.

Tachytes fulviventris rossi R. Bohart, new subspecies

Male.—As in typical fulviventris Cresson except that ground color of abdomen is all dark. Length 11 mm. Structural details shown in figs. 18-20.

Female.—Unknown.

Holotype male, 20 MILES N. MESQUITAL, BAJA, CALIFORNIA, September 27, 1941, (E. S. Ross, G. E. Bohart). Paratypes, 1 male, same data as holotype; 3 males, San Diego, California, August 23, 1891 (F. E. Blaisdell).

From the other dark males of the group, pepticus and pennsylvanicus, this form differs by its distinctive flagellum and genitalia. Also, the abundant scutal bright appressed pubescence separate it from pennsylvanicus, the shinier clypeus from pepticus.

Tachytes nevadensis R. Bohart, new species

Male.—Length 12 mm. Black, tarsi mostly and basal three abdominal segments red, wings very lightly stained. Pubescence of face and thorax silvery, thorax with pale appressed pubescence but not bright except for pretergular spot, apical bands on tergites I-IV silvery, VII slightly off-silvery. Median lobe of clypeus partly polished, no distinct boss; flagellomeres VII-IX slightly broadened, IX less so than VIII, none with a sharp inner edge (fig. 21); sternite VII with narrowly rounded teeth (fig. 21); gono-
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style long and slender, ventral tuft with many hairs and setae as well as three curved distal spines (fig. 23).

Female.—Length about 16 mm. Abdominal segments I-III red; facial pubescence and erect hair of thorax silvery, Tergite V with appressed pubescence dark reddish, pygidium with a dull, dark coppery reflection.


The male of nevadensis is most easily confused with that of sculleni which has a similar flagellum. However, flagellomeres VII-IX are not creased in nevadensis and there is practically no median bright appressed pubescence. The stout curled spines of the ventral tuft of the gonobase are diagnostic. The female is very similar to those of spatulatus and californicus but differs from both by the silvery to light creamy color of the appressed scutal pubescence. Also, the facial pubescence of nevadensis is generally more silvery than in the other two species.

Tachytes californicus R. Bohart, new species

Male.—Length 11 mm. Black, most of tarsi and basal two abdominal segments red, wings lightly stained. Face off-silvery, scutum without bright pubescence in anteromedian area, erect hair greyish-white to pale fulvous; apical bands on tergites I-IV slightly off-silvery, VII silvery. Median lobe of clypeus partly polished, no distinct boss, flagellomeres VII-IX increasingly broadened, inner edge sharp (fig. 15); sternite VIII with rounded teeth (fig. 16); gonostyle unusually broad, strongly bent outward (fig. 17), ventral tuft with many hairs.

Female.—Length about 18 mm. Abdominal segments I-III red; facial
pubescence creamy, appressed pubescence of scutum brownish, tergite V with appressed pubescence black; pygidium evenly and densely covered with nearly black setae with a dull, dark coppery reflection.

Holotype male, Davis, Yolo Co., California, July 16, 1955 (E. I. Schlinger). Paratypes, 110 males, May to September, all from California: Artois, Auburn, Davis, Tesla (Alameda Co.), Antioch, Mt. Diablo, Vacaville, Menlo Park, San Antonio Valley (Santa Clara Co.), Friant, Watts Valley (Fresno Co.), Three Rivers, Caliente, Shafter, Foster Park (Ventura Co.), Cressey, near Cachuma Lake (Santa Barbara Co.), Riverside, near Warner Springs. Metatypes, 11 females, California: Artois, Vacaville, Elk Grove, Orangegrove (Sacramento Co.), Green Valley (Solano Co.), Hospital Canyon (San Joaquin Co.), Friant, Los Angeles, Warner Springs, Santa Cruz Island. Also, males from Moscow, Parma, and Bliss, Idaho; and Jefferson Co., Oregon.

The male with its three broad and creased flagellomeres, absence of bright appressed pubescence medially on the scutum, and broad gonostyles is relatively easy to distinguish. However, the female is practically identical with that of spatulatus. Male-associated specimens of californicus seem to have the abdomen brighter and with more reflection from the appressed pubescence than male-associated specimens of spatulatus.

Tachytes sculleni R. Bohart, new species

Male.—Length 12 mm. Black, terminal tarsomeres and basal three abdominal segments red, wings practically clear. Face silvery, scutum and mesopleuron with considerable silvery bright pubescence; apical bands on tergites I-IV silvery, VII slightly off-silvery. Median lobe of clypeus partly polished, no distinct boss, flagellomeres VII-IX slightly broadened, IX less so than VIII, VIII-IX with sharp inner edge (fig. 8); sternite VIII with narrowly rounded teeth (fig. 10); gonostyle moderately broad (fig. 11), ventral tuft with many hairs and distal bristles.

Female.—Length about 15 mm. Facial pubescence and erect hair of thorax silvery; bright pubescence of scutum creamy, that of pleuron abundant and silvery; tergite V with some lateral creamy to fulvous appressed pubescence; pygidium with a rather bright coppery reflection. Flagellomere II about 1.6 times as long as broad (fig. 9).


The male of sculleni is distinguished by the flagellum, the moderately broad gonostyle, and the three red abdominal segments; the female by the silvery face, abundant scutal and pleural bright pubescence, creamy to fulvous lateral pubescence of tergite V, and the light coppery pygidium.

**Tachytes basirufus** Rohwer


*Male.*—Basal two abdominal segments red. Pubescence of face and thorax silvery, or bright pubescence sometimes yellowish on scutum, a little silvery bright pubescence on mesopleuron; tergite VII usually yellowish. Median lobe of clypeus partly polished. Flagellomeres VIII-XI slightly flattened and broadened, XI about twice as long as broad, X with a fairly well defined inner edge (fig. 1); sternite VIII with a rounded incision between blunt apical teeth (fig. 3); gonostyle long and slender, ventral tuft divided into a reddish median group of about 10 setae and a basal mass of dark bristles (fig. 4).

*Female.*—Length about 15 mm. Abdominal segments I-III red. Facial pubescence and erect hair of thorax silvery to slightly grey, bright appressed pubescence of notum and tergites silvery, that of anteromedian scutal depression limited to 10-20 separated hairs; tergite V with some lateral creamy fulvous appressed pubescence; pygidium with a dark coppery reflection. Flagellomere II fully twice as long as broad (fig. 2).

*Material examined.*—17 males, June to August, UTAH: Bluff (C. T. Brues); ARIZONA: Grand Canyon South Rim (H. and M. Evans), 15 miles E. Cameron (C. O'Brien); NEVADA: Mt. Springs Summit, Clark Co. (F. D. Parker), Alamo (F. D. Parker), Hiko, Lincoln Co. (R. C. Bechtel); CALIFORNIA: near Idyllwild (E. Ross, A. Menke, L. Stange, P. Hurd); Antelope Springs, Inyo Co. (H. Court); Saline Valley, Inyo Co. (A. Menke, L. Stange); HIDALGO (Mexico): Zimapán (H. Evans). Also, 2 females (associated with 4 males), NEVADA: Mt. Springs Summit, Clark Co., July 31-August 2, 1959 (F. D. Parker).

The male genitalia readily separate this species from its more common relative, *spatulatus*. Also, the longer and more slender
last antennal segment of *basirufus* is a reliable criterion. I have not seen Rohwer’s holotype male, but his original description points out the two red abdominal segments, the relatively simple flagellum, the rounded emargination of sternite VIII, and the yellowed tergite VII. The presumed female is close to *sculleni* but has the second flagellomere distinctly longer. The male has the flagellomeres proportionately longer than in other species of the group.

**Tachytes spatulatus** Fox


**Male.**—Basal two abdominal segments red. Pubescence of face and thorax silvery, scutum and mesopleuron without bright pubescence except pretergular spot. Median lobe of clypeus partly polished. Flagellomeres IX-XI distinctly broader than VIII, XI about two-thirds as broad as long and somewhat flattened as well as inflated, IX and X with a fairly definite inner edge (fig. 12); sternite VIII with broadly rounded teeth (fig. 13); gonostyle slender, a long row of median to basal hairs which are mostly fulvous to creamy (fig. 14).

**Female.**—Agreeing with description of *californicus*. It differs in the lesser development of silvery and fulvous appressed pubescence on the three red tergites, and the scantier appressed brownish hair of the scutum.


The inflated terminal flagellomeres of the male are diagnostic. The only species approaching it is *basirufus* in which the terminal flagellomere is about twice as long as broad. Since the differences in pubescence of the females of *spatulatus* and *californicus* involve a matter of degree, determination of male-associated specimens will be the most reliable criterion.
TACHYTES CRESSONI Banks


Known from three females only, collected at Fedor and Austin, Texas, *cressoni* is presumed to be in this group. Verification will depend on the discovery of males. The female characteristics are outlined in the key.

TACHYTES SAYI Banks


The dark male and partly red female led to a wrong association of sexes by Banks and consequently to the above synonymy. Banks' females of "sayi" were *pennsylvanicus*, and his males of "hesperus" were *nevadensis*. Strictly speaking, *sayi* does not belong in this group since the male flagellum is simple. The females, which might be confused with those of *sculleni* are differentiated in the key. The known distribution includes the western states as far east as Iowa, Kansas, and Texas. I have seen specimens also from British Columbia (Vernon) and Baja, California (Ignacio and San Benito Island).

Book Review


The literature on the subject of insect sounds is quite extensive, but until recently no synthesis has been available. Frings and Frings helped to correct the situation in their recent review (1958, Ann. Rev. Ent., 3:87-106), and the same authors provided the very useful "Sound production and sound reception by insects, a bibliography" (1960, Pennsylvania State University Press, ii + 108 pp.), which is made even more valuable by the inclusion of a taxonomic index, to the family level, and a subject index.

To these works may be added Haskell's book. This attractive volume serves both as a general introduction to the subject and as a manual for research. The first chapter discusses sound in general, sounds made by insects in particular, problems encountered in the recording and analysis of these sounds, and the equipment needed for research. The discussion is not especially technical, yet it provides enough information so that little knowledge of electronics is needed to make an intelligent selection of equipment.

The second chapter is on the mechanisms insects use to produce sounds.
Beginning with a classification of the known methods, Haskell continues by providing examples of these methods, order by order. The third chapter is devoted to insect hearing. The various kinds of receptors of airborne sounds and substrate vibrations are classified, the structures analysed, and the physics of sound and vibration reception are clearly outlined. The chapter ends with a table showing the distribution of various kinds of receptors in several insect orders and families.

The remaining chapters are concerned with the sounds produced by specific insects and the part they play in the insect's life. Chapter four, on the patterns of songs, is organized around the classification of mechanisms in the second chapter to emphasize the diversity of sound each kind can produce. The sounds are described verbally and, for a great many insects, illustrated with oscillograms and sound spectrograms. The fifth chapter covers one of the most interesting and yet least investigated aspects of insect sounds, the behavior associated with these sounds. Haskell observes that insects use sounds in many ways, and that more probably remain to be discovered; but he classifies sounds into those used for defense and warning, those involved in sexual behavior, and those related to social and subsocial organization. The difficulties presented by the interpretation of behavior are clearly pointed out.

Chapter six, titled "Some physiological aspects," discusses such things as the experimental separation of behavior stimulated by sounds from that produced by other stimuli—visual, for example; the experimental isolation of sites of sound reception; the determination of the parts of a sound essential to elicit a behavior pattern, by observing the response of an insect to modified recordings or artificially produced sounds; learned versus inherited response to sounds; and the location of centers in the nervous system that are related to sound production and reception. The last chapter, "Sounds in the insect world," reviews the value of insect sounds to the evolutionist: the selective advantages of sound production to insects as an isolating mechanism, etc. Here Haskell also discusses the possible practical uses of sound in control of insect pests and in determining when a hive of bees is about to swarm.

Throughout the book, Haskell stresses the need and opportunities for further research. His text and figures are for the most part admirably clear. He knows his subject and presents it well. This is an excellent book.

—PETER D. ASHLOCK, University of California, Berkeley.

ENTOMOLOGICAL SOCIETY OF AMERICA

The 1962 meeting of the Entomological Society of America will be held in the Hotel Westward Ho, Phoenix, Arizona, December 3-6. Details for presentation of papers will be found in the Bulletin of the Entomological Society of America, volume 8 (March, 1962).—EDITOR
HOST-PARASITE RELATIONSHIPS OF CALIFORNIA TORTRICINAE
(Lepidoptera: Tortricidae)

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During the past four years a number of parasite records have accumulated as a result of rearing done in connection with biological studies on California Tortricine moths. A detailed taxonomic and biological treatment is planned, but it is felt that a separate presentation of the parasite data is appropriate.

Rearing was accomplished primarily through field collection of near mature larvae which were kept in the laboratory on cut host plant leaves. Due to the scope of the study, individual larvae were not kept in separate containers except when small numbers were involved. Consequently specific data on habits of the parasites were not taken in most cases.

The Ichneumonidae comprise the most common group of parasites of North American Tortricinae, at least in terms of recorded host-parasite relationships; and this group was most frequently encountered during the present investigation. Townes and Townes (1951) state that host selection by Ichneumonids is sometimes restricted, but commonly it is related to the habitat of the exploring female; and a variety of species which occur there may be utilized. My data concern small, naked caterpillars in leaf shelters, and the records tend to support the Townes’ generalization. For example, six Ichneumonid species were reared from Croesia albicoma on rose bushes at Pleasant Hill, Contra Costa County. These were: three Ophioninae, Campoplex sp. nr. atridens, Horogenes pterophorae, and H. eureka; two Ephialtinae, Itoplectis quadricingulatus and Scambus tecumseh; and one Metopiinae, Triclistus emarginalus. Three of these species, the first and last two named, were also reared from Archips argyrospilus from oak trees at the same locality. In addition, a second Metopiine, Exochus nigripalpis subobscurus, was reared from Archips but not from Croesia. Some of these same parasites were encountered at other localities in the San Francisco Bay area. Horogenes pterophorae, which has been recorded previously from diverse groups of Lepidoptera, was reared from Acleris variegana on garden rose at Albany, Alameda County. Similarly, Horogenes eureka proved to be an ubiquitous parasite species in my rearings, appearing in
association with *Croesia albicomana* on wild rose and an unidentified Gelechiid on *Artemisia* at El Sobrante, Contra Costa County; with another unidentified Gelechiid on *Quercus agrifolia* and a Tortricoid, presumably *Epinotia crenana* (Hübner), on willow on the University of California, Berkeley campus; as well as with both *Acleris variegana* and *Pandemis pyrusana* on two ornamental plants at San Lorenzo, Alameda County. The latter two host rearings also produced *Exochus nigripalpis subobscurus*, which previously has been associated only with Tortricine and Sparganothine Tortricids in California. In addition, the same parasite was reared from *Cnephasia longana* on poppy near Castro Valley, Alameda County and from *Argyrotaenia franciscana* in San Francisco on *Scrophularia*, in quite a different ecological situation, the coastal fog-belt zone, one which tends to segregate species of Tortricinae.

Members of seven subfamilies of Ichneumonidae are recorded as parasites of Tortricinae in North America (Townes & Townes, 1951), and of these, all but the Ichneumoninae are represented in the present data. Summaries of the biologies of these groups given by the Towneses' (1951, 1959, 1960), together with the number of records accumulated on California Tortricinae during the current investigation (shown in parentheses) are as follows: Ephialtinae; Pimplini (3), the Scambus group are parasitic on larvae in plant tissues (buds, leaf-rolls, etc.) and oviposition occurs through the plant tissue to reach the host; Ephialtini (1) are internal parasites of pupae, usually exposed or semi-exposed Lepidoptera pupae, with oviposition into pupae or prepupae and emergence from pupae. Tryphoninae (2) attach their eggs to host caterpillars by stalks, and the parasite larva completes development in the host cocoon; their hosts are mostly sawflies, but Phytodietini, the Tribe represented by my records, parasitize mostly Lepidoptera. Gelinae (1) are said to ovipost in various small cocoons, including those of primary parasites and spider eggs. Banchinae (6) are internal parasites of caterpillars, very often Tortricidae. Metopiinae (10) ovipost into host larvae, primarily Pyraloids and Tortricoids usually well before maturity of the host, and emerge from the pupae, cutting off a cap-like lid from the head of the host pupal shell. Most species of Ophioninae (13) are parasitic on Lepidopterous larvae, including diverse groups, but commonly of Tortricids; my data suggest that the
hosts normally cease development in the penultimate or antepenultimate instar, their remains occurring at the posterior end of the Ichneumonid cocoon.

Records given by Muesebeck and Walkley (1951) suggest that Braconidae are common parasites of North American Tortricinae. However, Braconids were reared only occasionally during the present study, although frequently they were encountered on other Lepidoptera at the same localities. A large proportion of the records given by Muesebeck and Walkley are for common, widespread Tortricine species. It may be that these data have accumulated primarily through efforts of investigators rearing large numbers and working with dense populations of economically important species. This is not to suggest that Braconids are present only in small proportions, but it may be that gregarious habits of many of them are better suited to establishment in situations of dense host population. For example, Basinger (1935, 1938) listed twelve parasites of Argyrotaenia citrana in southern California, of which the two most important in citrus orchards were the Braconids, Apanteles aristoteliae Viereck and Hormius basalis (Provancher); and Benedict (present data) found the latter to be present in A. citrana populations in apple orchards in central California. However, numerous occasional rearings of A. citrana and the closely related A. franciscana from ornamental and native plants in the San Francisco Bay area during the past four years have not produced any Braconids. In each case cited below where Braconids were reared during the present study, the collection was made from a host colony of dense larval concentration.

Parasitism by Chalcidoidea involves species which are relatively host specific as well as others which are only incidentally associated. Most Chalcidoid wasps which I reared appeared as incidental individuals. The record of Copidosoma sp. (Encyrtidae) reared from a larva of Cnephasia longana near Orinda, Contra Costa County, is of interest because the host is an introduced species, and members of Copidosoma are usually thought to be rather host specific.

Tachinid flies are common parasites of Tortricine moths, but for the most part their association appears to be of minor importance. Phorocera tortricis Coquillett, which was reared from Archips cerasivoranus near Mt. Shasta, Siskiyou County, has been recorded only from Tortricinae (Aldrich & Webber, 1924). In
contrast, *Actia interruta* Curran has been recovered from various hosts at several localities in central California. It was found to be an occasional parasite of *Croesia albicomana* at El Sobrante and at Pleasant Hill, of *Archips argyrospilus* as well as the Saraganothine Tortricid, *Amobia cuneana* (Walsingham). Also in urban situations, I have reared it from *Acleris variegana* at San Lorenzo, and from an unidentified Tortricid on willow (probably *Epinotia crenana* Hübner) at Berkeley. It was also obtained in numbers from *E. emarginana* (Walsingham) on manzanita in a native situation near Booneville, Mendocino County in June 1957.

The parasite specimens cited below are deposited in the collection of the California Insect Survey, University of California, Berkeley, and the Canadian National Collection, Ottawa. Host identifications were made through associated, reared adults. Unless otherwise indicated, the collection records are my own.

**Tribe TORTRICINI**

**Acleris variegana** (Schiffermüller)

**Braconidae:**

*Apanteles* sp.; 1♂ ex larvae collected at San Lorenzo, Alameda County on *Pyracantha*, August 6, 1960, emerged August 25 (JAP-60H1).

*Apanteles* sp. nr. *aristoteliae* Viereck; 1♀ same data as preceding; 2♂ ex larvae collected at San Lorenzo on *Prunus avium*, August 19, 1960, emerged September 4 and 7. These Tortricine larvae were a mixed lot consisting primarily of *A. variegana*, but with a few *Argyrotaenia citrana* and *Pandemis pyrusana* (JAP-60H4).

**Ichneumonidae:**

*Phytodietus* sp.; 1♂ ex larva collected at San Lorenzo on *Rubus vitifolia*, August 19, 1960, emerged September 10 (JAP-60H6); emergence occurred through a ragged, subapical cut in the wasp cocoon, which had associated the remains of a last instar host larva near the emergence end; 1♂, 1♀ ex larvae with same data as above mentioned mixed lot on *Prunus*, emerged September 8 and “September” (JAP-60H4).

*Gelis* “sp. A”; 1♂ reared from a mixed lot similar to preceding, collected September 11, 1960 (P. D. Hurd, Jr.), emerged September 20.

*Exochus nigripalpis subobscurus* Townes; 1♂ ex pupa from larvae collected at San Lorenzo on *Pyracantha*, August 6, 1960,
emerged September 11 (JAP-60H1); 2♂ ex pupae from larvae collected at San Lorenzo, August 6 and 19, 1960, with the same data as above mentioned mixed lot, emerged August 26 and September 8 (JAP-60H3, 4).

*Horogenes eureka* (Ashmead); 1♂, 1♀ ex larvae collected at San Lorenzo on *Pyracantha*, August 6 and 19, 1960, emerged August 22 and 31 respectively (JAP-60H1); the two cocoons associated with host larval remains of two instars, presumably penultimate and antepenultimate; 6♂, 6♀ ex larvae collected at San Lorenzo with same data as above mixed lot, emerged August 16 to September 7 (JAP-60H3, 4); cocoons associated with the same two host instars as in preceding, the host remains being located near the posterior end of the wasp cocoons; 2♀ ex larvae from similar mixed lot, collected September 11, 1960 (P. D. Hurd, Jr.), emerged September 18 and 20.

*Horogenes pterophorae* (Ashmead); 1♂ ex larva collected at Albany, Alameda County, on garden rose, May 21, 1957; host remains of immature (penultimate?) instar.

Tachinidae:

*Actia interrupta* Curran; 1♀ ex larva collected at San Lorenzo on *Prunus avium*, August 6, 1960, emerged August 16 (JAP-60H3); an associated head capsule indicates that host probably died soon after moulting to final instar.

*Chalcididae:*

*Spilochalcis* sp.; 2♀ ex pupae collected at Pleasant Hill, Contra Costa County, on *Rosa californica*, May 19, 1958, emerged in late May.

Ichneumonidae:

*Scambus tecumseh* Viereck; 1♀ ex pupa collected at Pleasant Hill on garden rose, May 5, 1957; 1♀ ex pupa collected at Pleasant Hill on *Rosa californica*, May 19, 1958, emerged in late May.

*Itoplectis quadricingulatus* (Provancher); 1♀ ex pupa, same data as preceding.

*Triclistus emarginalus* (Say); 1♀ ex pupa collected at Pleasant Hill on garden rose, May 5, 1957, emerged after June 15.

*Campoplex* sp. nr. *atridens* Townes; 1♂ ex pupa, same data as preceding, emerged May 14.

*Horogenes eureka* (Ashmead); 1♂ ex larva collected at Pleasant Hill on garden rose, April 1, 1957 (W. E. Ferguson), emerged
April 12 (JAP-57D1); 1♂, 2♀ ex larvae collected at El Sobrante, Contra Costa County on *Rosa californica*, April 26, 1958, emerged in May (JAP-58D14).

*Horogenes pterophorae* (Ashmead); 1♂ ex larva collected at Pleasant Hill on garden rose, April 1, 1957 (W. E. Ferguson), emerged in late April (JAP-57D1).

Tachinidae:

*Actia interrupta* Curran; 1♂ ex larva collected at El Sobrante on *Rosa californica*, March 8, 1958, emerged in April (JAP-58C1); parasitization in this instance occurred early, since only small host larvae, presumably second and third instar, were collected on this date.

**Tribe CNEPHASIINI**

*Cnephasia longana* (Haworth)

Encyrtidae:

*Copidosoma* sp.; a number of individuals from a mummified larva, collected 2 miles east of Orinda, Contra Costa County, on *Eschscholzia californica*, May 11, 1958, emerged in late May (JAP-58E8).

Ichneumonidae:

*Exochus nigripalpis subobscurus* Townes; 1♀ ex larva collected 4 miles east of Castro Valley, Alameda County, on *Eschscholzia californica*, May 11, 1958, emerged in late May (JAP-58E9).

**Tribe ARCHIPSINI**

*Archips cerasivoranus* (Fitch)

Braconidae:

*Chelonus* sp.; 2♀ ex tent colony of larvae collected 5 miles east of McCloud, Siskiyou County, on *Prunus emarginata*, June 21, 1958, emerged in July (JAP-58F4).

Tachinidae:

*Phorocera tortricis* Coquillett; 1♂ ex tent colony, same data as preceding, emerged July 11.

*Phorocera sternalis* (Coquillett); 1♂ ex same tent colony as preceding, emerged in July. Subsequent examination of the tent revealed a dipterous puparium near the apex of the tent with the anterior parts of a small last instar *Archips* larva.

**Archips argyrospilus** (Walker)

Chalcididae:

*Brachymeria ovata* (Say); 1♀ ex pupa collected at Linden,
San Joaquin County, on *Juglans*, emerged May 12, 1954 (E. Oatman).

Ichneumonidae:

*Scambus tecumseh* Viereck; 1♂ ex pupa from larva collected at Pleasant Hill, Contra Costa County, on *Quercus lobata*, May 5, 1957, emerged May 14.

*Triclistus emarginalus* (Say); 2♂, 1♀ ex pupae from larvae collected at Pleasant Hill on *Quercus lobata*, April 20, 1957, emerged May 16 and 17 (W. E. Ferguson).

*Exochus nigrimalpis subobscurus* Townes; 1♂ ex pupa from larva collected at Pleasant Hill on *Quercus lobata*, May 5, 1957, emerged by June 15.

*Campoplex* sp. nr. *atrimens* Townes; 1♀ ex larva, same data as preceding, emerged May 18; host appears to have ceased development in penultimate instar, according to associated larval remains.

Tachinidae:

*Aplomya caesar* Aldrich; 1♂, 1♀ ex pupae, from Linden, San Joaquin County, on *Juglans*, May 12, 1954 (E. Oatman); 1♂ ex pupa, from Brentwood, Contra Costa County, April 24, 1956, emerged May 12 (F. H. Rindge).

*Actia interrupta* Curran; 1♂ ex collection from Berkeley, Alameda County, May 10, 1946, emerged May 27 (F. H. Rindge); 1♂ ex larva collected at Pleasant Hill, Contra Costa County, on *Quercus lobata*, May 5, 1957, emerged May 19.

**Choristoneura fumiferana** (Clemens)

Braconidae:

*Apanteles* sp. nr. *californicus* Muesebeck; 1♂ ex larva collected at Lily Lake, 7 miles east of Pine Creek, Modoc County, on *Abies concolor*, July 11, 1957, emerged in late July (JAP-57G3).

Tachinidae:

*Ceromasia* sp.; 1♂ ex larva, same data as preceding, emerged July 30.

**Choristoneura houstonana** (Grote)

A species of Chalcidoidea was found to have destroyed nearly every larva of *C. houstonana* near Acton, Los Angeles County, May 20, 1959. Parasite pupae were collected but most failed to emerge, probably due to dessication. The only parasite reared
was *Tetrastichus coerluescens* Ashmead (Eulophidae), which probably was a secondary associate according to Dr. Burks.

Ichneumonidae:

*Glypta* sp.; 1♀, 1♂ ex larvae collected at Hungry Valley (5 miles south of Gorman), Ventura County, on *Juniperus californicus*, May 4, 1959, emerged June 3 and 10 (JAP-59E1); 1♂ ex larva collected at Hungry Valley, May 29, 1959, emerged June 18 (JAP-59E8).

*Campoplex* sp. nr. *hyalinus* (Provancher); 4♀ ex larvae collected at Hungry Valley on *Juniperus*, May 4, 1959, emerged before May 30 (JAP-59E1); 1♀ ex larva collected 4 miles northwest of Acton, Los Angeles County, on *Juniperus californicus*, May 20, 1959, emerged before June 1. Parasite cocoons were found to have been constructed when host larvae had reached the penultimate instar, according to head capsule measurements and color. Pupation of the parasite occurred near the exit of the tube-like host shelter, and remains of the moth larva were located head inward, at the posterior end of the wasp cocoon.

*Pristomerus* sp.; 1♀ ex mass rearing material collected at Hungry Valley on *Juniperus californicus*, May 19, 1959, emerged June 10 (JAP-59E4).

**Argyrotaenia niscana** (Kearfott)

Ichneumonidae:

*Glypta* sp.; 3♂ ex larvae collected at Bouquet Canyon, Los Angeles County, on *Adenostoma fasciculatum*, May 19, 1959, emerged June 6, “June” (JAP-59E5).

**Argyrotaenia franciscana** (Walsingham)

Ichneumonidae:

*Campoplex* sp.; 1♀ ex larva collected at San Francisco (Strawberry Hill), on *Scrophularia californica*, April 8, 1959, emerged April 24.

*Glypta* sp.; 2♀ ex larvae, same data as preceding, emerged April 24, “May”.

*Exochus nigripalpus subobscurus* Townes; 1♀ ex larva, same data as preceding, emerged April 24.

**Argyrotaenia citrana** (Fernald)

Braconidae:

*Hormius basalis* (Provancher); 6♂, ♀ ex collections from Sebastopol, Sonoma County, on *Malus*, May 9, 1949 (S. H. Benedict).
ICHNEUMONIDAE

*Glypta* sp.; 1♀ ex larva collected at San Pablo, Contra Costa County, on garden rose, March 1, 1959, emerged March 18 (JAP-59C1); the parasitized larva was collected as a last instar, and the wasp spun a very loose, thin (relative to Ophioninae), cellophane-like cocoon by March 8.

*Exochus nigripalpis subobscurus* Townes; 1♂ ex collection from Sebastopol on *Malus*, April 24, 1949 (S. H. Benedict).

CLEPSIS FUCANA (Walsingham)

ICHNEUMONIDAE

*Glypta* sp.; 1♀ ex larva collected at San Francisco (Strawberry Hill), on *Scrophularia californica*, March 18, 1958, emerged in April (JAP-58C19).

PANDEMIS PYRUSANA Kearfott

ICHNEUMONIDAE

*Exochus nigripalpis subobscurus* Townes; 1♂ ex pupa from larva collected at San Lorenzo, Alameda County, on *Prunus avium*, August 6, 1960, emerged August 29 (JAP-60H3); 1♂ ex pupa from larva collected at San Lorenzo, August 19, 1960, emerged September 1 (JAP-60H4).

