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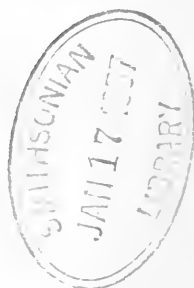
Vol. LXVIII

No. 1

CONTENTS

Stallings and Turner—Four new species of <i>Megathynus</i>	1
Dvorak—A character useful in separating <i>Cafius seminitens</i> Horn and <i>Cafius canescens</i> Makl	17
Muesebeck—New World <i>Apanteles</i> parasitic on <i>Diatraea</i>	19
Review	
Beiträge zur Systematik der Larven der Itonididae	25

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ENTOMOLOGICAL NEWS

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JANUARY, 1957

No. 1

Four New Species of *Megathymus* (Lepidoptera, Rhopalocera, Megathymidae)

By DON B. STALLINGS and J. R. TURNER

Megathymus alliae, new species

FEMALE: Upper surface of primaries. Dull black with the base overscaled with dull yellow-brown. Spots 1 (cell spot), 2, 3, 4 (subapical spots), 5, 6 (submarginal spots), 7, 8 and 9 (discal band) bright yellow-brown. Spot 7, 9 mm. wide; spot 8, 8 mm. wide; spot 9, 7 mm. wide. The dull yellow-brown overscaling extends about halfway in the costal area, and about three-fourths the way towards the outer angle. Veins narrowly edged with dull black. Fringes dull yellow-brown with vein tips smoky.

Upper surface of secondaries. Dull black, basal third covered with dull yellow brown hairs, with further dull yellow brown overscaling in the anal area. The discal band is composed of 5 bright yellow-brown spots, separated by narrow dull black lines along the veins. The discal band is about the same width as the dull black marginal area. Fringes dull yellow-brown with vein tips faintly smoky.

Under surface of primaries. Dull black with the apex heavily overscaled with dull yellow-brown. All the spots reappear with spots 2, 3, and 4 lighter in color.

Under surface of secondaries. Dull black heavily overscaled with dull yellow-brown. The discal band appears only as a series (reduced in size) of lighter spots in the overscaling. There are two faint spots below the costal area.

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Abdomen: Dull yellow-brown above, dull gray-brown below. Thorax: Dull yellow-brown above, beneath dull white. Palpi: Dull white. Antennae: Base of club white, remainder of antennae black above, lighter beneath, showing white at joints.

Expanse of forewing from 30 to 36 mm.; average 35 mm. Wing measurements of holotype: forewing, apex to base 36 mm., apex to outer angle 21 mm., outer angle to base 26 mm.; hindwing, base to end of vein Cu_1 25 mm.

MALE: Upper surface of primaries. Dull black with the base narrowly overscaled with dull yellow-brown. Spots 1, 2, 3, 4, 5, 6, 7, 8, and 9 bright yellow-brown. All spots greatly reduced in size compared with the female. All spots except 2, 3, and 4 separated from each other by more than the width of the veins. Fringes checkered dull yellow-brown and dull black.

Upper surface of secondaries. Dull black, basal half covered with dull yellow-brown hairs, extending outward in the anal area. The bright yellow-brown discal band is again greatly reduced in size, compared with the female. The spots of the discal band are separated by well defined dull black along the veins. Fringes checkered dull yellow-brown and dull black.

Under surface of primaries. Same as the female.

Under surface of secondaries. Same as the female, except that the lighter spots are only faintly discernible.

Abdomen, thorax, palpi and antennae: Same as female except palpi and underside of thorax are dull gray-brown.

Expanse of forewing from 28 to 32 mm.; average 30 mm. Wing measurements of allotype: Forewing, apex to base 30 mm., apex to outer angle 18 mm., outer angle to base 22 mm.; hindwing, base to end of vein Cu_1 20 mm.

Described from 62 specimens (35 males and 27 females) collected 15 miles west of Cameron, Ariz., along the canyon of the Little Colorado River, elevation 5000 ft. All ex-larvae or ex-pupae emerging from Aug. 25 to Oct. 5, during 1953, 1954 and 1955. Collected by Dr. and Mrs. R. C. Turner, Dee, Jack, Don, and Viola Stallings.

Holotype, female, Sept. 23, 1955, 15 miles west of Cameron, ARIZONA, el. 5000 ft. (Turner); *allotype*, male, Sept. 17, 1954, 15 miles west of Cameron, Ariz., el. 5000 ft. (Turner) are in



PLATE I, *Megathymus alliae*

Top row: Holotype, upper side to left; under side to right.
 2nd row: Allotype, upper side to left; under side to right.
 3rd row: Left: ♀ genitalia; center: ♂ valva; right: ♂ uncus.

the collection of the authors. *Paratypes* of both sexes will be placed in the following collections: H. A. Freeman, C. L. Remington, U. S. Nat. Museum, American Mus. of Nat. History, Los Angeles County Museum.

Food plant: *Agave utahensis* Engelm.

It will be interesting to learn whether *M. alliae* uses *Agave kaibabensis* McKelvey (a closely allied species of *Agave utahensis* which occurs on the north rim of Grand Canyon) as a food plant.

The females select medium sized plants for oviposition. The trap door, which is paper white, is nearly always (we have seen one exception) on the under side of the leaf.

It is rather difficult to select the nearest relative of *M. alliae* from which to distinguish it, for *M. alliae* does not fit in with any of the now known groups of species of *Megathymus*. *M. alliae* is the largest known species in the U. S. A. that feeds on the *Agave*. We will distinguish it from *M. baueri* Stallings & Turner as the two species are similar in some respects and occur rather close to each other.

First, *M. alliae* is distinguished from *M. baueri* by its huge size. The ground-color of the upper surface of *M. alliae* is dull black while in *M. baueri* it is deep black. The under surface of *M. alliae* has much heavier overscaling and this overscaling has much more yellow in it than does *M. baueri*. In the female the deep black ground color of *M. baueri* on its upper surface is much more extensive than in *M. alliae*.

The valva of the genitalia of the male *M. alliae* is characterized by having the projection at the apex uniformly narrow. In *M. baueri* and allied species this projection is tapered. In *M. alliae* the uncus seen in lateral view abruptly turns down at its apex while in *M. baueri* and related species the apex curves down, evenly. In the female of *M. alliae* the center portion of the genital plate is built more complex than *M. baueri* and allied species.

This species is named in honor of the mother-in-law and mother of the authors, Mrs. R. C. (Allie) Turner, who has aided materially in our work on the genus *Megathymus* and who collected the first pupa of this new species.

The next three species to be described all belong to the *Megathymus neumogeni* Edwards complex. We will first describe all three, then consider them together with *M. neumogeni* and with *M. chisosensis* and *M. mcclupini* recently described by H. A. Freeman, both of which belong to this group.

***Megathymus judithae*, new species**

FEMALE: Upper surface of primaries. Light orange with a black border along the outer edge of the wing approximately 4 mm. wide. Spots 1 (cell spot), 2, 3, 4 (subapical spots), 5, 6 (submarginal spots), 7, 8, and 9 (discal band) are all fused together with the light orange in the basal area. There is an irregular black spot between the cell and subapical area. There is a black line of color in the costal area towards the base. About equidistant between the base of the wing and the outer angle there is an irregular square black spot (actually two spots fused together) that is 4 mm. wide. Above this fused spot is a small black spot 1.5 mm. wide. Fringes yellow with vein tips black.

Upper surface of secondaries. Light orange with marginal black border. There is a band of black, heavily overscaled with light orange inward from the discal area. This band becomes weaker in color and narrower as it approaches the anal area. Fringes yellow with vein tips black.

Under surface of primaries. Dull brown-black with apex overscaled with white giving it a gray appearance. Spots 1, 2, 3, 4, 5, 6, 7, 8, and 9 appear on this surface as spots. All spots light orange in color except spots 2, 3, and 4 which are white.

Under surface of secondaries. Dull brown-black overscaled with white giving a gray appearance. At the base of the wing there are a few white hairs mixed with light orange hairs. In the anal area there are a few light orange scales mixed with the white scales. The discal band is indicated by heavier white overscaling. There is a round white spot in the costal area with a smaller white spot below it.

Abdomen, orange above, gray-white beneath. Thorax, yellow-gray above, white beneath. Palpi, dull white. Antennae, white ringed with black, base of antennae white, remainder black.

MALE: Upper surface of primaries. Black with the base overscaled with light orange. Spots 1, 2, 3, 4, 5, 6, 7, 8, and 9 light orange, spot 9 narrower than spots 7 and 8. Fringes yellow with vein tips black.

Upper surface of secondaries. Light orange with a marginal black border. All very similar to female. Fringes yellow with vein tips black.

Under surface of primaries. Dull black with apex overscaled with white. Spots reappear as above, except that spots 2, 3, and 4 are white.

Under surface of secondaries. Similar to female with discal band not so well defined.

Abdomen, thorax, palpi, and antennae same as female.

Expanse of forewing of female varies from 25 to 32 mm.; average 30 mm. Wing measurements of holotype: Forewing, apex to base 32 mm., apex to outer angle 18 mm., outer angle to base 22 mm.; hindwing, base to end of vein Cu_1 22 mm.

Expanse of forewing of male varies from 26 to 29 mm.; average 28 mm. Wing measurements of allotype: Forewing, apex to base 28 mm., apex to outer angle 16 mm., outer angle to base 20 mm.; hindwing, base to end of vein Cu_1 20 mm.

Described from 24 males and 23 females collected in the Hueco Mts., near Hueco, Texas, elevation 5300 feet. All ex-larvae or ex-pupae emerging from Sept. 10 to Sept. 30 during 1953 and 1954. Collected by Dr. and Mrs. R. C. Turner, Judith, Gayle, Beulah and J. R. Turner, Dee, Jack, Viola and Don B. Stallings.

Holotype, female, Sept. 21, 1953, Hueco Mts., Hueco, TEXAS, el. 5300 ft. (Turner); *allotype*, male, Sept. 20, 1954, Hueco Mts., Hueco, Texas, el. 5300 ft. (Stallings & Turner) are in the collection of the authors. *Paratypes* of both sexes will be placed in the following collections: H. A. Freeman, C. L. Remington, U. S. Nat. Museum, American Mus. of Nat. History.

Food plant: *Agave parryi* Engelmann. It is well to note here that the name *Agave parryi* is applied loosely. *Agave parryi* in the Hueco Mts. of Texas is not the same thing as *Agave parryi* in the Guadeloupe Mts. of Texas and N. Mex.



PLATE II, *Megathymus judithae*

Top row: Holotype, upper side to left; under side to right.

2nd row: Allotype, upper side to left; under side to right.

3rd row: Left: ♀ genitalia; center: ♂ valva; right: ♂ uncus.

This species is named in honor of Judith Turner, the daughter of J. R. Turner, who was present when the species was discovered and helped collect the type series.

The females select medium sized plants for oviposition. The trap door which is medium brown in color is usually on the upper side of the leaf. The length of the pupal case is 3.3 times the diameter of the case.

Megathymus carlsbadensis, new species

FEMALE: Upper surface of primaries. Bright yellow-orange with a black border along the outer edge of the wing, approximately 5 mm. wide. Spots 1 (cell spot), 2, 3, 4 (subapical spots), 5, 6 (submarginal spots), 7, 8, and 9 (discal band) are all fused together with the bright yellow orange in the basal area. There is an irregular black spot between the cell and subapical area. There is a thick black line of color in the costal area towards the base. About equidistant between the base of the wing and the outer angle there is an irregular black spot (actually two spots fused together). The bottom half of this fused spot is 4 mm. wide, the top half 5 mm. wide. Above this fused spot there is a small triangular spot (with the apex of the triangle pointed towards the base of the wing) that is 2.5 mm. wide. Fringes checkered yellow and black.

Upper surface of secondaries. Bright yellow-orange with marginal black border. There is a band of black overscaled with bright yellow-orange inward from the discal area. Fringes checkered yellow and black.

Under surface of primaries. Brown-black with apex overscaled with white giving it a gray appearance. Spots 1, 2, 3, 4, 5, 6, 7, 8, and 9 appear on this surface as spots, slightly lighter in color than the upper surface, except spots 2, 3, and 4 which are white, and spots 5 and 6 which are pale yellow-orange.

Under surface of secondaries. Brown black overscaled with white giving a gray appearance. At the base of the wing there are a few white hairs, sometimes with a few yellow hairs mixed in. In the anal area there is a strip with little white overscaling but usually has a few light orange scales. The discal band is

faintly indicated by slightly more white overscaling. There is a distinct round white spot in the costal area with a smaller (and fainter) white spot below it.

Abdomen, bright yellow-orange above, gray-white beneath. Thorax orange-gray above, gray white beneath. Palpi, gray-white. Antennae, white ringed with black, base of antennae white, remainder black.

MALE: Upper surface of primaries. Black with the base overscaled with reddish orange. Spots 1, 2, 3, 4, 5, 6, 7, 8, and 9 reddish orange. Spots 7, 8, and 9 all about the same size (3 mm.). Fringes yellow with vein tips black.

Upper surface of secondaries. Reddish orange with a marginal black border. All very similar to the female. Fringes checkered yellow and black.

Under surface of primaries. Brown-black with apex overscaled with white. Spots reappear as above, except that spots 2, 3, 4, 5, and 6 are white.

Under surface of secondaries. Similar to female.

Abdomen, thorax, palpi, and antennae same as female except for reddish orange color of abdomen and thorax above.

Expanse of forewing of female varies from 26 to 31 mm.; average 30 mm. Wing measurements of holotype, forewing, apex to base 30 mm., apex to outer angle 18 mm., outer angle to base 22 mm.; hindwing, base to end of vein Cu_1 22.5 mm.

Expanse of forewing of male varies from 25 to 29 mm.; average 27 mm. Wing measurements of allotype, forewing, apex to base 26 mm., apex to outer angle 15 mm., outer angle to base 19 mm.; hindwing, base to end of vein Cu_1 19 mm.

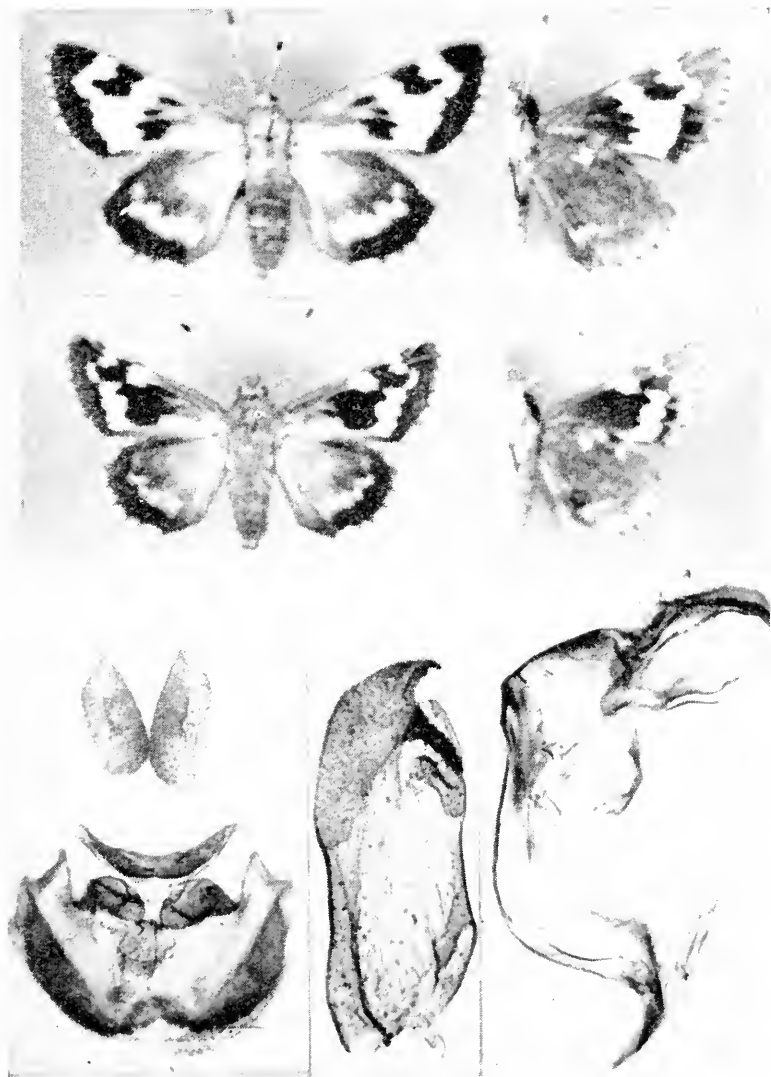
Described from 37 males and 25 females collected in the Guadeloupe Mts., Carlsbad Cavern National Park, New Mexico and immediately south around Nickle, TEXAS, in the Guadeloupe Mts., elevation from 4300 ft. to 5700 ft. All ex-larvae or ex-pupae emerging from Sept. 14 to Oct. 1st, during 1953 and 1954. Collected by Dr. and Mrs. R. C. Turner, Judith, Gayle, Beulah and J. R. Turner, Dee, Jack, Viola and Don B. Stallings.

Holotype, female, Sept. 21, 1953, Gaudeloupe Mts., Carlsbad Cavern National Park, NEW MEXICO, on the mesa at head of

Yucca Canyon, el. 5470 ft. (Turner); *allotype*, male, Sept. 21, 1953, same data and collector, are in the collection of the authors. *Paratypes* of both sexes will be placed in the following collections: H. A. Freeman, C. L. Remington, U. S. National Museum, American Mus. of Nat. History.

Food plant: *Agave parryi* Engelmann. There are three species of *Agave* plants in the Guadeloupe Mts.: *A. parryi*, *A. lechuguilla* Torrey and what we believe to be *A. chisosensis* Mueller (Mrs. Stallings and some other members of the family feel that the last named may in fact be a hybrid between the first two named).