Acknowledgment is made to W. E. Ferguson and P. D. Hurd, Jr., for assistance with observations and collections at Pleasant Hill and San Leandro (=San Lorenzo), and to the latter, whose cooperation permitted field research in connection with California Insect Survey activities. Determination of parasites was kindly provided by B. D. Burks, U.S. National Museum and R. L. Doult, University of California, Albany (Chalcidoidea); W. R. Mason (Braconidae), L. K. Smith and G. S. Walley (Ichneumonidae), Entomology Research Institute, Ottawa; and H. J. Reinhard, Texas A. & M. College (Tachinidae).

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Basinger, A. J.


MUESEBECK, C. W. F. AND L. M. WALKLEY
TOWNES, H. AND M. TOWNES

A HOST OF CHRYSIS (TRICHRYSIS) MUCRONATA BRULLE AND AN ADDITIONAL HOST OF CHRYSIS (CHRYSIS) COERULANS FABRICIUS
(Hymenoptera: Chrysididae)

Several specimens of Trypoxylon (Trypargilum) tridentatum Packard and Ancistrocerus tuberculocephalus sutterianus (Saussure) were reared from old mud nests of Sceliphron caementarium (Drury). The mud nests were collected from the underside of several cement bridges in the vicinity of Davis, California, during the winter of 1959-60.

Four male and four female specimens of T. tridentatum emerged from the nests. One of the Trypoxylon cells was occupied by a female of Chrysis (Trichrysis) mucronata Bd. (det. R. M. Bohart). The chrysidid was in the bottom cell of a two-cell series.

Thirty-seven male and forty-three female specimens of A. t. sutterianus emerged from the nests. Two females of Chrysis (Chrysis) coerulans F. (det. C. G. Moore) were found in the Ancistrocerus cells.

Bodenstein¹ listed no host for C. mucronata and apparently this is the first known host record. Krombein² recorded three other species of Ancistrocerus as hosts of C. coerulans.—F. D. PARKER, University of California, Davis.

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THE ATTRACTION CREATED BY MALES OF A BARK BEETLE IPS CONFUSUS (LECONTE) ATTACKING PONDEROSA PINE
(Coleoptera: Scolytidae)
DAVID L. WOOD
University of California, Berkeley

Recent studies of bark beetle behavior (Vité & Wood, 1961; Vité & Gara, 1961,1962; Wood & Vité, 1961; Wood 1962a,b) have focused attention on the mass attack phenomenon (Anderson, 1948; Person, 1931) which follows when susceptible host material sustains a successful initial attack (Vité & Wood, 1961; Wood, 1962a). Investigations on the behavior of Ips confusus (LeConte) under field conditions (Wood & Vité, 1961) have established experimentally the presence of a strong secondary attraction which evokes the mass attack from both males and females of the local population. Further, the source of this attraction was localized and found to be intimately associated with the live, mature, male beetle within the initial gallery. Females forced to initiate galleries under the same conditions, or the exposure of sapwood and phloem, or caging emerged males (both crushed and alive) on the bark did not produce the attraction (Wood & Vité, 1961). These results have been verified subsequently and, in addition, the importance of chemoreception (olfaction) in the response pattern of this beetle to the initial male gallery has been established (Vité & Gara, 1962).

A multiple-choice olfactometer was developed with an arena design (Wood, 1962b). Five sample positions (four controls) located on an arc subtended by an angle of 68° (radius=15") were established at one end of an artificially lighted cage. Air was directed over samples excised from recently felled trees (Wood & Vité, 1961) to a common release point.

The results of preliminary experiments designed to localize and define more precisely the source of this attraction are presented in Table 1.

A known attractive combination (Wood & Vité, 1961) consisting of bark-wood samples infested with three males elicited a positive response by males and females. The data summed from all tests showed 80% of all females but only 50% of all males...
exhibited this response. Female-infested samples did not evoke a positive response from individuals of either sex. This characteristic behavior pattern was evidenced by the beetle orientating to the air stream passing over the infested sample and crawling to the source. When passing out of this stream into an adjacent air stream, sharp, abrupt turning movements were observed until the attractive air channel was located again. This behavior also occurred as the beetle crawled toward the infested sample. When five control samples were tested or when an attraction was not produced by the treated sample, the beetles would veer to the left or right passing out of the arena covered by the air channels, or make a 180° turn, crawling in the opposite direction from the samples. In most tests a few individuals crawled to other samples but rarely did more than 2-3 individuals contact the same control receptacle during a single trial.

These observations together with the characteristic turning movements of the beetles themselves, orientating toward the air streams containing the attractants strongly indicate that the beetles were responding directly to the offered olfactory stimulus and not to other materials which may have been present in the arena. These data agree with the results of previous field (Vité & Gara, 1962; Wood & Vité, 1961) and laboratory (Wood, 1962b) studies thereby verifying the validity of the experimental design.

When the nuptial chamber of an attractive sample was divided and the male removed, an attraction to both sexes was still present in the phloem portion as well as the xylem. Intact bark-phloem samples (separated from the xylem and infested with males for three days) and the separated frass as well were highly attractive to males and females. Phloem first separated from the outer bark and xylem and then infested with males, was attractive to both sexes. These results support a study (Wood, 1962b) where ground phloem infested with males was attractive to females.

Boring dust from the outer bark only was unattractive to female beetles. Excrement pellets could not be located in this material.

Frass from female-infested bark-wood samples was unattractive while frass from male-infested samples was highly attractive to males and females, and remained so for at least four days when stored at 15° C. Fecal pellets were abundant in the frass produced by males feeding exclusively in the phloem and in bark-phloem samples. These results are at variance with the contention (An-
derson, 1948) that attraction is independent of boring dust because the dust continues to be produced after the attraction has ceased. Probably frass produced during his latter period results primarily from female boring activity.

Males removed from attractive bark-wood samples after feeding and crushed on a plastic disk were highly attractive to females but slightly so to males, while crushed newly-emerged males did not elicit a positive response from either sex. Previous attempts to create an attraction by crushing newly-emerged adults either by themselves (Anderson, 1948; Wood & Vité, 1961) or in combination with other materials (Vité & Gara, 1962) failed to produce an attraction.

The attraction first became evident 4-6 hours after introduction

<table>
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<tr>
<th>Treatment</th>
<th>Positive</th>
<th>No Total</th>
<th>Females</th>
<th>Positive</th>
<th>No Total</th>
<th>Males</th>
</tr>
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<tr>
<td>Control (5 uninfested bark-wood samples)</td>
<td>0</td>
<td>17</td>
<td>18</td>
<td>3</td>
<td>28</td>
<td>33</td>
</tr>
<tr>
<td>$\delta \delta$ Infested sample</td>
<td>242</td>
<td>53</td>
<td>299</td>
<td>55</td>
<td>49</td>
<td>108</td>
</tr>
<tr>
<td>$\varphi \varphi$ Infested sample</td>
<td>1</td>
<td>34</td>
<td>36</td>
<td>1</td>
<td>64</td>
<td>66</td>
</tr>
<tr>
<td>Bark and phloem portion only of “nuptial” chamber</td>
<td>10</td>
<td>4</td>
<td>14</td>
<td>14</td>
<td>9</td>
<td>24</td>
</tr>
<tr>
<td>Xylem portion only of “nuptial” chamber</td>
<td>6</td>
<td>2</td>
<td>9</td>
<td>16</td>
<td>41</td>
<td>60</td>
</tr>
<tr>
<td>Bark-phloem separated from xylem before infesting (males removed)</td>
<td>47</td>
<td>18</td>
<td>70</td>
<td>35</td>
<td>17</td>
<td>55</td>
</tr>
<tr>
<td>Phloem only infested with $3 \delta \delta$</td>
<td>25</td>
<td>5</td>
<td>30</td>
<td>10</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>Frass produced in initial 48 hours from $3 \delta \delta$ galleries</td>
<td>55</td>
<td>6</td>
<td>63</td>
<td>10</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Frass produced in initial 24 hours from $3 \delta \delta$ galleries</td>
<td>57</td>
<td>4</td>
<td>62</td>
<td>12</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>Frass produced in initial 48 hours from $3 \varphi \varphi$ galleries</td>
<td>0</td>
<td>43</td>
<td>47</td>
<td>1</td>
<td>37</td>
<td>40</td>
</tr>
<tr>
<td>Frass from $\delta \delta$ galleries in outer bark only</td>
<td>0</td>
<td>41</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frass from $\delta \delta$ galleries in bark-phloem removed from xylem before infesting</td>
<td>21</td>
<td>5</td>
<td>29</td>
<td>11</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>6 crushed, newly emerged males</td>
<td>2</td>
<td>76</td>
<td>81</td>
<td>0</td>
<td>39</td>
<td>40</td>
</tr>
<tr>
<td>6 crushed males removed from attractive sample</td>
<td>52</td>
<td>31</td>
<td>88</td>
<td>8</td>
<td>30</td>
<td>40</td>
</tr>
</tbody>
</table>

*Total tested minus the sum of positive and no responses equals the number that flew out of the test arena during the trials.
of the males into the sample and reached a maximum intensity within 24-48 hours which supports earlier observations (Vité & Gara, 1962). The delay was recorded in spite of the immediate male contact with the xylem through holes drilled in the samples. This delay together with observed attraction associated with male-infested phloem and the immediate response to crushed, fed males would not support the suggestion (Vité & Gara, 1962) that the attraction is dependent upon volatile materials (oleoresin) emanating from the xylem of the male gallery. The coincidence between attraction and the beginning of the nuptial chamber formation may be associated with the time necessary for the first food material to pass through the gut and not only the time required for a male beetle to penetrate the bark and phloem to the xylem.

The larger percentage of females than males responding to this attraction indicates a greater efficiency on the part of the female in locating the initial male gallery. This is not only important to the survival of the species but may also explain in part the loss of males that occurs between emergence (1:1) and attack (1:3♀♀).

I am indebted to R. W. Bushing for his valuable assistance in these experiments. This investigation was supported in part by a research grant (G-20993) from the National Science Foundation, California State Division of Forestry, T. B. Walker Foundation and various forest industries.

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WOOD, D. L. AND J. P. VITE

WOODB, D. L.

THE NEST OF ANCISTROCERUS WALDENII FLAVIDULUS BEQUAERT IN CALIFORNIA
(Hymenoptera: Vespidae)
O. W. RICHARDS
Imperial College, South Kensington, London

Some females of this species (det. Dr. R. M. Bohart) were found on a rocky knoll above Paradise Cove, Marin County, California. The wasp is very like the European A. oviiventris (Wesmael) (pictus Brit. Cat.) but the keels surrounding the posterior face of the propodeum are more incomplete on the upper part of the sides and dorsally; it has a similar wide first tergite but the gaster is in general more copiously yellow-marked. The nesting habits are also like those of the European species, cells being built on rock-surfaces and when completed being plastered over with mud. The first nest was found on 10 May, 1961, in a wide crevice on a rock facing southeast. The female was sitting on an open cell and when she flew off it could be seen that the cell was nearly full of caterpillars. Twenty minutes later it was nearly closed with wet mud. The wasp was caught and the barrel-shaped cell (12.0 x 5.0 mm.) contained an egg and seven larvae of Cnephasia longana (Haworth) (Tortricidae, det. Dr. J. A. Powell). By 18 May, the prey was all eaten and the larva which had been kept alive with the prey in a glass vial was pickled.

A second nest was found nearby on 10 May on a large rock (2½ x 1½ ft.) which had been upended three weeks previously; from its position it could therefore be said that the nest had been constructed in the previous three weeks. It was in a deepish pyramidal crevice and consisted of two rows of 3 and 2 cells each,
completely covered over by mud to make an amorphous mass 3 x 2 inches. Th wasp was just adding a little more mud to this outer coating. The nest broke up while being removed but the cells contained 55 larvae of Cnephasia longana and four of Archips argyrospilus (Walker) (Tortricidae; det. Dr. J. A. Powell), that is about 12 larvae a cell. Three eggs and two very young larvae were found. The egg was cylindrical with rounded ends, slightly curved, 3.0 x 0.75 mm., attached to the cell-wall by a short stalk about 1.0 mm. long. The larvae were reared together on the combined prey in 3 x 1" vial, laid flat. They were able to wander about the glass and find the separate paralysed prey. The prey showed no signs of recovery though capable of slight reaction when prodded. The larvae were full-grown on 18th May and were pickled before they began to spin their cocoons.

ZOOLOGICAL NOMENCLATURE: Notice of Proposed Use of Plenary Powers in Certain Cases (A. (n.s.) 55)

In accordance with a decision of the 13th International Congress of Zoology, 1948, public notice is hereby given of the possible use by the International Commission on Zoological Nomenclature of its plenary powers in connection with the following cases, full details of which will be found in Bulletin of Zoological Nomenclature, Vol. 19, Part 4 to be published on 16th July, 1962.

(3) Validation and interpretation of the specific name Culex aegypti Linnaeus, 1762 (Insecta, Diptera). Z.N.(S.) 1216.

Any zoologist who wishes to comment on any of the above cases should do so in writing, and in duplicate, as soon as possible, and in any case before 16th January, 1963. Each comment should bear the reference number of the case in question. Comment received early enough will be published in the Bulletin of Zoological Nomenclature. Those received too late for publication will, if received before 16th January, 1963 be brought to the attention of the Commission at the time of commencement of voting.

All communications on the above subject should be addressed as follows: The Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, LONDON, S. W. 7, England.—W. E. CHINA, Assistant Secretary to the International Commission on Zoological Nomenclature.
Little collecting of aquatic and semi-aquatic Hemiptera has been done in Nevada and the netting of saldids represents no exception. Only 10 species of saldids have been reported heretofore from the State (Drake, 1950; Drake & Hoberlandt, 1950; Drake & Hottes, 1950, 1955). Usinger (1956) presented keys and some general distribution records for the saldids of California. Many of these species also occur in Nevada.

The paucity of information on the ecology, seasonal occurrence, and associated species in the above papers is quite evident. The most common forms in Nevada are found along the damp margins of most bodies of water, including streams, lakes, irrigation ditches, ponds, and other areas with either alkaline or fresh water. Some species apparently prefer or tolerate principally salt and alkaline situations; others are saxicoline, or prefer semi-umbrous areas, or are found mostly in the mountains.

The species differ greatly in their agility, secretiveness, and abundance. Very agile species can often be collected more readily and in better condition by use of an atomizer containing a contact immobilizing agent such as ethyl acetate or carbon tetrachloride.

The writer collected about 1,700 saldids in Nevada from 1958-61, which represented 21 species and one variety. Observations on the distribution, habitats, associated species, seasonal occurrence, and separation from their congeners are presented below. Two species (Saldula arenicola and S. teretis), recorded from Nevada, were not netted by the writer, but since they have been listed in the literature, are added for completeness. Keys to genera and species inhabiting Nevada also have been formulated.

The valleys in the northern and central areas of the State range from about 4,300 to 6,000 feet in elevation, whereas those in the southern portion have an elevation of around 500 feet. The remarks on taxonomy and the characters used in the keys pertain only to Nevada material and may or may not apply to specimens from areas where some different species are found.

1 In cooperation with the Nevada Agricultural Experiment Station, Reno, Nevada.
Key to the Genera of Saldidae occurring in Nevada

1. First or inner cell of membrane produced forward two-fifths or one-half its length beyond the base of second cell
   
   First or inner cell not produced or at most only slightly extended forward beyond the base of the second cell

2. Antennae relatively thick, the third and fourth segments thicker than apex of second
   Antennae relatively slender, the third and fourth segments not thicker than apex of second segment

3. Corium with two distinct veins, the branches of inner vein forked apically and extending to membrane
   Corium without veins or with median vein not forked apically

Genus Ioscytus Reuter

Key to the Nevada Species of Ioscytus

1. General dorsal color of hemelytra, especially corium, blackish brown to black
   General dorsal color of hemelytra, especially corium, red

2. Embolium red to black
   Entire embolium yellow to white

Ioscytus nasti Drake and Hottes

This species was previously known only from a few specimens collected in California. The writer found it to be quite common in the Sierra Nevada Mountains at elevations ranging from 6,300-7,700 feet in both open and partially shaded damp areas adjacent to mountain streams, flooded mountain meadows, and mountain ponds.

Associated species were Saldula explanata, S. comatula, and Saida buenoi.

The dark color of the dorsal surface easily separates it from the prominent, reddish, hemelytral markings of politus and its variety flavicosta.

Seventy-six specimens collected from March-September: Mt. Rose, Lake Tahoe, and Zephyr Cove.

Ioscytus politus (Uhler)


This is a very common species along the damp margins of alkaline seep ponds, alkaline lakes, irrigation streams, temporary and permanent ponds, fresh-water spring-seeps, foothill streams,

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2 Adapted after Reuter (1912).
and hot springs. It seems to prefer unshaded habitats at elevations ranging from 4,300-5,000 feet and companion species were *Saldula pallipes*, *S. ourayi*, *S. comatula*, *Micracanthia quadrimaculata*, and *M. utahensis*. I did not collect *politus* in the southern portion of the State, although it should occur there.

The colors (red and black) of the embolium and corium are quite variable in relation to each other and thus some specimens almost grade into the variety *flavicosta*.

Seventy specimens collected from March-November: Carson City, Fallon, Fernley, Reno, Soda Lake, and Virginia City.

Ioscytus *politus* var. *flavicosta* (Reuter)


This is a new State record since this variety was previously known only from Utah and California. I collected it only in the southern part of the State where its habitats were damp areas adjacent to rivers and fresh-water springs. It was associated with *Saldula andrei* and *S. orbiculata*.

The yellow to white embolium is diagnostic.

Fourteen specimens collected in July: Ash Meadows (Amargosa Desert) and Mesquite (Virgin River).

**GENUS MICRACANTHIA REUTER**

**KEY TO THE NEVADA SPECIES OF MICRACANTHIA**

1. Outer embolium of hemelytra entirely pale; femur pale ..........*utahensis*
   
   Outer embolium of hemelytra mostly dark, except where interrupted by two pale spots; femur dark ..........*quadrimaculata*

   **MICRACANTHIA QUADRIMACULATA** (Champion)


   This species is very common and occupies a great variety of habitats. It was collected from the valleys to 8,500 feet in the Sierra Nevada Mountains. Habitats were damp areas adjacent to foothill streams, ponds, irrigation ditches and seep areas, irrigated meadows, hot springs, fresh-water springs, streams, lakes, and alkaline sink areas. It apparently does not prefer alkaline situations. Companion species were usually *Ioscytus politus*, *Saldula pallipes*, and *S. comatula*.

   The silver pubescence and four-spotted appearance of the hemelytra plus the less shiny dorsal aspect of the thorax and scutellum easily separate *quadrimaculata* from *utahensis*. *M. pusilla* Van Duzee is a synonym of *quadrimaculata*. 
Eighty-four specimens noted from February-November: Carson City, Dayton, Fernley, Fallon, Mt. Rose, Reno, and Schurz.

Micracanthia utahensis Drake and Hottes

This species was heretofore known only from Utah. I collected it in Nevada along the damp areas in thick salt grass adjacent to a hot spring. A single specimen was also taken from the damp margin of an irrigation ditch, again in thick vegetation. Later visits to these areas during the past several years have yielded no specimens of this species. Adults are not prone to move readily and when once seen, are more easily collected than many saldids. Associated species were *M. quadrinaculata* and *Ioscytus politus*.

The pale outer embolar area, pale femur, and very large eyes are distinctive to *utahensis*.

Thirty-four specimens noted in July-September: Reno and Reno Hot Springs.

**GENUS SALDA FABRICIUS**

**Key to the Nevada Species of Salda**

1. Entire dorsal surface, excepting membrane, shining, clothed
   with thinly scattered minute, reclining, grey, pubescence...*obscura*
   Entire dorsal surface, excepting membrane, dull, with very
   abundant, very short, reclining, brownish pubescence ..........*buenoi*

**Salda buenoi** (McDunnough)


This species was collected both in the valleys and at elevations up to 8,700 feet in the Sierra Nevada Mountains. Brachypterous specimens were often noted. Habitats consisted of damp areas adjacent to irrigation streams and their seep areas and mountain meadow ponds and streams, with sparse to fairly thick vegetation. Associated species at high and low elevations were *Saldula explanata* and *Ioscytus politus*, respectively.

The abundant brown pubescence delimits *buenoi* from *obscura*.

One hundred specimens collected from July-September: Fallon, Mt. Rose, and Reno.

**Salda obscura** (Provancher)


This is the first record of *obscura* in the State. It was found in an open, damp mountain seep area at about 8,000 feet in the
Ruby Mountains. The specimen was brachypterous and very small (4.2 mm). A companion species was *Saldula explanata*.

The status of *obscura* was questioned by Drake and Hottes (1950), but is now considered valid by them (personal correspondence from Dr. Drake). The writer has seen specimens from Oregon and collected specimens from Granby, Colorado, VI-28-58. All of this material appears to be typical *obscura* and thus quite distinct from *Saldula littoralis*, *buenoi*, and *bouchervillei*. Although both *obscura* and *bouchervillei* have a very shining black dorsal aspect, the latter species is larger and there are some differences in pubescence and genital structure. Color is variable. Although these two species are distinct from each other, the types need to be studied as the original descriptions will not separate them.

One specimen collected in June: Lamoille Canyon.

GENUS SALDULA VAN DUZEE

**Key to the Nevada Species of Saldula**

1. Dorsal vestiture of thorax and hemelytra with many long, dark, erect hairs ......................................................... 2
   Dorsal surface of thorax and hemelytra smooth or with only short pubescence, sometimes appressed ........................................... 5
2. Eyes with short hairs .................................................. *orbiculata*
   Eyes naked ........................................................................... 3
3. Hemelytra often pale except for dark transverse band at middle; dorsal surface very shiny; narrowest portion of vertex and one eye shorter than second antennal segment .................... *andrei*  
   Hemelytra pale or dark but without dark transverse band at middle; dorsal surface not especially shiny; narrowest portion of vertex and one eye equal to or greater than second antennal segment ................................................................. 4
4. Dorsal appearance shaggy, due to long, coarse, abundant pubescence, especially evident towards the side margins of pronotum; larger species; pubescence on hind tibia longer than width of segment .................................................*comatula*
   Dorsal appearance less shaggy due to shorter, finer, and much less abundant pubescence; smaller species; pubescence on hind tibia not very noticeable, much shorter than width of segment ...............................................................  *hirsuta*  
5. Sides of pronotum pale ......................................................  6
   Sides of pronotum concolorous with pronotum, without pale areas ................................................................................ 8
6. Pronotum with a pale lateral stripe on each side .................. 7
   Pronotum pale except for median portion ................................  *balli*  
7. Pale lateral stripe of pronotum narrower than the width of antennal segment and terminating before apical and
basal margins .................................................. coxalis
Pale lateral stripe of pronotum much wider than width of
antennal segment and usually reaching base and apex of
pronotum .......................................................... opiparia

8. Fore tibia with frontal, fuscous stripe interrupted near mid-
dle or with fuscous marking only at base ...................... 9
Fore tibia with frontal, fuscous stripe uninterrupted, ex-
tending to near apex ........................................... 13
9. Fore tibia with fuscous marking at base only .................. 10
Fore tibia with fuscous stripe interrupted near middle ...... 12
10. Larger species, length usually much greater than 4.4 mm;
leading margin of xyphus of metasternum luteus and not
concolorous with rest of metasternum; antennal segment
two almost twice the length of segment three .................. palustris
Smaller species, generally much less than 4.2 mm; leading
margins of xyphus of metasternum dark and concolorous
with metasternum; antennal segment two much less than
twice the length of segment three ................................ 11

11. Length less than 3 mm; side margins of pronotum straight .. teretis
Length greater than 3 mm; side margins of pronotum curved .. opacula

12. Pale marginal mark before middle of hemelytra forming a
“C” .................................................................. c-album
Pale marginal mark before middle of hemelytra not forming
a distinct “C” .......................................................... saltatoria

13. Narrowest portion of vertex and one eye shorter than second
antennal segment .................................................... nigrita
Narrowest portion of vertex and one eye longer than second
antennal segment .................................................... 14

14. Side margins of pronotum very explanate ....................... explanata
Side margins of pronotum not especially explanate .......... 15

15. Labrum entirely fuscous; membrane dark, smoky, and
opaque with few or no pale spots .................................. ourayi
Labrum all or in part pale; membrane usually pale with dark
spots ................................................................. 16

16. Corium dull with gray pubescence; pale areas of hemelytra
when present, tending to form a transverse band, not
especially interrupted with fuscous ............................... arenicola
Corium glabrous with gold to black pubescence; pale areas
of hemelytra when present, not forming a marked trans-
verse band but interspaced with fuscous ......................... pallipes

SALDULA ANDREI Drake


This rock-inhabiting species is known from many of the
western States. It was quite common along the open damp margin
of a lake and a few specimens were noted along the damp edge of
a river in the southern part of the State. Associated species were *Saldula balli* and *Ioseytus politus* var. *flavicosta*.

The antennal formula and shining dorsal appearance with the dark median hemelytral band are diagnostic. *Saldula lavinia* (Hodgden) is a synonym of *andrei*.

Sixteen specimens collected in July: Lake Mohave (Cottonwood Grove) and Mesquite (Virgin River).

**Saldula arenicola** (Scholtz)


This species was not collected by the writer but has been reported from Nevada and most of the Western States by Drake and Hottes (1955). According to the literature, it apparently prefers saline or alkaline situations, although it was never found in many collections from alkaline areas.

The characters used in the key will usually separate *arenicola* from *pallipes*. *Saldula ourayi* is a much smaller species with the labrum usually completely dark. *Saldula dispersa* (Uhler) is a synonym of *arenicola*.

**Saldula balli** Drake


This species is reported from Utah, Colorado, Arizona, and New Mexico (Drake and Hoberlandt, 1950). The damp margin of a lake yielded this new Nevadan record. *Saldula andrei* was a companion species.

The small size, almost completely pale pronotum, and general pale color are distinctive. It is a very active and easily disturbed species.

One specimen collected in July: Lake Mohave (Cottonwood Grove).

**Saldula c-album** (Fieber)


In the West this species is recorded from Utah, Colorado, and California (Drake and Hottes, 1950). A few specimens were taken in shaded fresh-water seep areas at 6,400 feet in the Sierra Nevada Mountains and this is a new record for the State. *S. saltatoria* was an associated species.

The fore-tibial marking, somewhat orbiculate shape, presence of bluish areas in corium, and distinctive "C" marking on the hemelytra differentiate this species from its congeners.
Two specimens collected in March and April: Glenbrook (Lake Tahoe).

**Saldula comatula** Parshley


This hairy species is known from most of the Western States except Nevada. The writer found it distributed in the valleys to 7,500 feet in the Sierra Nevada Mountains. Habitats were damp areas adjacent to hot springs, fresh-water spring seeps, lakes, irrigation seep areas, alkaline sinks, irrigated meadows, rocks in a river, and mountain meadow ponds. Associated species were *Saldula pallipes*, *S. palustris*, *S. opiparia*, and *Micranthia quadrimaculata*.

The shaggy appearance due to the very abundant long, erect, dark, dorsal vestiture of hairs, the very hairy legs, and the large, broad size are diagnostic. This species ranges in color from mostly pale to almost solid black.

One hundred sixty-five specimens collected from March-November: Carson City, Ely, Fernley, Fallon, Lake Tahoe, Lahontan Reservoir, Mt. Rose, Reno, Schurz, and Topaz Lake.

**Saldula coxalis** (Stål)


This species is known from most of the Western States including a record from Deeth, Nevada (Drake, 1950). It ranges from Argentina and Chile north into British Columbia. The writer collected two examples of it along the damp margins of an alkaline pool and an impounded area. Associated species were *S. opiparia*, *S. pallipes*, and *S. palustris*.

The narrow, short, pale, lateral stripe of pronotum delimits *coxalis* from related species. Occasional specimens may have this dorsal lateral stripe almost obliterated but a ventral view will show its presence. *Saldula argentina* (Berg) is a synonym of *coxalis*.

Two specimens collected in April and May: Gerlach and Golconda.

**Saldula explanata** (Uhler)


This species appears to be restricted to the mountains where it was collected on damp areas adjacent to open mountain meadow ponds and streams, mountain springs, and on logs in a mountain
meadow pond. It was found from 6,000 to 8,700 feet in both the Ruby and Sierra Nevada Mountains. Associated species were Sal-
dula pallipes, Salda buenoi, and Iosecytus nasti.

All specimens of *explanata* possessed the large explanate side margins of the pronotum. The species is very closely allied to *pallipes* and at times difficult to separate from it.

One hundred seventy-five specimens collected from March-
October: Glenbrook, Lake Tahoe, Lamoille Canyon, Mt. Rose, Reno, and Verdi.

**Saldula hirsuta** (Reuter)
*Acanthia hirsuta* Reuter, Rev. de Ent. VII:60, 1888.

Specimens were noted on open damp shores of a fresh-water spring and a shaded pool under a bridge in the southern part of
the State. This is the first record of *hirsuta* in the State. An asso-
ciated species was *Microvelia beameri* McKinstry.

The smaller size, shorter, sparser vestiture of dark, erect hairs separate it from *S. comatula*, and the less shining appearance and antennal formula from *S. andrei*.

Seven specimens collected in June: Ash Springs and Caliente.

**Saldula nigrita** Parshley

Specimens were collected only on rocks in rivers and on their shores and have not heretofore been reported from the State. Associated species were *Saldu pallipes* and *S. comatula*.

The long second antennal segment, large size, and dark coloring of *nigrita* easily separate it from other species.

Forty-one specimens collected from July-October: Fallon, Gardnerville (Carson River), and Reno (Truckee River).

**Saldula opacula** (Zetterstedt)

This truly bog-inhabiting species is widely distributed in the United States and is known in the Western States from Colorado, Oregon, and Utah. It was collected for the first time in Nevada from a partially shaded damp margin of a fresh-water spring seep area at 6,400 feet in the Sierra Nevada Mountains. *S. saltatoria* was a companion species.

The pale outer corium and tibia, usually marked fuscous only at the base, delimits this species.

One specimen collected in March: Glenbrook (Lake Tahoe).
Saldula opiparia Drake and Hottes

Saldula opiparia Drake and Hottes, Bol. Ent. Venez., XI(1 & 2) :9, 1955

This species is widely distributed throughout the Western States (Drake and Hottes, 1955). The writer found it along the open damp margin of fresh water and especially alkaline lakes, fresh-water seepage areas, hot springs, alkaline sink areas, and on rocks in a river. The preferred habitats appear to be those associated with alkalinity. Companion species were S. pallipes, S. comatula, S. palustris, and S. ourayi.

The large size and much broader pale lateral stripe on each side of the pronotum will generally separate opiparia from coxalis.

Eighty-six specimens collected from June-August: Fallon, Fernley, Golconda, Lahontan Reservoir, Pyramid Lake, Soda Lake, and Reno.

Saldula orbiculata (Uhler)


Emergent vegetation in a fresh-water spring in the Amargosa Desert yielded the only record of this species in the State. It is widely distributed in the Western States. Hebrus sobrinus Uhler and Merragata hebroides White were associated species. Ioscytus politus var. flavicosta was present on adjacent damp shores.

These Nevada specimens differ somewhat from specimens of orbiculata from other parts of the country but apparently fall within the limits of variation and were identified as orbiculata by Carl J. Drake.

The presence of short hairs on the eyes and pruinose areas on the hemelytra differentiate orbiculata from our other species. Saldula severini Harris and Salda opacipennis Champion are synonyms.

Four specimens collected in July: Amargosa Desert (Ash Meadows).

Saldula ourayi Drake and Hottes


Drake and Hottes reported this species in the West from California, Colorado, Idaho, Washington, Wyoming, and Utah. This is the first record of it in Nevada. It was collected along the damp shores of highly alkaline lakes and ponds. In late summer when the water level of Soda Lake receded, it was possible to collect specimens of ourayi in large "balls" which occurred
beneath clumps of saltgrass and objects close to the water's edge. A "ball" contained many thousand specimens consisting mostly of adults but with many nymphs of various instars. These clumps of grass and other objects represented the only possible sources of protection in this area.

A very large supply of food must be available to support such a tremendous population of this predaceous species. It is quite probable that a stage of an ephydrid fly (Paracoenia bisetosa (Coq.)) which inhabits Soda Lake and also reaches astronomical numbers, serves as a source of food for ourayi. Only a few specimens of Saldula pallipes, S. palustris, S. opiparia, and loscytus politus were noted in conjunction with ourayi.

The small size, fuscous labrum, and dark, smoky, nontransparent membrane (usually without pale spots) separate ourayi from its congeners. The coloration of the hemelytra is a very variable character in this species. In a large series, specimens vary from almost black to completely pale. An intermediate form with two large flavous areas in each hemelytron, is often present.

Two hundred sixty-five specimens collected every month of the year: Fallon (Soda Lake), Walker Lake, and Hazen.

**Saldula palustris** (Douglas and Scott)

*Salda palustris* Douglas and Scott, Ent. Month. Mag., 11:10, 1874.

The writer was only recently informed through personal correspondence with Dr. Drake that this Palearctic species was noted in collections from Alaska and Canada and also occurred in the Western States. It has been confounded in collections with *S. pallipes*. Specimens were collected in the State, principally from the damp shores of alkaline lakes, sink areas, and ponds. Some specimens were also noted from the margin of a fresh-water lake. The pale form appears to predominate in the State. Cobben (1959) states that *palustris* is exclusively halophilous and extremely variable in color in Europe and Asia. Associated species were *Saldula pallipes*, *S. comatula*, and *S. ourayi*.

The larger size and tibial markings differentiate it from *S. pallipes* and *S. opacula*.

One hundred twenty-four specimens collected from May-November: Fallon, Fernley, Golconda, Lahontan Reservoir, Pyramid Lake, Reno, Soda Lake, and Washoe Lake.

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3Identified by W. W. Wirth, taxonomist, of this Division.
Saldula pallipes (Fabricius)

Acanthia pallipes Fabricius, Ent. Syst. IV:71, 1794.

This is certainly the most widely distributed saldid in Nevada and the entire Americas. It is a European species. It was observed in a great variety of habitats, which included damp areas adjacent to alkaline and fresh-water lakes, fresh-water and hot springs, alkaline sinks, streams, rivers, reservoirs, ponds, irrigated fields, on rocks in rivers and lakes, and mountain streams and ponds. A few collections were made up to 7,500 feet in the Sierra Nevada Mountains and 8,000 feet in the Ruby Mountains. Associated species were Saldula ourayi, S. comatula, S. opiparia, S. palustris, Micracanthia quadrimaculata, and Iosecytus politus.

This is an extremely variable species both in color and size and more than one species may be involved. It has many synonyms.


Saldula saltatoria (Linnaeus)


This shade-loving species was observed on several occasions in the vicinity of Lake Tahoe at an elevation of 6,400 feet along the damp area of a shaded fresh-water spring seep area. It has a wide distribution in North America and this is the first record of its occurrence in Nevada. S. opacula was a companion species.

The tibial and hemelytral markings are distinctive.

Seventy-nine specimens collected March-May: Glenbrook (Lake Tahoe).

Saldula teretis Drake


Drake and Hoberlandt (1950) reported this species from Idaho and Nevada. Nothing is reported on its ecology. It was not collected by the writer.

The straight lateral margins of the pronotum and smaller size separate it from S. opacula.

Acknowledgements

Grateful acknowledgement is tendered to Carl J. Drake of the Smithsonian Institution, for checking the identification of a
number of species, for providing the writer with identified material of some of the western saldid fauna, and for reading the manuscript.

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Reuter, O. M.

Usinger, R. L.

LIVE BUPRESTIS AURULENTA IN BOARDS OF A HOUSE BUILT IN 1923
(Coleoptera: Buprestidae)
Hugh B. Leech
California Academy of Sciences, San Francisco

In January, 1962, Mr. W. Huber submitted pieces of 1-inch by 12-inch Douglas fir boards which were fairly riddled by the borings of Buprestis aurulenta Linnaeus larvae (fig. 1). One live larva was found in situ, and in the process of breaking up the boards to get them out without damaging the rest of the wall, four dead adults were uncovered.

The boards had been used as external sheathing on part of the west wall of the basement of a house on 39th Avenue, San Francisco; stucco had been applied directly against their outer side. The house was built in 1923 (the builder’s permit was still affixed to the adjacent wall) and the original boards were in place.
They showed no emergence holes on the inner side, exposed to the dry basement, but on the other side the wood had been eaten away right up to the stucco in places, though the stucco was not penetrated. The infestation was confined to the lower four or five boards, over a length of about three feet in each, and was found quite by chance when one was removed in repairing damage by termites in an adjacent corner.

As can be seen in Figure 2, some of the borings are those of very small larvae, and the greater part of the tunnelling was in the side toward the outer stucco wall, which may at times have contained more moisture; the boards were all very dry, and there was no sign that they had been other than that since the house was built. However, close examination showed buprestid galleries which were cut through when the lumber was originally sawn (fig. 3). Since it is believed that adults of *B. aurulenta* cannot successfully reinfest dry lumber (Linsley, 1943:348), it is reasonable to presume that the infestation dates from 1923 or a little earlier. The mature living larva may thus have been 40 years old when uncovered. The adults apparently made no attempt to emerge into the basement, but died in their pupal cells.

Addendum.—After the manuscript of the foregoing went to the printers, the June issue of *The Canadian Entomologist* was received. It has two fine articles on the same species by D. N. Smith: "Prolonged larval development in *Buprestis aurulenta* L. (Coleoptera: Buprestidae). A review with new cases" (pp. 586-593), and "A note on the longevity and behavior of adult golden buprestids, *Buprestis aurulenta* L. (Coleoptera: Buprestidae) under artificial conditions" (p. 672). New records are tabulated; one indicates a larval life of about 40 years, another of 51 years.

Fig. 1. Section of a Douglas fir board which was built into a house in 1923 and removed in 1962. It shows tunneling by larvae of *Buprestis aurulenta* Linnaeus, and contained a living larva in January, 1962.
Acknowledgment

I am indebted to Mr. W. Huber, a general contractor in San Francisco, for drawing the infestation to my attention, and for enabling me to examine the site.

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Fig. 2. Edge of a board one inch thick of Douglas fir (*Pseudotsuga Menziesii* (Mirbel) Franco). The arrow points to tunneling by a young larva of *Buprestis aurulenta* Linnaeus.

Fig. 3. Surface of a Douglas fir board used in house construction in 1923. The arrows point to buprestid burrows which were in the wood before it was cut into boards.
OBSERVATIONS ON HIBERNATION IN BELOSTOMA
(Hemiptera: Belostomatidae)

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Belostoma were observed in an apparent state of hibernation during the winter months at two different localities in California by Douglass R. Miller and the author. On December 27 and 29, 1959, at Laguna Canyon, Orange Co., California, before the major winter rains had begun, Belostoma bakeri Montandon was found in a water-soaked log lying about two feet from the water’s edge and about a foot above the water level of a temporary pond. The pond was teeming with notonectids, ostracods, and aquatic beetles, but no Belostoma were found. The bugs were found beneath the log and in crevices within it and were caked with mud in most instances, obviously having been out of water for some time. The legs were held up tightly against the body in a death-feigning attitude. Farther up the bank bakeri was found in damp, decaying leaf litter. The bugs were at the intersurface of leaf litter and permanent soil. A search of the perimeter of the pond revealed that the bugs were confined to the south end. Several bugs, still feigning death, were placed in an aquarium. They were quite sluggish at first, but after an hour they swam normally. For about one week most of the bugs attempted to get out of the water, climbing up on wooden floats. Eventually they settled down and mating was observed with subsequent laying of eggs on the hemelytra of the males.

During February, 1959 and 1960, at Zoology Pond, University of California, Davis, California, the thick oak-leaf litter around the shore of the pond was searched and Belostoma (bakeri or flumineum Say) was collected next to the soil surface. As in the southern California observations, the bugs were restricted to the south bank. They were caked with mud and feigning death. In the same general area under the leaf litter were a multitude of other aquatic insects including dytiscids and hydrophilids (e.g., Hydrophilus triangularis Say). On placing the Belostoma in an aquarium they reacted similarly to those of the previous observation.

The Belostoma were determined by Arnold Menke, U.C.D.
NOTES ON PHYLLOPHAGA SOCIATA (HORN) WITH A DESCRIPTION OF THE LARVA
(Coleoptera: Scarabaeidae)

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The discovery that scarabaeid larvae are common under and near ant nests in central Oregon has led to a number of new findings regarding their distribution and abundance. On May 21, 1961, while on a collecting trip near Bend, Oregon, the writer found a female of an unusual Phyllophaga in soil near the nest of the harvester ant, Pogonomyrmex occidentalis Cresson. Later in June, several other adults and numerous larvae of an unknown Phyllophaga, were dug from other ant nests in the same general area.

Study of the adults revealed that this species is Phyllophaga sociata (Horn). Identification of the larvae was confirmed by rearing five of the above-mentioned larvae to the adult stage and by obtaining nine first-stage larvae from eggs laid by two females, isolated in rearing cages with juniper as a food plant.

This interesting species was described by Horn in 1878 under the name Listrochelus sociatus, in his revision of the species of the genus Listrochelus of the United States. Saylor, however, in 1938, removed the species from Listrochelus to Phyllophaga, sensu stricte, based on studies which he and E. A. Chapin had made preparatory to a revision of the subgenus Listrochelus (see also Saylor, 1940). Luginbill and Painter (1953) also included the species in Phyllophaga, sensu stricto.

According to M. W. Sanderson (personal communication), Ph. sociata belongs in a new group of species, separate from both the subgenus Listrochelus and Phyllophaga sensu stricto, including Ph. xerophila Saylor, Ph. stohleri Saylor, Ph. reevseti Saylor, Ph. galeanae Saylor and several undescribed species. Study of reared larvae of Ph. (Listrochelus) mucoreus LeConte and Ph. (Listrochelus) pulcher, (Linell) (loaned by the USNM) and other Listrochelus (Ritcher, 1949) shows that they agree with Ph. sociata in having the last three pairs of abdominal spiracles reduced in size. Their rasters, however, and the setation of the head are very similar to those of many Phyllophaga, sensu stricto.

1Technical Paper No. 1496, Oregon Agricultural Experiment Station. This investigation was supported in part by grants from the National Science Foundation and from the General Research Fund of OSU.
2The assistance of David R. Smith and Nandini S. Khot is gratefully acknowledged.
Larvae of *Ph. sociata* are quite unique from these other two sub-genera in possessing a totally different raster, a different pattern of setation on the head, and a row of strong fossorial setae on each prothoracic leg. In fact, the larval characters of this species are so distinct that it could be placed in a separate genus.

Luginbill and Painter (1953) erroneously listed *Ph. sociata* as a southwestern species. The distribution is given by Leng (1920 as Nevada, Idaho and Oregon. Based on material in the Hatch collection, at the University of Washington, and in the collection at Oregon State University, this species has been collected from the following localities: Oregon—*Baker Co.*: Durkee. *Deschutes Co.*: 7 miles N. of Tumalo, Redmond, 10 miles SE of Sisters, 13 miles SE of Sisters, 15 miles east of Sisters, and 1 mile N. of Cline Falls. *Harney Co.*: “P” Ranch. *Jefferson Co.*: Cove State Park (near Culver). *Washington—*Bent Co.*: Prosser. *Grant Co.*: Moses Lake, Soap Lake, People’s Oil Well.

Adults of *Ph. sociata* were collected at black light in central Oregon during June of 1961. All the Hatch specimens (25) were taken during May. My studies show that the species overwinters both in the larval and adult stages, indicating a life cycle of two or three years. Pupation occurs in July and August with transformation to the adult stage occurring 25 to 27 days later (25°-26°C). Adults remain in the soil until the following spring before emerging.

**Phyllophaga sociata** (Horn), Third-stage Larva
(Figs. 1-8)

The following description is based on ten third-stage larvae and cast skins of three third-stage larvae reared to the adult stage. The larvae were dug from soil beneath nests of *Pogonomyrmex occidentalis* Cresson, 13 miles southeast of Sisters, Oregon, (De-schutes Co.), July 6, 1961, by P. O. Ritcher and David Smith. The larvae of this species may be distinguished by the following characters:

Maximum width of head capsule 3.3 to 3.5 mm. Head (Fig. 4) yellow-brown in color, faintly reticulated. Anterior half of frons with numerous setae; with about 17 setae in a transverse patch near the frontal margin, with 15 to 20 posterior frontal setae on each side, and with one long seta at each anterior angle. Dorso-epicranial setae inconspicuous, 2 or 3 on each side. Labrum symmetrical. Epipharynx (Fig. 8) with well-developed epizygum and zygum. Proplegmatia well developed, each elliptical with 17 to 18 proplegma. Proplegma long, narrow, and curved. Haptomerum
**Phyllophaga sociata** (Horn). Fig. 1, Left mandible, dorsal view. Fig. 2, right mandible, dorsal view. Fig. 3, Prothoracic leg, distal portion. FOS, fossorial setae. Fig. 4, head. Fig. 5, left maxilla. G, galea; LA, lacinia; LU, lacinial unci. Fig. 6, portion of abdomen showing segments 5-10. Fig. 7, venter of last abdominal segment. LAL, lower anal lobe; PLA, palidium; S, septula; TE, tegillum. Fig. 8, Epipharynx. DX, dexiotorma; H, helus; HM, haptomerum; LP, laeophoba; LT, laeotorma; PPL, proplegmatium.

**Explanation of Figures**

- **Fig. 1**: Left mandible, dorsal view.
- **Fig. 2**: Right mandible, dorsal view.
- **Fig. 3**: Prothoracic leg, distal portion.
- **Fig. 4**: Head.
- **Fig. 5**: Left maxilla.
- **Fig. 6**: Portion of abdomen showing segments 5-10.
- **Fig. 7**: Venter of last abdominal segment.
- **Fig. 8**: Epipharynx.

Additional abbreviations:
- G: Galea
- LA: Lacinia
- LU: Lacinial unci
- LAL: Lower anal lobe
- PLA: Palidium
- S: Septula
- TE: Tegillum
- DX: Dexiotorma
- H: Helus
- HM: Haptomerum
- LP: Laeophoba
- LT: Laeotorma
- PPL: Proplegmatium
set with 8 to 10 stout heli, the anterior 4 or 5 in a curved row. No sensilla among the chaetoparia. Haplotelachus without crepidal punctures. Pedium with a short laeophoba, anterior to the laeotorma, consisting of 3 to 6 flattened, branched filaments. Dexiophoba brushlike, with about 15 filaments, inserted at base of pedium just anterior to nesium externum (= sclerotized plate).

Dorso-exterior region of mandibles (Figs. 1 and 2) without either setae or pits. Setae in dorso-molar region of right mandible limited to a row of 5 to 8 setae inserted at the base of the molar structure. Dorso-molar region of left mandible with a cluster of 4 or 5 setae near the base of the molar structure. Maxilla (Fig. 5), with a regular row of 13 to 17 truncate stridulatory teeth bordering stipes. Lacinia with a longitudinal row of 3 unci on inner face and an anterior, oblique row of 3 stout, spinelike setae. Galea and lacinia, on inner surface, separated by a non-sclerotized membranous area. Last segment of antenna with a large ovate sensory spot. Eyespots absent.

Femora of prothoracic legs (Fig. 3) each with a ventral row of 4 stout, fossorial setae (worn down in older specimens). Claws of prothoracic legs unusually long and stout, claws of mesothoracic legs rather long and slender, claws of metathoracic leg much reduced in size. Last 3 pairs of abdominal spiracles much smaller than spiracles on abdominal segments 1 to 5 (Fig. 6). Respiratory plates not surrounding bullae. Raster (Fig. 7) with 2 widely separated, prominent palidia, diverging posteriorly. Posteriorly, each palidium consists of a comb-like row of 5 to 8 closely set, long, stout, flattened setae; anteriorly each palidium is continued as a sparsely set row of 3 or 4 short, sub-conical setae. Septula triangular. Laterad of each comb-like portion of each palidia is a patch of 10 to 14 hamate setae. Preseptular hamate setae usually absent. Anal slit Y-shaped with arms of Y about twice as long as stem. Dorsal and ventral anal lobes densely covered with fine, long and short setae. Lobes of lower anal lips bordered anteriorly with a row of 6 to 11 slender hamate setae.

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MELANOPLUS ALPINUS SCUDDER IN CALIFORNIA
(Orthoptera: Acrididae)

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Collecting trips to the high elevations of the Sierra Nevada Mountains of California have produced many interesting records and new species of Orthoptera in recent years. Mature grasshoppers are most abundant in late July and throughout August in this area.

Collecting in the green, moist, sub-alpine meadows along State highway 108 at an elevation of about 9000 feet near Sonora Pass, Tuolumne County during the month of August of the years 1959-61, has produced several dozen examples of the interesting Melanoplus alpinus Scudder. This is the first published record of the occurrence of this species in California. Hebard (1930) recorded the species from Alberta. Interesting records were published by Buckell (1921) concerning M. alpinus in British Columbia. He cites the grasshopper as being, “A sylvan species, found throughout the open pine forests above 3,500 feet elevation.” Describing the term “sylvan,” Buckell says, “The forests, bounding the open country on the north, are composed mainly of Douglas fir (Pseudotsuga mucronata), Engelmann spruce (Picea engelmanni) and Lodgepole pine (Pinus murrayana). There is very little undergrowth, the ground being covered with pine-grass. In these forests we find the sylvan species.” The same author (1922) says concerning M. alpinus, again in British Columbia, “A fairly common species in the dry Douglas fir forests in the Chilcotin District.” Fulton (1930) gave records of M. alpinus taken in the Crater Lake Meadows, Oregon. In 1941, G. Alexander listed “mountains at moderate elevations” for the habitat in Colorado.

The specimens of Melanoplus alpinus from near Sonora Pass were taken in a somewhat different situation from that which Buckell described. All were found in the meadows away from the trees. Springs and streams keep the meadows quite moist, even during the late summer months. It was in the moist grassy spots throughout the meadows that the specimens were taken. None were collected close to the trees.

An effort to obtain specimens from different localities at dif-
ferent altitudes was not successful. One typical area visited was a green meadow on the west side of the Sierra along the Sonora Pass road near the settlement of Dardanelle which is at an elevation of about 7000 feet. Searching there only revealed many specimens of *Melanoplus bilituratus bilituratus* (Walker). However, at Sonora Pass, *Melanoplus alpinus* is found in association with *M. bilituratus bilituratus* from which it can be quite easily distinguished.

Several species of the Mexicanus Group, of which *M. bilituratus* is a member, are characterized by having a mesosternal “hump”. *M. bilituratus* has this hump which is more highly developed in the males and hence more easily seen. There is no sign of such a swelling in *M. alpinus* which is not a member of this group. The cerci of the two species are also different. The male cercus of *M. alpinus* is roughly cylindrical on the basal half, elongate, the apical third extending posteriorly as a narrow, ventrally hooked structure; the cercus is narrow in the median portion and there is usually a brief dorsal knob just posterior of the center. The distinctively shaped cercus of *M. alpinus* indicates close relationship to *M. infantilis* Scudder, which is smaller and more widely distributed in the northern Rocky Mountain and Great Plains states. Adults of both *M. alpinus* and *M. bilituratus* are about 18-20 mm. in length. Color of both species is similar. Uniform brown is the commonest color form, but greenish specimens are frequently encountered.

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NOTES ON TYCHINI FROM WESTERN NORTH AMERICA
(Coleoptera: Pselaphidae)

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In 1958 Schuster and Marsh proposed the genus *Hesperotychus* for species of California Tychini with asymmetric genitalia. They did not consider the North American species of *Tychus* with symmetrical genitalia to be congeneric with *Tychus* Leach, neither did they propose a new genus for those species. Park and Wagner (1961) proposed the genus *Lucifotychus* for western species with symmetrical genitalia and a subgenus *Custotychus* for the eastern species. We feel that *Custotychus* deserves generic rank and that *Lucifotychus s. str.* can be divided satisfactorily into two distinct genera as follows:

Metasternum of males with a process between or immediately behind mesocoxae; pro- and metatrochanters armed. Tergites IV and/or V of females medianly tumid.........*Lucifotychus*

Park and Wagner

Metasternum of males simple; pro- and metatrochanters simple; mesotrochanter usually with macroseta. Tergites IV or V of females not tumid.........*Hylotychus* Grigarick and Schuster

**Lucifotychus** Park and Wagner

*Lucifotychus impellus* Park and Wagner, the type species of the genus, was described from Charleston, Coos Co., Oregon and their distribution records for the species included widely separated localities in Oregon and Washington. We have studied material from numerous localities also, and can discern at least five distinct populations. Whether these represent closely related species or subspecies is a question that cannot satisfactorily be answered on the basis of the limited material now available.

**Lucifotychus agomphius** Grigarick and Schuster, new species¹ (Fig. 1)

Male.—Head 325μ long x 260μ wide; antennal club 330μ long. Eyes well developed, five peripheral facets visible; vertexal foveae separated by 3½ times distance from each fovea to eye margin; right mandibular ramus with six teeth; labrum 100μ wide; maxillary palpus segment lengths/widths: I 37/15μ, II 215/52μ, II 140/56μ, IV 195/90μ with terminal palpal cone 60μ long and subapical projection 15μ long. Pronotum 350μ long x 420μ wide; elytra 570μ long. Brachypterous. Protrochanter with blunt spine;

¹ All of the holotypes of new species are slide-mounts, and are deposited in the California Academy of Sciences. The paratypes are retained by the authors.
mesotrochanter with tubercule; metatrochanter flanged; metatibia 510μ long. Each tibia with distal spine. Metasternum with blunt, longitudinal apophysis 23μ long, arising 15μ posterior to a line passing across base of metacoxal cavities. Posterior margin of tergite V transverse; that of sternite VI concave, slightly angulate. Aedeagus (fig. 1) about 440μ long, the base less than 1/2 this length; each paramere sclerotized for basal 2/3, membranous to apex; its apex bears a number of setae of which four are noticeably longer; dorsal lobe of aedeagus lacking lateral teeth, entirely membranous and minutely setate; ventral lobe excavate distally, with numerous small pores apically and a few large pores basally.

Male (point-mount). Predominantly dark brown, with elytra, legs and antennal club lighter brown; palpi and sternite VII yellow. Pronotum with seven basal punctures, median largest. Elytral stria over 1/2 length of elytron. Metasternum with small median impression. Sternite III impressed laterally along anterior margin. Sternite VI medianly impressed.

Female (point-mount). Resembles male except lacking modifications of the trochanters and metasternum. Sternite III not impressed. Sternite VI shorter, not impressed. Median tumosity of tergite V nearly obsolete, represented by a glabrous swelling, this polished, with impunctate surface.

The holotype male, one paratype male and two paratype females were collected near Bridge Camp, Coos County, Oregon, July 28, 1954 by V. D. Roth.

The males differ from those of L. impellus in the lack of marginal teeth of the aedeagus and in their smaller overall size. The females are distinguished by the near absence of a median tumosity on tergite V.

Hylotychus Grigarick and Schuster, new genus

Type of genus: Hylotychus dentatus Grigarick and Schuster, new species.

Tychini similar to Lucifotychus but in which the males differ in the general facies of the aedeagus, in the unarmed pro- and metatrochanters, and in the simple metasternum. The females differ in the lack of tumosities of tergites IV and V. The presence of a subapical projection on the fourth segment of the maxillary palpus (fig. 7) distinguishes both genera from Cylindracetus and the subgenus Lucifotychus (Custotychus).

Hylotychus dentatus Grigarick and Schuster, new species

(Fig. 2)

Male. Head 315μ long x 240μ wide; antennal club 315μ long; maxillary palpal segment III 135μ long, IV 205μ. Pronotum 345μ long x 390μ wide. Elytra 615μ long. Winged. Protibia with apical spur; metatibia 540μ long; mesotrochanter with prominent macroseta. Aedeagus (fig. 2) 315μ long x 165μ wide. Dorsal lobe 180μ long, wide basally, tapering distally to two lateral arms at apex; lateral arms 80μ across; a pair of small lateral projections
arise 60μ below apex, area between lateral arms and projections slightly granulate. Ventral lobe uniformly thick to fan-shaped apex, lateral arms 90μ across. Parameres as long as ventral lobe, ending in blunt apex of several small teeth.

Female. Unknown.

The holotype male and 11 paratype males were collected 19 MILES NORTHEAST OF GASQUET, DEL NORTE COUNTY, CALIFORNIA, July 11, 1959, altitude 1200 feet, in maple litter, by L. M. Smith. Additional paratypes were collected as follows: Ryan Creek, 6.5 miles north of Willits, Mendocino Co., California, 3♂ III-7-54 (P. D. Hurd); Faulkner Park, Anderson Valley, Mendocino Co., California, 1♂ X-14-54 (J. R. Helfer); 19 miles east of Green Point Ranch, Humboldt Co., California, 2♂ VII-11-54 (E. E. Gilbert, R. O. Schuster); French Creek, Trinity Co., California, 1♂ VII-11-54 (E. E. Gilbert, R. O. Schuster); Loon Lake, Douglas Co., Oregon, 3♂ VI-30-59 (humus under alder, L. M. Smith); Triangle Lake, Lane Co., Oregon, 1♂ IV-13-47 (I. M. Newell).

This species lacks the apical spine on mesotibia as does H. cognatus and H. stellatus, but the parameres of the aedeagus are blunt and multitoothed.

Hylotychus intellectus Grigarick and Schuster, new species (Fig. 3)

Male. Head 295μ long x 235μ wide; antennal club 304μ long; maxillary palpal segment III 305μ long, IV 180μ. Pronotum 327μ long x 387μ wide; elytra 577μ long. Winged. Pro- and mesotibiae have apical spine; mesotrochanter with prominent macrosetae; metatibia 476μ long. Aedeagus (fig. 3) 377μ long x 168μ wide. Dorsal lobe 204μ long; uniformly wide at base, tapering sharply at 1/2 its length, nearly parallel-sided to small obscure subapical projections; apex sharply pointed; a mucroned area extends 45μ posterior to lateral projections. Ventral lobe fan-shaped apically; prominent lateral arms 163μ across, these arise 56μ below apex. Parameres 159μ long, relatively straight, with five subapical setae 123μ long.

Female. Unknown.

The holotype male and three paratype males were collected at TRIANGLE LAKE, LANE COUNTY, OREGON, April 13, 1947, by I. M. Newell. One paratype male was collected at Loon Lake, Douglas Co., Oregon, July 1, 1959, by L. M. Smith.

The combination of long lateral arms on the ventral lobe of the aedeagus and the long setae of the parameres distinguish this species.

A parasitic mite, Hoplothrombium sp., determined by I. M. Newell, was recovered from a tergite of one of the specimens from Triangle Lake.
Hylotychus stellatus Grigarick and Schuster, new species
(Fig. 4)

Male. Head 330μ long x 255μ wide; antennal club 390μ long; maxillary palpal segment III 127μ long, IV 180μ. Pronotum 350μ long x 397μ wide. Winged. Elytra 600μ long. Protibia with apical spine; mesotrochanter with macrosetae; metatibia 517μ long. Aedeagus (fig. 4) 405μ long x 180μ wide. Dorsal lobe 215μ long, gradually tapering to apex with a pair of small lateral projections 45μ below apex; area from 45 to 90μ below apex covered with microsetae. Ventral lobe relatively narrow, fan-shaped apically, with two lateral projections arising 40μ below apex. Parameres extend to \( \frac{1}{2} \) the length of dorsal lobe, ending in a laterally directed subtriangular tooth and five long apical setae that extend to tip of dorsal lobe.

Female. unknown.

The holotype male and one paratype male were collected at FRESHWATER, HUMBOLDT COUNTY, CALIFORNIA, August 13, 1953, by G. A. Marsh and R. O. Schuster. One paratype male, from 6.4 miles south of Klamath, Del Norte Co., California, III-22-56 (N. A. Walker), and one paratype male, Smith River Cutoff, Del Norte Co., California, X-13-54 (V. D. Roth).

The aedeagus of this species is similar to that of H. intellectus but has shorter parameres and differs in the setal arrangement on the parameres. It is similar to H. dentatus in lacking an apical metatibial spine.