In this area *Agave lechuguilla* always produced *Megathymus mariac* and nothing else. In the area around Nickle, Texas (Parker Ranch) we found *A. parryi* and *A. chisosensis* in about equal numbers, and in this area *Megathymus carlsbadensis* laid eggs on both species of plants in about equal numbers. In August of 1954 we made a rather careful survey of the situation. At that time nearly 80% of the *A. parryi* plants that had had eggs of *M. carlsbadensis* laid on them, still had live larvae in the leaves (these were plants that showed that the larvae had hatched from the egg and entered the leaves). On the other hand only 20% of the *A. chisosensis* plants at that time (which had had larvae hatch and enter the leaves) had live larvae. We were successful in securing 6 butterflies from *A. chisosensis*, but these were not included in the type series of *M. carlsbadensis*. The first specimen that hatched from *A. chisosensis* (a female) was distinctly different from *M. carlsbadensis*; the other five specimens appear identical to *M. carlsbadensis*. H. A. Freeman and C. L. Remington, who have both examined the above mentioned female, are of the opinion that this female may be a distinct species. More specimens will have to be secured before a final determination can be made. In the meantime, we are inclined to consider the five other specimens that we secured from *A. chisosensis* as belonging to *M. carlsbadensis*, although we do not consider *A. chisosensis* the normal food plant. Population pressure could explain the use of this plant as food.

PLATE III, *Megathymus carlsbadensis*

Top row: Holotype, upper side to left; under side to right.

2nd row: Allotype, upper side to left; under side to right.

3rd row: Left: ♀ genitalia; center: ♂ valva; right: ♂ uncus.

The females select medium sized plants on which to lay eggs. The trap door, which is amber in color, is usually on the upper side of the leaf. The length of the pupal case is 3.6 times the diameter of the case.

Megathymus florenceae, new species

FEMALE: Upper surface of primaries. Bright orange with a dull black border along the outer edge of the wing, approximately 4 mm. wide. Spots 1 (cell spot), 2, 3, 4 (subapical spots), 5, 6 (submarginal spots), 7, 8, and 9 (discal band) are all fused together with the bright orange in the basal area. There is an irregular black spot between the cell and subapical area. There is a thin black line of color (sometimes absent) in the costal area towards the base. About equidistant between the base of the wing and the outer angle there is an irregular black spot (actually two spots fused together). The bottom half of the fused spot is 3 mm. wide, the top half 4 mm. wide. Fringes checkered yellow and dull black.

Upper surface of secondaries. Bright orange with marginal black border. There is a band of dull black overscaled with bright orange inward from the discal area. Fringes checkered yellow and dull black.

Under surface of primaries. Dull black with apex overscaled with white giving it a gray appearance. Spots 1, 2, 3, 4, 5, 6, 7, 8, and 9 appear on this surface as spots. All spots bright orange, except spots 2, 3, and 4 which are white.

Under surface of secondaries. Dull black sparsely overscaled with white giving a dark gray appearance. At the base of the wing there are a few white hairs mixed with light orange hairs. In the anal area there are less white scales, with some light orange scales mixed with them. The discal band is indicated by heavier white overscaling. There is a round white spot in the costal area.

Abdomen, bright orange above, gray-white beneath. Thorax, orange-gray above, gray-white beneath. Palpi, dull white. Antennae, white, ringed with black, base of antennae white, remainder black.

MALE: Upper surface of primaries. Dull black with the base overscaled with bright orange. Spots 1, 2, 3, 4, 5, 6, 7, 8, and 9 bright orange. Spot 8 (5 mm.) wider than spots 7 and 9. Inward from spot 8 there is a black spot with a small bright orange spot inward from this black spot. Fringes yellow with vein tips black.

Upper surface of secondaries. Bright orange with a marginal black border, all very similar to the female. Fringes checkered yellow and black.

Undersurface of primaries. Dull black with apex overscaled with white. Spots reappear as above except that spots 2, 3, and 4 are white.

Undersurface of secondaries. Similar to female.

Abdomen, thorax, palpi and antennae same as female.

Expanse of forewing of female varies from 26 to 31 mm.; average 30 mm. Wing measurements of holotype, forewing, apex to base 30 mm., apex to outer angle 19 mm., outer angle to base 21 mm.; hindwing, base to end of vein Cu_1 21 mm.

Expanse of forewing of male varies from 24 to 29 mm.; average 28 mm. Wing measurements of allotype, forewing, apex to base 28 mm., apex to outer angle 16.5 mm., outer angle to base 20 mm.; hindwing, base to end of vein Cu_1 20 mm.

Described from 16 males and 31 females collected in the Davis Mountains near Ft. Davis, Texas, el. 6200 ft. All ex-larvae or ex-pupae emerging from Sept. 17th and Oct. 5th, 1954. Collected by Dr. and Mrs. R. C. Turner, Dee, Jack, Viola and Don B. Stallings.

Holotype, female, Sept. 23rd, 1954, Davis Mts., Ft. Davis, TEXAS, el. 6200 ft. (Stallings & Turner); *allotype*, male, Sept. 17th, 1954, Davis Mts., Ft. Davis, Texas, el. 6200 ft. (Stallings & Turner) are in the collection of the authors. *Paratypes* of both sex will be placed in the following collections: H. A. Freeman, C. L. Remington, U. S. National Museum, American Mus. of Nat. History, Los Angeles County Museum.

Food plant: We have not been able to satisfy ourselves as to the species of plant in the Davis Mts. at this elevation (6200 ft.). It appears to be between *A. parryi* and *A. scabra* Lam-Dyck.

This species is named in honor of Miss Florence Draper, who gave the first named author, a great deal of encouragement, when a small boy, to continue his work in the field of the Lepidoptera.

For a number of years both H. A. Freeman and our group have known that a species of *Megathymus* occurred in the Davis Mts. None of us had been able to find the larvae. In 1954 Freeman was supposed to join us in a joint effort to work out the problem, but at the last minute was unable to join us. Plants of all sizes were plentiful in the area that we hunted (this species of *Agave* grows considerably bigger than *A. parryi*), but the first day that we hunted we found only one larva in a medium sized plant and it was parasitized. The second day as we continued to hunt without a sign of a larva Jack Stallings suggested that we check some of the tiny juvenile plants that are so small that they do not reach the height of the short grass in the area. Improbable as this seemed we started checking the tiny plants. The larvae were there. All of the type series were collected from these tiny plants. This distinct difference in the size of the food plant selected by the female upon which to oviposit is, in our opinion, a significant difference between this species and other species of this species group which use much larger (and older) plants on which to lay eggs. Later this same year, while on Mingus Mt. in Arizona hunting for larvae of *M. neuvoegeti*, we found that *M. neuvoegeti* uses the tiny juvenile plant for the food plant.

The trap door, which is amber in color, is usually on the upper side of the leaf. The length of the pupa case is 4.35 times the diameter of the case, and this difference in proportions from the two previously described species we also consider significant.

We are well aware that in describing allopatric species such as these that it may be that we are dealing with subspecies of one polytypic species. If we were separating these species on morphological characters alone we would be more inclined to treat them as subspecies. Another difficulty with treating them as subspecies is that with six distinct forms before us no cline

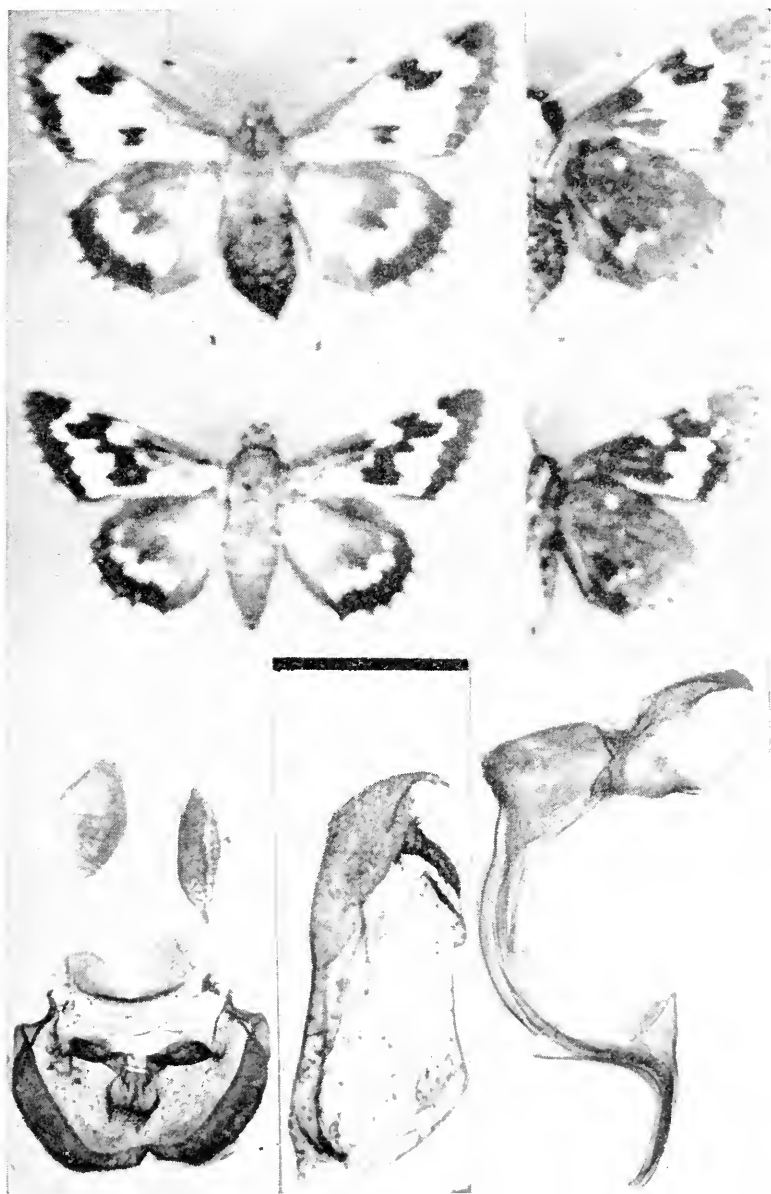


PLATE IV, *Megathymus florenceae*

Top row: Holotype, upper side to left; under side to right.

2nd row: Allotype, upper side to left; under side to right.

3rd row: Left: ♀ genitalia; center: ♂ valva; right: ♂ uncus

seems to appear. Freeman has already described two species (*chisosensis* and *mcalpinci*) in this group and has examined the type series of the three here described and agrees with us that all are species.

While all six species appear somewhat alike it is rather simple to separate them by constant differences. One of the key differences in the females is the black spots on the upper surface of the forewing located between the base of the wing and the outer angle, usually two or three spots, one above the other. If the spot is about round we call it a *dot* and if elongated a *dash*, if one of the spots is absent we call that a *blank*. Listing the spots from the bottom to the top of the wing, we then have:

neumoegeni:—dash-dash-dot
chisosensis:—dot-dash-dot
mcalpinci:—dot-dash-dot
judithae:—dash-dash-dot
carlsbadensis:—dash-dash-dot
florenciae:—dash-dash-blank

This key separates *florenciae* into a group by itself, *chisosensis* and *mcalpinci* into a second group and *judithae*, *carlsbadensis* and *neumoegeni* into a third group. *Neumoegeni* (in both sexes) separates from all the others by its slightly smaller size and the darker ground color (less white overscaling) of the undersurfaces of both wings. *Judithae* (in both sexes) separates from the others by its lighter orange color. *Chisosensis* (in both sexes) separates from the others by the extreme amount of black on the upper surfaces of both wings. The "dot" on the female *neumoegeni* is much smaller than on either *judithae* or *carlsbadensis*.

In the males of the six species (except *chisosensis*) on the upper surface of the forewings there is a large irregular black spot near the base of the wings. This spot is roundish in *neumoegeni*, *judithae* and *carlsbadensis*, and is rectangular (longer with the body, than wide) in *florenciae* and *mcalpinci*. In *florenciae* the bright orange spot inward from spot 8 always separates it from *mcalpinci*.

All six species are found in isolated desert mountains; the habitat, however, differs. *Neumoegeni*, *chisosensis* and *florenceae* are found in open woods while *carlsbadensis*, *judithae* and *mcalpinei*, particularly the first two, are found in open country. The last three named lay eggs on medium to large plants; *neumoegeni* and *florenceae* lay their eggs on tiny juvenile plants. From the few larvae and pupae collected it appears that *chisosensis* lays its eggs on medium to large plants.

The genitalia of the six species are different; however, the female genitalia seem to break into two groups: *mcalpinei*, *carlsbadensis* and *florenceae* in one group and *neumoegeni*, *judithae* and *chisosensis* in the other. The male genitalia break into three groups: *neumoegeni* and *judithae*; *florenceae* and *mcalpinei*; *chisosensis* and *carlsbadensis*.

A Character Useful in Separating *Cafius* (sg. *Bryonomus* Csy.) *seminitens* Horn and *canescens* Makl. (Coleoptera: Staphylinidae)

By RUDOLF DVOŘÁK, Praha, Czechoslovakia

Cafius (*Bryonomus*) *seminitens* Horn and *C. (B.) canescens* Makl. are two very closely related species, both of which may occur at the same time in the same localities in California. To distinguish these two species from each other may often be very difficult, and mistakes in identification have often been made. In using existing keys and works of authors one is often at a loss to separate these two species in a large series of specimens due mainly to the individual variability of the shagreen on the shining spots of the head and thorax.

Thanks to Mr. R. Q. Bliss of the Academy of Natural Sciences of Philadelphia and to Mr. R. L. Gillogly of California I received a large number of specimens of both species, and consequently was able to discover that the male copulatory organs constitute an excellent differentiating feature. Sketches of these parts of both species are presented herewith.

C. (B.) seminitens has the end of the aedeagus well rounded, the paramere stouter and a little shorter. In lateral view, the top also appears rounded. *C. (B.) canescens*, on the contrary, has an aedeagus with the top prolonged and pointed, and the paramere narrower. The lateral view shows a more swollen convex outline at the end of the outer side.

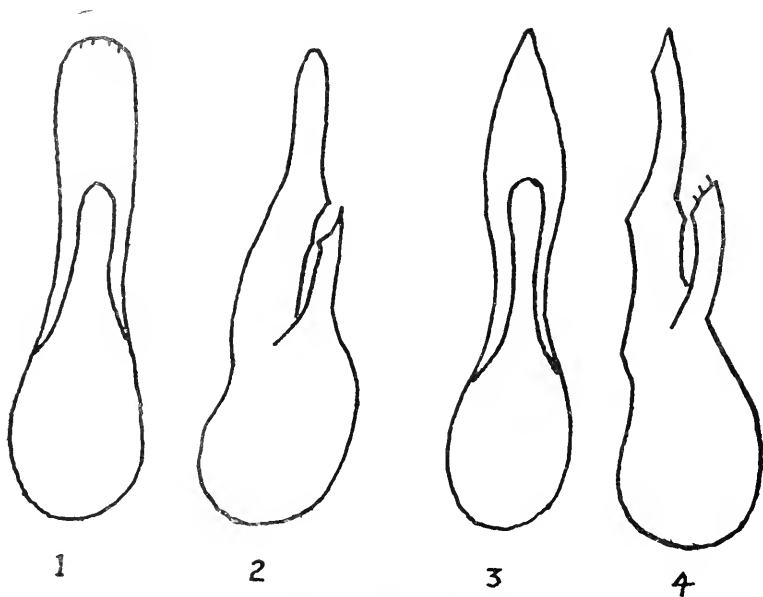


FIG. 1. *Cafius (Bryonomus) seminitens* Horn. Aedeagus.
FIG. 2. The same, lateral view.
FIG. 3. *Cafius (Bryonomus) canescens* Makl. Aedeagus.
FIG. 4. The same, lateral view.

New World *Apanteles* Parasitic on *Diatraea*. (Hymenoptera: Braconidae)

By C. F. W. MUESEBECK, United States National Museum

The seven species of *Apanteles* treated here, of which three were previously described, develop in larvae of species of *Diatraea* that live in the stems of certain grasses. One of them, *xanthopus* (Ashmead), is a solitary parasite; all the rest are gregarious and their cocoons, when formed, are tightly packed in the host burrows.

The following key will distinguish the seven forms.

1. Propodeum with a broad, sharply margined areola, and with distinct costulae that set off large apical, lateral areas. A solitary parasite.....*xanthopus* (Ashmead)
Propodeum without an areola or with a very narrow one that is usually poorly defined, and with no suggestion of costulae. All gregarious parasites.....2
2. Mesoscutum impunctate.....*impunctatus* Muesebeck
Mesoscutum distinctly punctate, at least anteriorly.....3
3. Plate of first tergite narrowing conspicuously from middle to apex; tegulae pale.....4
Plate of first tergite parallel-sided from middle to apex; tegulae black or blackish.....5
4. Hind femora black; length about 3 mm.; female antennae nearly as long as the body; ovipositor sheath longer than hind tarsus.....*minator*, new species
Hind femora yellow; length about 2 mm.; female antennae much shorter than the body; ovipositor sheath not longer than hind femur.....*zizaniae*, new species
5. Anterior and middle femora entirely yellow; hind femora piceous apically.....*abditus*, new species
Anterior femora in part, and middle and hind femora entirely, black.....6
6. Plate of first tergite about twice as long as broad; second flagellar segment of female antenna as long as first and twice as long as wide; ovipositor sheath longer than hind femur.....*diatracae* Muesebeck
Plate of first tergite three times as long as broad; second flagellar segment of female antenna shorter than first and not nearly twice as long as wide; ovipositor sheath shorter than hind femur.....*deplanatus*, new species

***Apanteles xanthopus* (Ashmead)**

Urogaster xanthopus Ashmead, 1900. Trans. Ent. Soc. London 1900, Pt. 2: 288. ♀.

The type is from the island of St. Vincent. Numerous additional specimens in the U. S. National Museum are labeled as having been reared from *Diatraea saccharalis* (F.) in Argentina, Uruguay and Brazil. Jaynes, 1933 (U. S. Dept. Agr. Tech. Bull. 363: 21), points out that the cocoons occur singly in the smaller tunnels of the host, indicating that only one parasite develops in a host larva, and suggesting further that the *Apanteles* attacks the very small borers "shortly after they enter the stalk, or possibly even before they actually enter it."

This differs strikingly from all the other American species parasitic on *Diatraea* in its strongly sculptured and areolate propodeum. The thorax is not noticeably depressed; the female antennae are fully as long as the body; the mesoscutum is closely, finely punctate, confluent so anteriorly; the plate of the first tergite is nearly parallel-sided and about twice as long as broad at apex, and the ovipositor sheath is at least as long as the hind femur but decidedly shorter than the hind tibia. The legs, including all coxae, are yellow.

***Apanteles impunctatus* Muesebeck**

Apanteles impunctatus Muesebeck, 1933. Proc. Ent. Soc. Wash. 35: 194. ♂ ♀.

This species is known only from the type series of 18 specimens which were reared from a single larva of *Diatraea saccharalis* (F.) in Louisiana.

***Apanteles minator*, new species**

This is conspicuously the largest of the known American gregarious species of *Apanteles* that parasitize *Diatraea* larvae. It differs further in its less strongly depressed thorax, and in its longer ovipositor sheath which is longer than the hind tarsus.

Female. Length 3 mm. Head not broader than thorax; face only slightly convex, smooth and shining; frons polished;

temple with weak, setigerous punctures, somewhat receding; antenna nearly as long as the body, flagellar segments 1 to 8 at least twice as long as broad, the first not longer than the second.

Thorax a little broader than high; mesoscutum rather closely punctate, especially anteriorly, impunctate and polished at posterior border; disc of scutellum flat, polished, impunctate; polished area on lateral face of scutellum triangular and extending almost to base; propodeum indefinitely sculptured along lateral margins and down the middle, with an indication of a narrow, elongate areola; meso- and metapleuron impunctate, polished; hind coxa polished; inner spur of hind tibia much less than half as long as metatarsus; radius tending outward, very slightly longer than intercubitus; stigma and metacarpus subequal in length.

Abdomen with plate of first tergite narrower at apex than at base, more than twice as long as broad at apex, the apical half finely longitudinally rugulose and with a shallow, longitudinal median impression; plate of second tergite smooth and polished, slightly broader at base than long, defined laterally by strongly oblique grooves that diverge caudad, its posterior margin arcuate; ovipositor sheath slightly curved downward at apex, a little longer than hind tarsus.

Black; antennae, labrum and mandibles brownish black; tegulae transparent whitish; wings hyaline, stigma and veins hyaline except stigmal margin, radius, intercubitus and stub of last abscissa of cubitus, which are pale brown; anterior and middle legs brown, their coxae blackish; hind legs with coxae black, trochanters brown, femora piceous, tibiae light brown on basal two-thirds and blackish on apical third, and tarsi brownish black.

Male. Like the female except for the normal sexual differences and in having the antennae longer than the body and the legs more extensively darkened.

Type. U. S. National Museum No. 63285.

Type-locality. Misiones, ARGENTINA.

Described from five females and three males reared from *Diatraea angustella* Dyar by H. L. Parker.

Apanteles zizaniae, new species

Distinguished from all the other gregarious species considered here, except *impunctatus*, by its entirely yellowish legs, and from *impunctatus* by its distinctly punctate mesoscutum.

Female. Length about 2 mm. Face strongly convex, only about one-third as long as broad, weakly punctate and subopaque; frons smooth and polished, more than twice as long as face; level of upper eye margins far below anterior ocellus; antenna much shorter than the body, first flagellar segment longer than second, second twice as long as broad, flagellar segments 10 to 15 not distinctly longer than broad.

Thorax strongly depressed; mesoscutum distinctly punctate, the punctures weaker posteriorly; disc of scutellum flat, smooth and polished; propodeum nearly horizontal, mat, finely rugulose, and with a poorly defined median longitudinal area; first abscissa of radius and intercubitus subequal in length, meeting in a very weak angle; hind coxa smooth and shining; hind femur about three times as long as its greatest width; inner calcarium of hind tibia hardly half as long as metatarsus.

Abdomen with plate of first tergite parallel-sided on basal half, narrowing gradually from middle to apex, about three times as long as broad at apex, finely rugose, its flexible margins broad; plate of second tergite smooth and polished, strongly transverse, defined laterally at base by short, widely divergent grooves, less than half as long as broad at base and only one-fourth as long as the third tergite; suture separating second and third tergites very weak, sometimes not distinct; ovipositor sheath hardly as long as hind femur.

Head and thorax black; abdomen dark brown, with plate of first tergite black; antennae brown, yellowish basally; all legs yellowish; wings hyaline, stigma brown.

Male. Essentially like the female but with the antennae as long as the body, more slender than in the female and paler in color.

Type. U. S. National Museum No. 63286.

Type-locality. Anacostia Island, DISTRICT OF COLUMBIA.

Described from 16 females and 1 male reared by C. E. Chambliss from *Diatraca* sp. in wild rice from the type locality, and 3

specimens of each sex reared from a larva of *Diatraea* sp. in wild rice, at Wilmington, Delaware, by H. L. Dozier.

Apanteles abditus, new species

In habitus very similar to *diatraeae* Muesebeck, but distinguished especially by the much narrower sclerotized plate of the first tergite which is more than three times as long as its median width, by its somewhat shorter antennae and paler legs, and by having the first abscissa of the radius usually shorter than the intercubitus.

Female. Length about 2 mm. Head broader than thorax; face much broader than long, convex, smooth and shining; frons and vertex smooth and shining, impunctate; temple not receding but less than half as wide as eye; antenna shorter than body, first flagellar segment conspicuously the longest, flagellar segments 10 to 15 as broad as long.

Thorax strongly depressed; mesoscutum shining, sparsely punctate on anterior two-thirds, impunctate and polished posteriorly; disc of scutellum flat, impunctate, polished; propodeum only slightly declivous, finely rugulose, with a poorly defined, narrow, median longitudinal area and without costulae; mesopleuron polished, impunctate; posterior femur rather stout; inner calcarium of hind tibia less than half as long as metatarsus; first abscissa of radius usually distinctly shorter than intercubitus and joining the latter in a distinct angle.

Abdomen about as long as thorax; sclerotized plate of first tergite more than three times as long as its greatest width, nearly parallel-sided, weakly sculptured on caudal half; second tergite with two short, oblique furrows delimiting the central plate basally; suturiform articulation not evident; abdomen beyond first tergite polished; ovipositor sheath about as long as hind femur.

Black; antennal flagellum yellowish brown toward base; palpi pale yellow; all coxae black; remainder of legs yellowish except hind femora which are more or less piceous, and hind tibiae apically and hind tarsi which are dusky; tegulae and wing bases blackish; wings subhyaline, stigma pale yellow, transparent; veins pale.

Male. Essentially like the female but with the antennae slender and longer than the body, all the flagellar segments being at least twice as long as broad.

Type. U. S. National Museum No. 63287.

Type-locality. Itaquaquecetuba, BRAZIL.

Described from 20 females and 1 male reared by H. L. Parker from a *Diatraea* larva in a grass belonging to the genus *Panicum*.

Apanteles deplanatus, new species

Most similar to *abditus*, described above, but with the posterior legs largely black, the stigma brown rather than hyaline as in *abditus*, and the propodeum smooth and shining each side of the median area.

Female. Length about 2 mm. Face twice as broad as high, convex, shining, weakly punctate; antennae longer than head and thorax combined but shorter than the body; first flagellar segment distinctly longer than second, which is less than twice as long as broad; last ten segments of flagellum as broad as long.

Thorax strongly depressed, flattened above; mesoscutum shining, with numerous though distinctly separated punctures except posteriorly where it is smooth and polished; disc of scutellum flat, polished and impunctate; propodeum nearly horizontal, only very slightly and gradually declivous caudad, with a weak suggestion of a median longitudinal area, the space between this and the large spiracle on each side smooth and polished, the posterior lateral angles a little rugulose; first abscissa of radius and intercubitus subequal and meeting in a distinct angle; hind coxa smooth and polished; hind femur only slightly more than twice as long as broad; hind tibia conspicuously thickened apically, its inner calcarium nearly or quite half as long as metatarsus.

Abdomen with plate of first tergite more than three times as long as broad, very weakly sculptured; second tergite less than half as long as third, its central plate barely as long as broad at base, defined laterally by sharp, posteriorly divergent grooves, smooth and polished; the following tergites smooth and polished; ovipositor sheath shorter than hind femur.

Black; antennae brownish basally; anterior femora apically, anterior and middle tibiae and their tarsi yellowish brown; hind tibiae brown basally; wings hyaline, stigma brown.

Type. U. S. National Museum No. 63288.

Type-locality. MEXICO.

Described from 12 female specimens reared from a larva of *Diatraea* sp. in sugarcane from an unknown locality in Mexico, intercepted at Laredo, Texas, March 2, 1949, by inspectors of the U. S. Department of Agriculture.

Apanteles diatraeae Muesebeck

Apanteles diatraeae Muesebeck, 1921. Proc. U. S. Nat. Mus. 58: 491, 520. ♂ ♀.

The type series is from Cuba but I have seen numerous specimens from other islands of the West Indies, and also from various localities in Central and South America, as well as one series from Arizona. The recorded hosts are *Diatraea saccharalis* (F.), *D. lineolata* (Walk.), and *Zediatraea grandiosella* (Dyar).

Professor Bradley Honored by the Tenth Congress

One of the actions taken by the recent Tenth International Congress held at Montreal was the election of DR. J. CHESTER BRADLEY as an Honorary Life Member of the congresses. Dr. Bradley also continues as a member of the Permanent Committee of the entomological congresses. DR. O. A. JOHANNSEN is the only other American Honorary Life Member, having been elected at the Stockholm congress in 1950. Both Professors Bradley and Johannsen have long been members of the American Entomological Society and contributors of scientific papers to ENTOMOLOGICAL NEWS.

Review

BEITRÄGE ZUR SYSTEMATIK DER LARVEN DER ITONIDIDAE (= CECIDOMYIIDAE, DIPTERA). Teil 1: Porricondylinae und Itonidinae Mitteleuropas, by Edwin Möhn. Zoologica, Band 38, Lieferung 1, Heft 105, Lieferung 1 and 2, pp. 1-247, 30 plates. 1955.

In spite of the fact that there is an abundance of gall midges in Europe, and many are of economic importance, very few entomologists have turned their attention to a taxonomic study of the larvae of these insects. Dr. Möhn is presenting for the first time a comprehensive treatise on the larvae for the entire family Itonididae. Part 1 is a very admirable study of the subfamilies Porricondylinae and Itonidinae, which comprise the vast majority of the family. (It should be mentioned that at the Copenhagen Congress, the International Committee on Zoological Nomenclature ruled that a family name may be based on a genus placed in synonymy. Hence the Meigen 1800 names do not invalidate the better known family names in the Diptera, and Cecidomyiidae must replace the rather recent change to Itonididae. Similarly the Porricondylinae must revert to the Epidoseinae. However, the usage employed by Dr. Möhn is employed in this review.)

Following a section describing the taxonomic features exhibited by the larvae, there is a brief section on their biology and ecology. The section on general taxonomy is a valuable contribution on comparative morphology as related to phylogenetic relationships. On a basis of personal study, Dr. Möhn has been able to characterize 129 genera, while 15 other genera are included on a basis of published descriptions. Only 31 genera that are known to occur in central Europe remain unknown.

Keys are presented to the subfamilies and genera. It is particularly noteworthy that this is the first time that keys have been prepared for the identification of the larvae of porricondyline, asphondyliine, oligotrophine, and lasiopterine midges.

Although certain anatomical features of cecidomyiid larvae were first noted rather early in the eighteenth century, it was

not until late in the nineteenth century that any attempt was made to present a diagnostic description. Shortly thereafter, J. J. Kieffer began to pioneer larval systematics, and in 1913 he presented keys to many of the lestromiine and cecidomyiine genera.

Dr. Möhn has provided the first comprehensive work on gall midge larvae since that by Kieffer. It is generally accepted that Kieffer maintained no collection, but Dr. Möhn was fortunate in having access to the valuable material of Rübsaamen. He was also able to study larval specimens from the extensive collection of Dr. H. F. Barnes and enlisted the aid of other cecidologists.

The higher classification of gall midges until rather recently has consisted of three subfamilies, in one of which a few tribes were recognized. Enderlein (1936) recognized four subfamilies and a very large number of tribes, his work, of course, being based on adult morphology; but his classification, for the most part, has not been accepted. Limited contributions toward a suprageneric classification have more recently been made by F. W. Edwards; and M. J. D. White has made proposals based on cytological studies.

This is the first attempt to further our knowledge of the phylogenetic relationships of the gall midges on a basis of morphological studies of the larvae. Dr. Möhn recognizes the four subfamilies of Enderlein. Furthermore, he recognizes within the Itonidinae the four supertribes of Enderlein. However, larval relationships are found to be strongly divergent to Enderlein's opinions concerning tribes and subtribes. Rather than use formal names that might lead to confusion, Dr. Möhn has merely recognized a large number of generic groups to show immediate relationships.

Thus, in this excellent monograph, a new tool has been used to clarify phylogenetic relationships within the Itonididae, keys have been presented to facilitate identification of the larvae of most of the middle European genera, and a diagnosis is given of each genus and many species. It is hoped that there will be no delay in Dr. Möhn's treatment of larval forms representing the rest of the family.—A. EARL PRITCHARD

NOTICE: The December 1956 issue of ENTOMOLOGICAL NEWS was mailed at the Post Office at Lancaster, Pa., on December 1, 1956.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspy, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Wanted—Data on exact location of colonies of *Epibembex* (olim *Bembix*) (Hymenoptera), any species, any part of country, for biological studies. Howard E. Evans, Dept. Entomology, Cornell Univ., Ithaca, N. Y.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

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THE NEOTROPICAL SPECIES OF THE 'SUBGENUS AESCHNA' SENSU SELYSII 1883 (Odonata)

By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeshna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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FEBRUARY 1957

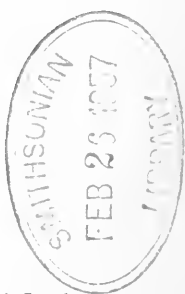
Vol. LXVIII

No. 2

CONTENTS

Phillips—How much do you pay for your fun?	29
Judd—Diptera collected from bird's nests	32
Blickle and Conklin—Distribution of Dermacentor	34
Sublette—Immature stages of Polypedilum obtusum	37
Nomenclature notice	40
Brown—Early entomological collectors in Colorado	41
Lewis—Distribution of the bat flea, Nycteridopsylla	48
Schmieder—Hermann Weber (1899–1956)	49
Review—A morphological study of a relic dragonfly Epiophlebia superstes Selys	53
Books Received	55

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ENTOMOLOGICAL NEWS

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No. 2

How Much do You Pay for Your Fun?

By MAURICE E. PHILLIPS

This may seem a light subject for the *News*, but a very serious matter is involved. Pure scientific research, so-called, has always been considered by its devotees as an inviolable field—akin to a man's religion. It is the fiber of which our journals are made.

Of those who contribute papers to such periodicals a question might be asked: why did you become an entomologist, a botanist, an ichthyologist? That you are definitely characterized in moving pictures and on television as something of a freak, and as a harmless screw-ball by the public at large must mildly fret you at times. But I now ask this question and invite you to join me in seeking an answer.

For our present purposes it will do you no good unless you seriously indulge for a time in a little introspection; forget the standard answers and get down to brass tacks—why *did* you? There must be good reasons, worth-while compensations.

There are several fairly obvious possible replies to the question we have asked. Could the answer lie in the field of our personal economics—do we expect to get rich at it? This seems hardly likely. The number of pure research scientists who amass a fortune by their endeavours is small indeed. They usually make an adequate living, but I know many who draw a smaller wage than a first-class union plasterer. The average young research scientist just starting his career, has spent seven or eight expensive years of his time and effort in college—he is an intelligent young man or he would not be where he is today.

With his natural talents and the same amount of time spent in business training, he could go places in the business world. Money, therefore, seems hardly the answer.

Could it be that there are involved here various aspects of nobility and self-sacrifice? Are we throwing our considerable talents into the pot for the uplift of mankind—for sweet charity's sake? In many years' association with universities and research institutions, I have known hundreds of research scientists. On the whole they are as fine a group of people as you can find anywhere. They don't beat their wives, they love their children, they go to the polls, and they come as near living by the Golden Rule as any segment of society you are apt to examine. But I have never observed in them any very obvious force driving toward humanitarian uplift. They know, of course, that a project on which they are working, and which may have no apparent practical value, may some day turn out to have one, but it would be gambling their time to assume it—and they are not a race of gamblers.

What do we have left then? It may be heresy even to think it, but the most apparent answers are: fun and glory. These may seem cynical answers, but they are human; they may suggest clay feet, but who can cast stones at clay feet? There can be no question but the research scientist looks with high approval at his name on papers—with more approval yet if it is on many papers. I do not condemn this; I have felt the tug myself. The number of his readers will not be large—his works are not best sellers, but the approval of his fellow scientists is one of life's sweetest treasures.

But the big pay-off for the research scientist is *fun*—he really has it. Many of the world's greatest have no hobbies but their work. They live and breathe it; they eat with it; they take it home in brief cases, satchels and bags; when not doing it they talk about it most of their waking time. They would be very unhappy and neurotic if their fathers had insisted they be mechanics. Some have never learned how to dance, it is a waste of time to go to the movies; anyway they are having too good a time with their research—it *is* their recreation, their amusement. If you have never been one you will never know the

pull of the unknown, the lift from finding out, and adding to the "sum-total of human knowledge." If you *are* one of these lucky people, how much are *you* paying for your fun? The budget experts concede that it is just and proper to expend at least 5% of your income for amusement and recreation.

It is unquestionable that a tradition has grown up that after a scientist has devoted his skills to doing a piece of research, it is his just due that it be published at no cost to him. This, even though a mass of such published work may immeasurably increase his scientific stature and, to a considerable extent his salary.