Hylotychus remipennis Grigarick and Schuster, new species
(Fig. 5)

Male. Head 307μ long x 240μ wide; antennal club 345μ long; maxillary palpal segment III 127μ long, IV 172μ. Pronotum 335μ long x 390μ wide. Winged. Elytra 600μ long. Pro- and mesotibia have weak apical spines; mesotrochanter with microsetae only; metatibia 525μ long. Aedeagus (fig. 5) 382μ long x approximately 195μ wide. Dorsal lobe 195μ long, with broad base gently tapering to apex; a pair of lateral recurved arms 110μ across arise 90μ below apex; two weak projections arise 22μ below apex giving apex a triangular shape; micronated area lacking. Sides of ventral lobe gradually expand for \( \frac{1}{2} \) its length, then rapidly constrict, expanding gradually to fan-shaped apex. Parameres subequal to length of ventral lobe, terminating in acute, laterally directed apices; an excrescence comprising four to eight small teeth occurs in region of eight subapical setae.

Female resembles the male except for brachyptery and lack of secondary sexual characters.

The holotype male and one paratype male were collected EIGHT MILES SOUTH OF DUNSMUIR, SISKIYOU COUNTY, CALIFORNIA, November 23, 1954, by E. E. Gilbert and R. O. Schuster. One paratype male was collected from the same locality July 11, 1954, by E. E. Gilbert and R. O. Schuster, and one paratype male, 11 miles east of Douglas City, Trinity Co., California, on the same date by E. E.
Explanation of Figures

Figs. 1, 4, entire aedeagi, dorsal; figs. 2, 3, 5, aedeagi, parmeres shown with ventral lobe, dorsal lobe separate except fig. 3 which is reversed.
Gilbert and R. O. Schuster. Additional specimens not included in the type series are as follows: eight miles south of Dunsmuir, 2♀ VI-26-54 (B. J. Adelson, R. O. Schuster); 9♀ XI-23-54 (E. E. Gilbert, R. O. Schuster); ten miles south of Dunsmuir, 2♂, 1♀ VII-11-54 (E. E. Gilbert, R. O. Schuster); Shasta Retreat, Siskiyou Co., California, elevation 2,416 feet, 1♀ July 1, 1931 (F. E. Blaisdell); Ingot, Shasta Co., California, 2♀ II-3-59, mixed litter _Pseudotsuga taxifolia_ and _Abies concolor_ (R. W. Gerhardt).

A male from Mokelumne Hill, Calaveras County, California, apparently belongs to this species. However, the aedeagus was damaged during dissection and identification was not positive.

The black body color, normal for this genus is replaced in this species by a red-brown color. The lack of a macroseta on the mesotrochanter is also diagnostic.

**Hylotychus bipuncticeps** (Casey), new combination

(Fig 6)

*Tycthus bipuncticeps* Casey, 1887.

The aedeagus of the holotype (U. S. National Museum #38741) is the only part of the type that has been seen by the authors. It was mounted in P. V. A. and was somewhat distorted.

_Aedeagus_ 375μ long x 195μ wide; dorsal lobe appears very broad basally; two long arms curve anteroventrally; sides taper rapidly from lateral arms to blunt apex; ventral lobe with broad, blunt apex and two large subapical arms curving basodorsally; lateral parameres relatively slender, slightly curved inwardly with five subapical setae.

This species was considered to be a synonym of _T. cognatus_ LeConte by Casey in 1893. It was described from one specimen from Lake Tahoe, California. The dorsal lobe of the aedeagus has large pro-curved lateral processes and the ventral lobe has large recurved processes. Thus, elements of the aedeagus of both _H. cornus_ Grigarick and Schuster and _H. dentatus_ are represented in this species.

**Hylotychus newelli** (Park and Wagner), new combination


This species is similar to _H. stellatus_ but the parameres reach the lateral projections of the ventral lobe while these projections are much farther forward in _H. stellatus_. The ventral lobe is similar to that of _H. remipenis_ but the dorsal lobe of _H. remipenis_ is much broader and bears large lateral projections. We have not seen the type of _H. newelli_; however, Dr. Park kindly loaned the manuscript description of this species and a detailed illustration of the aedeagus.
Explanation of Figures

Figs. 6, 8, 9, aedeagi, parameres shown with ventral lobe, dorsal lobe separate; fig. 7, fourth segment of maxillary palpus showing palpal cone and subapical projection; fig. 10, entire aedeagus, dorsal.
HYLOTYCHUS COGNATUS (LeConte), new combination
(Fig. 9)

*Tychothys cognatus* LeConte, 1874.

**Male.** Head 320μ long x 255μ wide; antennal club 375μ long; maxillary palpal segment III 125μ long, IV 185μ. Pronotum 345μ long x 405μ wide. Elytra 615μ long. Winged. Protibia with apical spine; mesotrochanter with a prominent macroseta; metatibia 540μ long. Aedeagus (fig. 9) 375μ long x 190μ wide. Dorsal lobe converges in distal 1/3 to small lateral projections arising 15μ below apex; margins and apex set with small mucrones. Ventral lobe relatively broad with fan-shaped apex; lateral extensions lacking. Parameres relatively straight, tapering distally and bearing five large subapical setae.

**Female,** unknown.

Specimens examined were collected at Stanley Park, Vancouver, British Columbia, IV-17-49, by W. Lazorko, and from two miles north of Brinnon, Jefferson County, Washington, VII-7-59, by L. M. Smith.

The aedeagus of this species is somewhat similar to that of *H. simplicis* Grigarick and Schuster but is distinguished by having a dorsal lobe with sloping sides, an acute apex, and straight parameres. The mesotibial spine is lacking in *H. cognatus*.

**Hylotychothys simplicis** Grigarick and Schuster, new species
(Fig. 8)

**Male.** Head 320μ long x approximately 230μ wide; antennal club 360μ long; maxillary palpal segment III 127μ long, IV 195μ. Pronotum 330μ long x 390μ wide; elytra 620μ long. Winged. Pro- and mesotibiae spined apically; mesotrochanter has prominent macroseta; metatibia 532μ long. Aedeagus (fig. 8) 480μ long x 210μ wide. Dorsal lobe 205μ long; sides nearly parallel, slightly broader at base; two converging rows of mucrones arise 52μ below base and extend toward broadly rounded apex. Ventral lobe of nearly uniform width, broadly rounded distally and lacking lateral arms. Parameres curved laterally so that their apices diverge nearly 90 degrees.

**Female,** unknown.

The holotype male was collected at Shore Acres State Park, Coos Bay, Coos County, Oregon, on September 7, 1958, by L. M. Smith.

This species is related to *H. cognatus* in that both dorsal and ventral lobes of the aedeagus lack pronounced lateral processes. It differs in having a dorsal lobe which is parallel sided and blunt distally, curved parameres, and spined mesotibiae.

**Hylotychothys cornus** Grigarick and Schuster, new species
(Fig. 10)

**Male.** Head 315μ long x 255μ wide; antennal club 315μ long; maxillary palpal segment III 127μ long, IV 187μ. Pronotum 337μ long x 405μ wide.
Elytra 630μ long. Winged. Pro- and mesotibiae with prominent apical spine; mesotrochanter has prominent macroseta; metatibia 525μ long. Aedeagus (fig. 10) 390μ long x 210μ wide. Dorsal lobe 135μ long; a pair of lateral arms 112μ across arise 52μ from base. Ventral lobe with sides parallel, widely divergent at base. Parameres of uniform width, curving inward to blunt apex with four subapical setae.

Female resembles the male except for brachyptery and lack of secondary sexual characters.

The holotype male was collected at Mendocino, Mendocino County, California, on May 26, 1955, by J. R. Helfer. Two paratype males from the same locality, October 10 and October 20, 1954, and one paratype male from Little River, Mendocino Co., May 3, 1955, were also collected by J. R. Helfer. Specimens considered to be conspecific, but not dissected or included in the type series, are as follows: Mendocino, Mendocino Co., California, 1♂ XII-19-53, 1♀ I-1-54, 1♂, 3♀ X-10-54, 1♂ XI-10-54, 1♂, 3♀ III-23-55, 1♀ V-26-55, 3♂, 4♀ VII-14-55, 1♂, 2♀ VII-23-55, 1♂, 2♀ III-30-57, 3♂, 2♀ IV-3-57, 1♂, 3♀ V-2-57, 2♀ V-15-57, 1♀ VII-2-57, 1♀ X-8-57, 2♀ X-19-57, 2♀ XII-2-57; Little River, Mendocino Co., 2♂, 2♀ V-3-55, 1♀ VI-7-55, 1♂ VII-9-57, 1♂, 2♀ VIII-4-57 (all J. R. Helfer); Monte Rio, Sonoma Co., California, 1♂ II-22-54 (M. Schuster); five miles south of Scotia, Humboldt Co., California, 1♂ X-1-59 (V. D. Roth); Smith River Cutoff, Del Norte Co., California, 1♂ X-13-54 (V. D. Roth).

This species is unique in that the aedeagus lacks subapical teeth on the ventral lobe but has well developed lateral processes on the dorsal lobe.

_Hylotychus sonomae_ (Casey), new combination

_Tychus sonomae_ Casey, 1887.

This species was described from a female. Since the species concepts in this genus are based on males and most of the females have not shown distinguishing characters, we consider it to be a nomen dubium.

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A STRIDULATORY STRUCTURE IN CHRYSOPIDAE
(Neuroptera)

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Stridulation has not previously been reported in the Order Neuroptera. However, a stridulatory mechanism is present in both sexes of Meleoma schwarzi (Banks), 1903, n. comb. (Chrysopa).

M. schwarzi is referred to Meleoma on the basis of the male genitalia (Figures 2, 3, 5). In this genus, a complete set of genitalic elements is present: transverse arch, gonarcus with medi-uncus, pseudopenis, parameres, gonapsis, and gonocristae. Distinctive characteristics of schwarzi are: transverse arch (Fig. 5, t.a., shaded area) lacks a median tooth; undersurface of mediuncus with scale-like sculpture; pseudopenis upcurved, spatulate; para-meres flat plates on surface of bowl-like depression surrounding pseudopenis; gonopsis pointed, slightly curved, with lateral field of short, seta-like gonocristae.


I have never seen a living specimen of this species. Observations of the biology, especially sound production and reception, would be of great interest. Meleoma schwarzi should be easy to recognize in the field; it is the only known species, inhabiting semi-desert areas in the southwest, which is green, with two brown dorsal longitudinal body stripes and pale antennae.

In this species, the second abdominal sternite of both the male and the female (Fig. 1) bears laterally a series of striae formed by coalescence of short microtrichia; on the ventral (medial) surface, the microtrichia are randomly dispersed and of normal length. Setae are confined to the ventral (medial) region of the sternite. On the third sternite, there is a slight patterning into rows of the microtrichia, which are of normal length. The second, and to a lesser extent the third, sternites appear somewhat more strongly sclerotized than do the others.
The hind femur (Fig. 4) bears on the inner surface a row of small wartlike tubercles, which represent modified setal bases. The setae are extremely short, and are located on the side of the tubercle facing the femoral apex. In this position, they would not interfere with contact between the tubercle and the abdominal ridges during stridulation.

Smith (1922) and Principi (1949) record courtship behavior which suggests the probable mode of evolution and operation of the stridulatory mechanism. In both sexes of *Chrysopa oculata*, and the male of *Chrysopa formosa*, the abdomen is jerked up and down rhythmically prior to mating. This habit is probably widespread in Chrysopidae. If the hind femora were held against the abdomen during this activity, weak sound production would result; favorable response by the opposite sex might result in selection

**Explanation of Figures**

*Meleoma schwarzi* (Banks): Fig. 1, left lateral view of second abdominal sternite of male, showing striae; Fig. 2, male genital armature, posterior view; Fig. 3, same, lateral view; Fig. 4, inner surface of right hind femur, same scale as Fig. 1, showing row of modified setal bases; Fig. 5, lateral view of male abdomen. Gp, gonapsis; pm, paramere; psp, pseudopenis; t.a., transverse arch.
of an improved sound-producing mechanism. If this sequence has taken place, *M. schwarzi* may be expected to stridulate by rubbing the abdomen against the femora, rather than the reverse. Sound is probably received by the alary chordotonal organs. Other possible sound receptors are the pedal chordotonal organs, and Johnston's organ.

All species of *Meleoma*, with the exception of *schwarzi*, exhibit strong sexual dimorphism. The scapes are usually lengthened, and widely separated medially; the flagellum may have the basal segments inflated and fused. There is often a deep, seta-lined cavity in the frons, or the anterior surface of the scape. In *M. signoretti* Fitch, a long horn, bearing an apical tuft of setae, is located on the vertex. The face is characteristically broad, and the eyes relatively small, in both sexes. In one species, the radial sector in the male hind wing is inflated.

No observations of mating in *Meleoma* have been published, nor have histological studies of the aberrant structures been made. It may be conjectured that these structures are concerned with either attraction of the female to the male, or, more likely, olfactory or gustatory stimulation of the female during courtship.

None of these specializations is present in *M. schwarzi*. In both sexes, the face is narrow, the eyes large, and the antennae and wings quite normal. Stridulation is a substitute for, rather than a supplement to, the sexually dimorphic characters of the other species. Probably it serves a parallel function—attraction of the sexes, or stimulation during courtship.

Sexual dimorphism and modification of non-genitalic structures in connection with courtship are exceedingly rare in the Chrysopidae. It is therefore of great interest that two such mechanisms, totally different in structure should arise, apparently independently, within the same genus.

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NOTES ON THE BIONOMICS OF ZONOSEMATA VITTIGERA (COQUILLETT), A FRUIT FLY ON SOLANUM
(Diptera: Tephritidae)

Mont A. Cazier

University of California, Berkeley

The genus Zonosemata is represented in the North American fauna by two species. Zonosemata electa (Say), the pepper maggot, because of its economic importance has been studied rather extensively and its host plants and distribution are rather well-known. Zonosemata vittigera (Coquillett) has been collected on a number of plants—alfalfa, cotton, sunflower, orange, peach and quince (Foote, 1960: 114), but its only authenticated natural food plant is Solanum elaeagnifolium Cavanilles (Foote, 1960). It is possible that Z. vittigera may eventually be found in cultivated plants and information on its biology and parasites may ultimately be of economic importance.

Solanum elaeagnifolium, also known as white or silver horse-nettle, bull-nettle and trompillo is widely distributed throughout much of southwestern North America occurring from Kansas, Colorado and Texas, west into California and south to tropical America. In Arizona it occurs throughout the arid portions of the state from 1,000 to 5,500 feet (Kearney and Peebles, 1951) where it is most commonly found around sink holes, tanks, along roadsides and fields usually where the ground has been disturbed. It apparently prefers sandy soil and is a conspicuous member of the desert flora although it is on occasion a “weed” pest of all kinds of cultivated crops and is of little or no value as forage. It reproduces either from the seeds or from creeping rootstalks, is silver in color and covered with spines. The blooming period is long, extending from May to October, and seeds may be found during most of this period although more abundantly from June to September. The flowers are conspicuous and vary from deep violet to blue. The round fruit, which ranges from 1/3 - 1/2 inch in diameter, are mottled green when young, yellow upon maturity and often remain on the plants throughout the winter months. Those seeds that are dark or black are the result of the infestation of Zonosemata vittigera larvae.

The unripe fruit of this plant is reputed to be poisonous because of the presence of an alkaloid, solanin, but the Pima Indians use the crushed berries in making cheese (Kearney and Peebles,
1951) and a number of insect species, including *Z. vittigera*, thrive on the berries, both ripe and unripe. A protein digesting enzyme resembling papain has also been found in the plant.

The adults of this fly were observed mating on the leaves and stems of *Solanum elaeagnifolium* in June and July of 1960 at a locality two miles northeast of Portal, Arizona, in an earthen tank. In July many of the green seeds showed oviposition punctures and had started to turn black, thus indicating that mating and oviposition had taken place earlier, probably in late May or early June. Females (Fig. 1) were observed ovipositing in the green or slightly yellow seeds during July and August of 1960 but had been laying earlier, probably in June, and fresh oviposition punctures were in evidence in early October.

The eggs are laid in the green pulpy material beneath the skin of the green or maturing fruit. When the ovipositor is withdrawn a small bubble of liquid exudes from the skin opening and is the only indication of infestation until the egg hatches and the larva begins to feed. As feeding begins the area around the puncture turns dark (Fig. 2) and becomes progressively larger as the larva continues to feed. Fruits with as many as nine oviposition punctures were noted but no more than three maturing larvae were ever found inside, the usual number being one larva per fruit. Thus, there is usually only one emergence hole in each fruit, but two are found occasionally. It would appear that although multiple oviposition occurs as a rule in the fruit, the larvae kill each other or succumb from lack of food until usually only one remains.

Although the larvae (Fig. 3) begin feeding beneath the skin of the fruit they soon progress to the more extensive green pulpy central area between the seeds leaving a black, liquid, digested material behind. This material eventually stains all or most of the skin of the fruit black as feeding progresses and all of the green pulp is devoured. The seeds remain undamaged but are imbedded in this digested material (Fig. 4) which hardens after the larva leaves the fruit for pupation. When the larvae are mature (Fig. 3) they are from 9-10 mm. in length, white and are located in the center near the base of the fruit. From this position they burrow outward usually laterally, cut a round hole in the skin of the fruit (Fig. 5) and drop to the ground for pupation.

Depending on the nature of the soil, the larvae dig down from
1-3 inches where they pupate without making a cell (Fig. 6). The pupal case is hard, can stand considerable pressure without being dented or damaged and the fly over-winters in this condition. The first three segments on the dorsal surface of the pupa are slightly depressed (Fig. 6) and have a lateral carina, evidently a weakened area, that curves inward in about the middle of the fourth segment. When the fly emerges this flap is pushed out, taking half of the fourth segment with it, and usually becomes detached from the rest of the pupa exposing the white silken inner lining (Fig. 7).

Between October 1 and 14, 1960, several hundred infested fruit of *S. elaeagnifolium* were brought into the laboratory for rearing purposes. The larvae were extracted from the fruit on October 14 and ranged in size from about half-grown to fully mature and ready for pupation. These were placed in glass jars with dirt in the bottom and kept between 70° and 75° F. All the larvae disappeared into the soil immediately and pupation occurred between October 15 and 17 at which time 38 of them were

---

**Fig. 1**  
**Fig. 6**

**Fig. 3**  
**Fig. 7**

**Explanation of Figures**

*Zonosemata vittigera* (Coquillett). Upper left, adult female; upper right, pupae; lower left, larva; lower right, pupae from which adults have emerged.
taken from the soil and placed in petri dishes for observation. Six pupae were placed in the climatizer and kept at temperatures ranging from 70-90° F. and at relative humidities ranging from 23-34% for varying periods of time. On December 7, 1960, one fly emerged in the laboratory and one in the climatizer and no further specimens emerged until May 19, 1961. This indicates considerable resistance or tolerance to changes in temperature and relative humidity and all but the two specimens withstood these abnormal conditions until May-August, their normal field emergence period.

Those larvae that pupated on October 15, 1960, emerged between June 6 and August 22, 1961, a minimum of 264 and maximum of 311 days and an average of 284 days in the pupal stage. Those pupated on October 25, 1960, emerged between June 26 and August 22, 1961, a minimum of 244, maximum of 278 and an average of 262 days. Those pupated on October 29, 1960, emerged on July 28, 1961, after 272 days in the pupal stage. One specimen that pupated on November 15, 1960, emerged on May 19, 1961, after 185 days as a pupa and four specimens that pupated on November 17, 1960, emerged on July 12 and 13, 1961, after 237 and 238 days as pupae. The range of the pupal period extended from 185-311 days with an average of 263 days. Since the emergence of the flies in the laboratory coincides closely with their appearance in the field it is probably that the above given figures would apply to specimens emerging under natural conditions at least in the area of the Chiricahua Mountains or under similar conditions.

While making field observations on *Zonosemata vittigera* a small (2.5 mm.) Braconid wasp with an orange-red body, black eyes, black legs, black antennae, fuscous wings and a black ovipositor which is almost as long as the body was seen flying around the *S. elaeagnifolium* plants or walking around on the stems, leaves and fruit. No females were observed inserting the ovipositor into the seed but the wasp, *Opius sanguineus* (Ashmead), (Fig. 8) is a larval parasite of both *Z. vittigera* and *Z. electa*. The female evidently uses the long ovipositor to insert her egg into the fly larva while it is still in the fruit. The fly larva isn’t killed by the parasite until after pupation and the adult wasp emerges from the pupal case either by pushing the entire anterior end out or by chewing an irregular opening in it.
From *Z. vittigera* larvae that pupated in the laboratory on October 15, 1960, nine *Opius sanguineus* adults emerged between November 5 and 18, 1960, probably as a result of the high (70-75° F.) temperatures. Larvae that pupated on October 29, 1960,
gave rise to two adult *Opius* on September 16, 1961, or after 322 days from the pupation of the fly. Larvae that pupated on November 15, 1960, produced two *Opius* adults on August 21, 1961, or 279 days after the fly pupated. Since *Opius* oviposition was not observed it is impossible to give accurate figures on duration but the minimum indicated is 279 days, maximum 322 days and an average of 301 days that the wasp spends in the fly pupae.

**Acknowledgments**

The author would like to express his appreciation to Mr. Wes Niles, University of Arizona, for the determination of the *Solanum*; Dr. R. H. Foote, Entomological Research Division, U.S.D.A., for the name of the Zonosemata; Dr. C. F. W. Muesebeck, Entomological Research Division, U.S.D.A., retired, for the determination of the *Opius* parasite. Special thanks are extended to Miss Marjorie Statham, Department of Entomology, American Museum of Natural History, New York, and Martin A. Mortenson, Southwestern Research Station, Portal, Arizona, for the excellent photographs.

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**Observations on the Flight Behavior of an Ascalaphid of the Genus Ululodes**

*(Neuroptera: Ascalaphidae)*

C. Don MacNeill

*California Academy of Sciences*

The following notes are offered in the hope that they will be helpful to anyone attempting to work with the genus *Ululodes*. The few observations on behavior reported here, together with an awareness of the physical circumstances necessary to observe this behavior, might suggest the means for more effective sampling of populations and for detailed studies of behavior.

It was noticed that, in areas where these insects abound, they are readily observed or collected during a twenty-minute period commencing about one-half hour after sunset. During this period it is sufficiently dark that the low flying *Ululodes* are not visible
against a background of vegetation or dark soil, but they can be seen in silhouette against a very pale substrate.

In early September of 1951 I first became aware that these neuropterans could be observed easily under such conditions at Molino Basin in the Santa Catalina Mountains near Tucson, Arizona. The site in this case consisted of a clearing, perhaps one hundred by fifty feet, located near the junction of two streams. The area was nearly devoid of vegetation since it was used as a parking lot in connection with a nearby picnic area. The soil was primarily hard-packed, light-colored sand and gravel. The ascalaphids were observed there during many evenings in September of that and more recent years, as well as at two other localities in Arizona where I was able to locate a suitably pale substrate to make observation possible. One of these sites consisted of a whitish sandy portion of a road in Madera Canyon in the Santa Rita Mountains, and the other was the white sand of a broad stream bed in Temporal Canyon near Patagonia.

At the Molino Basin site the ascalaphids were first noticed about twenty minutes after sunset, flying high and coursing particularly around and over the higher oak trees in the area. At this time none was seen to descend lower than about twelve feet above the ground level. Within five minutes occasional individuals were seen at eye level, but, owing to the dark vegetational background bordering the clearing, visibility at this horizon was very poor and probably many more were present than were observed. In another five minutes these insects were visible in some abundance, several being in view at any given moment. During this period their flight horizon appeared to be primarily within a foot or so of the ground, but they would often rapidly ascend to as much as ten feet where coursing was resumed for a few seconds only before they returned to near ground level.

For a fifteen minute period thereafter, that is between about one-half hour and forty-five minutes after sunset, the Ululodes were rather common at the site, flying from within a few inches to about three feet above ground level. Their density at the site fluctuated considerably during this period, however, so that they seemed to appear in waves of individuals. At the end of this fifteen minute period there occurred a rather abrupt decline in observed activity. Despite the increasingly poor visibility owing to the gathering darkness, the pale substrate remained an effective back-
ground for observation of these insects, and, occasional individuals were seen during the following five minutes. None were seen after ten minutes prior to the time when darkness had rendered visibility inadequate even over the white substrate.

A gasoline lantern and collecting sheet were operated near the parking lot for many nights during several different years, and no Ululodes were collected by this means. On several occasions the lantern and sheet were placed in the clearing while the flight was in progress, and while some of these insects were seen in the vicinity of the light there was nothing about their behavior to suggest that they had responded to the presence of the light. This is of interest since perhaps most of the known specimens of Ululodes have been taken at light, but seldom, if ever, in large numbers.

The flight of these neuropterans was quite different from the weak, fluttering flight of myrmeliontids and some other ascalaphids. It was rather rapid, but meandering, not particularly direct, and was frequently interrupted by abrupt changes in course and lateral darting, or rarely, momentary hovering. The flight was quite similar to that of certain Odonata but slower and less direct. During the peak period of the observed flights they appeared to remain within two or three feet of the ground. Those individuals nearest the ground, roughly below the one foot level, seemed to fly slower and to briefly hover more often than did those flying above that level.

Two individuals were observed in coordinated, possibly precopulatory, flight. One member was coursing slowly about one foot above the surface and the other member was stationed approximately six inches directly above. This position was accurately maintained for perhaps fifteen or twenty seconds, until an attempt to secure both individuals failed. Another pair was seen, evidently in dorso-ventral contact and probably copulating, as they were flying at a height of two feet quite as rapidly and easily as a single individual. Both were facing forward and one of the members was slightly behind the other. Visibility was not adequate to permit observation of further detail. The pair rapidly separated in the net but the specimens did represent both sexes.

It would seem that, either by utilizing natural clearings with a very pale substrate or, perhaps better, by temporarily applying a portable white overlay to any otherwise suitable area, a great deal could be learned about the habits of these interesting animals.
PARASITES REARED FROM A SPECIES OF NEODIPRION FOUND ON DOUGLAS-FIR IN IDAHO
(Hymenoptera: Diprionidae)

DAVID R. SMITH
Oregon State University, Corvallis

A sawfly infestation was detected on Douglas-fir in the Deer Creek drainage about 10 miles northeast of Fairfield, Idaho, in 1959. The sawfly was identified as Neodiprion near scutellaris Rohwer by H. H. Ross. Larvae and pupae were collected in the summer of 1960 in conjunction with a study supervised by Walter E. Cole, Forest Entomologist, Intermountain Forest & Range Experiment Station, Ogden, Utah. The following parasites were reared from field collections:

Hymenoptera: Pteromalidae — Tritneptis klugii (Ratzeburg)
Cleptidae — Cleptes provancheri Aaron
Ichneumonidae — Lamachus angularis (Davis)
Exenterus tsugae Cushman
Exenterus sp.
Endasys sp.
Bathythrix n. sp.

Diptera: Bombyliidae — Villa sinuosa (Wiedemann)
Tachinidae — "Phorocera" hamata Aldrich & Webber
Tsugaea nox Hall

All of these parasites emerged from field collected cocoons, whereas Exenterus sp. was the only parasite to emerge from cocoons resulting from larval collections.

Exenterus sp. and Tritneptis klugii (Ratz.) appeared to be the most common. These species were collected easily by sweeping in the infested area, Mature sawfly larvae were present in the same area at this time. It appears that Exenterus sp. attacks the sawfly in the mature larval stage, overwinters in the cocoon of the host, and emerges the following year when mature host larvae are again available.

The parasites were determined by: B. D. Burks (Pteromalidae); K. V. Krombein (Cleptidae); L. M. Walkley (Ichneumonidae); C. W. Sabrosky (Tachinidae); W. W. Wirth (Bombyliidae), all located at the United States National Museum, Washington, D.C. The specimens have been deposited in the Oregon State University insect collection.
ZOOLOGICAL NOMENCLATURE: NOTICE OF PROPOSED USE OF PLENARY POWERS IN CERTAIN CASES (A. (n.s.) 56)

In accordance with a decision of the 13th International Congress of Zoology, 1948, public notice is hereby given of the possible use by the International Commission on Zoological Nomenclature of its plenary powers in connection with the following cases, full details of which will be found in Bulletin of Zoological Nomenclature, Vol. 19, Part 5 to be published on 10 September 1962.

(5) Validation of rostrata (Aelia) Boheman, 1852 (Insecta, Hemiptera). Z.N.(S.) 1490;

(6) Validation of Tetrastichus Haliday, 1844 (Insecta, Hymenoptera). Z.N.(S.) 1503;

(14) Validation of PHASMIDAE (Insecta, Orthoptera). Z. N. (S) 1167.

Any zoologist who wishes to comment on any of the above cases should do so in writing, and in duplicate, as soon as possible, and in any case before 10 March, 1963. Each comment should bear the reference number of the case in question. Comment received early enough will be published in the Bulletin of Zoological Nomenclature. Those received too late for publication will, if received before 10 March, 1963, be brought to the attention of the Commission at the time of commencement of voting.

All communications on the above subject should be addressed as follows: The Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, LONDON, S. W. 7, England.—W. E. CHINA, Assistant Secretary to the International Commission on Zoological Nomenclature.
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BIOLOGICAL AND TAXONOMIC NOTES ON
TWO CALIFORNIA SPECIES OF PROTEOTERAS
(Lepidoptera: Tortricidae)

JERRY A. POWELL
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The genus *Proteoteras* includes eight described species in North America, six of which are restricted to Canada and the northeastern United States. Only one, the widespread *P. aesculana* Riley, has been listed in California (Heinrich, 1923). The larvae of the several species for which biological information is available are borers and gall-makers in the seeds and twigs of maples, box elder, and horse chestnut (Heinrich, 1923; MacKay, 1959; Peterson, 1958; Schaffner, 1950).

*Proteoteras arizonae* Kearfott


The type locality of this species is Prescott, Arizona, and there were cotypes from Colorado. Heinrich (1923) figured the male genitalia of a specimen from Mesilla, New Mexico, and described a closely related species, *P. obnigrana*, from New Hampshire which is distinguished by wing color and minor genitalic differences, primarily in the shape of the valvae. Recently collected California specimens of this complex have the genitalia form of *obnigrana* but otherwise match the description and worn lectotype male of *arizonae* in the American Museum of Natural History. The olivaceous tinge of the forewing, characteristic of *obnigrana*, is not represented in any western specimens I have seen. A series in the U.S. National Museum from Eureka, Utah compares well with the type of *arizonae* and has genitalic characters (slide No. 8, C.H., 18 Oct., '24) of California specimens. It seems apparent that Heinrich's figure (fig. 300) does not represent *P. arizonae* well; and if, as Heinrich stated, "the differences (between fig. 300 and *P. obnigrana*, fig. 305) are more than could be looked for in one species," the southern New Mexico specimen may represent an undescribed species.

The California specimens of *P. arizonae* are very similar genitalically to *P. obnigrana* but appear to differ by the more well developed "shoulders" of the tegumen and by having larger lateral
spines of the valva. The number of these spines may vary from three to five on the same specimen, or one or more may be greatly reduced, but the size of the well developed three may be diagnostic.


*Biology.*—Specimens collected as larvae in San Mateo County during June 1959 were reared from *Acer negundo californicum*. Host plants have not been recorded in other areas. The larval tunnel into the terminal twigs but apparently do not cause any gall-like swelling as does *P. willingana* (Kearfott) on boxelder (Peterson, 1958). Feeding begins at what appears to be the base of the current season’s growth, ultimately causing all the twig and leaves beyond this point to die. Working downward, larvae burrow out all contents of the hard, green stems; fully developed larval chambers measured 25 to 35 mm. in length and usually tapered somewhat downward. Apparently most of the frass is ejected from the shelter, as only a few particles were found at the lower end of mature tunnels. A small amount also adheres to webbing which closes the entrance area and is visible from the exterior.

Pupation probably normally takes place within the shelter, since two pupae were found *in situ*, one of which had pupated prior to having been collected. However, in the laboratory two individuals left the stems and pupated between folds of the paper at the bottom of the container; and the larva of *P. willingana* leaves the feeding chamber and drops to the leaf duff to pupate according to Peterson (1958). Prior to pupation *P. arizonae* spins several fine silken partitions at varying intervals along the length of the burrow. The cocoon consists of a fine silk structure or lining of the apical area of the chamber, the pupal head being adjacent to the exit spot.

The flight records suggest two generations during a season in the San Francisco Bay area.

About one-half the larvae from the Redwood City rearing lot (JAP-59F2) were parasitized by the Ichneumonid, *Apistephialtes nucicola* (Cushman)¹. A male and four females were reared, emerging July 7 to 13. Townes and Townes (1960) record this

¹Determined by G. S. Walley, Entomology Research Institute, Ottawa.
species as a parasite of various larvae in galls and nuts. The *A. nucicola* larvae matured when the host larvae had reached the penultimate instar, judging from the remains of the host caterpillars. Pupation of the Ichneumonid occurred in the twig, either head-downward or head-upward.

The larva of *P. arizonae*, which has not previously been described, is most similar to that of *P. willingana* (Kft.) among the known species (MacKay, 1959). This relationship does not concur with that shown in the adults by the male sex scaling of the hindwing. The larva of *P. arizonae* may be characterized as follows (based on two specimens):

**Ultimate instar.**—Length about 14 mm. (distended in KAAD preservative). Essentially as described for *P. aesculana* Riley by MacKay, differing as follows. Head measurements variable, length: width of the two specimens, 1.01:1.28 mm. and 0.97:1.10 mm. Head dark yellow-brown, darker at posterior margin, ocellar and postgenal areas black. Ocellus V apparently slightly larger than III and IV. Spinneret rather stout, length about 4 to 4.5 times width. Thoracic shield pale yellow-brown, restricted posterolaterally, (as in *P. willingana*). Setal pinacula large and somewhat raised, but unpigmented, not differentiated from body color. Spinulation of integument minute, colorless, scarcely discernable at 54x magnification. Setal characters: *L*<sub>1</sub> on prothorax closer to *L*<sub>2</sub> than to *L*<sub>3</sub>, located on a straight line between *L*<sub>2</sub> and *L*<sub>3</sub> or distinctly below it. *D*<sub>1</sub> on meso- and metathorax slightly posterodorsal to *D*<sub>2</sub>. SV group on abdominal segments 1, 2, 7, 8, and 9, 3:3:2:2:1, 3:2:2:2:1, or 2:3:2:2:1. Setae *V*<sub>1</sub> on segment 9 only slightly farther apart than those on segment 8. Crochets primarily biordinal, about 38 abdominal, 23 to 27 anal. Anal fork absent.

The larva of *Proteoteras arizonae* thus may be differentiated from the other members of the genus described by MacKay (1959) as follows:

1. Anal fork present .................................................................2
   Anal fork absent ...............................................................3

2. Setae *D*<sub>1</sub> of anal shield much shorter than setae SD<sub>1</sub>; anal fork well developed, usually 3 to 5 teeth..............*aesculana* Riley
   Setae *D*<sub>1</sub> of anal shield as long as setae SD<sub>1</sub> or variable in length: anal fork minute .........................two unidentified species on *Acer platanoides*

3. Setal pinacula brownish, large and distinct, especially on thorax ..................................................*willingana* (Kearfott)
   Setal pinacula not differing from body color.............*arizonae* Kearfott
Proteoteras aesculana Riley


This widespread species was recorded from California by Heinrich (1923) without detailed data. It is commonly collected in the San Francisco Bay area, and the records suggest a multivoltine life cycle. The rearing record given below involves silver maple, an introduced ornamental plant. A specimen in the U.S. National Museum from Corvallis, Oregon was reared from Acer negundo; and this host, as well as Aesculus californicum may be expected to be native foodplants in California.

California material examined.—Sonoma Co.: Santa Rosa, 1♂ V-12-36 (E. C. Johnston); Petaluma, 1♀ VI-26-37, 1♀ VIII-1-38 (E. C. Johnston). Napa Co.: Napa, 1♀ “Apr. 20” (Guedet). Contra Costa Co.: Richmond, 1♀ VI-15-59, 1♀ X-6-59 (C. D. MacNeill); El Cerrito, 1♀ IV-4-60, 2♀ VII-7, 19-60 (C. D. MacNeill), IX-27-60 (T. R. Haig); Walnut Creek, 1♀ VI-20-62 (J. Powell). Alameda Co.: Berkeley, 4♀, 1♀ III-10 to 17-59 (G. I. Stage), 1♀ III-9-59, 1♀ IV-1-59, 1♀ IX-25-59, 3♂, 2♀ III-4 to IV-7-60, 1♀ VII-20-60, 1♀ II-26-61, 1♂, 2♀ IV-3, 4-61, at light (J. Powell). San Mateo Co.: Belmont, 1♀ VI-30-59, r.f. Acer dasycarpum [≡ saccharinum] emgd. VII-27-59 (JAP-59F1) (A. E. Pritchard).

Biology.—Larvae collected at Belmont displayed a similar feeding behavior to that described for P. arizonae. However, the tunnels ranged up to 40-46 mm. in length. Pupation may normally occur outside the shelter, since a number of abandoned twig chambers were collected from the trees; and the one individual which was reared pupated on the bottom of the container.

A collection of young larvae (apparently 3rd and penultimate instars) was taken in mid July 1959 on Acer negundo californicum near Castro Valley, Alameda County, by A. E. Pritchard. These are presumed to be P. aesculana, although the smaller larvae lack the differentiated pinacula and the anal fork. In at least one case a small larva was found feeding in a tunnel obviously made by a mature larva. Such abandoned shelters, often with new plant tissue growing into the chambers, were common at the site; none contained pupal shells. The collection lends evidence to support the assumptions that more than one generation occur each season and that boxelder is a native host in California.

Two mature larvae taken in the Belmont lot (59F1) compare very well in structural details with the description of P. aesculana given by MacKay (1959). The head of the California examples is darker, being brown with darker, mottled areas laterally, and an
extensive black postgenal region. The thoracic shield is correspondingly darker, especially on one specimen; and it is considerably darker than the anal shield. Head measurements of the two individuals, length: width, were 0.90: 1.03 mm. and 0.94: 1.15 mm. Abdominal crotchets varied from 38-42.

Acknowledgement is made to the following, whose cooperation enabled study of the specimens in their care: J. F. Gates Clarke, U.S. National Museum; T. N. Freeman, Canadian National Collection; C. D. MacNeill, California Academy of Sciences; and F. H. Rindge, American Museum of Natural History.

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OBSERVATIONS ON THE VOLUNTARY DISPLAY OF COREMATA IN ESTIGMENE ACREA
(Lepidoptera: Arctiidae)

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The existence of coremata or "brush-organs" on the abdominal venter of many adults of Arctiidae and related families has repeatedly been demonstrated (Muller, 1874; Bethune-Baker, 1925; Chretien, 1926; Eltringham, 1934, 1935; Lane, 1957). Such organs have been noted in Estigmene acrea (Drury) (Morrison, 1874; Stretch, 1883; Weed, 1883; Berlese, 1909:541). The above records report results of hand manipulation of living captives or of artificial inflation of dissected organs of dead specimens; how-
ever, two of these (Morrison, 1874; Stretch, 1883) briefly mention chance observations of extrusion of coremata without artificial stimulation. I am aware of only one paper (Pagden, 1957) dealing in detail with the voluntary display of these organs. That report provides excellent photographs and discussion of this rarely observed phenomenon, in the arctiid Creatonotus gangis (L.) in Malaya.

During the spring of 1959 E. acrea appeared quite commonly at an outdoor light in Richmond, California. This incandescent light was located upon a white stucco wall exposed to the north. During the day of 28 April the temperature rose to 69 degrees F. but dropped about 10 degrees after dark owing to a brisk breeze. By 11:30 P.M. (P.D.T.) relatively few insects had responded to the light, including only one male individual of E. acrea. This moth was at rest upon the wall, oriented roughly toward, and 3 feet below, the light. The wings were slightly elevated and somewhat spread. The coremata were extended approximately 13 or 14 mm. and consisted of a pair of tapered, simple, yellow processes, slightly divergent and gently curved dorsally. Upon the surface of each process was a loose vestiture of long dark hair which became gathered into the form of a brush upon withdrawal of the coremata.

After the moth was first seen the coremata were held everted for about sixty seconds and then withdrawn so that only the aggregated hairs protruded from the abdomen. Within ten seconds the processes were fully re-everted for another period of approximately one minute. This procedure was repeated a total of three times. Thereafter the rhythm of the display remained as before but the organs were extended about one-half, then about one-fourth the distance of the preceding extensions. I then gently tapped the wall about six inches from the moth. The organs were immediately fully extended but for only ten seconds. Thereafter followed partial eversions of shorter duration.

During the process of eversion the abdomen was distinctly telescoped and appeared to bulge rhythmically with a peristaltic motion. When the coremata were withdrawn between periods of extension, the aggregated hairs were clearly visible in dorsal view as paired black, brush-like, structures slightly diverging and protruding about three or four mm. caudad of the abdomen.
The display was terminated when, during a period when the coremata were only slightly visible in dorsal aspect, I lightly touched the tip of an antenna of the moth. The coremata were rather quickly withdrawn, the "brushes" disappearing more slowly. The peristaltic movement of the abdomen became vigorous and continued until the brushes were no longer visible except in caudal aspect. Then the abdomen was lengthened and the wings were closed down over the body in the normal resting position.

During the entire period no other individuals of this species were seen. One hour later a female arrived but no response to or from the male, which had not moved, was detected.

The above observations differ in two particulars from those reported by Pagden for C. gangis. The coremata of E. aerea are comprised of a pair of simple processes roughly one-half the relative length of the doubly paired processes of C. gangis at full extension. The display of C. gangis was estimated to have lasted for at least half an hour and consisted of continuous extension of the coremata, while that reported here was rhythmic. Both of these features were mentioned by Morrison. The texture and general appearance of the extended coremata of E. aerea is much like that so clearly shown in the photographs by Pagden.

The questions concerning the meaning of this phenomenon remain, to my knowledge, unanswered. The more obvious possibilities suggested are that the display is of either a repugnant or a sexual nature, both of which are discussed by Pagden and others. On the basis of the observation reported here I can only add my support to the several objections Pagden raised concerning these two alternatives. However, other evidence presented in most previous reports on the subject (including that of Pagden) seems to me to suggest strongly that a sexual display is involved. Pagden's discussion points out that we do not understand the mechanism.

Since coremata in Arctiidae are evidently male structures their function must reflect some aspect of the male role of the organism. The most obvious, and indeed primary, male role is concerned with mating. Courtship, an integral and often highly complex aspect of this role, is frequently dependent upon a vast array of environmental factors, the limiting action of which is little understood at present. It can be emphasized that the rarely
observed voluntary display of coremata has involved only very common species, although such structures are known for many, if not most, moths of this group. This suggests that, if coremata are useful at present and are displayed by most individuals so endowed, the process occurs under relatively rigid environmental circumstances.

The few "natural" displays recorded were usually observed under semi-natural conditions at best, which is ordinarily the only way we can observe nocturnal insects. Copulating pairs of nocturnal insects are often observed, but, although I have not attempted to research this, I suspect that the details of courtship of nocturnal insects are rarely observed phenomena. I find no present evidence to indicate that the display of coremata is not of a sexual nature.

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SPECIES OF THE GENUS BATRISODES
FROM THE PACIFIC SLOPE OF
WESTERN NORTH AMERICA
(Coleoptera: Pselaphidae)

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All of the species of Batrisodes known from the Pacific Slope of North America, although a heterogenous group, can be placed in the subgenus Empinodes (Park, 1953). The distinguishing features of this subgenus (after Park) are as follows: (1) face not excavate between antennal cavities, (2) vertexal foveae nude, (3) vertex not granulate-punctate, (4) antennal segment X not ventrally foveate, (5) elytron trifoveate, (6) mesofemora of male not spined, (7) mesotarsus of male simple, (8) metathoracic tibia bearing apically a bundle of long setae, (9) the aedeagus bearing right and left internal spines which appear to be attached to the internal sac and, hence, more or less capable of being exserted. In reference to (6) above, the mesofemur is actually spined to some extent in all of the species. Two species groups can be separated on the basis of this spine. In some species it is a large spine midway on the femur and in others it is a smaller spine more approximate to the trochanter. The more northern species belong to the latter group and the spine is represented by a tubercle.

Many of the species have been collected in association with ants. This association is apparently not obligate and frequently may be nothing more than chance co-existence. Most of the specimens have been recovered from rotting wood or from under stones. Although some species are winged, none of the specimens were taken at lights.

Specimens from the type locality or close to the type locality were selected and compared with the types of the species of Casey and Brendel. Preparations of the aedeagi were then made from these selected specimens and, although the types were not dissected, conspecificity of the specimens is highly probable except for B. monticola, B. tulareanus and B. speculum. Specimens of B. monticola were not available; specimens comparable to B. tulareanus were not from the type locality; and the B. speculum type is a female.

Measurements of head length were made from clypeus to neck.
of antennal segments as indicated by line "a" fig. 3, and of certain aedeagi as indicated in figs. 21, 22. All other measurements are given as maxima.

Special thanks are extended to Drs. J. F. Gates Clarke, O. L. Cartwright, J. A. G. Rehn and E. S. Ross whose cooperation made possible examination of type material. The majority of the specimens studied were from the collections of the California Academy of Sciences and the University of California, Davis. The holotypes of new species are deposited in the California Academy of Sciences.

**Key to the Species of the Genus Batrisodes**

1. Terminal antennal segment with blunt tooth at inner proximal margin (fig. 2); mesofemur spined; last sternite usually excavate .................................................. males 2
   - Terminal antennal segment lacking tooth; mesofemur not spined; last sternite usually without, or with only a small excavation .................................................. females 3

2. (1) Mesofemur with spine near middle (fig. 10); head with or without lateral carinae (fig. 1) ............................................................ 3
   - Mesofemur with spine within proximal one-third (fig. 9); head without lateral carinae ............................................................ 8

3. (2) Antennal segments II and III subequal in length (fig. 3) .......... 7
   - Antennal segment III one-half to three-fourths length of segment II (figs. 4-5) ............................................................ 4

4. (3) Last sternite shallowly impressed; median lobe of aedeagus equal to or shorter than basal lobe .................................................. 5
   - Last sternite with deep circular depression occupying most of segment; median lobe of aedeagus longer than basal lobe (fig. 11) .................................. *indistinctus* Grigarick & Schuster

5. (4) Lateral carinae absent; Sierra Nevada Mountains .................. 6
   - Lateral carinae of head present; Coast Range ............................................................ *martini* Grigarick & Schuster

6. (5) Width of antennal segment II subequal to length of segment III, (fig. 5); median lobe of aedeagus relatively straight (fig. 13) .................................. *nebulosus* Grigarick & Schuster
   - Width of antennal segment II greater than length of segment III (fig. 4) median lobe of aedeagus rounded-transverse (fig. 14) .................................. *obscurus* Grigarick & Schuster

7. (3) Pygidium with a tubercle as long as wide, appearing truncate in lateral view (fig. 23) .................................................. *denticauda* Casey
   - Pygidium with a tubercle obviously wider than long, appearing rounded in lateral view (fig. 25) ............... *cicatricosus* Brendel

8. (2) Apex of median lobe simple, at most slightly rotated (figs. 16-18) ............................................................ 9
   - Apex of median lobe with laterally directed process and large thin flange (figs. 19-22) ............................................................ 10

1 Females can generally be identified by comparison with males in respect to characters other than secondary sexual characters.
Aedeagus with left internal tooth very broad (fig. 16) \textit{albionicus} (Aubé)

Aedeagus with left internal tooth relatively slender (fig. 17) \textit{mendocino} Casey

Median lobe of aedeagus oriented to left (fig. 19) \textit{opacus} Grigarick & Schuster

Median lobe of aedeagus oriented to right (figs. 20-22)

Left anterolateral angle of base of aedeagus obsolete, partly fused with median lobe (fig. 20) \textit{tulareanus} Casey

Left anterolateral angle of base of median lobe well developed (figs. 21-22)

Right internal tooth of aedeagus wider than left

Left internal tooth of aedeagus wider than right (fig. 21)

Left internal tooth longer than right \textit{speculum} Casey

Left internal tooth shorter than right (fig. 22) \textit{lustrans} Casey

Batrisodes indistinctus Grigarick and Schuster, new species

(Fig. 11)

\textbf{Male.}—Reddish-brown. Head 430\(\mu\) long x 363\(\mu\) wide. Vertexal foveae 150\(\mu\) apart; ambient sulcus shallow, ending at vertexal foveae; lateral margins not carinate; face simple. Eyes nearly round, of about 25 facets. Median carina of ventral surface interrupted by a small fovea. Antenna 1.1 mm. long; lengths/widths of segments in microns: I, 130/90; II, 120/76; III through VIII, approximately 68/55; IX, 75/75; X, 75/85; XI, 250/112. Pronotum approximately 445\(\mu\) long x 415\(\mu\) wide, medianly sulcate. Elytra 615\(\mu\) long; discal setae somewhat sparse, about 81\(\mu\) long; discal striae less than one-half elytra length. Alate or brachypterous. Mesofemur 510\(\mu\) long with spine 300\(\mu\) from base; mesotibia 420\(\mu\) long, with large terminal spine, subterminal spine very small, obscured by setae. Metasternum broadly and deeply impressed, not extending between metacoxae. Abdomen 725\(\mu\) long; tergite I 625\(\mu\) wide, with parallel carinae 110\(\mu\) long, separated by 220\(\mu\). Pygidium evenly convex. Last sternite with deep circular depression occupying entire length of segment, no median posterior extension on anterior margin. Aedeagus 568\(\mu\) long x 218\(\mu\) wide.

\textbf{Female.}—Resembles male except eyes smaller, of about 15 facets. Pygidium tapered posteriorly to a blunt apex. Last sternite without deep circular depression.

\textit{Holotype male}, 14\(\delta\) and 13\(\varphi\) \textit{paratypes.} \textit{SEVEN MILES NORTH OF LAKEHEAD, SHASTA COUNTY, CALIFORNIA, IV-23-54, under stones, R. O. Schuster.}

This species is related to \textit{B. martini}, and \textit{B. nebulosus} but differs in having a deep circular depression in the last sternite.

Batrisodes martini Grigarick and Schuster, new species

(Figs. 6, 10, 12)

\textbf{Male.}—Reddish-brown. Head 408\(\mu\) long x 390\(\mu\) wide. Vertexal foveae 163\(\mu\) apart; ambient sulcus shallow, extending to back of head; lateral carinae
weakly developed; face simple. Eyes nearly round, with approximately 30 facets. Antennae lengths/widths of segments in microns: I, 127/82; II, 91/64; III through VIII, 68/54; IX, approximately 68/73; X, approximately 68/77; XI, 204/114. Pronotum 454μ long x 410μ wide, lacking median sulcus. Elytra 530μ long; discal setae sparse, about 60μ long; discal striae nearly obsolete, nearly one-third elytra length. Brachypterous, wings 450μ long. Mesofemur 530μ long with spine 225μ from base; mesotibia 455μ long, terminal and subterminal spines obsolete. Metasternum broadly and deeply impressed, not extending between metacoxae. Abdomen 725μ long; tergite I 635μ wide, with parallel flattened carinae very short, separated by 160μ. Pygidium weakly convex. Last sternite lacking conspicuous depression, with uniformly wide, polished anterior margin. Aedeagus 422μ long x 200μ wide.

**Holotype male,** three male and two female paratypes, CYPRUS RIDGE (PRESUMABLY NEAR WOODACRE) MARIN COUNTY, CALIFORNIA, between April 11 and April 17, 1920, J. O. Martin. Additional specimens, not included in the type series, were collected as follows: Hills back of Oakland, 1♀, III-19-22, E. C. Van Dyke; Marin County, 1♂, II-28-20, J. O. Martin; San Francisco, 1♀, November, F. E. Blaisdell.

This species differs from B. indistinctus by the absence of a depression in the last sternite and from B. nebulosus and B. indistinctus by the presence of lateral carinae of the head.

**Batrisodes nebulosus** Grigarick and Schuster, new species

(Figs. 5, 13)

**Male.**—Reddish-brown. Head 413μ long x 363μ wide. Vertexal foveae 150μ apart, separated by a small longitudinal depression; ambient sulcus extends beyond vertexal foveae; lateral carinae lacking; face with one small puncture on each side of center. Eyes slightly reniform, of about 45 facets. Ventral surface of head with uninterrupted median carina. Antenna approximately 1.1 mm long; lengths/widths of segments in microns: I, 136/82; II, 118/59; III through VIII, about 59/50; IX, 75/75; X, 75/85; XI, 222/135. Pronotum 422μ long x 409μ wide, with very weak median sulcus. Elytra 531μ long; discal setae 77μ long; discal striae about one-half elytra length. Brachypterous. Mesofemur 490μ long with spine 272μ from base; mesotibia 409μ long with terminal spine long and thin.

**Explanation of Figures**

Fig. 1, head, dorsal view; fig. 2, antennal club of male; figs. 3-5, first three antennal segments, "a" indicates measured length; fig. 6, pronotum; fig. 7, apical and subapical mesotibial spines; fig. 8, depression of last sternite and small anterior margin; fig. 9, mesofemoral spine approximate to trochanter; fig. 10, mesofemoral spine remote from trochanter; figs. 11-22, Aedeagi; figs. 23-26, terminal segments of abdomen (figs. 23 and 25, lateral view; figs. 24 and 26 ventral view).
October, 1962  Grigarick & Schuster—Batrisodes

1. denticauda

- Clypeus
- Antennal segment 1
- Ambient sulcus
- Eye
- Vertexal fovea
- Lateral carina
- Tempora

2. mendocino

3. denticauda

4. obscurus

5. nebulosus

6. martini

7. mendocino

8. zephrinus

9. mendocino

10. martini
11 indistinctus 12 martini 13 nebulosus
14 obscurus 15 cicatricosus 16 albionicus
17 mendocino 18 mendocino 19 opacus
subterminal spine not visible. Metasternum broadly and shallowly impressed, the impression extending between metacoxae. Pygidium with conical tumosity, basal margin slightly raised and polished. Sternite V with slight median impression. Last sternite very shallowly impressed. Aedeagus 500μ long x 209μ wide.

**Female.**—Similar to male except eyes of about 20 facets. Pygidium evenly convex. Last sternite with shallow transverse basal impression.

**Holotype male** and two paratype females, **FOUR MILES WEST OF NEWCASTLE, PLACER COUNTY, CALIFORNIA, 1-3-59**, from litter of *Quercus wislizenii*, F. C. Raney and R. O. Schuster.

*B. nebulosus* can be separated from *B. indistinctus* by the differences previously mentioned and by the shorter median lobe of the aedeagus.

**Batrisodes obscurus** Grigarick and Schuster, new species

(Figs. 4, 14)

**Male.**—Reddish-brown. Head 410μ long x 370μ wide. Vertexal foveae separation 160μ; lateral carinae absent. Median carina of ventral surface of head uninterrupted. Antenna 0.98 mm long; lengths/widths of segments in microns: I, 140/77; II, 100/72; III through VIII, 64/55; IX, 75/75; X, 75/90; XI, 190/105. Pronotum 407μ long x 407μ wide, medianly sulcate. Elytra 538μ long; discal setae 60 to 75μ long. Brachypterous, wings less than 470μ. Mesofemur 505μ long with spine 387μ from base; mesotibia 453μ long with blunt terminal spine, subterminal spine 195μ from apex. Abdomen approximately 775μ long; tergite I 590μ wide with parallel carinae separated by 145μ. Last sternite without deep impression. Aedeagus 436μ long x 239μ wide.

**Female.**—Unknown.


**Batrisodes obscurus** tends toward *B. denticauda* and *B. cicatricosus* in genitalic structures but it differs from them by having antennal segment II longer than III, as in *B. nebulosus*.

**Batrisodes denticauda** Casey, 1893

(Figs. 1, 3, 23, 24)

**Male.**—Reddish-brown. Head 485μ long x 455μ wide. Vertexal foveae 163μ apart; ambient sulcus deep, extending past vertexal foveae beside lateral carinae; face simple. Eyes reniform, of about 45 facets. Median carina of ventral surface of head entire. Antenna approximately 1.0 mm long; lengths/widths of segments in microns: I, 186/100; II, 82/64; III through VII, 77/64; VIII, 68/64; IX, 73/82; X, 73/104; XI, 215/120. Pronotum 477μ long x 490μ wide, median sulcus very deep and long. Elytra 680μ long; discal setae sparse, about 95μ long; discal striae slightly over one-third elytra length. Wings approximately 2.36 mm long. Mesofemur 650μ
long with spine 331 µ from base; mesotibia 499 µ long, with large terminal and subterminal spines. Metasternum with median sulcus not extending between metacoxae. Abdomen 795 µ long; tergite I 790 µ wide, with parallel carinae about 60 µ long, separated by 159 µ. Pygidium with prominent tubercle as long as wide, truncate in lateral view. Last sternite with a deep circular depression nearly as long as segment, about two-fifths width of segment, anterior margin medianly narrowed. Aedeagus 395 µ long x 295 µ wide.

**Female.**—Resembles male with respect to eyes, pygidium and wings. Last sternite with a small circular basal depression.

**Distribution:** California. Madera County: Sugar Pine, (21 specimens on "European style" points nearly impossible to determine sex), Dr. A. Fenyes. Mariposa County: Wawona, 3 ♂, 4 ♀, VII-17-46, H. P. Chandler; Miami, 2 ♂, 1 ♀, May, A. Fenyes Collection. Shasta County: no further locality 1 ♂, Van Dyke Collection; Castle Crag, 2 ♂, VII-28-1898, A. Fenyes. Siskiyou County: no further locality, 2 specimens, August, Koebele Collection; McCloud, 2 ♂, VI-4-27, A. Fenyes. Oregon. No locality, 1 ♂, July, Blaisdell Collection.

This species is readily distinguished from all others by the shape of its pygidium. The aedeagus is similar to that of *B. cicatricosus*.

**Batrisodes cicatricosus** Brendel

(Figs. 15, 25, 26)

*Batrisodes cicatricosus* Brendel, 1890.

*Batrisodes pygidalis* Casey, 1893, new synonymy.

**Male.**—Reddish-brown. Head 445 µ long x 420 µ wide. Vertexal foveae 150 µ apart; ambient sulcus very shallow, ending at vertexal foveae. Lateral carinae extend posteriorly from antennal tubercles; face simple. Eyes reniform, of about 55 facets. Median carina on venter of head uninterrupted. Antenna about 1.1 mm long; lengths/widths of segments in microns: I, 168/87; II, 92/67; III through VIII, approximately 77/67; IX, 75/75; X, 75/90; XI, 205/120. Pronotum 443 µ long x 443 µ wide, medianly sulcate. Elytra 636 µ long; discal setae 75 µ long; discal striae weak, about one-third elytra length. Wings about 2.3 mm long. Mesofemur 575 µ long with spine 285 µ from base; mesotibia 480 µ long with large acute terminal spine, subterminal spine 200 µ from apex. Metasternum broadly and medianly sulcate, terminating before reaching metacoxae. Abdomen 870 µ long x 640 µ wide; tergite I with parallel carinae 75 µ long, separated by 125 µ. Pygidium broadly tumid with a transverse, polished, impunctate sulcus along basal margin. Last sternite with deep, nearly circular depression occupying anteromedian one-third of segment; anterior edge uniformly margined. Aedeagus 383 µ long x 280 µ wide.

**Female.**—Resembles the male with respect to eyes, pygidium with basal sulcus and transverse tumosity. Last sternite with a small circular basal depression.

**Distribution:** California. Alpine County: 3 ♂, VII-14-1907, F. E. Blaisdell.

The Brendel type of *B. cicatricosus* is a male. It is in the Academy of Natural Sciences of Philadelphia and bears, besides the name, the following information: Placer Co., California, September, Brend. Horn Coll. H9417. There is no significant external difference between the types of *B. cicatricosus* Brendel and *B. pygidialis* Casey, nor is there any reason to suspect any difference to be present between the aedeagi.