Entomological News is one of the many journals, which as the organ of an independent society, is feeling the pinch in the matter of imposing no amusement tax on its authors. An analysis of the 1956 volume, exclusive of the December issue, reveals that of the general papers on taxonomy, ecology, morphology, life histories, etc., eight were by members of the Society, and contained a total of approximately 29 pages. Forty papers by 36 authors—with a total of 166 pages—are by authors who are *not* members, and who consequently contributed nothing except the minor cost of engraving to the operation and maintenance of the *News*. That is, the strictly scientific material was made up of approximately 15% member papers, and 85% non-member. Who paid the bill? It has largely been paid over the years by resident members, in time and work, and in financial contributions to permanent funds. The drudgery of editorial work has been donated; the building up of what permanent funds there are has been a long, slow arduous task, but with increasing costs these are not now enough.

If your name has appeared often as an author over a period of years, the Society may have put up some thousands of dollars for you. If authors paid one-fourth of the cost of printing their papers, the *News* would again be in the black. It is as simple as that. How much are *you* paying for your fun?

Any donation you might care to make toward the expenses of publishing the *News* will be gratefully received. It should

be addressed to the AMERICAN ENTOMOLOGICAL SOCIETY, 1900 Race St., Philadelphia 3, Pa. You may designate its use for either the permanent funds or for the relief of the present shortage.

Have you joined the Society?

Diptera (Calliphoridae, Heleidae and Chloropidae) Collected from Birds' Nests at London, Ontario

By W. W. JUDD, Department of Zoology, University of Western Ontario, London, Ontario

In an earlier communication (Judd, 1954) a report was presented on insects collected and reared from nests of birds in the vicinity of London, Ontario during 1951-1953. These studies were continued in 1955 and among the insects collected were several flies which were kindly identified by two taxonomists of the United States National Museum, C. W. Sabrosky (Calliphoridae and Chloropidae) and W. W. Wirth (Heleidae).

Calliphoridae

Many blowfly larvae were collected from nests when these nests were examined on the day that the last of the young birds left each nest. The larvae were put into jars with part of the fabric and debris from the nest; and as the adult flies emerged they were pinned and the dates of their emergence were recorded.

Protocalliphora sp. (sialia S. and D.):

All the blowflies reared were identified as *Protocalliphora*, probably *sialia* S. and D., but Mr. Sabrosky pointed out (*in lit.*) that they represent a complex of species still requiring revision. The larvae were taken from three nests of robins (*Turdus migratorius*) and one of a brown thrasher (*Toxostoma rufum*).

1. Robin—This nest, in the crotch of a Manitoba maple, con-

tained four young birds on May 16. One bird was gone on May 18 and two others departed on May 20, leaving the fourth bird dead in the nest. The nest yielded 54 larvae. Twenty-seven flies were reared: 3—June 3; 15—June 4; 7—June 5; 2—June 6.

2. Robin—This nest, in a bush of twin honeysuckle, contained two eggs on May 12, three on May 13 and four on May 14. There were four young birds on May 27 and they left the nest on June 6, when 40 larvae were collected. Only three flies emerged: June 20.

3. Robin—This nest, in a grape vine twining through an apple tree, contained one egg on May 30, and two eggs on June 7. Two young birds were present on June 14 and they departed on June 23, when 8 larvae were found in the fabric of the nest. Seven flies emerged on July 4.

4. Brown Thrasher—This nest, in a bush of twin honey suckle, contained one egg on May 11, two on May 12, three on May 13, four on May 14 and five on May 17. Four eggs hatched on May 27 and the fifth on a later date, and the five young birds left the nest on June 7, when 4 larvae were found in it. Three flies emerged on June 21 and a fourth on June 22.

The 41 flies are retained in the U.S.N.M. *Protocalliphora* sp. (near *sialia* S. and D.) was reared at London in 1952 from nests of the red-winged blackbird (Judd, 1954).

Heleidae

Culicoides travisi Vargas:

A nest of a catbird (*Dumetella carolinensis*), in a barberry bush, contained three catbird eggs and one cowbird egg on May 30. The cowbird egg was missing on June 7. The last of the young catbirds left the nest on June 23, when a female *C. travisi* was found in the fabric of the nest. The specimen is retained in the U.S.N.M. Flies of the genus *Culicoides* have previously been reported in nests of crows in Montana (Jellison and Philip, 1933) and in the nest of a catbird at London (Judd, 1954). In the latter case the flies were engorged with blood.

Chloropidae

Oscinella luteiceps Sabrosky:

A nest of a catbird, in a bush of black-berried elder, was complete on May 23. Four eggs were laid in it successively on May 27, 28, 29 and 30. Two birds hatched on June 11, a third on June 12 and the fourth on June 13. All four birds left the nest on June 23, when one fly, *O. luteiceps*, was found in it. The specimen is deposited in the collection of the Department of Zoology, University of Western Ontario. One of the paratypes from which this species was described was collected at London (Sabrosky, 1940).

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Distribution of *Dermacentor variabilis* (Say), the American Dog Tick, in New Hampshire

By R. L. BLICKLE and J. G. CONKLIN ¹

The published records for the distribution of *Dermacentor variabilis* (Say) for New Hampshire as are follows: Bishopp and Smith (1936), Bishopp and Smith (1938), Bishopp and Tremblay (1945), and Smith *et al.* (1946) for the central and southwestern part of the state, all based on collections of the Bureau of Entomology and Plant Quarantine made in 1936. Bequaert (1947) published a record for Ossipee, a town in the east central part of the state.

Recent collecting and a study of the records in the collection of the University of New Hampshire show *D. variabilis* to be well established in at least nine towns. There are additional records for ten other towns. However, the data is such that,

¹ Published as Scientific Contribution No. 189 of the New Hampshire Agricultural Experiment Station.

for the present, these are considered to be stray collections rather than established foci.

The following areas are considered to have established foci of tick infestations. These records are in addition to the ones published by the above authors. Central area: Moultonboro (April 8 to June 20, with tick drag) (18 July, 1949, on fox, D. L. Collins coll.); Sandwich (April 19 to May 20, on dogs); Tuftonboro (May 25, with tick drag); Wolfeboro (May, on man); New Durham (May to July, on man); Center Harbor (18 July 1949, with tick drag, D. L. Collins coll.); Ossipee (May 30, on man); southern and southeastern area: Dover (May and June, on dogs); Amherst (July, with tick drag).

Four towns from which ticks have been recorded, namely, Conway, Eaton, Freedom, and Barnstead, probably have established infestations since they border the central area. The six towns from which ticks have been recorded but are not considered to have established foci are Concord, Dublin, Jaffrey, Laconia, Lancaster, and Sutton.

The main area of infestation is in the central and east central part of the state. This area is bounded by Lake Winnepesaukee on the west and extends eastwardly into Maine. In the past twenty years, from 1936 to 1956, the infested area has increased from approximately 100 square miles to an area of at least 400 square miles. Throughout this area the ticks are confined to the grassy areas, or to the low vegetation and pine woods adjacent to the grassy area. If the infested area in Maine is included the total infested area would be approximately 1000 square miles and would extend to Lake Sebago.

The infestation is quite heavy in some parts, notably along Shannon Brook and along parts of the lake shore in the towns of Moultonboro and Tuftonboro. In May 1952 the above areas showed a population of one tick per square yard when a tick drag was used for sampling. However, most of the samples taken in other localities showed a considerably smaller population.

How and when the infestation in Moultonboro and Tuftonboro started is rather obscure. The local inhabitants claim,

probably through prejudice, that a certain individual brought the ticks in when he pastured sheep on the land. This so-called introduction of ticks occurred approximately thirty years ago. It may be that the increase of ticks coincided with the introduction of sheep and the residents associated the two occurrences. Smith *et al.* (1946) state, "A small area of infestation occurs around Lake Winnepesaukee, N. H., with indications that in certain localities it has persisted there for at least several decades. In other localities the infestation is apparently recent, and may have been caused by the transportation of infested dogs by vacationists."

The infestation in the town of Amherst is of recent origin, and was started, presumably, by the introduction of ticks on dogs. This infestation is confined to two or three farms. A family living in this area traveled, frequently, between Cape Cod, Mass., and the farm in question. The family dogs were carried back and forth on these occasions. There is no history of ticks previous to the family's moving into the area, and since the infestation is limited to this and adjoining properties, it seems safe to assume that the infestation was started in this manner.

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The Immature Stages and Female of *Polypedilum* (*Polypedilum*) *obtusum* Townes (Tendipedidae: Diptera)

By JAMES E. SUBLETTE, Northwestern State College,
Natchitoches, Louisiana

Several adult male and female midges were reared from mature larvae collected in Little Bayou Pierre, a small, clear, sandstone-rubble bottomed stream of the Kasatchie Wold in West-Central Louisiana. The adult males agreed with Townes' (1945) description in all respects except size. Measurement of seven specimens gave: mean wing length, 1.73 mm.; standard deviation, .55 mm.; range, 1.6–2.1 mm.; mean leg ratio, 1.68; range, 1.37–1.93; the antennal ratio, 1.95 (mean of two specimens only). Townes lists these measurements for this species as: wing, 2.2 mm. long; leg ratio, 1.75; and antennal ratio, 2.0. Although a size difference exists, *P. obtusum* has such distinctive male genitalia that there can be no doubt as to the identity of these specimens. Eight females having the same identical immature stages as the males of *P. obtusum* were reared from the same material and undoubtedly belong to that species.

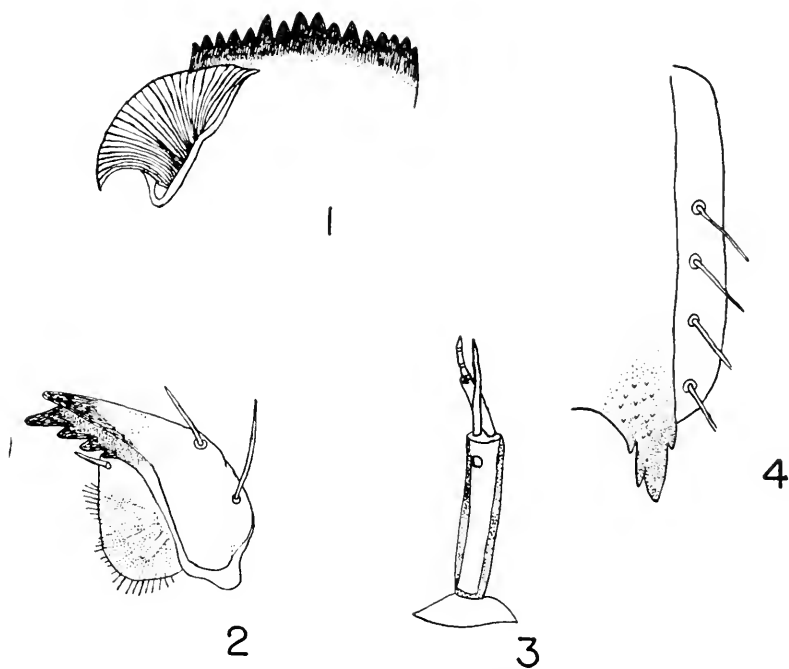
Female. Coloration and general body features same as male except that abdomen of female has a definite light green color instead of a very faint green color. Mean wing length, 1.8 mm.; standard deviation, .34 mm.; range, 1.4–2.4 mm.; mean leg ratio, 1.83; range, 1.67–1.96.

Larva. Total length (mean of two mature specimens), 5.4 mm.; head length, .45 mm. Color, pale yellowish-green; head capsule, very lightly colored with only tips of mandibles, labial plate and ventral part of occipital area darkened. Labial plate (Figure 1) very closely resembles that of *P. convictum* (Walker) as illustrated by Johannsen (Plate V, Figure 76, 1937). Paralabial plates (Figure 1), finely pointed at both ends, with about 28–30 coarse striae. Posterior margin of paralabial plate very strongly arched, apparently more so than other

described species of this genus. Antennal ratio, 56:20:5:6:5. Antennae slightly longer than mandibles and have a mean ratio of 21:22. Antennal blade reaches tip of fifth segment or very slightly exceeds it (Figure 3). Mandibles (Figure 2) are blackened at tips with usual preapical comb and compound brush; accessory tooth of mandible reaches tip of first free tooth; basal tooth fused with distal end of the mesial shelf of mandible. Epipharyngeal comb has 13 teeth arranged in three groups, a central group bearing 3 teeth and two lateral groups with 5 teeth each. Lateral to epipharyngeal comb are about 6 long slender blades; posterior ventral surface of labrum bears broad median pectinate blade which is rounded on free border; anteriorly, two pairs of socketed pectinate blades, most anterior pair being smaller; lateral, inferior surface of labrum with 5 heavy curved pectinate bristles on each side. Premandibles with tips bifid and darkened. Maxillary palpus inconspicuous, 3 segmented; basal segment slightly longer than remaining two; basal segment bears about 5 blades at apex. The rather small rounded eye spots (diameter about one third the length of the mandible) are contiguous. Anterior prolegs are composed of two dense tufts of long slender claws; posterior prolegs are short and terminate in a group of pale hooked claws. Each pre-anal papilla bears 8 bristles; on anterior surface is a bristle. Two anal gills, about half as long as prolegs, each constricted and tapering beyond middle; anterior to gills are two strong bristles.

Pupa. Total length (mean of two specimens), 4.4 mm.; respiratory organs not clearly discernible on mounted slides. Second abdominal tergite with anterior, inconspicuous band of erect denticles, posterior margin with up to 30 dorsally turned black hooks; segments 3-6 with distinct anterior and posterior bands of suberect, barbed denticles, the anterior and posterior bands being broadly joined along the mid-dorsal line by a broad, fenestrated band of the same denticles. Segments 7 and 8 with a greatly reduced anterior band only. Lateral margin of segment 5 and 6 with 3 lateral bristles; segment 7 with 4 bristles, the anterior 2 broadly separated from the posterior 2; eighth

segment also with 4 bristles, most anterior one being scarcely beyond middle (Figure 4). Posterior lateral spur of segment 8 as in Figure 4; basal denticles, frequently obscured. Swim fin with 60-70 bristles.



Polypedilum (Polypedilum) obtusum Townes

FIG. 1. Labial and paralabial plates of larva.

FIG. 2. Mandible of larva (preapical brush omitted).

FIG. 3. Antenna of larva.

FIG. 4. Posterior lateral corner of segment eight of the pupa showing spur and lateral fringe.

Polypedilum obtusum very closely resembles the description of *P. convictum* in all of its life stages. As I have not had the opportunity of studying immature stages of *P. convictum* I am not certain that the larvae of the two can be separated unless size and the greatly arched posterior margin of the paralabial

plate are diagnostic. The pupae can be separated on the basis of two characters: tergal armature and features of the posterior-lateral spur of segment 8. The females do not appear to have any diagnostic features which will separate them from other members of the *convictum* group.

The occurrence of *Polydillum obtusum* in Louisiana represents a new state record and a considerable extension of range as the species has been previously reported only from New York and Michigan (Townes, 1945).

The illustrations were prepared by microprojection. I gratefully acknowledge the assistance of my wife, Mary Smith Sublette, in the preparation of those illustrations.

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Nomenclature Notice

All comments relating to the following should be marked with the Commission's File Number, and sent to Francis Hemming, 28 Park Village East, Regent's Park, London N. W. 1, England.

Pieridae Duponchel, 1832, validation of family-group name (Class Insecta, Order Lepidoptera). File: Z.N. (S.) 289. For details see Bull. Zool. Nomencl. Vol. 12, Part 11.

Two Early Entomological Collectors in Colorado

By F. M. BROWN, Fountain Valley School, Colorado Springs

While engaged upon a search for the source of W. H. Edwards' Kansan co-type of *Coenonympha ochracea* I have unearthed information that may be of assistance to others who are interested in material collected during 1858-1863 in what is now the state of Colorado. First let me review some of the history of the area. During the period under consideration the region around Denver and Colorado Springs, Colorado, was first a part of Kansas Territory and then part of Colorado Territory. During the time it was part of Kansas Territory the western boundary of that Territory was the Continental Divide. When the Colorado Territory was established in February 1861 the western boundary of Kansas was moved eastward to about the 102nd meridian.

In 1859 there was considerable effort on the part of the residents of Kansas living west of Denver in the mining camps to establish there the Territory of Jefferson. To the south, in the Pikes Peak region, later to center on Colorado Springs, the residents wanted the new territory to be called Colorado. In the end the Coloradans won but from 1859 to 1861 the advocates of the Territory of Jefferson were militant and used that name.

The first entomologist to visit the region was Thomas Say who accompanied Major Stephan H. Long to the Rocky Mountains in 1819-1820. His collections were stolen by a pair of packers on the return journey. The next generally accepted collector in the region is James Ridings of Philadelphia who visited the Denver region in 1864, a few years after Colorado became a territory. In 1866, Tryon Reakirt compiled the first list of Colorado butterflies upon the strength of Ridings' collection and those in the hands of members of the Entomological Society of Philadelphia and in the Society cabinet.

A careful study of Reakirt's paper and of several earlier ones by William H. Edwards and others yields plenty of evidence that there were earlier collectors in the region than Ridings.

Two of these earlier Collectors, Winslow J. Howard and William S. Wood, Jr., were early members of the Entomological Society of Philadelphia. There is a suggestion that there was at least one other, but as yet I have no inkling who he was.

WILLIAM S. WOOD, JR.

According to Ewan (1950, p. 340), Wood was a member of the expedition led by Lieutenant F. T. Bryan, U. S. A., to scout a wagon road from Fort Riley, Kansas, to the Great Salt Lake over Bridger's Pass in 1856 and 1857. James Cooper, the ornithologist, was surgeon for this party. Hume (1942, p. 41) in his account of Cooper states that the party disbanded upon reaching the Rocky Mountains without fulfilling its mission.

There are three primary sources of information about the naturalists and collectors who accompanied the military expeditions of this era: The published reports of the War Department; those of the Smithsonian Institution; and, Prof. Spencer Fullerton Baird's fabulous correspondence files in the Smithsonian Institution. In the Annual Report of the Smithsonian Institution for 1856 (Baird, 1857, p. 64) is this entry: "Lieutenant F. T. Bryan, U. S. A., Six boxes, one keg containing alcoholic specimens, birds, mammals, and skeletons, from United States wagon-road to Bridger's Pass." There is no reference to insects collected. In the Report for the next year (Baird, 1858, p. 50) I found: "Lieutenant F. T. Bryan, U. S. A., Three boxes of zoological specimens collected by William S. Wood on the wagon-road expedition from Fort Riley to Bridger's Pass." On the following page acknowledgment is made of Cooper's material collected from Fort Laramie back to Independence, Missouri.

The earliest extant correspondence between Wood and Baird is a letter dated February 19, 1857. This is No. 221 in Baird's letter-press book for 1857. It reads:

"February 19, '57

"My dear Mr. Wood

"The wagon route you saw announced is not under charge of the War Dept. but under that of the Department of the

Interior. Lt. Bryan will not have charge of it. As soon as an opportunity presents itself however, I will try to find you a good place on one or other of the exploring parties. We shall know about them in about three weeks.

"I have deposited your eagle in the Mechanics Institute fair here, in your name, for competition as a specimen of taxidermy.

"Yours truly

ss/ Spencer F. Baird

"Wm. S. Wood

"Phila."

In a letter dated April 24, 1857, Baird offered Wood a post with Lt. Bryan. One dated July 12, 1857, and addressed to Wood at Fort Kearney, N. T. (Nebraska Territory), is ample evidence that Wood was on the 1857 field party but most likely not with the party in 1856. There is no evidence that Wood penetrated the area now included in Colorado while on the 1857 Bridger's Pass Wagon Road Expedition. His collections for that year in all probability were made along the Platte River in Nebraska, in eastern Wyoming, and around Fort Laramie.

In March 1859 there was an extended correspondence between Baird and Wood about the Landeges wagon road party bound for the Great Salt Lake and about Lt. Mullen's wagon road party exploring the route between Walla Walla, Washington, and Fort Benton, Montana. At this time Wood was living on Oak Street at the corner of Rose Street in West Philadelphia. Wood had been idle for some months and was anxious to get into the field on a collecting expedition. A letter from Wood dated March 28, 1859, told Baird that arrangements had been made to go west on a collecting trip for another group. Baird was so irate about this that he struck Wood from the rolls of field collectors for the Smithsonian and there is no further correspondence between the two.

The 1859 collecting trip to the west may well have been undertaken for the Entomological Society of Philadelphia. Both Charles J. Wood and William S. Wood are listed by Cresson (1909, p. 51) as "Organization Members" of the Society. They attended the meeting held on March 1, 1859, and

it was shortly after this that William Wood wrote to Baird telling him that he could not accept Baird's proposal since he had accepted a \$60.00 advance to go west for another group.

Where did Wood go in 1859? Edwards in his description of *Colias Alexandra* (1863, p. 15) states: "From Pikes Peak; in the Society's collections; 6 males, 1 female. The second female is from the collection of Mr. George Newman and was taken among the Rocky Mountains, some years ago, by Mr. Wood." There are other similar citations that link "Mr. Wood" and "Rocky Mountains." There is no doubt in my mind that "Mr. Wood" is William S. Wood, Jr. In 1859 there was only one place that a person from the East not attached to a government party could use as a base for operations in the Rocky Mountains. That was the vicinity of Denver. There were several flourishing mining camps in the mountains connected with Denver City on the plains by wagon roads and good horseback trails. The settlement of Colorado City in the shadow of Pikes Peak was just forming and the chances that Wood visited it and not Denver are very slight. Bird specimens collected by Wood tie him to the Clear Creek area west of Denver. Travel was slow except to the mining camps west of Denver. With limited time and virgin territory, I am sure that Wood confined his travels to the region delimited by Denver, Golden, Empire and Central City in Colorado. All of his insect specimens were labelled "Rocky Mountains."

I have been unsuccessful in finding biographical material about Wood. He was the son of an Englishman, William S. Wood, who had leanings toward natural history. Mr. Wood, Sr., may have been a taxidermist. I know that he sent bird skins to the Smithsonian Institution (Baird, letter June 26, 1858). William, Jr., in addition to being a member of Lt. Bryan's expedition, was a member of the Naval Expedition to New Grenada, Colombia, under Lt. Muhler in 1857-1858. On this trip he was accompanied by his brother Charles. Another brother, Christopher, accompanied the Naval expedition to the Rio Plata in southern South America in 1858. I have no information about William, Jr., between 1859 and 1878 when he

was listed as a taxidermist in Wilmington, Delaware, first at 903 Market Street and later at 402 East 11th Street. He drops out of sight again after 1884 (Hindes, letter June 14, 1956). Frank Morton Jones, the dean of Delaware naturalists, was unable to give me any information to add to what I had.

WINSLOW J. HOWARD

It will be noted in Edwards' description of *alexandra* cited and in part quoted above is the locality "Pikes Peak." There are many specimens in the collections of the Entomological Society of Philadelphia that bear this label. I had been misled by Reakirt's article about Colorado butterflies and by references by Edwards in "Butterflies of North America" into thinking that Ridings was responsible for these captures. Since there are a number of citations of the locality in the literature before Ridings set out on his trip someone else must have collected the specimens.

I have found that some of these "Pike's Peak" specimens are credited to "Howard." The solution of the question of who "Howard" was is found in an article on Hymenoptera by Cresson (1863, p. 73) where in stating the type locality of *Masaris vespoides* he wrote: "Hab. Pike's Peak. Collected by Mr. Winslow J. Howard." The history of the American Entomological Society written by Cresson (1909) for its fiftieth anniversary includes among the members "Howard, W. I., Central City, Colo., March 10, 1862." As far as I know this makes Howard the earliest resident entomologist in Colorado.

Who was Howard? Ewan (1950, p. 235) notes very briefly that he sent some specimens of plants from Montana to Asa Gray at Harvard University in 1866. Dr. C. E. Kobuski (letter, April 13, 1956) could find no mention of Howard in the archives of the Gray Herbarium. In the literature of entomology there are scattered references to specimens collected by Howard outside of Colorado. These almost invariably place him in Prescott, Arizona, during the 1870s. Inquiries in Prescott drew a blank. Howard's constant association with mining camps led me to suspect that he was a mining engineer or at

least associated with that industry. He was, but in a most indirect way. Looking for information about him I ran into more blind alleys than I care to mention. At last in the Western History section of the Denver Public Library I struck pay-dirt.

While scanning the earliest newspapers printed in Colorado for mention of Howard's name I found in *The Western Mountaineer* for July 19, 1860, this article:

"Watches and Jewelry—We solicit your special attention to the advertisement of W. J. Howard, Esq., which appears in this issue. Mr. Howard was formerly in the leading establishment in his line on the continent—that of Messers Tiffany & Co., New York City—and we are able to assure our readers from personal knowledge that any work entrusted to him will be skillfully and properly done. He has a rare collection of the natural curiosities of the Rocky Mountains, which will be found very entertaining to those interested in natural science. Give Mr. Howard a call, and if you have any interesting specimens of the mineral wealth of the country, take them with you."

Although the newspaper quoted was published in Golden City, J. T. (Jefferson Territory), Howard's business was located on the east corner of Larimer and F Streets in Denver City. As late as December 20, 1860, Howard's advertisements appeared in *The Western Mountaineer*. We know that Howard gave Central City as his residence when he applied for membership in the Entomological Society of Philadelphia (later the American Entomological Society) in March 1862. Probably he moved there during the summer of 1861. In Central City he established Howard and Colony, manufacturing jewelers. The advertisements for this concern appear as late as January 4, 1865, in the daily *Rocky Mountain News*, the first newspaper published in Denver and still active.

Apparently Howard moved back East late in 1865. The February 27, 1866, issue of the *Rocky Mountain News* carried a note from a returning Coloradan that Howard was living in Brooklyn, New York, and had married. Howard returned to the West that autumn. The *Rocky Mountain News* for October 15, 1866, noted his arrival on the H. O. M. & Ex. Co.

stage from the East and that he registered at the Pacific House in Denver on the 14th. On the next page is this note: "W. J. Howard . . . collector of botanical, mineral and entomological specimens, called on us today. He arrived from the East by the last coach and goes on to Montana tomorrow." There my knowledge of Howard stops. I am anxious to get further information about the movements of both Wood and Howard in the West.

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Known Distribution of a Bat Flea, *Nycteridopsylla chapini* Jordan (Siphonaptera: Ischnopsyllidae)

By ROBERT E. LEWIS, Department of Entomology,
University of Illinois

The brown bat flea, *Nycteridopsylla chapini* Jordan, is now known from several widely distributed areas of the United States east of the Great Plains. Originally it was described from Glen Echo, Maryland, by Jordan (1929). The type specimens were taken from the big brown bat, *Eptesicus fuscus* (Beau.), and were collected by R. C. Shannon in 1916. Vernon Bailey collected *N. chapini* from the Indiana bat, *Myotis sodalis* Miller and Allen, taken at Colossal Cave, Kentucky. M. W. Sanderson took *N. chapini* from the type host from a cave in Benton County, Arkansas. Lane (1953) noted the collection of a single female from the type host in Hocking County, Ohio, in 1951. The latest record is that of one male and four females collected by R. F. Myers from a male of the type host collected in Pulaski County, Missouri, in 1955.

This determination was confirmed by Dr. G. P. Holland, Department of Agriculture, Division of Entomology, Ottawa, Ontario, Canada, and one male and one female were deposited with him. Of the other three, two are housed in the collection of the Illinois Natural History Survey, and the remaining one is in the collection of the Department of Entomology, University of Wisconsin, Madison, Wisconsin.

Miller and Kellogg (1955) list the distribution of *Eptesicus fuscus fuscus* (Beau.) as: "Eastern North America, west approximately to longitude 102°W., from Quebec, Ontario and Manitoba south to northern Florida and Nuevo Leon, Mexico." If one considers the other eight subspecies of *Eptesicus fuscus* as well as the additional four species of the genus which occur in North and Central America, it seems reasonable to assume that further collections will extend the known range of this flea to the west. It is doubtless a much more common species than its presence in collections would indicate (Holland, 1956).

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Hermann Weber (1899-1956)

Professor Dr. Hermann Weber, a Corresponding Member of the American Entomological Society, died November 18, 1956, at Tübingen, Germany, a few days before his 57th birthday. Although without doubt one of the really important entomologists of the present century he was hardly known personally in this country. Dr. Weber apparently never visited America, although he did correspond with a number of American morphologists. From Dr. A. Glenn Richards, *Entomological News* learned of Weber's death, and from Dr. R. E. Snodgrass we were able to learn of his serious illness for the past year or more. Dr. O. A. Johannsen was able to tell us of a brief but pleasant visit at Weber's home in Danzig many years ago, and of their discussion of certain morphological problems.

From an examination of Kürschner's *Gelehrten Kalender* for 1954 we learned that Weber was born in Bretten, Baden, November 27, 1899, and that before coming to Tübingen in 1950 to become Professor and Director of the Zoologisches Institut of the University of Tübingen, he had taught at Bonn, Danzig, Freiburg, Münster, Wien, and Strasbourg. He was awarded the Fabricius Medal by the Deutsche entomologische Gesellschaft, was an Honorary Member of the Royal Entomological Society of London, and of the Österreichische Akademie der Wissenschaften.

However meager our information regarding Weber as a person, we know a great deal of him as a scientist. He is perhaps best known as the author of the "Lehrbuch der Entomologie," (1933), generally considered the finest textbook of entomology ever written, despite the fact that the author was only 33 years old when it appeared. Quoting from Dr. Snodgrass' review, in *Ent. News* 44: 166-168: "The book is not only predominantly morphological in the sense that it deals largely with structure and the homologies of structural parts, but it is morphological from the viewpoint that anatomical form is an adaptation to function. In other words, the morphology of insects becomes a part of the biology of insects, as it properly should be. . . . The subject of insect morphology, as demonstrated by Dr. Weber's book, has now reached a stage in which it may rightly assert its ability to render the fundamental services that should be expected of it to the other branches of entomological science, particularly, in taxonomy and insect relationships, physiology, and ecology." And, we may add, this same approach to morphological studies is characteristic of Weber's other writings, that the structures are expressive of the life of the insect and necessarily tied to function and to ecology.

Another textbook, "Grundriss der Insektenkunde," appeared in 1938 and was intended as an introduction to entomology. The second edition and third edition were much enlarged, especially in areas in which research had progressed rapidly in recent years. This was desirable because the "Lehrbuch" of 1933 had been long out of print, and the work on a proposed revision still incomplete. The third edition (Gustav Fischer Verlag, Stuttgart, 1952) is noteworthy for the clear and concise accounts it gives of the recent work in the field of experimental embryology (Seidel, Bock, Krause), of the many studies on insect hormones, and of the work of Henke, Stossberg, Süffert, etc., on development of butterfly scales and wing pattern, and of many other matters otherwise available only in lengthy original papers.

Of great value also are Weber's review articles that appeared

in *Fortschritte der Zoologie*, in 1939 and 1942 (Vols. 4 and 9). In the latter he provides critical reviews of recent works dealing with the morphology, histology, and development of all articulates. In the first 31 pages he gives a complete and very clear discussion of the theories of head segmentation and comes to a series of conclusions as regards possibilities, but finds more information is necessary to provide a theory applicable to annelids as well as arthropods. In the same way, the thorax and abdomen are covered, and the histology and functioning of the various internal systems and organs.

Another large general work is the "Biologie der Hemipteren" (1930), regarding which we may again cite Dr. Snodgrass (*Ent. News* 41: 275-276): [It] ". . . is without question one of the best publications of recent times in biological entomology. Within it the writer brings together not only a review of all that has heretofore been written on the life and structure of the Hemiptera, but also the results of his own extensive and minute studies of the complex hemipterous mechanisms that for a century have baffled the skill of insect anatomists."

A glance through the *Zoological Record* for the years 1923 to 1953, shows that Weber also published a large number of research papers making up an additional 1500 odd pages in *Zool. Jahrb. (Anat.)*, in *Zeitschr. Morph. Okol. Tiere*, in *Zeitschr. vergl. Physiol.*, in *Zool. Anz.*, and in other journals. These researches deal with the morphology of the head and thorax in various groups, as a contribution to general morphology, and with detailed investigations on the anatomy, particularly of the mouth parts, on the physiology of sucking, and on the sensory physiology of a number of homopterous species and the Anoplura.

Noteworthy is the important place Weber always assigned to ecological considerations. In his "Grundriss," the chapter on ecology occupies about one-fifth of the text. And finally, although essentially a morphologist, he also gave serious thought to fundamental theoretical aspects of systematics as exemplified in his article on "Grenzen in der Biologie," in Vol. 5 of *Studium Generale*. Here is a discussion on the possibilities of drawing definite boundaries in the course of our research and thinking.

After much philosophical argument he concludes, e.g., that systematics cannot exist by itself, but that ecological, population, behavior, genetic, and especially population-genetic studies must go hand in hand with it if we are to discover the reasons for the existence or non-existence of boundaries between populations. Also, the animal and its environment must be considered as a unit, and the variability of the environment compared with the variability of the animal. If one does not thus arrive at precise definitions and limits, one nevertheless has a truer picture of reality. In the study of colonies, social groups, societies, mixed populations, and biomes the defining of boundaries is even more difficult. As a result, physicists and professional philosophers may conclude that biology is an inexact science. Weber's point of view was that where sharp boundaries exist we do well to define them, but where they do not, where transitions are fluid or series continuous, precise delimitation would really make biology inexact, would not present a true picture.

In sum, Hermann Weber contributed a great deal towards our present knowledge of the morphology and functional anatomy of insects, particularly of the Hemiptera and Anoplura. He was also thoroughly conversant with most other aspects of entomological science so that by means of his text-books, and his monographic reviews on morphology, histology, and development he earned the gratitude of teachers and investigators over the world by providing them with such reliable accounts of the present state of knowledge. His untimely death is truly a great loss to entomology.

R. G. SCHMIEDER.

Review

A MORPHOLOGICAL STUDY OF A RELIC DRAGONFLY EPIOPHLEBIA SUPERSTES SELYS. By Syoziro Asahina. The Japan Society for the Promotion of Science, Tokyo, 1954. iv + 153 pp., 71 pl. [Maruzen Co. Nihonbashi, Tokyo, \$5 (U. S.)]

Epiophlebia superstes, a species somewhat zygopteroid and anisopteroid but essentially unique, is the subject of a painstaking morphological analysis by Syoziro Asahina. Dr. Asahina, along with his colleagues, has given us over the past years considerable information on the ecology and life history of this interesting Japanese species which is attaining thereby the status of one of the most completely known Odonata. Turning his attention now to more critical matters the author introduces evidence from comparative anatomy to facilitate settling the long-standing problem of the affinity of *Epiophlebia* to the recent two great suborders. He also succeeds in another aim of his study, namely, "to bring forward some rather neglected problems of Odonata structure in the light of recent progress on insect morphology."

The gomphine *Davidius nanus* Selys and the calopterygine *Mnais strigata* Selys are anatomically compared from the viewpoint of homology to both larval and imaginal *Epiophlebia superstes* with special reference to sclerites, muscles and several internal organs. Comparisons with other Odonata and with generalized insects (according to the interpretations of Ferris and Snodgrass) add to the significance of this study and to the weight of evidence in favor of the author's conclusions. This detailed comparative anatomy occupies over three-quarters of the text and is supplemented by more than 200 figures.