**Batrisodes albionicus** (Aubé), 1833

(Fig. 16)

*Male.*—Reddish-brown. Head 515μ long x 440μ wide. Vertexal foveae separated by 180μ; lateral carinae lacking; face simple. Eyes reniform, of about 65 facets. Median carina of venter of head entire. Antennal lengths/widths of segments in microns: I, 173/109; II, 91/75; III, 95/73; IV through VIII subequal with VIII slightly shorter; IX, 91/100; X, 91/123; XI, 263/150. Pronotum 544μ long, median sulcus shallow and confined to basal half. Elytra 770μ long; discal setae 68μ long. Wings 2.7 mm long. Mesofemur 675μ long with small spine 137μ from base; mesotibia 590μ, subapical spine two-thirds as large as distal spine. Metasternum medianly impressed. Abdomen 960μ long x 900μ wide. Tergite I with short parallel carinae, separated by 185μ. Pygidium evenly convex, slightly wider than long. Last sternite with large median depression, not margined anteriorly. Aedeagus 627μ long x 350μ wide.

*Female.*—Resembles the male except eyes smaller, of 35 facets. Pygidium longitudinally tumid, in lateral view convex. Last sternite without depression.

*Distribution:* California. Del Norte County: 15 miles northeast Crescent City, 2 ♂, 1 ♀, III-13-58, redwood duff, J. Schuh. Oregon. Benton County: 8 miles north Corvallis, 1 ♀, XII-28-50, V. D. Roth; Scotts Hill, 1 mile southwest Corvallis, 1 ♀, X-31-50, ground litter, J. D. Lattin; Clackamas County: Metzler Park, 5 miles southwest Springwater, 1 ♂, VI-3-59, douglas fir litter, G. W. Krantz; Colton, 1 ♀, May 1953, E. S. Ross. Coos County: Near Bridge, 1 ♂, 3 ♀, VII-27-55, V. D. Roth; Near Bridge Camp, 5 ♂, 3 ♀, VII-28-55, V. D. Roth; Cape Arago, State Park, South Charleston, 1 ♀, V-24-57, cut grass along road, H. S. Dybas; Charleston, 2 ♂, 1 ♀, IX-10-47, I. M. Newell, 1 ♀, X-1-59, V. D. Roth; Marshfield (Coos Bay),

*Batrisodes albionicus* is closely related to *B. mendocino* but differs by not having a medianly extended margin of the anterior border of the last sternite and by possessing a smaller mesofemural spine. The pygidium of the female of *B. albionicus* is more truncate in profile than that of *B. mendocino*. One population sample from northern California contained probable intergrades between the two species.

The type of locality of *B. albionicus* is given as "America Septentrionali". This species commonly occurs in British Columbia, Washington and Oregon, and has been collected in California only in the extreme north of Del Norte County.

**Batrisodes mendocino** Casey, 1886

(Figs. 2, 7, 9, 17)

Male.—Reddish-brown. Head 468μ long x 440μ wide. Vertexal foveae 168μ apart; ambient sulcus deep, ending at fovea, lateral margins not carinate; face simple. Eyes reniform, with about 37 facets. Venter with median carina uninterrupted. Antenna 1.05 mm long; lengths/widths of segments in microns: I, 159/82; II and III subequal, 90/77; IV through VIII slightly shorter; IX, 86/105; X, 91/127; XI, 259/141. Pronotum 530μ long x 545μ wide, with deep median sulcus. Elytra 700μ long; discal setae sparse, approximately 85μ long; discal striae shallow, slightly over one-third elytra length. Brachypterous, wings about 1.0 mm. Mesofemur 672μ long with large (45μ long by 25μ wide) cuneiform, spine 168μ from base; mesotibia 568μ long, with a large blunt terminal spine, subterminal spine acute, moderate in length. Metasternum broadly and deeply impressed, not extending between metacoxae. Abdomen 820μ long; tergite I 800μ
wide, with parallel carinae 45μ long separated by 152μ. Pygidium nearly as long as wide, evenly convex. Last sternite with deep circular depression occupying entire segment length, anterior margin widest medianly. Aedeagus 508μ long x 280μ wide.

**Female.**—Resembles male except smaller eyes of approximately 26 facets. Pygidium of female tapers posteriorly to pointed tuberosity with dorsum in lateral aspect concave. Last sternite without deep depression.


This species is closely related to *B. albionicus*, but the male differs in the last sternite, the mesofemural spine and the left internal tooth of the aedeagus. The pygidium of the female of *B. mendocino* is more tapered than that of *B. albionicus*.

**Batrisodes opacus** Grigarick and Schuster, new species

(Fig. 19)

**Male.**—Reddish-brown. Head 460μ long x 410μ wide, vertexal foveae
150μ apart; ambient sulcus moderately deep, continuing less conspicuously to back of head; lateral margins not carinate; face simple. Eyes reniform, of about 37 facets. Median carina of ventral surface of head uninterrupted. Antennae 1.1 mm long: lengths/widths of segments in microns: I, 150/95; II, 91/68; III through VII, 77/60; VIII, 68/60; IX, 82/91; X, 86/114; XI, 227/127. Pronotum about 490μ long, median sulcus shallow. Elytra 645μ long: discal setae sparse, about 77μ long; discal striae less than one-third elytra length. Winged. Mesofemur 622μ long with spine 163μ from base; mesotibia 530μ long, with a thin spine perpendicular to tibia, subterminal spine small, acute. Metasternum deeply impressed, not extending between metacoxae. Abdomen approximately 900μ long by 750μ wide, with parallel carinae on tergite I extending 50μ, separated by 127μ. Pygidium evenly convex. Last sternite with deep circular depression occupying entire length of segment and three-fifths width, with slight median swelling of anterior margin. Aedeagus 590μ long by 285μ wide.

Female.—Resembles male except eyes smaller and rounder, of about 20 facets. Pygidium convergent to a broadly rounded apex. Last sternite without deep circular depression.

Holotype male, April 26, 1959, and 3♂ paratypes April 18, 1954, June 1, 1957, and April 26, 1959, were collected 6 MILES SOUTHEAST HALF MOON BAY, SAN MATEO COUNTY, CALIF., by R. O. Schuster. Other specimens considered conspecific but not included in the type series are as follows: Marin County: Inverness, XI-1-53, 1♀; E. E. Gilbert, V. D. Roth, R. O. Schuster; Muir Woods, 1♂, IV-23-11, E. C. Van Dyke; 4.5 miles south Woodacre, 1♀, XI-1-53, G. A. Marsh, R. O. Schuster. Santa Clara County: Mt. Madonna, 2♀, 1-2-54, D. Burdick. Santa Cruz County: Big Basin, 1♂, XII-23-53, V. D. Roth; Santa Cruz, 1♀, Van Dyke collection; Santa Cruz Mts., 42♂, 12♀, Koebele collection. San Mateo County: Kings Mtn., 1♂, XI-1-58, litter of redwood and laurel, R. O. Schuster.

This species is related to B. lustrans. The orientation of the median lobe of the aedeagus is to the left in this species and to the right in B. lustrans.

Batrisodes zephyrinus Casey, 1886
(Fig. 21)

Male.—Reddish-brown. Head 500μ x 442μ wide. Ambient sulcus ending in vertexal fovea; without lateral carinae; face simple. Eyes of about 40 facets. Median carina of ventral surface of head entire. Antennal segments lengths/widths in microns: I, 122/77; II, 91/73; III, 91/73; IV through VIII subequal with VIII slightly shorter; IX, 88/91; X, 80/123, XI, 245/127. Pronotum 550μ long x 535μ wide, medianly sulcate. Elytra 700μ long; discal stria shallow, less than one-half elytral length; discal setae sparse,
75μ long. Brachypterous, 500μ long. Mesofemur 635μ long, with very small spine 170μ from base; mesotibia 550μ long with acute subapical spine at least one-half as large as distal spine. Tergite I with abdominal carinae separated by 177μ. Pygidium four-fifths as long as wide, evenly convex. Depression of last sternite deep, one-half segment width; anterior border of depression with very small median margin. Aedeagus 635μ long x 305μ wide.

**Female.**—Resembles male except eyes smaller, of about 25 facets. Pygidium with a large pointed tubercle. Last sternite lacking depression.

**Distribution:** California. Lassen County: Duck Lake, 2♂, V-8-21, J. O. Martin; Facht, 4♂, 6♀, various dates in May, 1921 and 1922, J. O. Martin.

The male genitalia of *B. zephrinus* is similar to that of *B. lustrans* and *B. speculum* but differs by having the left internal tooth wider than the right and by a larger flare on the median lobe.

**Batrisodes speculum** Casey, 1886

A single male specimen from Alameda County, the type locality, was studied. The specimen had been slide-mounted and was therefore difficult to compare with the type female. If the male is a representative of *B. speculum*, then the species differs from *B. lustrans* only in the character employed to separate them in the key.

**Batrisodes lustrans** Casey, 1908

(Fig. 22)

**Male.**—Reddish-brown. Head 500μ long x 445μ wide. Vertexal foveae separated by 173μ; ambient sulcus deep anteriorly, ending in vertexal foveae; lateral carinae lacking; face simple. Eyes reniform of about 45 facets. Antennal segments lengths/widths in microns: I, 173/91; II, 95/77; III, 91/77; IV through VIII subequal with VIII slightly shorter; IX, 91/104; X, 91/127; XI, 260/145. Pronotum 545μ long x 531μ wide, median sulcus quite shallow. Elytra 760μ long; discl stria very shallow, less than one-third elytra length; discl setae sparse, 90μ long. Wings 1.9 mm. Mesofemur 680μ long, with large spine 170μ from base; mesotibia 570μ long with eumiform subterminal spine over one-half length of distal spine. Tergite I with abdominal carinae separated by 160μ. Pygidium evenly convex, wider than long. Last sternite with wide, deep depression two-thirds width of segment; anterior margin of depression short but wide. Aedeagus 568μ long x 272μ wide.

**Female.**—Eyes smaller, of 25 facets. Pygidium bearing a pointed tubercle, Last sternite lacking depression.

The aedeagus of *Batrisodes lustrans* differs from that of *B. zephrinus* in a shorter straighter median lobe and in a different configuration of the left anterolateral angles of the base (lines a and b, figs. 21, 22). The sizes of the internal teeth are reversed between these species. Specimens of *Batrisodes lustrans* are darker, or nearly black at lower elevations. A suspicion exists that *B. lustrans* may be a synonym of *B. monticola*. Until the types can be dissected, however, there is insufficient evidence to warrant such synonymy.

**Batrisodes monticola** Casey, 1886

The type locality of *B. monticola* is not known with accuracy. The aedeagus of the type is also unknown. The type of *B. monticola* differs from that of *B. lustrans* by darker color, slightly shorter and broader elytra, and in the abdominal carinae being more closely spaced.

While specimens of *B. lustrans*, from Tahoe City, are of a brown color, specimens of the same species from lower elevations in Eldorado and Amador Counties are much darker. Although we suspect that *B. lustrans* in a synonym of *B. monticola*, formalizing the synonymy seems to be unwise until such time as the type specimens are dissected.

**Batrisodes aphengastri** Fall, 1912

We have not seen material of this species. It is considered in the Pselaphid section of *Hatch's Beetles of the Pacific Northwest* by Park and Wagner.

**Batrisodes occidus** Casey, 1886

We have seen only the type male. It is characterized by a broad but shallow depression in the last sternite and by obsolete humeral angles of the elytra.

**Literature Cited**

Aube, Charles


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1908. Remarks on Pselaphidae. Canadian Ent. XL, pp. 207-211.

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BOOK NOTICES

THE CERAMBYCIDAE OF NORTH AMERICA. By E. Gorton Linsley.


Not since the days of Leng's synoptic papers (1884-1890!) have collectors and students had a manual for the identification of our Longhorns, those most popular of Nearctic beetles. The present monographic work gives not only keys, but full synonymies, descriptions, summaries of biological information, excellent distributional maps and many original figures.

Part I stands as a unit, with its own bibliography—and one is constantly amazed at how thoroughly the literature has been searched. Certainly a great many of the references have not been cited in American papers before, and this introductory section is especially valuable in that summaries from the literature on exotics give ideas for research on the bionomics of our own species. The main headings show the broad coverage achieved, but give little idea of the depth of treatment: Biology and Ethology, Structural Adaptations, Geographical Distribution, Fossil Cerambycidae, Historical Background of Classification, and Phylogenetic Relationships of the Higher Categories.

Part II begins the taxonomic treatment. The many new species discovered in the course of the studies have been described in various papers by Linsley, and Linsley and Chemsak, with others to appear as the work progresses. But a number of synonymies, some designations of type species, and at least one new generic name and one new genus, are first proposed in Parts II and III of the monograph.—HUGH B. LEECH, California Academy of Sciences.

THE ANOBIIDAE OF OHIO (Coleoptera). By Richard E. White.


In earlier volumes of the Bulletin J. N. Knall set a standard of finely illustrated papers on the beetles of Ohio, and White's drawings are equally good. The title of his paper is a little misleading in that 20% of the species discussed are only expected to occur in Ohio, but have not been taken yet. Many of the keys and all but two of the descriptions are original; host associations are given where known.—HUGH B. LEECH, California Academy of Sciences, San Francisco.
NEW NORTH AMERICAN TACHINIDAE1
(Diptera)

H. J. Reinhard
College Station, Texas

The new forms characterized below represent noteworthy additions to the tachinid fauna of the western United States and Mexico. I am indebted to the various collectors listed below for the privilege of studying collections of the California Insect Survey and some material from other sources as specified under the descriptions.

Isidotus Reinhard, new genus

Allied to Eutrixa, but larger in build, with normal-sized calypters.

Head wider than high, faciooral profile arcuate, subequal length of frontal, which is prominent at antennae; occiput swollen below middle; clypeus strongly impressed at sides with a sharp median carina becoming wider and rounded below; epistoma gently receding and strongly widened downward from the narrowed vibrissal angles; vibrissae not differentiated; vibrissal axis fully three-fourths antennal, which is a trifle below eye middle; antenna short, first segment prominent but not elongate, second and third subequal in length; arista bare; parafacial sparsely inconspicuously setose on upper half; palpus bowed upward from middle and rather strongly swollen in female; haustellum subequal palpal length; male front greatly constricted before ocelli but broad in female from vertex to antennae and approximating one-third head width; frontal bristles stopping at antennal base; procline ocellars weak; inner vertexals short and barely differentiated; eye bare, reaching level of vibrissal angles. Thoracic chaetotaxy: acrostichal 2, 3; dorsocentral 3, 3; intraalar 2 or 3 (anterior one sometimes absent); supraalar 3; presutural 1 (outer); humeral 3; notopleural 2; sternopleural normally 2 (sometimes 2, 1) pteropleural 1 (smaller than hindmost scutellar); scutellum with 4 lateral pairs of uniform length besides 1 depressed pair of equal size and 1 weaker discal pair; prosternum and propleuron bare; postnotal slope setose. Legs long and moderately slender, weakly bristled. Wing elongate extending well beyond apex of abdomen; first posterior cell open a trifle before extreme wing tip; cubitulus broadly rounded, without fold or appendage; third vein with four or five small hairs near base; hind lobe of calyptr but little longer than wide, front lobe not reaching middle of latter. Abdomen as wide as thorax and about as long as same, five-segmented in male, more tapered apically and six-segmented in female; first segment without median marginals, each following one with a marginal row, discals on second to fourth segments, usually weak and irregularly spaced; sternites and ventral membrane exposed.

Type: Isidotus incanus Reinhard, new species

1 Contribution No. 3733, Department of Entomology, Texas Agricultural Experiment Station.
Isidotus incanus Reinhard, new species

*Male.*—Head gray to subsilvery pollinose on black background; front 0.13 of head width at vertex narrowed to 0.60 of same before ocellar triangle thence widening rapidly downward into facial angle; frontalia striae, wider than parafrontal on anterior half, brownish to black; basal antennal segments pale reddish, third more or less infuscated apically; arista brown, proximal segments small, basal fifth of third segment slightly enlarged thence very slender to tip; parafrontal rather wide, subequal three-fourths clypeal width; palpus yellow, sparsely black-haired; cheek subventral, nearly one-half eye length; occiput thinly clothed with pale hairs intermixed with coarser black ones on outer margin above. *Thorax* and scutellum black (latter sometimes with a reddish tinge in ground color) dusted with quite heavy pale gray pollen, mesonotum marked with five distinct black vittae, outer one widely interrupted at suture and none extending to scutellar base; calypters semi-transparent white. Legs predominantly reddish, claws and pulvilli elongate. *Abdomen* black with a reddish tinge at sides usually obscured by heavy pale gray pollen on entire surface above, latter clothed with fine black hairs which including bristles arise from rounded polished areas; genital segments black, forceps slender and united in the form of a curved beak, accessory process also very slender and fingerlike, about as long as forceps; penis narrow strap-like, shiny black with pale margin, elongated, curved forward from base thence suddenly rearward and recurved shortly before simple tip; black fifth sternite lobes large and widely exposed.

*Female.*—Front at vertex 0.32 and at lunule 0.40 of head width; frontalia nearly four times parafrontal width at mid front level; palpus strongly swollen on apical half and beset with a several black stubby hairs; cheek one-third eye length; claws and pulvilli shorter than last tarsal segment; abdomen arched in profile, anal segment tapered apically; truncate at apex, orifice large and rounded, exerted piercer of genitalia stout, compressed, directed downward and forward at tip, anal cerci showing as a united thin lobe fringed with long brownish hairs.

Length, 7.5 to 9 mm.


Eutrixia laxifrons Reinhard, new species

Differ from the type species, *E. exilis* (Coquillett), in the narrower build, darker habitus, female genitalia, etc.

*Female.*—Front at vertex 0.30 of head width and nearly equibroad to antennae; parafrontal gray pollinose on dark background, beset with short black hairs and three to four weak proclinate orbitals; frontalia broad to vertex, nearly twice parafrontal width; inner verticals short, decussate at tips; small proclinate ocellars; frontal bristles weak, in a single row stopping at antennae; cheek bare; two-thirds eye length, thinly pollinose on pale or
reddish ground color which extends upward to include parafacial except on outer margin; vibrissae weak but distinct; epistoma greatly narrowed but widening downward and extending in oral membrane to subequal length ofclypeus; antenna short, segments one and two reddish, third black and but slightly longer than second; bare arista black, subbulbous near base, thence very slender to tip; palpus yellow, slender, about equal haustellum length; occiput swollen on lower half, gray pollinose on dark ground color, with a sparse vestiture of short black hairs. Thorax and scutellum wholly black, rather uniformly dusted with gray pollen leaving four subshiny dark vittae on mesonotum; acrostichal 2, 3; dorsocentral 2, 3; intraalar 2; supraalar 3; humeral 3; presutural 1 (outer); sternopleural 2; pteropleural 1 (smaller than sternopleural); scutellum with 2 lateral and 1 equally strong apical pair; post notal slope setose, prosternum and propleuron bare. Wing long and rather narrow, subhyaline, slightly tinged with brown costally and along veins; cubitulus broadly arcuate; first posterior cell narrowly open shortly before wing tip; costal spine vestigial; narrow calypters transparent, hind lobe about twice length of anterior. Legs long and slender, brownish to black, weakly bristled. Abdomen black, slender, dusted with gray pollen which is thinner and tinged with brown on apical half of last three segments above, each of latter bearing a row of weak appressed marginal bristles; genitalia terminating in a broadish sclerotized ovipositor, which is thin in profile and in rear view nearly uniform in width with apex suddenly reduced to a sharp delicate tip.

Length, 6-7.5 mm. Male unknown.


Microchaetina teleta Reinhard, new species

At once distinguished from the more common southwestern M. valida Townsend in abdominal chaetotaxy and the paler color pattern.

Male.—Head pollen silvery on reddish background occiput darker and cinerous; front narrowed above middle thence widening upward to 0.20 of head width at vertex; frontalia red, wider than bare parafrontal except at anterior extremity; frontal row extending from near mid front to antennal base or a trifle below; inner vertical erect, ocellars procline; parafacial sparsely micro setose, facialia bare; vibrissae on oral margin, decussate at tips; antenna slightly shorter than face, proximal segments reddish, third infuscated, rather slender and twice length of second; arista short, plumose to near tip; basal segments short; cheek nearly one-third eye length; haustellum slender but well under head height; palpus slender, yellow to brown; eye bare; occiput moderately swollen on lower half. Thorax and scutellum black, with uniformly cinereous pollen, notal vittae indistinct; chaetotaxy as in valida but usually with three sternopleurals (lowermost weak at times). Legs black, trochanters and tibiae reddish, mid tibia with one stoutish anterodorsal bristle; claws and pulvilli elongate. Wing hyaline, veins yellow, last section of
fifth nearly as long as the preceding and third with two to four hairs near base; first posterior cell closed, long petiole reaching costa far before wing tip; costal spine strong; calypters transparent white and rather small, hind lobe longer than wide; prosternum and postnotal slope setose. Abdomen translucent yellow with a more or less distinct black median vitta which expands apically to include posterior half of third and all of anal segment: median marginals on segments one and two, complete marginal row on three and four, one discal pair on intermediate segments and a row of same on last: genital forceps small, keeled on basal half behind tapering to a slender slightly divided apex.

Female.—Much darker and grayer in general aspect than male; vertex 0.33 of head width; abdomen considerably broader and black with venter of at least the two proximal segments paler or yellowish in ground color; genitalia wholly retracted within tip of abdomen.

Length, 6-7 mm.

Holotype male and allotype “1 mi. West Tom’s Place, Mono Co. Calif., VIII-13-57 D. D. Linsdale” in California Academy of Sciences Collection. Paratypes 3 males and 3 females, same data as type and 1 male, S. Cove Fort, Utah, VIII-3-54, G. F. Knowlton and D. W. Davis.

Chromatocera fumator Reinhard, new species

The distinct coloration of the present species, especially with respect to the antennae and abdomen, readily separate it from the type species, Eulasiona setigena Coquillett, hitherto the sole member of the genus.

Female.—Head gray pollinose on dark ground color; frontalia deep velvety brown to black, wider than one parafrontal; latter thinly pollinose and rather coarsely black-haired; two pairs of verticals and procline orbitals; ocellar bristles procline; frontals rather short, three to four bristles beneath antennal base; front 0.32 of head width at vertex and 0.44 of same atantennal base; parafacial setose on entire length and nearly equal clypeal width; proximal antennal segments red, third mostly black and hardly twice length of second; bare, black arista thickened on proximal two-fifths thence very slender to tip, intermediate segment sometimes twice longer than wide but normally shorter; eye sparsely but distinctly haired; cheek one-half to three-fourths eye length; vibrissae near oral margin, facialisia with three or four bristly hairs on lower extremity; proboscis short, labelia large and fleshy; palpus red; occiput cinerous, with a vestiture of mostly short black hairs. Thorax black dusted with gray pollen which shows five narrow but distinct vittae before suture and four less defined behind; scutellum black with apex obscurely reddish. Chaetotaxy as in setigena. Legs black, trochanters normally reddish; claws and pulvilli short. Wing tinged with brown along costa and principal veins; latter brown and bare except third which bears four or five setulae near base; first posterior cell narrowly open to closed at costa shortly before wing tip: cubitulus angular, with or without a short
stump; costal spine vestigial; calypters tawny white. Abdomen entirely black, lightly dusted with gray pollen; intermediate segments with one pair of median discals set for forward: one median marginal pair on second segment, an incomplete marginal row on third and complete discal and marginal row on anal segment; genitalia wholly retracted; sternites covered. Male unknown.

Length, 6.5-7.5 mm.


Plagiomina brevirostris Reinhard, new species

Traces to P. disparta B.B. in Aldrich's key (Trans. Am. Ent. Soc. 52:25) but at once distinguished from this and all other known species by the much shorter haustellum.

Female.—Head gray pollinose; parafacial inconspicuously pale setose; second antennal segment nearly one-half length of third; slender tapered haustellum barely exceeding eye length; first, third and fifth veins setulose; retracted hind cross vein its length from cubitulus, last section of fifth vein a trifle shorter than preceding; claws and pulvilli distinctly shorter than last tarsal segment; abdomen above with cinerous pollen which becomes thinner on hind margin of last three segments; genitalia black and wholly retracted. Male unknown.

Length 7.5-8 mm.


Plectops erisma Reinhard, new species

Habitus quite similar to type species, P. melissipodis Coquillett, but readily distinguished by the slender black palpi and bare first vein of wing.

Male.—Face and cheek subsilvery parafrontal and occiput cinerous on dark background; antenna wholly black, enlarged third segment widened from base to a truncate apex, which is subpointed on apical anterior extremity; arista thickened to tip, segments two and three greatly elongated and equal in length, first about twice longer than wide; vertex 0.40 of head width; frontal in a single row, lower two bristles beneath antennal base; ocellars procline, inner verticals erect; frontalia blackish, wider than parafrontal; bare parafacial nearly pinched out at mid face level; facialia flattened and bare; vibrissae on oral margin; proboscis short; cheek black-haired, barely one-third eye length. Thorax and scutellum black with moderately dense feebly shining cinereous pollen with a slight greenish tint apparent on the nonvitrate mesonotum; four sternopleural bristles but intermediate two weak, one small pteropleural, two presutural and postsutural acrostichal, three post dorso-
centrals; scutellum with two lateral and hairlike apical pair. Wing subhyaline with an apparent yellowish tint on costal margin; first posterior cell open at wing tip; third vein with one good-sized bristle near base; costal spine well developed; calypters whitish, hind lobe tawny; halteres yellow.

Legs black, weakly bristled; fore tarsus slender, with claws and pulvilli subequal one-half length of apical segment. Abdomen shining black, last three segments above with gray pollen bands on basal margin, which widen laterally to near middle of each; one pair of median marginals and laterals on second and third segments, a complete marginal row on last, no discals; genitalia black, convex vertical first segment much larger than second, forceps small and retracted.

**Female.**—Similar to male; vertex 0.40 of head width; third antennal segment much narrower, nearly equibroad from base to tip and about four times longer than second; arista thickened on basal three-fourths; apical segment of fore tarsus moderately swollen and approximating combined length of two preceding segments, claws and pulvilli minute.

Length, 4.5-5.5 mm.


**Ginglymia fracida** Reinhard, new species

A small fly similar to the genotype, *G. acrirostris* Townsend but with wings, legs and abdomen more extensively infuscated.

**Male.**—Head tawny pollinose on paler ground color; inner orbits subparallel from lower extremity to vertex, latter 0.40 of head width; two pairs of verticals and procline orbitalis, ocellars weak, proclinodivergent; frontals short, non-decussate, two bristles beneath antennal base; frontalia brownish marked with a dark median vitta, equibroad and wider than parafrontal; parafacial bare and narrowed on lower three-fourths; facialia scarcely raised above clypeal plane and practically bare; vibrissae situated below oral margin level; antenna blackish, about as long as face, third segment a little widened from base to middle thence narrowed to rounded apex, about two and one-half times longer than second; bare black geniculate arista thickened to pointed tip, second segment about two-fifths length of third; haeckellum and labella slender, subequal head height; palpus yellow, slender to tip, cheek hardly one-sixth eye length; eye bare. Thorax black with gray pollen leaving four rather poorly defined dark notal vittae, scutellum concolorous with thorax bearing two lateral bristles, no discals; prescutellars well developed, no preacrostichals; three post dorsoacentrals and sterno-pleurals. Wing hyaline with a uniform yellow tinge except along narrow hind margin; first vein setulose to tip, third to or a little beyond small cross vein; cubitulus broadly arcuate, without stump or fold; first posterior cell narrowly open at extreme wing tip; costal spine minute; calypters opaque, tawny white. Legs reddish brown to black, weakly bristled; claws and pulvilli
minute. *Abdomen* black with sides and venter of two basal segments reddish yellow, entire upper surface dusted with opaque gray pollen which becomes paler and denser on narrow basal margin of last three segments; latter marked with a dark median vitta; one pair of median marginals on segments two and three (latter with two or three laterals) and a complete marginal row on anal segment; genital segments black, caudoventral; forceps short, apical half beaklike, polished black.

**Female.**—Similar to male except vertex measures 0.44 of head width; antenna smaller with third segment nearly equibroad from base to apex; legs darker, abdomen more broadly ovate, etc.

Length, 4.5-5 mm.

**Holotype male and allotype** Colima, Mexico, March 27, 1934, without collector's label.

**Ginglymia devia** Reinhard, new species

**Male.**—Differs from the preceding species chiefly as follows: Front wider, at vertex 0.46 of head width; antenna wholly black, third segment three times length of second; parafacial setose to arista level and subequal width of third antennal segment but narrowed downward; cheek wider, about one-fourth eye length; palpus black; proboscis including labella quite slender and approximating one and one-fourth times head height; clypeus thinly gray pollinose on black ground color; abdomen yellow with a black median vitta which expands to include hind margin of third segment and most of anal, bristling very weak and largely appressed; proximal segments without differentiated median marginals and a weak marginal row on third but with a stronger marginal row on following segment, which is black on venter and contrasts sharply with pale ground color of preceding segments. Female unknown.

Length, 5.5 mm.

**Holotype male,** Ocosingo, Chiapas, Mexico, March 9, 1953 (R. C. Bechtel, E. I. Schlinger) in the California Academy of Sciences Collection.

**Paraphasmophaga dissita** Reinhard, new species

A small shining black fly quite similar to type, *P. clavis* Tns., but with wholly red antennae and wings distinctly infuscated on costal half.

**Female.**—Front at vertex 0.40 of head width, widening evenly forward into facial angle; red frontalia strongly divergent upwards and nearly pinching out parafrontal on upper extremity; frontals in a single row with two or three bristles below antennal base; ocellars proclinate; two pairs of proclinate orbitals and vertical bristles; bare parafacial well narrowed below, gray pollinose on dark background, cseck groove red, vibrissal angle and facialia immediately above concolorous; vibrissae on oral margin, short with tips barely meeting; antenna rather slender and subequal facial length, third segment about five times second; bare, black arista thickened to tip, proximal
segments short; facialia bristled to above mid face level; cheek one-fourth eye length; eye bare; proboscis short, palpus red, slightly thickened at tip. Thorax and scutellum polished black, prescutum pruinose in a flat rear view; acrostichal 3, 3; dorsocentral 3, 4; presutural 2; sternopleural 4; pteropleural 1 (small); scutellum with 4 lateral, 1 discal and 1 small upturned apical pair. Wing smoky becoming darker along principal veins on costal half; first posterior cell closed, with petiole one-half to three-fourths length of apical cross vein; cubitulus angulate, usually bearing a short stump; last section of fifth vein one-half length of preceding; third vein setulose nearly to small cross vein; costal spine small but distinct; calypters opaque white. Legs black, rather short and stout; claws and pulvilli small; fore tarsus moderately flattened, hind tibia with a row of uneven bristles on outer posterior side. Abdomen wholly shining black above without a trace of pollen, anal segment pointed and usually with a reddish tinge in ground color; intermediate segments with discs, one pair of median marginals on segments one and two and a marginal row on three, and anal segment with irregularly spaced bristles on upper surface but no defined marginal row; anal orifice cadoventral, genitalia entirely retracted. Length, 5-6.5 mm.