Into his review of the chronology of opinion on the systematic position of *Epiophlebia* the author adeptly dovetails the progress in understanding of odonate phylogeny. He relates that Selys placed *Epiophlebia* in the Zygoptera; Needham and Tillyard did likewise in their earlier studies but Needham later shifted the genus to the Anisoptera whereas Tillyard subsequently placed it in Handlirsch's Anisozygoptera, the suborder which flourished during the Mesozoic era; Schmidt and Fraser also hold to

Anisozygoptera placement. Because of the identical nature of the discoidal cells in both pairs of wings, Carpenter is of the opinion that a new suborder is probably necessary to accomodate this relic species. Although seeming to be in considerable sympathy with Carpenter's viewpoint, Asahina is of the opinion that the Anisozygoptera affinities of *Epiophlebia* are quite close based on wing venation characters alone. He goes only so far as to separate the Epiophlebiidae from the remaining fossil families of Tillyard and Fraser's Heterophleboidea by proposing a new superfamily, Epiophleboidea; he considers it advisable to limit the fossil Anisozygoptera to the Liassic forms represented by the Heterophleboidea and he suggests that the only known Tertiary Anisozygoptera, Sieblosiidae of Oligocene times, might be a true Zygoptera.

Evolutionary tendencies of certain morphological features, particularly the wings, are discussed with regard to the three suborders. Asahina significantly concludes that the superfamily Epiophleboidea [was] "established from a narrow-winged ancestor before the families of Heterophleboidea appeared and advanced along its own evolutionary passage toward the direction of Anisoptery . . . it has arrived, in the present day, at a state where the body structure, especially the larval shape, has attained nearly to a complete Anisopterotic stage."

Dr. Asahina's lucid style has occasional refreshing oriental phraseology; the comparative morphological approach appears to be fundamentally sound in the choice of materials; his conclusions are not so far-reaching as one might have anticipated but are nevertheless well documented. The arrangement of the figures is sometimes awkward since they do not always read from top to bottom or from left to right and there are one or two omissions of figure references on the plates; although not of the usual high oriental standard the figures are wholly sufficient for the author's purpose.

This is a most notable and significant contribution to the literature on Odonata and to a broader-based understanding of phylogenetic relationship within this group.—EDWARD J. KORMONDY

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and **Stizini** (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

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By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeschna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of *Aeschna*. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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ENTOMOLOGICAL NEWS

MARCH 1957

Vol. LXVIII

No. 3

CONTENTS

Richards and Kolderie— <i>Oncopeltus</i> eggs and mother's age	57
Ananthakrishnan— <i>Bamboosiella</i> n. gen. (<i>tubilifera</i>)	65
Judd—Insects from the pond snail	69
Dreisbach—A new species of <i>Arachnoproctonus</i>	72
Evans—Notes on a <i>Stictia</i> new to the United States	76
Frost—More about <i>Membracidae</i> at lights	77
Notes and News in Entomology	79
Pacific Science Congress, Fire at Budapest Museum, New book on butterflies, Grants available at Oklahoma.	
Reviews	81
Evolution and classification of the mountain caddisflies, Systematics of the suborder <i>Tubulifera</i> , A textbook of entomology.	

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Variation in Weight, Developmental Rate, and Hatchability of *Oncopeltus* Eggs as a Function of the Mother's Age¹

By A. GLENN RICHARDS and MARJORIE Q. KOLDERIE,
Department of Entomology and Economic Zoology,
University of Minnesota

It is well known that egg production of various insects may be greatly affected by environmental conditions and the past history of the mother. But it is commonly assumed that eggs laid by females raised and kept under standard conditions will be the same irrespective of the age of the female. We unconsciously assumed this in experiments with the milkweed bug, *Oncopeltus fasciatus* (Dallas), until it became evident that such was not strictly true. To be sure, a considerable literature on the influence of parental age has accumulated for some groups of organisms (see Strong, 1954) but only recently has the phenomenon been measured in insects (Durrant, 1955; Sang, 1956).

The manner in which many insect species are cultured in the laboratory leads to the production of distinct broods rather than a population containing all stages of the life cycle. Commonly, then, there occur periods when the stage desired is not available. As soon as the desired stage becomes available it is used. Proceeding in this manner we encountered unexpected trouble. The number of hours required for incubation at various temperatures had previously been satisfactorily taken from the data

¹ Paper No. 3697, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul 1, Minnesota.

Acknowledgment is due to the National Science Foundation for a grant supporting this research project.

of Lin *et al.* (1954). The data given by Lin *et al.* were obtained from eggs collected during the peak of egg laying periods, *i.e.*, when the females were two-three weeks post emergence. We have now found that the data of Lin *et al.* are valid for eggs laid during that period but are not valid for eggs laid early or late in the fecund stage. Partly to learn how precisely we needed to control the mother's age in the sense of restricting egg collection to what portion of the fecund period, and partly because we needed weight and time data from a fairly large number of egg lots for another purpose (Richards, 1957), a systematic study was made of certain variables. This was repeated once; the general conclusions were the same in the two tests and both times fitted with discrepancies previously encountered in time of hatching. Only the more extensive set of data will be presented.

For the tests, five dozen teneral adults of *Oncopeltus* were segregated from the stock cultures. The number of each sex was not determined but presumably there were about half males and half females. This group was held under the same environmental conditions as they had grown under, *i.e.*, 25° C. and 60-75% R.H. Eggs will be dropped promiscuously in the culture if nothing is present that the female prefers. If small rolls of gauze or other open-mesh cloth are added, egg laying is stimulated and the eggs are laid in batches inside the roll of cloth by insertion of the ovipositor therein. The cloth rolls also provide a convenient method for obtaining eggs of known age since one has only to remove the roll of gauze after the desired interval and open it to extract the eggs. The eggs were counted and sorted into weighing bottles using a small soft brush. When the group was laying most actively, 400-600 eggs were used in each lot, but commonly fewer were available, and at the beginning and end of the egg laying period only a few dozen were available for each lot. The eggs were then incubated at 75% R.H. and usually 17° or 25° C. Subsequently, determinations were made of per cent hatching, average weights of the newly hatched larvae, and viability of the young bugs under standard favorable conditions.

Adult *Oncopeltus* at 25° C. begin mating 4–6 days after reaching the adult stage, and start laying eggs on the 5th to 8th day. At first only a few eggs are laid—perhaps only certain females begin this early. Thus, for data presented in fig. 1, no eggs were obtained on the 5th day, only 78 on the 6th day, 289 on the 7th day, but more than 1,500 on the 10th day. Egg production then reached a peak at about 20 days and remained almost at the same high level until about 40 days; then it fell off and became somewhat erratic. Very late in the test (> 50 days), when only the most long-lived were still alive, egg production again dropped to a few dozen but the single venerable female which lived for 72 days laid 10 eggs shortly before dying.

As far as longevity of the adult is concerned, we have reason to believe that this group lived unusually long. In general, our segregated groups seem to have died sooner but we usually discard groups as soon as significant numbers are seen to have died. In one repeat test on longevity, all the females were dead after 41–44 days but some males lived to > 50 days. Also, less complete data suggest that the peak egg production period is not constant from one generation to another. In the generation plotted in fig. 1, peak production occurred 18–20 days after ecdysis but in other generations it has been sooner (as low as 10–12 days). But, however long the groups live and whenever the peaks occur, egg production and egg weight are low the first few days of egg laying and fall off to low again near the end of life.

As shown in fig. 1, the first several batches of eggs are relatively light. In this test, the first group had an average weight of only 225 micrograms. Average weights then increased to a maximum of 280 micrograms in the period when maximum numbers of eggs were being produced. This is an increase of about 25%. Subsequent average egg weights then dropped but not constantly or with regularity in the period of 25–55 days of age. Terminal egg lots had very much lower weights (about 25% lower than the first lot and 40% lower than the maximum value). Averaging all the values together one obtains an over-all average of 255.0 ± 3.6 micrograms. A pre-

vious test that involved six lots collected at 8–22 days of female adult life gave somewhat lower values ranging 226–240 and averaging 234 micrograms. It will bear repeating that the range of 160–280 micrograms is a range of averages; the range of individual egg weights must be greater than this and may be very much greater. Even average values from the two halves of a single large batch of eggs may vary by several per cent (note 33 day group).

Freshly hatched larvae of course weigh less than the eggs from which they develop. But, surprisingly, at below about 20° C. there is a greater effect of temperature in slowing development than in slowing energy expenditure (Richards, 1957). One of the results of this is that whereas larvae from eggs incubated at 25° C. average 224.8 ± 3.2 micrograms, those from eggs incubated at 17° average 203.2 ± 2.7 μ g., and those from eggs incubated at 15° C. average only 190.0 μ g. Comparing values from matched eggs lots, the wet weight losses following incubation are 33 micrograms at 25°, 53 μ g. at 17°, and 83 μ g. at 15°. Compared to the 20–30° C. range, then, there is $1.6 \times$ as much loss at 17°, and $2.5 \times$ as much loss at 15°. As already pointed out elsewhere (Richards, 1957), the weight of eggs is not only correlated with their hatchability but seems to be one of the factors involved in successful hatching. In other words, lighter eggs have less stored food reserves. And since an egg contains only a finite amount of food and cannot get more, it follows that lighter eggs are less likely to give larvae that hatch successfully. It also follows that the variable hatching percentages obtained at and near threshold temperatures may be no more than an expression of the variation in egg weights in different batches of eggs. In fact, we have data showing that only the heaviest eggs can hatch at the threshold temperature of 15° C.

Incidentally, one can calculate the approximate amount of energy required for embryonic development from the weight losses. Extractions show that almost all of the dry weight loss at an incubation temperature of 25° C. is fat; the water content remains constant at 68–70%. From this and well-known aver-

age caloric values, one can calculate that only about a tenth of a gram calorie is required to complete the development through hatching for an *Oncopeltus* egg at 25° C. This is only enough energy to raise the temperature of one drop of water 2° C. or about 4° F.!

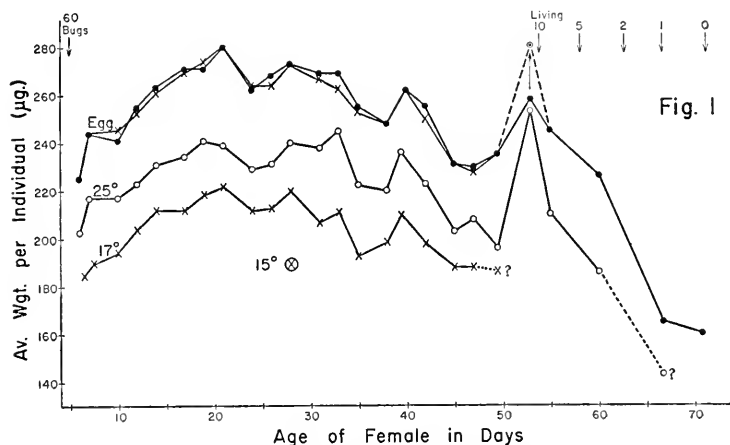


Fig. 1

FIG. 1. Average weights of *Oncopeltus fasciatus* as a function of time after molting to the adult instar. Top curves give weights of freshly laid eggs; egg lots shown as solid circles incubated at 25° C. to give larvae plotted as open circles; egg lots shown as crosses incubated at 17° to give larvae plotted as crosses. A single value for larvae from eggs incubated at 15° shown at day 28. Most of the points represent averages from lots of 200-500 eggs but fewer eggs were available for the first two and the last five points.

The egg weight value at 53 days must have been erroneously recorded to judge from the weight of the larvae obtained; a calculated probable value is plotted and joined in by the broken line. The last points of each larval curve are queried because of low hatching percentage in these lots.

Hatchability of the eggs shows differences somewhat paralleling the weight differences (fig. 2). At 25° C., hatching rises from an initial value of 80% to the 92-96% range, and falls precipitously for eggs from old females. The differences are even greater at 17° where hatchability rises from 38% to nearly 90% (or even higher if rupture of the egg shell is taken as the criterion of hatching). Similar results were obtained in an earlier set of determinations.

Similarly, the rate of development is slower for eggs from the first and last parts of the fecund period (fig. 4). This quantitative difference implies a qualitative difference in the eggs that can hardly be just a matter of weight and amount of stored reserves. What the difference is remains to be determined but clearly early and late eggs develop more slowly. [In *Drosophila melanogaster*, Sang (1956) reports that the opposite is true, i.e., the early and late eggs are about 10% faster than those of the peak middle period.]

There is, however, no clear cut difference in the viability of larvae that hatch until very late in the egg laying period (fig. 3). Larvae from eggs incubated at 25° C. are much more likely to grow to maturity when placed at optimum conditions than are ones that were incubated at 17°. Possible reasons for this are being discussed elsewhere (Richards, 1957).

The dips in the center of the curves in fig. 3 require some explanation. Near the end of the experiment M. Q. K. went away on vacation leaving these growing larvae to the tender ministrations of A. G. R. Her departure came when the larvae from 25° incubations of eggs from 38-day females and larvae from 17° incubations of eggs from 24-day females were growing. The precipitous drop in the 25° curve was due to known drowning of the 40-, 42- and 45-day lots, but the drop in the 17° curve was correlated with infrequent cleaning and renewal of seeds rather than accidental mortality. Then, M. Q. K. returned to tend the final few groups, and survival of 17° lots returned to what it had been.

This otherwise unfortunate episode does suggest an explanation of a previous discrepancy. Hodson and Al Rawy (1956) have reported that *Oncopeltus* larvae from eggs incubated at 25° grow satisfactorily whereas ones from eggs incubated at 17° all die. M. Q. K. had not been able to reproduce Al Rawy's results but A. G. R. did! Omitting the facetious language, eggs incubated at 17° give weak larvae only a minority of which survive under the best care, all of which die under care which will suffice for larvae from eggs incubated at 25°. [While the point was not proven, it seems that the lethal effect is due to

the development of mold on the milkweed seeds. Even at 75% R.H. which is rather low for mold growth, seeds must be changed and containers cleaned every 2-3 days for survival of larvae from eggs incubated at 17° C.]

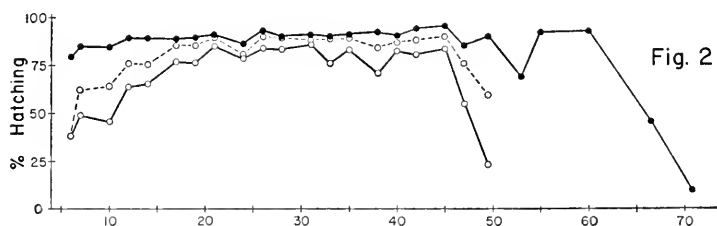


Fig. 2

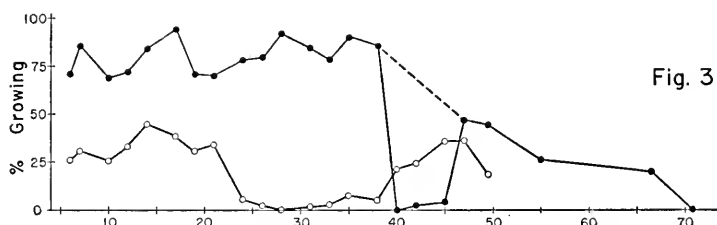


Fig. 3

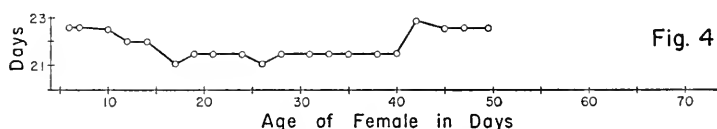


Fig. 4

FIG. 2. Hatching percentages for *Oncopeltus* eggs incubated at 25° C. (solid circles) and 17° (open circles). Open circles connected by a solid line represent complete hatching; open circles connected by a broken line include those larvae that developed and broke the egg shell but did not emerge completely therefrom.

FIG. 3. Survival percentages for larvae reared at 25° C. and 75% R.H. from eggs incubated at 25° (solid circles) and 17° (open circles). The fall of the 25° curve to zero for the 40-45 day period was due to accidental deaths. See text for discussion.

FIG. 4. Days required for incubation and hatching at 17° C.

In conclusion, eggs are laid by *Oncopeltus* females from about one week after adult emergence until death. But very early and very late in the fecund period fewer eggs are laid, and these weigh less, take longer to develop, and give lower hatching percentages. These differences are mostly in the 10-20% range

but in extreme cases may be much greater. It follows that minimum variation *within a single collection* will be obtained by using eggs from females of a known standard age (and in practice greatest constancy is obtained with *Oncopeltus* at the peak egg production period). Conversely, maximum variability will be obtained from cultures or populations containing individuals of extreme ages plus ones in the peak production period. However, as Durrant (1955) points out, quantitative values vary from one generation to the next, and less variability may be encountered in summing data *from different generations* if a selected sampling procedure is used instead of restricting data to the progeny of mothers of a particular age.

All the data presented in the present paper deal with constant temperatures in incubator cabinets. This is satisfactory for showing physiological differences but we have reason to know that *Oncopeltus* has considerably narrower tolerance range under constant temperature conditions than under varying temperatures whose weighted average equals the constant temperature. But this is another story on which we are still working.

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Bamboosiella nov. gen. (Phlaeothripidae, Tubulifera) from India

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Genus **BAMBOOSIELLA** nov.

Antenna 8-segmented, slender as in *Liothrips*; joint 3 emarginated within, 8 slightly narrowed at base, but not constricted, joint 1 narrowed towards apex; sense-cones rather long and fine, though on 3 and 4 *not* setiform. Head elongate, slightly narrowed towards base, widest across eyes, cheeks with a few weak spines especially in posterior third, as in *Hoplandrothrips*. Mouth-cone short, rounded, maxillary stylets confined to mouth-cone, very short, fine. Eyes large, oval; anterior ocellus on a slight elevation but not surpassing interantennal projection. Postocular setae long, knobbed, longer in the male. Prothorax much broader than head, heavy in the male, with black internal middle ridge. Bristles long, all knobbed, inner anteromarginals vestigial; epimerals single. Pterothorax tapering from the middle towards apex.