Promasiphya confusa irrisor Reinhard, new variety


Male.—Head pollen subsilvery, vertex 0.27 of head width, third antennal segment two or more times length of second. Thorax gray pollinose on dark background, notal vittae four before and five behind suture, all well defined, scutellum reddish apically, bearing two very strong lateral, one smaller decussate apical and one appressed widely spaced but distinct discal pair. Wing hyaline with a slight yellow tinge along costal margin to base, third vein with five or six setulae near base, first posterior cell narrowly open well before wing tip, costal spine vestigial. Legs shiny black except hind surface of front femur dusted with gray pollen, pulvilli fully equal to combined length of last two tarsal segments, claws also strongly elongated and usually bicurved (outward thence inward) before the minute hooked tip. Abdomen broadly reddish at sides, sometimes almost wholly so showing only a vague dark median vitta, entire upper surface dusted with gray pollen leaving a narrow interrupted dark median vitta, basal segments with one pair of widely spaced median marginals (weak on first), complete marginal row on segments three and four and a discal row well behind middle on last. Genitalia as illustrated by Aldrich (loc. cit. p. 110) but the short apical segment of the penis in profile is inversely wedge-shaped (thickest at apex) and wider on entire
length as viewed from the rear, narrowly divided into two cone-shaped parts, each terminating in a semicircular concave tip with reflexed margin; fifth sternite broadly and deeply excised, lobes reddish, narrowly exposed, preceding sternites largely covered.

Length, 8.5-12 mm.

Females taken in company with the form described above appear indistinguishable from *confusa*.


**Admontia offella** Reinhard, new species

A small fly slender in build, with proximal aristal segments short, facial profile strongly convex and facialia bearing short infraciliate bristles to or almost to middle.

*Male.*—Parafrontal and parafacial golden, both setose on inner margin
to mid face level or below; basal antennal segments short, first erect and longer than second, third black, over twice parafacial width and as long as face; black arista micro-pubescent, thickened on basal two-fifths, vibrissae slightly below oral margin; front wide, at vertex 0.33 of head width; frontia
short, brown, wider than one parafrontal; outer verticals vestigial, inner erect; procline ocellars and orbitals subequal in size; frontals in a single row ex-
tending one bristle beneath antennal base; palpus yellow; proboscis well un-
der one-half head height; occiput and cheek cinerous, latter about two-fifths eye length. Thorax and scutellum gray pollinose on black ground color, notum
marked with four narrow but well defined vittae. Chaetotaxy: acrostichal 2, 3;
dorsocentral 2, 3; intraalar 3; supraalar 3; presutural 2 (inner one small);
notopleural 2; humeral 2; posthumeral 2; pteropleural 1 (small); sternopo-
pleural 3 (lower one often hairlike or absent); scutellum with 3 lateral, 1
apical reduced to small hairs and 1 appressed discal pair behind middle. Legs
subshiny black, moderately long and slender; mid tibia with one anterodorsal
bristle; claws and pulvilli small. Wing clear, first posterior cell narrowly
open at or a trifle before extreme wing tip; third vein with two or three
setulae near base; cubitulus obtusely rounded; costal spine vestigial;
epaulet black; calypters white, hind lobe with a uniform light tawny tinge.
Abdomen narrower than thorax, shiny black with gray or yellowish gray
fasciae on basal half or less of last three segments above; one pair of median
marginals on segments one and two, a complete marginal row on three and
four, besides a discal row on latter and one discal pair on three and two;
genitalia quite distinctive, fused forceps moderately wide on basal half thence
suddenly narrowed to a very slender, slightly bowed beak, which is com-
pressed apically and bears a short series of minute hairs on hind margin
before tip; accessory process strikingly elongated with hind margin somewhat
expanded near middle (which is setose on inner face) thence bowed forward
and moderately slender to rounded apex; fifth sternite lobes black, largely
retracted.

Female.—Similar to male except for sexual differences and as follows:
head pollen grayer, at times showing very little golden color on parafacial and
parafrontal; abdominal pollen more extensive and in less defined basal fasciae
on intermediate segments; fore tarsal segments moderately widened; genitalia
retracted.

Length, 3.5-5.5 mm.

Holotype male, "S.W. Res. Sta. 5 mi. W. Portal, Cochise Co.,
Ariz. IX-1-59, J. R. Powers" in California Academy of Sciences
Collection. Allotype female, same locality as type but dated IX-20-
59, Karl W. Kirkwood in P. H. Arnaud's Collection. Paratypes:
44 males and 6 females, same locality as type dated September 1
to 8, 1959 (D. D. Linsdale, J. R. Powers, Karl W. Kirkwood and
P. H. Arnaud); the latter collector's series bear the additional note
“taken at light.”
NOTES ON THE DISTRIBUTION OF SOME SOUTHWESTERN MEGACHILIDS, WITH DESCRIPTIONS OF THREE NEW FORMS

(Hymenoptera: Apoidea)

ROY R. SNELLING
Turlock, California

Although the primary objective of this paper is to describe three megachilids, the opportunity is taken to present new data on the distributions of other species. Since some of these represent new areas it is felt that they should be published in order that the information may be more generally available.

For the opportunity to examine material recorded herein, I am deeply indebted to the following: George D. Butler, Jr., University of Arizona (UA); Jerome G. Rozen, Jr., personal collection (JGR); Stuart M. Fullerton, personal collection (SMF). These have been supplemented by material in the joint collection of Gerald I. Stage and the author (SS). Much of the latter has been presented to us by the collectors, and I wish to express our gratitude to these individuals: J. S. Buckett, D. R. Miller, C. W. O'Brien and J. A. Powell.

Subfamily LITHURGINAE

LITHURGE ECHINOCACTI (Cockerell)

Previously recorded only from Arizona (Tempe, Palmdale, Coyote Mts.), available material now extends the range into northwestern Mexico.


Subfamily ANTHIDIINAE

Paranthidium jugatorium butleri Snelling, new subspecies

Female.—Structurally similar to nominate and other forms, but mesoscutal punctures a little finer, less approximate. Black, with dull yellow maculae as follows: Clypeus, except longitudinal median black stripe; sides of face with broad extension along inner orbits almost to tops of eyes (somewhat tapering above); stripe of variable extent behind eyes; L-shaped mark on anterior corner of mesoscutum; posterior border of scutellum; axillae occasionally; spot at apices of femora; stripe on outer surface of anterior tibiae; spot at bases of middle and hind tibiae; two widely separated apical spots (often somewhat elongate) on side of first tergite; narrow apical fasciae on tergites two to five (median interruption becoming progressively more narrowed so that fascia on fifth may be entire); broad spot in center of sixth
tergite. Hind tibial spurs dirty-white. Tegulae black, edges brownish. Wings smoky-gray, stigma and veins black and/or dark brown, marginal cell very darkly clouded. Pubescence as in P. j. perpectum Cockerell.

*Male.*—Very similar to males of other forms and to its female, differing from latter as follows: clypeus entirely, mandibles except apices, axillae, all tibiae and tarsi entirely, yellow. Fifth and sixth tergites (rarely fourth to sixth) with complete apical fasciae, sixth often entirely yellow. Seventh tergite black. Ventrites largely yellow. Tegulae ferruginous. Wings as in female.

*Holotype female, allotype, 3 ♀♀ paratypes, Chiricahua Mts., Arizona, 7000-8000 ft., September 6, 1953 (G. D. Butler), on Helianthus, 1 paratype on Erigeron.* The following additional paratypes were also examined: 11♀♀, same locality, Sept. 7, 1953 (G. D. Butler), partly on Erigeron; 1 ♀, Baboquivari Mts., Sept. 25, 1938 (R. H. Crandall); 1 ♀, Huachuca Mts., Sept. 27, 1936 (R. H. Crandall); 3 ♂♂, Santa Catalina Mts., Sept 5, 1938 (R. H. Crandall); 3 ♀♀, Huachuca Mts., Aug. 30, 1953 (G. D. Butler); 11 ♀♀, 2 ♂♂ Graham Mts., Aug. 15, 16, 1952 (G. D. Butler), on "crown beard"; 1 ♂, Santa Catalina Mts., Aug. 25, 1954 (G. D. Butler); 1 ♀, Flagstaff, Sept. 12, 1951 (J. G. Rozen). The holotype, allotype and most paratypes are in the collection of the University of Arizona. One paratype is in the Rozen collection, and several have been retained in the author's collection.

This subspecies, named for the collector of the type series, shows some variation in the females; in some cases the median stripe of the clypeus extends only one-half, or even less, of the distance between the base and apex. In many of the paratypes the stripe behind the eyes is supplemented by another immediately behind the ocelli, forming a band extending from the upper one-third of the outer orbit across the vertex, slightly interrupted in the middle. In some specimens, also, there are small yellow maculae present on the mesopleurae, showing a tendency toward *P. j. perpectum.*

**Anthidium palmarum micheneri** Schwarz

This form was recently described by Schwarz (1957) from a small series (8 ♂♂ ♂, 2 ♀♀) from Quemada, Maverick Co., Texas. Additional specimens are available from the following localities.

**New Records.**—*Arizona:* 1♂ Molina Basin, Mt. Lemmon, May 13, 1954 (F. G. Werner; UA); 1♂, 1♀, [Santa] Catalina Mts., May 9, 1954 (G. D. Butler; UA), on *Phacelia distans,* 1♂, [Santa] Catalina Mts., May 13, 1954 (G. D. Butler; UA), on *Sphaeralcea.* *Texas:* 1♀, 3♂♂, 36 mi. S. Sonora, April 10, 1950 (Beamers, Stephen, Michener, Rozens; JGR) on *Phacelia*;
1♂, 8 mi. S. Concan, April 14, 1952 (Michener, Beamers, Wille, LaBerge: SS), on Phacelia.

**Anthidium porterae** Cockerell

Schwarz has recorded this species from Flagstaff, Arizona. The following records from that state would indicate that it is both widespread and rather common there.

**New Records.—Arizona:** 1♂, Boyce Thompson Arboretum, near Superior, Aug. 23, 1953 (G. D. Butler; UA); 1♀, Santa Rita Mts., Aug. 23, 1924 (G. T. Vorhies; UA); 2♀♀, 2♂♂, Peppersauce Canyon, Santa Catalina Mts., Aug. 13, 1940 (J. I. duBois; SS); 4♀♀, 1♂, Tucson, May 1, 1938 (R. H. Crandall; UA); 1♀, 2♂♂, 4 mi. E Florence Junction, May 15, 1954 (G. D. Butler; UA), on *Psilostrophe* and *Asclepias*; 1♀, 5 mi. E Willecox, May 19, 1954 (F. G. Werner; UA), on *Erigeron*; 1♀, Pearce, Oct. 2, 1954 (G. D. Butler; UA); 1♂, 5 mi. W. Portal, Chiricahua Mts., Aug. 3, 1958 (P. A. Opler; SS) *New Mexico*: 2♀♀, 2.5 mi. N. Rodeo, Hidalgo Co., Sept. 9, 1959 (G. I. Stage; SS); 1♀, 3 mi. N. Rodeo, Sept. 3, 1959 (G. I. Stage; SS); 3♀♀, 11 mi. NW Lordsburg, Hidalgo Co., Sept. 9, 1959 (J. M. Burns; SS); 1♀ Las Cruces, Dona Ana Co., June 10, 1938 (SS), on *Penstemon occidentalis*. Texas: 1♀, 36 mi. S. Sonora, April 10, 1950 (Beamers, Stephen, Michener, Rozens; JGR), on Phacelia.

**Callanthidium formosum** (Cresson)

A male from Oak Creek Canyon, Coconino Co., July 9, 1959 (SS), extends the range of this species into Arizona. Although extensive collecting has been done in the southern part of the state by Dr. Butler, this species has not yet been found there. Probably the species is not anywhere common in that state.

**Dianthidium curvatum xerophilum** (Cockerell)

A female from Apache Pass, Dos Cabezos Mts., Arizona, Aug. 20, 1954 (F. G. Werner; UA), is apparently the first capture of this rare form outside of New Mexico.

**Stelis** (Chelynia) **semirubra reducta** Snelling, new subspecies

This appears to be a northern form of *S. semirubra* Timberlake which is characterized by a reduction in the extent of the ferruginous color of the abdomen. In the southern individuals which I have seen, unfortunately all males, the ferruginous color extends over the first five tergites, with the ventrites also largely or entirely of that color; the fourth and fifth tergites may at times be somewhat suffused with brownish. In the Sierran material, this ferruginous coloration is limited to the first three tergites only, with the ventrites largely darkly suffused. The one northern female has the ferruginous color almost entirely suppressed, limited to...
large spots on the first two tergites and the second and third ventrites.

_Holotype male, allotype female,_ from _Strawberry Lake, Tuolumne Co., Calif.,_ June 17, 1961 (R. R. Snelling). One paratype male is from 2 mi. S. Mormon Bar, Mariposa Co., Calif., May 21, 1960 (R. R. Snelling), on _Cryptantha._ The holotype and allotype are in the California Academy of Sciences, the paratype in the author’s collection.

Subfamily _MEGACHILINAE_

**Anthocopa (Atoposmia) pycnognatha solata** Michener

Since this apparently rather widespread species seems to be uncommon, the following new records are of interest. The capture at Knight’s Ferry is noteworthy since it represents an area quite different from that which may previously have been considered the normal habitat for _A. p. solata._ This is an area of rolling grassland hills covered with oaks. A few pines occur locally in the immediate area where the specimens were captured. In general the spring vegetation is very similar to that of such higher elevations as, for example, the Mariposa region where this species has also been taken. It is of significance that the captures were made along the Stanislaus River bottom. It seems probable that the river flora, which is characteristic of higher elevations, has been carried down to this level by the stream, and that the bees have migrated downstream along with their host plants.


**Anthocopa (Atoposmia) hebitis** (Michener)

This rare species is closely related to the above and apparently has a similar distribution.


**Proteriades remotula** (Cockerell)

Hurd and Michener (1955) record a total of eleven specimens of this uncommon species. The following records should, therefore, be added to the known range of _P. remotula._

New Records.—_Calif.: San Diego Co.: 3♀♀, Jacumba, May 13, 1956 (R. R. Snelling; SS), on _Cryptantha._ Los Angeles Co.: 1♀, 4 mi. S. Pear-
blossom, April 14, 1960 (R. R. Snelling; SS), on Cryptantha. Stanislaus Co.: 1♀, 3 mi. NW. LaGrange, April 6, 1960 (S. M. Fullerton, SMF): 3♂♂, 4♀♀, same locality, April 10, 1961 (R. R. Snelling; SS) resting on ground; 9♀, 8♂, same locality, April 15, 1961 (R. R. Snelling & M. D. Snelling; SS), 2♀ on Cryptantha, ♂♀♀ resting on ground and on Cryptantha; 1♂, same locality and date (T. D. Duncan; SS), on Cryptantha. Mono Co.: 1♀, Crooked Creek, White Mts., June 25, 1961 (D. R. Miller; SS): 2♂♂, same data (J. S. Buckett; SS).

The specimens from Crooked Creek were at first thought to be P. incanescens (Cockerell), but the female is too small, the antennal scape is too short, and the clypus is not so strongly produced and truncate. In the males the second ventrite is not enlarged to cover the third, and so these specimens must be referred to P. remotula.

Ashmeadiella (Ashmeadiella) aridula astragali Michener

On May 16, 1955 the author collected a single gynandromorphic specimen of this species at Turlock, Stanislaus County, California, at the flowers of Phacelia distans. This capture is of interest since there have been only two sex anomalies previously described in the genus. Michener (1943) described intersexes of A. (Ashmeadiella) opuntiae (Cockerell) and A. (Chilosima) rhodognatha Cockerell. The two specimens described by Michener were not laterally distinctive, while the present example is primarily so in the characters of the head and thorax. An examination of the abdomen and its terminalia reveals no modifications over those of normal females.

The head and thorax of the present individual offer characters which on the left half are essentially male, and on the right essentially female. The pubescence of the lower two-thirds of the face on the left half is very dense and yellowish, a characteristic of the males of this species, while on the right it is somewhat shorter, much sparser and rather whitish as in normal females. The left mandible is typically male in appearance, while the right is typically female. The clypeal punctures on the right are coarse and distinct, comparable in size to those of the vertex; the punctures of the left side are much more obscure, the few apparent punctures present on a dull, roughened surface, these being finer than those of the vertex as in normal males; the apical margin of the clypeus is as shown in figure 1B. The right antenna is twelve segmented and the left is thirteen segmented (as in normal females and males respectively).
The thorax is, unfortunately, generally denuded of pubescence, but that which remains is apparently typical of the female. The left tegula is distinctly darker than the right (normal males often have somewhat darker tegulae than the females). The left tarsal claws are not cleft as in normal males, but are apically thickened; the right tarsal claws are simple, as in normal females.

As stated above, the abdomen does not differ from that of the normal females.

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**Explanation of Figures**

Fig. 1. *Ashmeadiella* (*Ashmeadiella*) *aridula* *astragali* Michener. Lower half of face of: A, normal female; B, gynandromorph, including mandibles; C, normal male.

**Ashmeadiella (Ashmeadiella) titusi** (Michener)

The distribution of this rare species, previously known only from cismontane southern California, is now extended into moderate elevations in the Sierra Nevada Mountains. This area does not differ essentially from that of southern California, and the two regions have many species in common. The records from Los Angeles and San Bernardino Counties are significant since they indicate a tendency toward a desert habitat, the two areas being transitional between typical cismontane and desert habitats.


**Ashmeadiella (Ashmeadiella) difugita emarginatula** (Michener)

The capture of two females of this species in the Kern River Canyon, 25 miles east of Bakersfield, Kern Co., Calif., June 18, 1961 (C. W. O'Brien; SS), on *Clarkia* sp., is of interest since this apparently is the first record of this species west of the Sierran crest. The specimens do not differ from Lassen County specimens in my collection.
Ashmeadiella (Arogochila) micheneri Snelling, new species

In the Hurd and Michener key (1955) this species drops out at couplet 2, since it combines a nearly absent lateral clypeal notch with an apically widened median lobe. By liberal interpretation, it may be run to couplet 6 where it again fails to meet either requirement, since the apex of the labrum is truncate and more than half as wide as the mandible at the narrowest point.

Despite these discrepancies, however, micheneri seems to be closely related to A. erema Michener, from which it differs in the shape of the median lobe, the lack of well defined lateral clypeal notches, and the broadly truncate apical margin of the labrum. It shares with that species the peculiar, forward directed median lobe.

Female: Integument of head and thorax black. Mandibles black, except for rufous apical one-fifth. Scape and pedicel black, flagellum uniformly brownish. Tegulae dark piceous, usually with rufescent spot in middle. Legs dark rufescent or piceous, hind femora with rufous stripe or spot on dorsal surface; middle and hind tibial spurs black; tarsal claws rufescent. Integument of abdomen largely black, but with large lateral rufous blotches, diminishing on progressive tergites, fifth and sixth tergites entirely black. Pubescence sparse throughout, entirely pale, except on inner surface of basitarsi where it is ochraceous. Wings hyaline, slightly brownish, veins and stigma dark rufescent. Head: Face broad, distance between eyes at level of clypeal base 1.35-1.61 times distance from anterior ocellus to clypeal base (median, 1.50); eyes distinctly convergent above; checks broad, 0.85-0.97 times greatest eye breadth (median, 0.91); clypeus and frons bulging when viewed in profile, at level of clypeal base 0.40 times maximum eye breadth in front of eye, lateral areas of face and clypeus sharply depressed below median area. Distance from lateral ocelli to hind margin of vertex slightly greater than distance between ocelli and eyes; distance from antennal sockets to anterior ocellus 1.43-1.47 times distance from that ocellus to posterior margin of vertex. Mandibles elongate, apical margin forming broad cutting edge in which apical tooth is narrowly rounded and middle tooth forms a slight convexity on the edge. Labrum somewhat variable, apex truncate to slightly notched, apex as broad as, or slightly broader than, the narrowest part of mandible. Clypeus with lateral projections reduced to mere triangular protuberances of the margin or entirely absent; median lobe somewhat elongate, narrow basally, expanding suddenly in middle, then reduced to narrowly pointed apex (Fig. 2A, B), greatest breadth slightly more than median length. First flagellar segment 1.40 times second, 0.61-0.64 times second plus third. Clypeus moderately shiny, disc roughened, punctures quite sparse and obscure; punctures of basal and lateral areas distinct, confluent, as large as those of lower lateral areas of face. Punctation of lower lateral areas becoming finer and ovoid at level of antennae, more rounded above antennal level, more nearly rugose, integument a little duller than that of lower areas. Punctures of supraclypeal area coarse, integument subrugose. Punctures of frons sub-
equal to those of upper lateral areas, close, interstices shining, but inner surface of punctures dull, minutely rugose. Punctures of vertex coarse, close, with shining interstices, those of area between eyes and ocelli larger than those behind ocelli; punctures of genae finer than those of lower lateral areas of face, with shining interstices. Thorax: Punctures of mesoscutum coarse, dense, interstices shining, punctures equal to those of vertex. Punctures of mesopleurae a little larger than of mesoscutum, interstices strongly shining. Tegulae largely impunctate, with a few scattered punctures anteriorly and along inner margin, outer margin distinctly tesselate, surface otherwise shining. Mesocutellum punctured as mesoscutum, with narrow median impunctate longitudinal line. Lateral areas of metanotum virtually impunctate, moderately shining; median area tesselate, duller than lateral area, with a few scattered large punctures. Basal area of propodeum tesselate, moderately shiny, minutely longitudinally wrinkled; posterior surface rather shiny, tesselation distinct, lateral areas somewhat more roughened, with pubescence arising from minute, subconical raised areas. Tarsal claws edentate, broad basally, abruptly narrowed at midpoint; hind tibial spurs long, slender, pectinate, the teeth distinct, very close. Abdomen: Punctures generally rather coarse; of first tergite a little finer and closer than of second; of third to fifth, becoming progressively finer and closer; of sixth, coarser than of fifth, so that segment appears almost rugose; apical margins of tergites one to five more finely, closely punctate than discs. All tergites with distinct pubescent fasciae arising immediately before apical margins. Scopa moderately dense; the ventrites dull, tesselate with large scattered punctures, those of apical segment especially dense.

Length, to apex of second tergite, 3.5-5.0 mm.; forewing, 3.8-4.7 mm.

Male.—Pubescence and integument as in female, except that in small individuals the ferruginous color of the abdomen is usually reduced to lateral blotches on first three tergites, while in larger specimens the color extends to sixth tergite. Tegulae rufo-testaceous. Ferruginous blotch on hind femur of small individuals greatly reduced or entirely absent. Tibial spurs and tarsal claws dark ferruginous to light rufescent. Head: Essentially as in female. Transfacial breadth at level of Clypeal base 0.65-0.81 times distance between anterior ocellus and clypeal base (median, 0.73); eyes 0.46-0.53 times greatest genal breadth (median, 0.49); distance from lateral ocelli to posterior margin of vertex 0.81-0.89 times distance between eyes and ocelli (median, 0.85); first flagellar segment 1.20-1.25 times second (median, 1.22), 0.33-0.36 times second plus third (median, 0.34). Thorax: Punctuation generally as in female, but tegulae with a few more evident punctures, entire metanotum rugosely punctate, lateral areas of propodeum strongly punctate. Hind tibial spurs as in female. Tarsal claws thickened apically, with distinct inner tooth separated from shaft by narrow cleft. Abdomen: Punctuation as in female. Apical tergite and genitalia as Fig. 2C, D.

Length, to apex of second tergite, 4.2-5.1 mm.; forewing, 3.5-4.0 mm.

Holotype male, allotype female, 23 ♀♀, 15 ♂♂ paratypes, Knight’s Ferry, Stanislaus Co., Calif., April 10, 1951 (R. R. Snelling), on Phacelia. Paratypes: 8 ♀♀, 5 ♂♂, same data as
holotype (S. M. Fullerton); 5 ♀♀, 3 ♂♂, same locality, April 15, 1961 (R. R. Snelling & M. D. Snelling) on *Phacelia*; 1 ♀, same data (T. D. Duncan); 2 ♀♀, 1 ♂, same locality, April 9, 1961 (S. M. Fullerton); 6 ♀♀, 3 ♂♂, same locality, April 20, 1961 (S. M. Fullerton); 2 ♀♀, Exchequer Dam, Mariposa Co., March 29, 1961 (R. R. Snelling), on *Phacelia*.

Holotype, allotype and four paratypes in collection of California Academy of Sciences. Paratypes in the following collections, in addition to those of the author and S. M. Fullerton: American Museum of Natural History, California Department of Agriculture, California Insect Survey, Museum of Comparative Zoology, United States National Museum, University of California at Davis and Riverside, and the University of Kansas.

At the type locality this species was rather abundant. Females were noted entering and leaving smaller crevices and pock marks in the rocks which comprised a stone fence line.

I take great pleasure in dedicating this species to Dr. Charles D. Michener in recognition of his invaluable contributions to apoid

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Fig. 2. *Ashmeadiella (Argochila) micheneri*, new species. A, female head, frontal aspect; B, same, lateral aspect; C, outline of male seventh tergite; D, male genitalia, right side dorsal aspect, left side ventral aspect.
systematics in general, and megachiline systematics in particular.

Ashmeadiella (Arogochila) australis (Cockerell)

The captures from Knight's Ferry, as given below, probably represent an intrusion into an otherwise unsuitable area after the manner discussed above for Anthocopa pycnognatha solata.


Literature Cited


A NEW SPECIES OF AMBRYSUS FROM COSTA RICA
(Hemiptera, Nacoridae)

Ira La Rivers
University of Nevada, Reno

The species described below is quite distinctive, without any obviously close relatives in the genus. The outline of the female plate superficially resembles that of A. inflatus La Rivers (1953) when both are drawn on a flat surface, but is quite different when the third dimension is added. Whereas the plate in A. inflatus is relatively flat, that of the new species has strong dorso-ventral curvature, specially to the two median, most posterior, terminal sinuosities. The male genital processes are singularly different between the two species, as are other points. A. harmodius is a member of the signoreti group.

This is a medium-sized, light-colored species, with vague mottling, particularly posteriorly and is quite typical looking for an Ambrysus. Size 10.0 mm. in length and 6.25 mm. in width. Dorsum lighter on head, prothorax, scutellum, embolia and connexival borders; with darker mottling on hemelytra. Venter light-
colored, rather whitish over head, thorax and legs, deeper yellow on abdomen.

**Ambrysus harmodius** La Rivers new species

*Head.*—typically smooth, shiny, sparsely punctate, comparatively flat. Vertex only slightly protuberant in front of eyes, the whole margin forming a rather smooth, slightly curved outline which flattens between the eyes. Eyes flush with head surface; outer and posterior eye margins weakly angulate at point of union. Labrum wide, smooth and rather sharply rounded at tip; ratio of length-to-width 20::12 (60%), uniform in color. Mouth parts similar to labrum in color at base, darkening in terminal segments. Head ratios are: (1) total length to width (including eyes) 54::83 (65%), (2) anterior distance between eyes to posterior distance 38::48 (80%), (3) anterior distance between eyes to inner eye length 38::40 (95%), (4) posterior distance between eyes to greatest length of head posterior to this line 48::15 (31%). *Pronotum.*—shiny, smooth, moderately punctate; light yellow in background color, with prominent slightly broken or uneven brownish line forming a broad posterior border, interrupted in the middle and not extending into lateral border area; pronotum posterior to brown line more whitish than remainder of disc. Lateral edges lacking pilosity, smooth and weakly curved, sharply rounded at postero-lateral "angles;" per cent of curvature (viewed perpendicular to the frontal plane of section of the animal as a unit) about 18% (av. 85::15). Venter light yellow, with the usual pilosity along the posterior border and on the keel, which latter is ridged anteriorly and sharply and flatly sloping posteriorly below the median union of the propleura; ratio of anterior keel ridge to total keel length (including posterior sloping face) 26::16 (62%). Prosternum free from propleura, and disappear-

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**Explanation of Figures**

Fig. 1. *Ambrysus harmodius*: (A) Terminal outline of female subgenital plate, holotype; (B) Male genital process, allotype.
ing caudal beneath the latter. Propleura weakly and thinly united along median line just posterior to prosternum. Pronotal ratios are: (1) width between anterior angles to width between posterior angles 62::120 (52%), (2) median length to greatest width 41::120 (34%), (3) distance between anterior and posterior angles on same side to perpendicular distance between anterior angle and baseline of pronotum 63::52 (83%). Scutellum.—light yellow at three corners and in the middle, moderately shagreened. Ratio of three sides, anterior and two laterals, 100::75::75. Hemelytra.—about equally mottled light yellow and pale brown, shagreened with thickly punctuate white spots. Embolia weakly but definitely demarked along its posterior border; length-to-width 80::31 (39%), broad for the genus; emboliar crease weak; embolia typically lighter in anterior 4/5ths, darker in remainder, but the two fading into each other with no perceptible dividing point. Hemelytra rather broadly exposing connexival borders posterior to embolia, and not quite reaching abdominal tip. Wings functional, nearly as long as hemelytra and possessing the usual large, “costal” cell. Venter.—the prothoracic venter has been discussed. All angles except those of connexival segment I are weakly and rather bluntly spinose, increasing imperceptibly in size posteriorly; connexival borders III, IV and V weakly serrate, I and II smooth; connexival borders lacking hydrofuge pile are narrow as is usual with most Ambrysi, and not broad and/or scalloped as in A. maldonadus La Rivers and the closely related A. montandoni La Rivers. Male genital process strongly developed, slightly “dog-headed” in shape, dark in color. Female subgenital plate outline quadrisinate, the outermost angles or sinuosities much lower than the two prominent median ones (see illustration). Legs.—Prolegs—structure typical for the genus. Color whitish yellow. Femoral incrassation about average, ratio of length to greatest median width 70::45 (64%). Tibia average, combined tibia-tarsus, when closed, slightly overlapping adjacent (proximal) end of femur. Mesostiga—Femoral ratio of length to greatest median width 70::16 (23%), femur stout for the genus; length 2.25 mm. Tibia prominently brown spinose, spines larger toward distal end; tibia wider toward distal end; ratio of length to greatest width 60::10 (17%); length 2.0 mm.; distal end with two transverse rows of spines, the secondary or proximal row extending only about half way across the tibia. Tarsus 3-segmented, basal segment small; terminating in two prominent, moderately curved claws. Metatibia—Femoral ratio of length to greatest median width 90::18 (20%), stout for the genus; length 3.0 mm. Tibia longer, narrower and more parallel-sided than mesotibia; length to greatest width 95::8 (8%), slim and spinose; length 3.5 mm.; terminal transverse spination as in mesotibia. Tarsus similar to mesotarsus.

Holotype female, allotype male and two paratypes from Rio Virilla, Costa Rica, 26 December 1931, Heinrich Schmidt are in the collection of the writer, Reno, Nevada.

Reference

La Rivers, Ira
JAPYGIDAE OF SOUTH AMERICA 2.
THE GENUS PROVALLJAPYX
(Insecta: Diplura)

Leslie M. Smith
University of California, Davis

In defining the higher categories of the Japygidae, the mandible is of prime importance. The mandible of *Provalljapyx* Silvestri 1949\(^1\) was implied to be the same as in the genus *Evalljapyx*. Silvestri’s complete description of the genus *Provalljapyx* is: “Genus similar to *Evalljapyx* Silv. with the arms of the forceps similar to each other and provided with few denticles.” To the present time, this genus is monotypic, with the single species *P. lanei* Silvestri. In his description of this species Silvestri did not mention nor illustrate the mandible, so we are left to the conclusion that the mandible, as in *Evalljapyx*, is composed of three similar teeth and a prostheca.

Through the courtesy of Mr. Henry S. Dybas, of the Chicago Natural History Museum, I have been permitted to study a specimen from the State of Paraná, Brazil, collected about 200 miles southwest of the type locality for *P. lanei* which is Jabaquara, Brazil. This specimen differs somewhat from *P. lanei* but is obviously referable to the genus *Provalljapyx*. This new species shows that the mandible is strikingly different from the mandible of *Evalljapyx*. It thus becomes possible to amend the genus *Provalljapyx* and to supply many details omitted by Silvestri.

Genus *Provalljapyx* Silvestri, 1949

Head with about 16—20 + 16—20M\(^2\) mostly simple, body with stout setae mostly pinnate with 3 to 4 conspicuous pinnules, antenna with 19 to 21 segments, terminal segment nearly hemispherical with 6 to 8 large, conspicuous placoid sensillae, trichobothria 3 + 5 + 5, distal lamina of lacinia falciform, the four other laminae pestinate, lacinia falciform, without a tooth, mandible with four large teeth, some of which have secondary teeth, maxillary palpus uniformly tapered, thumb of galea not heavily sclerotized, labial palpus minute with 3 setae, or absent and represented by one long seta. Thorax, pronotum 6 + 6 M, meso- and metanotum with 9—11 + 9—11 M, legs short, setae at dorsal apex of femur: 2 pinnate and one simple, calcar setae stout, with many minute pinnulae, setae per ventral row on tarsus 2 to 3, tarsal claws subequal, empodium as long as pretarsus. Abdomen, tergites II to VI with about

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12+12M all pinnate, pleura with prepleurite 1 or 2M, and pleurite 2M, sterna, apotome about 6+6M, sternite with about 20+20M, styli broad at base, no secondary cone, one mesad seta, lateral subcoxal organs with one row of thin glandular setae, and one row of sensory setae bilaterally pinnate, antecedent setae 6–8+6–6 pinnate, in one irregular row, genitalia typical, segment X slightly wider than long, dorsally with about 8+8M, carinae absent, acroproxygidium very flat or absent. Forceps, twice as long as wide, dorsal articulation rounded, seta A nearly as large as adjacent seta, arms symmetrical, uniserate with few teeth and no denticles.

**Type:** *Provalljapyx lanei* Silvestri (original designation)

**Provalljapyx brasiliensis** Smith, new species

**Female.—** Head with 20+20M dorsally, not pinnate, and a few microsetae, lacinia with the distal, falceiform lamina as long as the adjacent pectinate lamina, all laminae curved, lacinia falciform, galea with one external seta, thumb of galea slightly sclerotized, without setae, but with 5 terminal projections, terminal segment of maxillary palpus uniformly tapered toward the apex, with one median seta longer than the segment and 6 other setae, five of which are terminal, mandible with four large teeth, as follows: dorsal tooth simple, rounded, second with a sharp terminal end and two sharp lateral teeth, third simple, curved, rounded, ventral (fourth) tooth curved with one small lateral tooth, and a minute, triangular tooth between the second and third teeth, prostheca not visible; antenna with 19 segments, slightly tapered, ratio of width segment 3: width of segment 18=1.5, segment 3 with one whorl of 11 setae and one other seta posterior to the whorl, penultimate segment with about 65 setae not in distinct whorls, terminal segment as wide as long, subhemispherical, with 8 placoid sensilla, of which 6 are in a basal whorl, trichobothria one and one-half times as long as adjacent setae, segment 10 typical with anterior whorl of 17 setae and posterior whorl of 19 setae, labial palpus absent, but represented by one long seta, longer than other setae on the submentum, and a small seta. **Thorax,** pronotum 6+6M and 6+6m, mesonotum prescutum 1+1M, scutum 11+11M, and a few m, mesocoxa with 4M and 1m, trochanter with 5M, dorsal apex of femur with 2M and 1m, ventral apex of tibia with two stout, pinnate calcar setae, tarsi strongly tapered apically, setae per ventral row on tarsus two, tarsal claws with a minute, basal, ventral tooth, empodium as long as pretarsus and parallel to tarsal claws. **Abdomen:** tergite I prescutum 1+1M, scutum 8+8M, tergites II-VI with 14+14M, tergite VII with 13+13M, tergite VIII 8+8M, segment IX dorsal 3+3M, tergite X 8+8M, carinae absent, acroproxygidium not distinct, tergites II-VII with postero-lateral angles rounded, pleurae II-VII prepleurite 2M, pleurite 2M+1 large m and 1 small m, sternum I apotome with 6+6M, sternite 13+13M, antecedent setae pinnate 8+8 in one irregular row. lateral subcoxal organs occupying more than two-thirds of the distance between the styli, with one row glandular setae 12+12, half as long as sensory setae, sensory setae pinnate, 6+6, twice as long as seta on stylus, median glandular area not protruding, without structures, sternum II-VII apotomes with 6–7+6–7M, sternites with 23+1+23M, sternum VIII with 66+6M and 8+8M, genital orifice ringed with one row of simple setae, sper-
matophore burster not visible, segment X ventral 8+8M and a pair of large postero-median m. Forceps, seta A three-fourths as long as adjacent seta, arms symmetrical, twice as long as wide at base, dorsal articulation rounded, one median tooth and one postmedian tooth, uniserate.

Explanation of Figures

Fig. 1. Dorso-lateral view of tip of left mandible of Provalljapyx brasiliensis L. Smith. Fig. 2. Dorsal view of tip of meso-femur. Fig. 3. Ventral view of left stylus from abdominal segment III. Fig. 4. Dorsal view of abdominal segments VIII, IX, X, and forceps. Fig. 5. Ventral view of half of sternum I showing antecedent setae pointed anteriorly. Fig. 6. Pretarsus of mesothoracic leg showing ventral spine on tarsal claw. Fig. 7. Terminal segment of antenna showing 8 placoid sensillae, with all setae omitted. Fig. 8. Prepleurite and pleurite of abdominal segment III, lateral view. Fig. 9. Ventral view of half of sternum V.
Male unknown.
Length of body including forceps, 3.5 mm.

Holotype female Rondon, State of Paraná, Brazil, July 1952 (Fritz Plaumann) is deposited in the collections of the Chicago Natural History Museum.

The finding reported in this paper, and in an earlier paper by Smith⁵, make possible a further definition of the subfamily Provalljapyginae Smith⁶. It can now be defined as follows:

PROVALLJAPYGINAE L. Smith

Body with pinnate setae, antennae with 19 to 23 segments, distal segment with 6 to 8 large placoid sensillae, lacinia falciform, mandible with three or four large teeth and several secondary teeth (except Nanojapyx), labial palpus small rudimentary, or absent, styli without secondary cone and with a single mesad seta (except Eojapyx), pleura VII not heavily sclerotized or projected to the rear, setose sac in urite III of the male, with an irregular row of plumose setae at the orifice, each connected to a long slender filament, arms of the forceps approximately similar, with few teeth, no sexual dimorphism, uniserate (except Eojapyx).

1. Four or more large, similar teeth, uniserate, on each arm of the forceps, tergite X with 3+3 pinnate setae, terminal segment of antenna with 6 placoid sensillae........................Nanojapyx
Less than four large teeth on each arm of the forceps, tergite X with more than 3+3 pinnate or simple setae, terminal segment of antenna with 8 placoid sensillae ........................................ 2

2. Two ventral apical tarsal setae modified and projecting between the tarsal claws, two setae on each stylus, mandible with 3 large teeth and 10 secondary teeth, segment X longer than wide, forceps smooth, each arm with 3 minute basal teeth and 3 superior denticles...........................Eojapyx
Without setae projecting between the tarsal claws, one seta on each stylus, mandible with 4 large teeth, some of which carry secondary teeth, segment X wider than long, forceps smooth, each arm with a large postmedian tooth, uniserate (Provalljapyx) .......................................................... 3

3. Labial palpus present, rudimentary, with 3 setae, tergite X with 9+1+9M, some of which are pinnate, antennae with 21 segments, metanotum 9+9M .......................P. lanei Silvestri
Labial palpus absent, represented by two setae, tergite X with 8+8M, all of which are simple, antenna with 19 segments, metanotum 12+12M ........................................ P. brasiliensis L. Smith

In his paper Silvestri\(^5\) mentioned two paratype specimens collected at Jabaquara, Brazil, and adult, (sex unknown), with 19 segments in the antenna, and a larva (third instar) also with 19 segments. Silvestri did not state the sex of the type specimen, but it was probably a female since he did not mention the setose sac in urite III of the male. He also mentioned another specimen with 19 segments in the antenna, sex unknown, collected at Posades, Misiones, Argentina, and placed this also in the species *P. lanei*. If these specimens could be studied, it is probable that those from Jabaquara with 19 segments in the antenna are *P. brasiliensis*. There are thus only five specimens known for the genus *Provalljapyx*.

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A NOTE ON THE CARDER BEE

ANTHIDIUM JUNODI MELANOSOMUM CAMERON

(Hymenoptera: Megachilidae)

J. S. TAYLOR

*Port Elizabeth, Republic of South Africa*

On 28 January 1960 while inspecting the vials which, inserted in a block of wood, form artificial nest sites for solitary bees, and several of which were occupied by a leaf-cutting species of Megachilidae at the time, some white silky material was noted at the base or inner end of one of them. A little later a hitherto strange species of bee arrived at the nest site, and after darting about from side to side with much humming it entered the vial concerned and was seen working busily within. This bee was subsequently identified as *Anthidium junodi melanosomum* Cameron, a common and widely distributed species of carder bee in South Africa. This is so far the only occasion upon which any carder bee has used these artificial nests, while this particular individual is the only one of its species to have done so. The following is an account of its activities at the artificial nests.

As already mentioned, the bee was first observed on 28 January; it remained in the vial overnight and was still present on the following morning. The next few days were cold, damp and overcast, and it was not until 4 February that the first cell at the

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inner end of the vial appeared to be complete and sealed or closed. A second cell was completed and closed by the afternoon of 8 February; three cells had been completed by the morning of 9 February and a fourth was nearing completion by that evening. On the morning of 15 February the bee was in the seventh cell but at 4 p.m. on the same date the beginnings of a new nest were found in the vial immediately below the first, and the bee was seen to be working there. The seventh cell of this second nest was completed on 29 February, but the bee was occupied with another cell—the eighth—until 2 March. This cell, however, was never completed, and was left apparently open, which had also been the case with the last cell of the previous, or first, nest. The third nest was commenced on 2 March, and five cells had been completed by 10 March with an apparently open and incomplete cell added. A fourth nest consisting of two cells, one complete and the other incomplete, was constructed between 12 and 14 March, and on the latter date the bee was seen for the last time. The vial in which this last nest was made contained the beginnings, one empty cell only, of a nest of the leaf-cutting *Megachile (Eutricharaea) gratiosa* Gerstsecker, which had been abandoned. The carder bee had used this leaf cell as a base for its nest.

This particular carder bee had been active at the artificial nests from 28 January until 14 March, a period of 47 days. During this time it had constructed four nests containing a total of twenty cells. The time required to construct and complete a cell varied and depended upon the state of the weather, the bee remaining dormant in the nest on cold and damp days. The average worked out at about 2.25 days per cell, but in fine and warm weather the rate of construction might even reach one cell per day. Each nest included what resembled an incomplete or partially formed cell added to the last completed one. This evidently formed the seal to the nest and it is generally situated about a cell's length, or a little more, from the outer end of the vial or nest. The vials measured three inches by three-tenths of-an-inch.

After the completion of the nests the vials containing them were transferred to glass jars: the first and fourth nests were kept indoors, and the second and third in an insectary.

On 20 November the first emergence, from the second nest, took place, and altogether five bees emerged from this nest over a
period of eleven days (20 November to 1 December), while the remains of a dead bee were later found in one of the cells. From the first nest, which had been kept indoors, six bees emerged over a period of nine days from 24 November to 3 December: from the third nest only one emergence, on 25 November, took place, while the single cell of the fourth nest was found to contain honey only. The twenty cells formed by the original female bee therefore produced twelve progeny.

From the completion of the last cell of each nest to the first emergence the period varied from 263 to 282 days, and to the last emergence from 276 to 291 days.

The adult bee is about 8 mm. in length, and the female is black, liberally supplied with white hairs which are longer and denser on the face, legs and ventral surface of the abdomen where they form the scopa or pollen brushes. In the male the hairs on the thorax are yellowish-buff, while the frons is yellow and there are yellow markings on the legs and abdomen.

The fibrous material used in the making of the nest is very fine, almost silken in appearance, and a first is pure white but later becomes discolored. It is believed to be derived from one of the Compositae, probably a species of Helichrysum, and in this connection it may be mentioned that M. C. Jacot-Guillarmod has seen this species of Anthidium removing fibre from the stems of Helichrysum in Basutoland. Helichrysum argenteum was growing in vicinity of artificial nests at the time and and may well have been the source of the nest material. No sign of the carder bee was seen at the nesting site during the following two summers, and the disappearance of the nearby Helichrysum, due to building operations, seems to be the most likely reason.

The cocoon of the carder bee is oval and brown, and it would appear that the species is single-brooded.

Acknowledgments

The writer is much indebted to Mr. C. Jacot-Guillarmod, Albany Museum, Grahamstown, for identifying the carder bee as well as for supplying information on its distribution and habits; also to Miss G. V. Britten, Botanical Survey, Grahamstown, for assistance in the identification of the plant material used by the bee in nest construction.
A NOTE ON NOTHYLAEUS HERALDICUS (SMITH)
THE MEMBRANE BEE
(Hymenoptera: Colletidae)

J. S. Taylor
Port Elizabeth, Republic of South Africa

Among four species of solitary bees which have occupied artificial nests at Port Elizabeth is one belonging to the Colletidae, namely Nothylaeus heraldicus (Smith), otherwise known as the membrane bee, and perhaps the most widely distributed small bee in South Africa. Dr. S. H. Skaife in his "African Insect Life" (1954) gives an account of this bee and its habits which is largely confirmed by the observations of the present writer at Port Elizabeth. It is hoped that the following notes on the behaviour and habits of this bee at artificial nests at Port Elizabeth will be of interest, especially to those to whom Dr. Skaife's book is not familiar.

The adult bee is about three-eighths of an inch in length, and is reddish brown to black with red antennae and legs. The front of the head is pale yellow and there are two small stripes of the same color on the abdomen.

At Port Elizabeth this bee has twice used the artificial nests, once in April-May 1960 and again in June-July 1961. It has not hitherto been observed at the nest site during summer although it has been obtained from a beetle burrow in a pine stump in December. This autumn and winter nesting would appear to be at variance with its behaviour in the Western Cape where there are two generations per year, in October-November and in January-February, and where the larvae of the second generation, full-grown in April, do not pupate until the spring (Skaife, op. cit.).

N. heraldicus normally nests in any suitable opening such as hollow stems, holes in walls and the burrows of wood-boring insects. The artificial nests which it adopted at Port Elizabeth were glass tubes measuring three inches by three-tenths of-an-inch, the containers for cocaine as used by dentists, and also paper and cellophane cylinders of the same dimensions. The latter were found to be more satisfactory than the glass vials in which nests and their contents are apt to become infected by mould, with fatal results. The vials and cylinders were inserted in a small block of wood situated in an open-sided box on a north-facing windowsill. Four
species of solitary bees, the other three all belonging to the Megachilidae, have now used the artificial nests.

*N. heraldicus* was first observed at the nest site on 23 April 1960 when a female commenced nesting operations and continued thus until 2 June or possibly a few days later. No further sign of the species was then seen at the site until 1 July 1961 when a recently completed nest of three cells was found in a cellophane cylinder. The bee responsible (presumably) was noted constructing another nest in a paper cylinder a few days later and continued working until 26 July when it was last seen.

*N. heraldicus* has been well-named the membrane bee from the structure of its nest. It lines the adopted hole with a salivary secretion which dries into a thin transparent pellicle (*Imms, 1957*). One cell is thus constructed at a time. Invariably, but sometimes before and sometimes after the construction of the first cell, a transverse and horizontal barrier of the same transparent material is formed at a distance of approximately half-an-inch from the entrance to the nest and which has a small round hole in its exact centre through which the bee passes to and from the nest inside. When the base and sides of the cell have been completed the bee supplies it with a semi-liquid mixture of pollen and nectar, resembling, as remarked by Skaife, egg-yolk in color and consistency. He also mentions that the food is much more liquid than that of most solitary bees and that it would soak into the walls of the nest were it not for the waterproof membrane or pellicle. The bee brings the food to the nest in its crop and regurgitates it there, members of the Colletidae lacking the scopula or pollen brushes of the more advanced bees. The long and narrow cylindrical egg is deposited on the honey and the cell is then sealed off leaving sufficient space for the developing larva. A completed cell measures 7 to mm. in length but the first or basal cell may be up to 10 mm. long. The number of cells per nest had varied up to five. In 1960 the bee concerned made five nests containing a total of twelve cells complete with complement of food or honey. In 1961 the bee involved formed four nests, again with a total of twelve fully furnished cells. As Skaife points out, however, the female bee may continue nest construction after her ovaries have become exhausted, and it has been observed at Port Elizabeth that some cells, particularly the last to be made, are abortive although apparently containing the normal
amount of food. He also states that twelve to fifteen cells is the limit of capacity for one bee. When a nest has been completed it is sealed off at or just within the entrance to the hole or container with the same salivary secretion which resembles, to quote Skaife, "a thin sheet of mica."

The period occupied in cell and nest construction varies according to prevailing climatic conditions: in warm weather building may be at the rate of one cell per day but under cold conditions activity is greatly reduced and may cease altogether for the time being. An average of two days per cell would appear to be normal at Port Elizabeth during autumn and winter. On cold days the female bee remains inactive within the nesting hole with its head facing the entrance: it also spends the night in the same position and situation.

The incubation period at Port Elizabeth during July occupied 10 to 11 days—Skaife gives 5 to 10 days for the Western Cape. On hatching the larva lies in a curled position, resembling the letter, C, on the stored honey which it gradually consumes, after which it stretches out lengthways in the cell. The duration of the larval period at Port Elizabeth has not been determined but according to Skaife it occupies some two weeks. When full-grown the larva pupates in its cell—no cocoon is formed—and the adult emerges three to four weeks later, or about two months after the egg was laid. In the case of a nest constructed towards the end of May in Port Elizabeth adult progeny emerged on 26 August, after a period of approximately 96 days in the immature stages. Other nests, completed in June-July, produced adults from late September to early October after periods of some 90 to 97 days.

Hitherto, as mentioned earlier, _N. heraldicus_ has been observed at the artificial nests in autumn and winter only when the duration of the various immature stages would normally be longer, hence the differences in this respect between Port Elizabeth and the Western Cape. It seems possible that nesting is continuous throughout the year at the former while the absence of this bee at the artificial nests there in summer may be due to the fact that these are then so much occupied by other species one of which is greatly given to interference in the nests of others. On the other hand if, as in the Western Cape, there are two generations per year, there must be considerable overlapping. Adults have been recorded
locally from April to July, September—October, and also in December.

The female of *N. heraldicus* is quick and jerky in its movements like a wasp, and it works rapidly smoothing with its tongue the silky gummy material which speedily hardens to form the pellicle. In this operation the tongue performs forward and sideways sweeping movements, the antennae and first pair of legs are also involved. Similarly, after the regurgitation of honey, it smooths the latter over with up and down sweeping movements of the tongue. It may be absent on foraging trips for ten minutes or longer, while the deposition of honey in the cell occupies one or two minutes. The bee has also been seen pushing or working at the honey with the tip of its abdomen. This would continue over a period during which it frequently rubbed the tip of the abdomen with one of the third legs. In this cleaning operation the ovipositor was seen to be extruded slightly. It may have been at or about the time of actual oviposition as the cell concerned was observed being sealed off immediately afterwards.

If the nest tube or vial is at once removed on the return of the occupant from a foraging trip the bee may exhibit agitation and leave the cell in which it is working although not the actual nest. If undisturbed for a few moments, however, the bee will remain unconcerned when the vial is removed and will continue working, even if subjected to close scrutiny with a hand-lens and in bright sunlight.

The male of *N. heraldicus* has not been observed at the nests except at the time of emergence.

Skaife (*op. cit.*) also gives an account of *Gasteruption spilopus*, one of the ensign wasps and a parasite of *N. heraldicus* in the Western Cape. It deposits its egg in a cell of the bee and the subsequent larva feeds on the honey as well as on the egg and larva of the bee. It may thus destroy the contents of two cells before it is full-grown. There are two or three generations per year, and autumn-produced larvae winter as such, not pupating until the spring. It has also been obtained from other solitary bees.

During May 1960 a female ensign wasp was seen on more than one occasion examining the nest site at Port Elizabeth and also thrusting its long ovipositor into several of the nests, as well as entering one of them, posterior end first, and then entirely
disappearing within. On 11 August a male and female wasp emerged from a nest of *N. heraldicus*, after a period of approximately 100 days since the parasite was first noted at the nest site. This wasp was subsequently determined *Gasteruption caffrarium* Schletterer. Two friends of the writer, one in Grahamstown and one in Port Elizabeth, find this wasp commonly on their glassed-in verandahs. In the case of the Port Elizabeth verandah small bees nest in the grooves where the slats of the blinds are inserted. Early in February 1962 the Port Elizabeth friend with the glassed-in verandah, Mr. A. H. Mowbray, collected some of the bees nesting there and they proved to be *N. heraldicus*. This lends support to the view that this bee nests throughout the year in Port Elizabeth, and only uses the artificial nests in winter when there is less competition from other species.

In one instance the megachilid *Heriades freygessneri* Schletterer occupied a recently commenced nest of *N. heraldicus*. The latter had almost completed the first cell when it was taken over by a female of *Heriades* which proceeded to tear the fabric of the cell apart. The rightful owner, which offered no resistance, was shortly afterwards seen prospecting for a fresh site, and a little later it had started a nest in another vial. This same *Heriades* frequently interferes with and takes over the nests belonging to other individuals of its own species as well as the nests of the leaf-cutting megachilid *Megachile (Eutricharaea) gratiosa* Gerstaecker. *Heriades* is active at the nest site from August to April and its presence then in numbers, as has been suggested earlier, may account for the absence of *N. heraldicus* there at that time. It also seems possible that this bee is susceptible to interference.

**Acknowledgment**

The writer is much indebted to Mr. C. Jacot-Guillarmod, Albany Museum, Grahamstown, for the identification of *N. heraldicus* (Smith) and to Dr. E. McC. Callan, Rhodes University, Grahamstown, for the determination of its parasite *Gasteruption caffrarium* Schletterer.

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ABANDONMENT OF DISTURBED HOSTS BY THEIR FLEAS

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Communicable Disease Center, Technology Branch
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Indices of fleas on hosts are of particular concern in ecological studies of parasitism or of plague in nature. The method of capturing hosts for flea counts is important in obtaining accurate indices. For example, more fleas are obtained from live-trapped animals than from animals caught in snap traps (Jameson, 1947; Gross and Bonnet, 1949). Cole and Koepke (1947:8) impugn the validity of indices from animals that have remained long in live traps.

In our work, we have noted an additional factor that may be important in collecting fleas from live animals. On numerous occasions while processing live-trapped rodents, we have observed a mass exodus of fleas from the host that is highly disturbed. This behavior pattern was suggested by Bequaert (1953:215) in the case of hippoboscids. Baltazard and Eftekhar (1957) state that "certain" species of fleas abandon an excited host and suggested blowing on the host as method of removing fleas.

In early March 1959, studies were conducted on the transfer of radioactively tagged fleas from one host to another. The method of handling the rodents for this study and the large number of fleas per host at this particular time made this abandonment pattern apparent and subject to observation. The rodents were captured in cage-type traps fitted with a retreat box to provide shelter and to facilitate removal of animals (Kinney et al., 1957). Animals removed from the retreat box were held over an enameled bucket by the scruff and tail for a period of from 3 to 5 minutes while being scanned with a counter. When radioactivity was detected, the host was anesthetized and all fleas were removed. The animal was released if radioactivity was not detected.

To determine the proportion of fleas that left the host under different conditions of handling, a count of fleas in the bucket was made before and after etherization of each rodent. Care was taken to avoid blowing or breathing on the rodent's pelage during handling. A total of 241 fleas was removed from 10 Microtus californicus and 2 from a single Reithrodontomys megalotis; the latter
2 fleas dropped from the host while it was being held. Of the 241 fleas from *Microtus*, 24 were *Hystrichopsylla linsdalei*, a giant flea identifiable in the field, and the remaining 217 belonged to various smaller species. Fleas were not identified microscopically but were necessarily returned to their hosts as part of the transfer study. Previous checks of flea indices indicated that about 88 percent of the small species were *Malareus telchinus*. Of the 24 *Hystrichopsylla*, 1 was found inside the retreat box of the live trap after removal of the host, 13 left their host while it was being held, and 10 were removed by etherization. Of the 217 smaller fleas, 3 were found in the retreat box, 167 voluntarily left their immobilized host, and 47 were removed by etherization.

The totals of the above numbers of fleas indicated that the majority of fleas remained on the host as long as it was inside the live trap, and afterward if the host was handled carefully. Approximately two-thirds of the fleas left a disturbed host, and the remainder were recovered after etherization. The proportions of collected fleas are shown in Table 1.

Table 1. Proportions of fleas that left forcibly restrained rodent and proportion recovered after etherization of the host.

<table>
<thead>
<tr>
<th>Flea Species</th>
<th>Number and proportion of fleas that voluntarily left host</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Host forcibly restrained</td>
</tr>
<tr>
<td></td>
<td>% left</td>
</tr>
<tr>
<td><em>Malareus telchinus</em> +12% other species**</td>
<td>78</td>
</tr>
<tr>
<td><em>Hystrichopsylla linsdalei</em></td>
<td>58</td>
</tr>
</tbody>
</table>

* Mean number of fleas per host.
** *Asyphlocerus multidentatus multidentatus*, *Catallogia wymani*, and *Opisodasys keeni nestorius*.

In addition to loss of fleas from carelessly handled live-trapped animals, these observations bring up the question of possible effects steel traps might have in calculating flea indices. It seems fairly certain that even though the animal remains alive in a steel trap, the pain, fright and struggling caused by the trap would result in a considerable loss in the number of fleas and consequently in the species composition of fleas obtained from such a host.
The nature of the changes which cause fleas to leave following death of a host or disturbance of living host is not known. However, we wish to emphasize that the reactions of the fleas to the disturbance stimulus was immediate: Few fleas left a quiet host, but if it struggled or became particularly excited, or if the restraining grip was tightened, fleas would often drop in unison.

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NEW DISTRIBUTION AND HOST RECORDS OF NEORHYNCHOCEPHALUS SACKENII (WILLISTON)
(Diptera: Nemestrinidae)

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A recent collection of Neorhynchocephalus sackenii (Williston) has stimulated us to present some additional information on this interesting parasite of certain species of rangeland grasshoppers.


Specimens in the collection of the California Insect Survey now
show that this species also occurs in the Coast Range of California and as far south as the state of Nayarit in Mexico. The specific records are as follows:


**MEXICO.**—Nayarit, Ahuacatlan, ♀, VII-18 to 22-51 (P. D. Hurd).

*Melanoplus sanguinipes* (Fabricius), formerly known as *mexicanus* (Saussure) and later as *bilituratus* (Walker) (Gurney, 1962) is reported by Prescott (1960) as being the major host for *sackenii*. It is no surprise, therefore, to find it parasitizing the very closely related *devastator* in California.

Williston (1894) reported that Prof. Bruner had observed *Rhynchoccephalus sackenii* ovipositing in *Eriogonum alatum*. Prescott (1960) reported it ovipositing in cropped-off stems of *Eriogonum heracleoides* and it will be noted that several of the California collections record females from a third species of wild buckwheat, *Eriogonum latiformis nudum*. Prescott (ibid.) remarks that *sackenii*, contrary to previous reports, preferred galls, cavities and crevices in dead or moribund range vegetation for oviposition sites instead of beetle-riddled and weather-checked fenceposts and telephone poles.

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