Legs slender, but forefemora of female distinctly, of male strongly enlarged, foretibiae unarmed, foretarsi of both sexes with tooth, stouter in the male. Wings narrowed towards middle, but from middle to apex little widened, with up to 7 double-fringe cilia. Tube short, conical, anal setae long, longer than tube, dark.

Bristle 2 of segment IX of male stouter, much shorter than bristle 1, though only spine-like. Bristles on IX (female) long, pointed nearly as long as tube.

Genotype—*Bamboosiella bicoloripes* sp. nov.

Dr. Priesner, who has kindly examined the specimens, informs me that this genus has very close resemblance to *Adrancothrips* Hood and *Hoplandrothrips* Hood. *Adrancothrips* differs from this genus in the smaller eyes, shorter prothorax, forefemora not or scarcely enlarged and cheeks unarmed. *Hoplandrothrips* has

long, closely approximated maxillary stylets (very short in *Bamboosiella*) and forefemora of male with one or two apical teeth. Similarly the genera *Apelaunothrips* Karny, *Phylladothrips* Priesner and *Mesothrips* Zimmerman, also show affinities, though much less than *Adraucothrips* and *Hoplandrothrips*. *Apelaunothrips* has similar coloration, but differs in the band-shaped maxillary stylets, short cephalic production, thin forelegs, unarmed tarsi and reticulate ocellar region. *Phylladothrips* on the other hand has short head, no double fringe, foretarsi of female and cheeks unarmed; *Mesothrips* also has head constricted at base, but antennae are thicker, joint 3 shorter and strongly conical, more strongly sclerotised in general.

I wish to express my sincere gratitude to Dr. Priesner of Egypt for kindly examining the specimens and for his invaluable advice and suggestions.

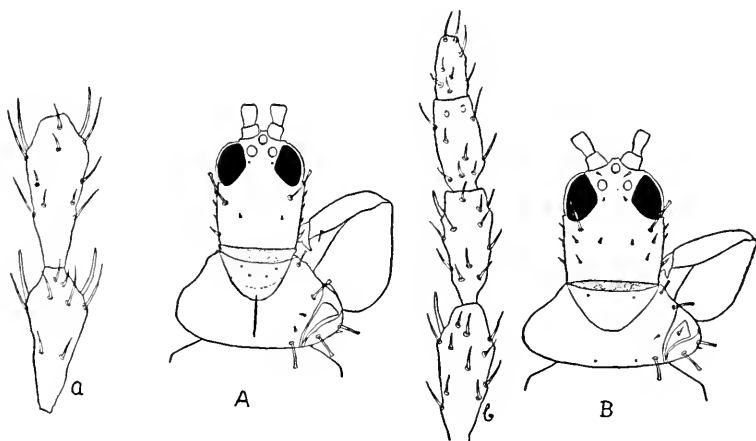
***Bamboosiella bicoloripes* gen. et sp. nov.**

Macropterous female: Total body length * 1.862 mm. Abdomen bicolourous, segments I–VI almost yellow, VII–X blackish brown like head and thorax. Antennals 1, 2, 7 and 8 dark, the remainder pale yellow. All legs wholly yellow, coxae darkened; patches of red pigment scattered all over the brownish areas, except those of antennal region. Eyes dark, ocelli with dark red pigment. Wings hyaline, wing fringes brown.

Head elongate, 238 μ long from front margin of eyes, 196 μ wide across eyes, slightly narrowed at base (182 μ); cheeks with a few weak spines, the posterior-most one, the longest. Mouth-cone short, rounded, 84 μ long, 70 μ wide at apex, reaching the middle of the prosternum. Eyes large, oval, 98 μ long, 56 μ wide, occupying 0.4 time the head length; interocular space 70 μ wide. Ocelli well developed, anterior ocellus placed far forward, but not surpassing interantennal projection; posterior ocelli placed just above the middle region of eyes. Postocular setae 64 μ long, knobbed, placed 29 μ from cheeks and 26 μ from lower margin of eyes. Antenna 8-jointed, slender, nearly twice as long as head; joint I narrowed at apex; joint III emarginated

* Posterior abdominal segments little telescoped.

within; joint VIII narrowed slightly at base, but not constricted. Antennal joint III and IV each, with an outer and inner sense cone, *rather long and fine, not setiform*; joints V and VI each, with only an outer sense cone, slightly shorter than those on III and IV. Measurements of joints: Length(width) in μ : 38(38 at base, 35 at middle, 32 at apex); 51(26 at middle); 77(26); 83(26); 70(26); 58(26); 45(22); 32(13).



Bamboosiclla bicoloripes gen. et sp. nov.

- A. Head and prothorax of male.
 B. Head and prothorax of female.
 a. Antennal joints 3 and 4.
 b. Antennal joints 5-8.

Prothorax 168μ long at middle, shorter than head, being 0.7 time as long; much broader than head, 168μ wide at anterior margin and 350μ at base including coxae. Prothoracic bristles long, anteroangulars moderately so, knobbed; inner anteromarginals vestigial; anteroangulars 32μ long; midlaterals 35μ ; epimerals 58μ ; coxals 43μ . Pterothorax tapering from middle towards apex, 350μ long and 378μ wide at middle.

Legs slender but forefemora distinctly enlarged, 98μ wide at middle; forefemora and tibiae unarmed, foretarsus with a distinct tooth.

Forewings 812μ long, narrowed at middle, but, from middle

to apex, little widened, with 7 fringe cilia; basal wing bristles strong and well developed, measuring 38, 48 and 64 μ long, respectively, knobbed.

Abdomen narrower than pterothorax, widest across IV and V segments; wing retaining bristles well developed, 2 pairs in each of the segments II-VI. Bristle 2 of segment IX, 147 μ long, pointed, nearly as long as tube; tube short, about 0.65 time head length, 63 μ wide at base, and 35 μ wide at apex. Anal setae 182 μ long, longer than tube, dark.

Measurements in μ (unless otherwise specified): Total body length, 1.862 mm.; head, length 238; width across eyes 182; prothorax, length at middle, 168; width at anterior margin, 224; width at posterior margin, inclusive of coxae, 350; pterothorax, length 154; anal setae, length 182.

Habitat: *Holotype* on bamboo sheaths, 12-4-1954, Coimbatore, T.N.A. Colls. No. 256.

Male (Macropterus): General coloration and characters as in the female, but for the following: Postoculars longer, 67 μ ; prothorax on one side in the allotype, with an abnormal additional epimeral bristle, while the normal condition for the genus is only one. Prothorax heavier than in female, with black internal middle ridge. Prothoracic bristles well developed; anteroangulars 32 μ ; epimerals 57; coxals 42 μ long.

Forefemora strongly enlarged, 112 μ wide at middle, forefemora and tibiae unarmed, foretarsus with a stout tooth.

Abdomen widest at base, gradually tapering towards apex. Segments VII-IX 203, 168 and 98 μ wide, respectively. Bristle 2 of IX segment stouter and shorter than B.1; B.1 and B.2, 141 and 160 μ long, respectively. Tube shorter than head, half as wide at apex, as at base.

Measurements in μ : Total body length 1.918 mm. Head, length 217; width across eyes 154; eye, length 91; prothorax length at middle 182; width at anterior margin, 182; width at posterior margin inclusive of coxae, 308; pterothorax, length 308, width at middle, 322; tube length 140; width at base 49, at tip 28; anal setae, length 196.

Habitat: 2 males on bamboo sheath. 12-4-1954. Coimbatore, T.N.A. Colls. No. 256.

Insects Reared and Collected from the Pond Snail, *Lymnaea palustris* Müll., at London, Ontario

By W. W. JUDD, Department of Zoology, University of
Western Ontario, London, Ontario

In London, Ontario there is a small cat-tail marsh located at the south-east corner of Adelaide and Cheapside Streets, well within the built-up area of the city. On May 20, 1955 the marsh was dried up to the extent that there was no standing water in it and only damp mud formed its floor. On that day a large population of the pond snail, *Lymnaea palustris* Müll., was found on the mud. Most of the snails were crowded into the damper, shaded hollows while some were generally scattered over the mud. None of the snails were moving and each snail was withdrawn into the upper portions of the spiral of its shell so that no parts of the body could be seen. By cracking open the shells it was found that some of the snails were alive, while others were dead with the body flaccid and in various stages of decay. The living snails were found to be harbouring no parasites or predators, but several of the dead snails contained wriggling maggots. During the next two weeks collections of the snails were made in the marsh and insects were collected or reared from them, as related in the following account. All specimens are deposited in the collections of the Department of Zoology, University of Western Ontario except a few retained in the United States National Museum (U.S.N.M.), as noted.

COLLECTIONS

1. May 20—One dipterous larva, collected from a snail, pupated and from the puparium there emerged on June 7 four wasps, *Aphaereta auripes* (Prov.) (Braconidae).

2. May 25—One beetle, *Glischrochilus quadrisignatus* (Say) (Nitidulidae) was found in a shell.

3. May 27—Two *Glischrochilus quadrisignatus* were found among shells in a hollow in the mud. Two rove-beetles, *Alc-*

ochara sp. and *Philonthus* sp., were found moving actively about in two shells. One wasp, *Aphaereta auripes*, was collected as it emerged from the mouth of a shell.

4. June 1—Six rove-beetles of the subfamily Omaliinae (*Omalius*? sp.) were collected from shells.

5. June 2—Eighty-five intact shells were collected and placed in two jars and adult insects emerging from them were collected and the dates of their emergence were recorded, as follows: June 11—1 *Athyroglossa*? sp. (Ephydriidae); June 12—1 *Athyroglossa*? sp., 2 *Sarcophaga sinuata* Mg. (Sarcophagidae); June 13—1 *Sarcophaga melampyga* Ald., 1 *Sarcophaga* sp.; June 17—1 *Pherbellia fuscipes* (Macq.) (Sciomyzidae), 1 *Pherbellia nana* (Fall.), 1 *Phygadeuon*? sp. (Ichneumonidae), 10 *Aphaereta auripes* (Prov.); June 18—1 *Pherbellia fuscipes* (Macq.); July 3—1 *Muscina stabulans* (Fall.) (Anthomyiidae), 1 *Chlaenius sericeus* Forst. (Carabidae); Aug. 5—1 *Muscina stabulans* (Fall.).

DISCUSSION OF COLLECTIONS

Coleoptera

The ground beetle, *Chlaenius sericeus* Forst., was in its teneral condition when it appeared, so it must have emerged from a pupa formed in the snail shell. This species is recorded by Blatchley (1910) as being "common about the margins of ponds, lakes and streams." Carabid beetles are known to be predaceous upon snails (Boettger, 1934, 1935, Ingram, 1946 and Schaeffer, 1931). The most prevalent beetles in the collections were the staphylinid beetles of the genera *Alcochara*, *Omalius*?, and *Philonthus*. When the shells were picked up these beetles emerged rapidly from the mouth of the shell and attempted to escape to cover. The three *Glischrochilus quadrisignatus* were found in or by the shells. Parsons (1943) records that this species breeds in fleshy fungi and that other nitidulid beetles breed in carrion and are predaceous on insects.

Hymenoptera

Muesebeck *et al.* (1951) list several species of calyptrate flies as hosts of *Aphaereta auripes*. The wasps that appeared on June 7 emerged from a puparium and those that emerged on June 17 were doubtless parasites of puparia in the shells collected on June 2. The 15 specimens are deposited in the U.S.N.M. Muesebeck *et al.* (1951) record that wasps of the genus *Phygadeuon* are parasites of muscoid flies. It is likely that the ichneumonid wasp that emerged on June 17 was a parasite on one of the flies predaceous on the snails.

Diptera

Two ephydrid flies, *Athyroglossa?* sp., were the first flies to emerge from the snails collected on June 2. The two specimens are deposited in the U.S.N.M. One specimen of the non-biting stable-fly, *Muscina stabulans*, emerged on July 3 and the second was found in the jar on August 5 when the collection of shells was discarded. At least two species of *Sarcophaga* (*melampyga* and *sinuata*) were reared from the snails. Berg (1953) reports that flies of the families Ephydridae, Anthomyiidae and Sarcophagidae have been reared from snails. Of the three specimens of *Pherbellia* that emerged from snails, one of *P. fuscipes* is deposited in the U.S.N.M. Berg (1953) records that flies in several genera of Sciomyzidae are predators of snails but does not include *P. nana* or *P. fuscipes*.

ACKNOWLEDGMENTS

Dr. H. van der Schalie, Curator of Mollusks, Museum of Zoology, University of Michigan, kindly identified the snails as *Lymnaea palustris* Müll. Identifications of insects in several families were made by the following taxonomists of the United States National Museum:—L. L. Buchanan (Carabidae), L. M. Walkley (Nitidulidae), C. F. W. Muesebeck (Braconidae), R. E. Warner (Ichneumonidae), W. W. Wirth (Ephydridae), C. W. Sabrosky (Anthomyiidae, Sarcophagi-

dae, Sciomyzidae). Dr. C. H. Seevers, Roosevelt University, Chicago, identified the Staphylinidae.

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A New Species in the Genus *Arachnoproctonus* (Hymenoptera: Psammocharidae) with Photomicrographs of the Genitalia and Subgenital Plate

By R. R. DREISBACH, Midland, Michigan

Until the writer's description of *Arachnoproctonus occidentalis* (ref.), the species *A. relativus* (Fox) was the only species known in this genus which had hair bands on the abdominal ventral segments in the male, very similar to those in the genus *Anopolius*. In working on a lot from the American Museum, another specimen with hair bands on the fourth and fifth ventrites turned up which had a distinctly different subgenital plate than either of the other two, and also with other differences. This is described below as a new species.

Arachnoproctonus variegatus n. sp.

Holotype male: Completely black, except for the apex of the mandibles which are reddish, rather long black hair on the vertex, shorter and thinner on clypeus, pronotum, sides of thorax and propodeum; heavy hair brushes on the ventral parts of the

fourth and fifth abdominal sternites, these bands over whole length of segments, and hair of same length on each; when seen from the side, nearest of posterior ocelli just barely visible and the front below anterior ocellus barely raised above the eyes, clypeus almost flat but slightly bowed in the middle, practically no posterior orbits; when seen from the front, the vertex sloping slightly above the eyes with a slight mound, which contains the ocelli, the head width almost equal to the length (0.88); interocular distance equal to $0.63 \times$ transfacial distance at greatest eye width; vertex width equal to the interocular at the clypeus; clypeus twice as wide as its length; posterior ocelli slightly greater distance apart than their distance to the eyes (16:12); ratios of the first four and last two joints of the antennae are as 25:8:20:25:19:19. Thus it is seen that the first and fourth joints are slightly longer than the third; the third, fourth, fifth and sixth joints with ventral surface flattened slightly; the pronotum rises in a smooth curve from the neck to the dorsal surface, posterior edge slightly triangular and curved; propodeum with short upright hair on dorsal border and covered with whitish, very short, almost appressed hairs on posterior edge, this is the only silvery hair on the body; the third intercubital vein slopes backward, is slightly wavy but almost straight; the first intercubital vein is strongly arched inward, that is convex; second cell is longer on the cubitus than on the marginal vein; second and third cubital veins are only about $3 \times$ their width apart on the marginal vein; the length of the two cells on the cubitus almost equal; basal vein interstitial with the transverse in the forewings, and in the rear wings the cubitus and the discoidal are also interstitial; the wings are very dark colored, more so at the apex; the abdomen increases in width slightly from the base to the middle of the second tergite and then decreases to apex of abdomen; the first tergite on the apical half covered with fairly long hair; legs are fairly well spined as is usual with the genus; ratios of the joints of the posterior legs starting with the femur are as 90:115:90:45:27:22:28. The longer spur of the posterior legs is equal to 0.7 the length of its metatarsal joint.

Genitalia similar to *relativus* but with the hair tufts on volsellae with the hair shorter and with knobs at tip of hairs not quite as large, and with fewer long hairs at base of volsellae; subgenital plate with basal two-thirds of plate almost parallel-sided (slightly tapering toward apex) with sides at middle of this part sinuous; apical third of plate suddenly narrowed and slightly tapering to broad fairly long haired apex; length of head and thorax 6.0 mm; abdomen same length; forewing 8.6 mm long; rear wing 7.3 mm long; genitalia length 1.32 mm, width 0.86 mm, subgenital plate 1.66 mm long, 0.73 mm wide.

Holotype male: N. Mexico only data (Am. Mus.).



Arachnoproctonus variegatus n. sp.
Genitalia and subgenital plate $\times 45$

Key for Separating the Three Species with Ventral Hair Bands

1. Hair bands on fourth and fifth ventral segments; genitalia with a very large hair tuft of long hair, bent at right angles near tip and clubbed at tip, near apical part of volsellae but with apex bare of hair; wing heavily infuscated, posterior femora compressed.....2

1. No hair bands on ventral segments, nor with the long heavy tufts of hair on volsellae. . . . Remaining species of Genus
2. Hair band on fourth ventral not prominent, of much shorter hair and less well haired than the fifth, which is long haired and prominent; third antennal joint shorter than both the first and fourth, only $\frac{5}{6}$ as long as fourth, twice as long as wide; interocular distance 0.58 as long as transfacial at the widest point; subgenital plate slightly ovate-shaped but with apex broad across tip, widest about mid-length tapering to each end; parapenial lobes narrow and shorter than aedeagus. Over the whole of U. S. *relativus* (Fox)
2. Hair band on fourth ventral with as long hair as the one on fifth; third antennal joint as long as or longer than either first or fourth, 1.04 and 1.26 as long respectively; interocular distance 0.50 and 0.63 times as long as transfacial; subgenital plates either parallel sided or much reduced in width on apical third. 3
3. Hair band over whole length of fourth and fifth ventrals, not so dense as next; subgenital plate parallel sided; parapenial lobes very wide at least twice as wide as the preceding and the following and longer than the aedeagus; volsellae with hair on hair tuft not as long nor with tips as bent as in *relativus*, tips blunt and with longer bare surface, while tips of the other two are more acute; third antennal joint $1\frac{1}{4}$ times as long as fourth and 1.65 times as long as wide; interocular distance 0.50 times as long as transfacial; head 0.94 times as long as wide. California.
3. Hair band on fourth and fifth ventrals only over $\frac{3}{4}$ or less length of the segments (posterior $\frac{3}{4}$); subgenital plate with basal $\frac{2}{3}$ almost parallel but sinuous and with the apical $\frac{1}{3}$ suddenly reduced to a broad tip; parapenial lobes about like *relativus*; volsellae with tuft of hair shorter and tips not bent so much; third antennal joint about as long as first almost 3 times as long as second and slightly longer than fourth, 2.3 times as long as wide; interocular distance 0.63 times transfacial; length head 0.88 times as long as wide. New Mexico. *variegatus* n. sp.

REFERENCE

DREISBACH, R. R. 1954. Am. Mid. Nat., vol. 52, no. 2, pp. 437-442.

Notes on a *Stictia* New to the United States (Hymenoptera: Sphecidae: Bembicini)

By HOWARD E. EVANS, Cornell University, Ithaca, N. Y.

The genus *Stictia* includes some of our largest and most showy digger wasps. Only one species, the common "horse guard," *S. carolina* (Fabr.), is truly a member of the Nearctic fauna. One other species, the Neotropical *S. signata* (L.) has been taken in southern Florida and in southern California. It is now possible to add a third species, *S. vivida* (Handl.), to the list of species known to occur in the United States. Handlirsch (1890, Akad. Wiss. Wien, Math.-Nat. Kl. Sitzber., 99: 25-26) described this species from one female from "Mexico" and another female without locality data. Parker (1929, U. S. Nat. Mus. Proc., v. 75, art. 5, p. 35) recorded seven females from Alta Mira, Tamaulipas, Mexico. These are the only published records on this species, and the male has remained unknown.

From June 22 to June 28, 1956, Eric G. Matthews and myself collected insects in Cameron Co., Texas. Most of our time was spent along the shores of Laguna Madre about five miles west of Port Isabel. In this locality a great many Hymenoptera were taken on the flowers of black mangrove, *Avicennia nitida* Jacq., including four male *Stictia vivida*. We also discovered two female *vivida* nesting on the beach at Boca Chica, several miles south and east of Port Isabel. The nests were situated in rolling but fairly hard-packed sand well back from, but facing, the Gulf shore. The nests were of simple structure, with a burrow 60-68 cm long leading to a cell about 2×5 cm in size. Both nests contained fairly large larvae plus a few horseflies, *Tabanus texanus* Hine [det. L. L. Pechuman]. The females carried the flies in the usual manner of Bembicini and always closed the nest upon leaving.

Thus *Stictia vivida* appears to be well established in extreme southern Texas. I also collected the species on June 19, 1951, at Tecolutla, Vera Cruz, Mexico. In this locality nine females

were taken in sand dunes immediately behind the beach. These new records, along with Parker's record from coastal Tamaulipas, indicate that the species ranges along the Gulf shore for at least 400 miles. I have collected *Stictia* at several inland localities in Mexico, but have never taken *vivida* away from the sea beach.

Since the male has not previously been described, a few notes on its recognition may be in order. In both Handlirsch's and Parker's papers, the males key directly to *dives* (Handl.), a common inland Mexican species. They bear a close resemblance to *dives*, but differ in the following characters: labrum narrowly bordered with black, but with little or no black medially; yellow on the scutellum narrowly interrupted medially; penultimate sternite with moderately dense, short, suberect setae and with the specialized median elevation located at the extrem base and not conspicuous. The male *vivida* closely resembles the female in color pattern, differing chiefly in having less yellow on the mesopleura, in having the apical abdominal tergite marked with yellow, and in having the legs much more extensively marked with yellow.

More About Membracidae at Lights

By S. W. FROST, Pennsylvania State University

In 1955¹ the writer reported large numbers of Membracidae taken at lights and noted that previously most entomologists considered they were not strongly attracted to light. During 1956, a trap operated in Centre County, Pennsylvania, attracted even larger numbers of these insects. This trap was equipped with a 60-watt tungsten filament lamp and was placed in a dense oak woodlot. Several nights during July unprecedented numbers of Membracidae were caught. Collections on the

¹ Ent. News, 66(3) : 63-64, 1955.

nights of July 1 and 6 were selected for analysis. The insects were caught in a quart jar, containing kerosene, at the bottom of the trap. The Membracidae were separated from the other insects, dried and weighed. Immediately a sample was taken and the species of treehoppers determined as follows.

Membracidae taken at one light trap July 1, 1956,
Centre County, Pa.

Species	Males 5-gram	Females sample	Estimation for total catch 54.5 grams
<i>Cyrtolobus vau</i> Say	424	0	4621.6
<i>Cyrtolobus pallidifrontis</i> Emms	2	1	32.7
<i>Atymna querci</i> Fitch	34	0	370.6
<i>Ophiderma flavicephala</i> Goding	115	0	1253.5
<i>Smilia camelus</i> Fab.	0	1	10.9
Total	575	2	6289.3

Membracidae taken at one light trap July 6, 1956,
Centre County, Pa.

Species	Males 2-gram	Females sample	Estimation for total catch 20 grams
<i>Cyrtolobus vau</i> Say	395	3	3980
<i>Cyrtolobus fenestratus</i> Fitch	25	0	250
<i>Atymna querci</i> Fitch	18	1	190
<i>Ophiderma flavicephala</i> Goding	4	0	40
Total	442	4	4460

It is more evident than previously published that Membracidae, especially those of the Genera *Atymna*, *Cyrtolobus* and *Ophiderma*, are attracted in large numbers when lights are close to the infestations. It is also evident that the males respond more freely than the females.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Pacific Science Congress. The Ninth Pacific Science Congress will be held at Bangkok, Thailand, 18 Nov. to 9 Dec., 1957 (including post-sessional tours). Plans for the entomology section include sessions on problems in Pacific entomology; zoogeography of Pacific insects; fauna and ecology of Thailand (with Zoology); use of insecticides, their merits and hazards, and insects of medical importance (both with Public Health section); biological control of insects and weeds; insect pests of rice; coconut pests; ecology and control of the giant African snail; and quarantine. Also, participation in UNESCO symposium on climate, vegetation and land utilization in the humid tropics, and participation, with zoology and botany, in symposium on bibliographic problems in the Pacific. For the latter, the undersigned would like to receive information regarding bibliographies in preparation, or in existence, which include Pacific insects or relate to Pacific entomology, or suggestions for needs in this line.

It is hoped that as many entomologists as possible may try to get to the Congress, and that papers on the above, or additional subjects, may be submitted. Correspondence may be addressed to the undersigned, chairman of the Standing Committee on Pacific Entomology, at Bishop Museum, Honolulu 17.
—J. L. GRESSITT

Fire at the Budapest Museum. During the revolution in Hungary in late 1956 part of the Hungarian National Museum in Budapest was burned. According to Mrs. J. J. H. Szent-Ivany who was working at the museum at the time, the Acarina, Orthoptera, neuropteroid and Diptera (except acalyptrates) collections were entirely destroyed (including a few thousand Diptera types), and the very important Horvath collection of Heteroptera was partly destroyed, but the Coleoptera and Lepidoptera collections remained safe, with only slight damage. Mrs.

Szent-Ivany escaped to Vienna with her daughter near the end of the year, and both are joining Dr. Szent-Ivany in New Guinea.—J. L. GRESSITT

New Book on Tropical American Butterflies. The American Museum of Natural History is about to publish "BUTTERFLIES OF THE AMERICAN TROPICS—The Genus *Anaea* (Lepidoptera Nymphalidae)—a study of the species heretofore included in the genera *Anaea*, *Caenophlebia*, *Hypna*, *Polypographa*, *Protogonius*, *Siderone*, and *Zaretis*" by William Phillips Comstock.

From advance specimen pages sent out it is evident that this will be a large and beautiful volume. The page size, trimmed, is $9\frac{3}{4} \times 13$ inches, and there will be xvi + 276 pages and 30 full-page color plates. Dr. A. B. Klotz has spoken very highly of the scientific value of this work and also points out that . . . "because of its superb beauty of illustration and excellence of design, [it] is destined to have the strongest appeal to bibliophiles the world over, as well as to everyone genuinely interested in natural history. I am afraid that we in the United States have lagged behind in the production of such books. This one, happily combining great intrinsic scientific worth with illustrative artistry of the highest calibre, will do much to redeem us."

Because of the great costs of the 30 color plates it is necessary for the American Museum to obtain in advance an indication of the demand for such a book, as well as for a series of such books on butterflies and on other groups that is under consideration. The pre-publication price is \$20.00 per copy. After publication the price will be \$25.00. Orders should be sent to: The American Museum of Natural History, Central Park West at 79th Street, New York 24, N. Y. If British sterling is more convenient, send orders direct to the printer, W. S. Cowell, Ltd., Butter Market, Ipswich, Suffolk, England.

Summer Grants at Oklahoma. The National Science Foundation has provided funds for a number of grants-in-aid for students and investigators during the summer session at the University's Biological Station, Lake Texoma. Both post- and

pre-doctoral grants are available, from \$200, \$350, to \$500 each. Applications should be sent before April 10 to Carl D. Riggs, Director, University of Oklahoma Biological Station, Norman, Okla.

Reviews

ROSS, HERBERT H. 1956. *Evolution and Classification of the Mountain Caddisflies*. University of Illinois Press, Urbana. vi + 213 pp. Price: \$6.00.

Though this volume treats, in detail, only the families Philopotamidae, Rhyacophilidae and Glossosomatidae, it is in reality far broader in its scope than the title would indicate.

In the introduction Dr. Ross treats of such concepts as "living fossils," "primitive, generalized and specialized" and "dispersal." These concepts, basic to any discussion of phylogeny, are briefly and lucidly defined. This is followed by an excellent discussion of the evolution and origin of the caddisflies as a whole. The main part of the book consists of a detailed treatment of each of the above mentioned families. For each family the evolution and dispersal of the genera and species is given followed by a systematic treatment of the family with keys to genera and species.

The last major section is concerned with the dispersal in geologic time of the above three families. This is a difficult and, to a large extent, speculative subject—involving as it does the superimposition of the aforementioned evolutionary and dispersal data upon the geologic and ecologic history of the earth. This task is very ably handled here and this section could serve as a model for this type of study. The volume is well worth reading by any student of systematics and evolution, regardless of his particular field of study.—SELWYN S. ROBACK.

SYSTEMATICS OF THE SUBORDER TUBULIFERA (THYSANOPTERA) IN CALIFORNIA. By H. Edwin Cott. University of California Publications in Entomology, Vol. 13. (University

of California Press, Berkeley and Los Angeles.) 216 pp., 4 pls. 1956. Price: \$3.50.

This is the first analytical work of size on a thrips fauna to appear in America since Hinds' monograph in 1902. Although limited to California, which is relatively depauperate in representatives of Tubulifera as compared to the eastern and tropical regions of North America, Cott's work is of wide significance because it summarizes the taxonomic criteria and methods commonly used in the study of the suborder. Furthermore, because intergrading species between *Haplothrips* and *Leptothrips* and between *Liothrips* and *Rhynchothrips* flourish in California, Cott is able to bring meaningful attention to the problem of delimiting these extensively distributed genera.

In all, Cott treats 29 genera and 60 species, of which 12 of the species are new. His classification is a conservative one following closely the system proposed in 1927 by Priesner. Each genus is redefined and is discussed with particular reference to affinities and taxonomic status. The species are described in detail and type localities, hosts, distribution, and material studied are given. The keys appear to be workable.

Of general interest to entomologists is Cott's break with tradition in referring to the immature stages of thrips as nymphs and pseudopupae rather than as larvae and pupae. His argument for this nomenclature is that it is in keeping with the nomenclature used for other insects having paurometabolous development.

This careful study provides the specialist with much new information on a heretofore little known fauna and, of equal importance, it provides interested entomologists with the first modern American guide to a portion of the Tubulifera.—LEWIS J. STANNARD, JR., Illinois Natural History Survey, Urbana.

A TEXTBOOK OF ENTOMOLOGY by Herbert H. Ross. Second edition. John Wiley & Sons, Inc., New York, Chapman & Hall, Ltd., London. 1956. Pp. xi + 519. Price: \$7.50.

The first edition of this textbook was reviewed in ENTOMOLOGICAL NEWS for May, 1949 (Vol. 60: 139). This second edition maintains all the virtues described in that review, and we may affirm in 1957 that this is still the only American textbook that will provide the student with an introduction to the science of entomology as it exists to-day. Covering, as it does, so wide a field in only 500-odd pages, it necessarily concerns itself with fundamentals to the exclusion of minor detail. Each chapter, whether it deals with the history of the subject, external or internal anatomy, physiology, life cycles, the orders of insects, geological history, ecology, or control, is very skillfully written so as to present the basic facts concisely, and in simple language. In spite of treating the subject from such a broad standpoint, the study of the insect orders is by no means slighted. Under each order there are keys to the principal families with line drawings illustrating all the characters used in these keys, and there are the customary habitus pictures of representative forms, and descriptive text.

The entire book has been re-set in a different style of type and with more pleasing headings. A great improvement in general appearance has also resulted from re-drawing and making new engravings of most of the numerous anatomical illustrations. The convenience of having each anatomical part labelled directly with its name instead of with a symbol will also be appreciated.—R. G. SCHMIEDER.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acaassuso (Buenos Aires), Rep. Argentina.

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CONTENTS

Alexander—James Speed Rogers, 1891–1955	85
Woolley—Redescription of Ewing's Oribatid mites, I	89
Nomenclature notice	96
Bradley—A new species of Brazilian Campsomeris	97
Reinhard—New American muscoid Diptera	99
A new film	111

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JAMES SPEED ROGERS

1891-1955

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James Speed Rogers, 1891-1955

With the passing of Doctor James Speed Rogers, at the relatively early age of 63, the world has lost the leading student of the biology and ecology of the Tipulidae, largest family in the order Diptera (over 11,000 species). Dr. Roger's longtime associate, Dr. Theodore H. Hubbell, present Director of the Museum of Zoology at the University of Michigan, has prepared a detailed account of his life and work.¹ In the brief space available I am able to note only a few points of general and personal interest in the career of this outstanding worker and dear personal friend.

Dr. Rogers, affectionately known to his close friends by his middle name of "Speed," was born in Dayton, Indiana, November 4, 1891, son of the Reverend Mr. Henry Martyn Rogers and Alma Goodloe (Smith) Rogers. He died suddenly and unexpectedly of a heart ailment at Ann Arbor, Michigan, on May 17, 1955. Following his high school days, he briefly attended Hanover College, Hanover, Indiana, later going to the University of Michigan from whence he received successively the degrees of A.B. (1915), A.M. (1916), and Ph.D. (1930). From 1919 to 1922 he was on the staff of Grinnell College, Grinnell, Iowa, which he left to become Professor of Biology at the University of Florida, from 1922 to 1946. In 1946 he was called to his Alma Mater to become Professor of Zoology and Director of the Museum of Zoology, a position that he held to the moment of his decease. On April 18, 1918, he was married to Miss Irene Russell, whom he had known in his college days,

¹ HUBBELL, THEODORE H., James Speed Rogers, 1891-1955. Report of the Director, Museum of Zoology, University of Michigan 1954-1955, pp. 8-19, portrait; 1956.

and who survives him, together with his two children, Dr. James Speed Rogers and Mrs. Irene Russell Howard. At the time of his passing he was a member of several of the leading entomological societies.

Although his studies on the biology of crane-flies occupied virtually all of his research time, he prepared, with Drs. Hubbell and Byers, one of the outstanding university texts, "Man and the Biological World."² His published papers on the Tipulidae, 18 in number, have been listed in the Bibliography prepared by Dr. Hubbell. To this record one further article that had been omitted inadvertently, should be added.³ While all of the papers that he wrote on the biology and ecology of the Tipulidae are important, three are so outstanding that they must always rank as models in their treatment of the subjects.⁴

At the time of his passing, Dr. Rogers had some further papers in various stages of preparation, one of which (on *Lipsothrix sylvia*) was completed by his student, Dr. George W. Byers. Others are sufficiently advanced that they may be reviewed and eventually published. However, as is so often the case with outstanding workers who are overwhelmed with other duties, the great mass of his observations remains unpublished, and very many, perhaps the great majority, of his numerous observations passed with him. There remain, however, carefully prepared field notes, voluminous records, and an unparalleled collection of the immature stages in the family, which will provide the basis for future work on the subject.

² ROGERS, J. S., with T. H. HUBBELL and C. F. BYERS. Man and the Biological World. Ed. 1, pp. x-607, 180 figs.; 1942. Revised Ed. 2: xiv-690, 375 figs.; 1952. McGraw Publishing Co. A Spanish translation by R. Muratorio was published in Buenos Aires in 1946.

³ ROGERS, J. S. Descriptions of the immature stages of some New Zealand crane-flies: Part 1. Trans. New Zealand Inst. 58: 301-309, 14 figs.; 1927.

⁴ ROGERS, J. S. The summer crane-fly fauna of the Cumberland plateau in Tennessee. Occas. Papers Mus. Zool., Univ. Michigan 215: 1-60, 5 pls.; 1930. The ecological distribution of the crane-flies of northern Florida. Ecol. Mon. 3, No. 1: 1-74. 25 figs.; 1933. The crane-flies (Tipulidae) of the George Reserve, Michican. Misc. Publ., Univ. Michigan 53: 1-128, 8 pls., 1 map; 1942.

Additional to his great work on the immature stages of crane-flies, Dr. Rogers later in his career became intensely interested in problems of subspeciation, clinal distribution, and comparable aspects, and in his attempts to solve some of the problems that are found here, built up a vast collection of the adult flies in this group. He once told me that he wished he could secure 10,000 specimens of every species. Dr. Hubbell estimates that the collection may include 100,000 pinned specimens of the adult flies, with between 400,000 and 1,000,000 still in papers, accompanied by more than 7,000 microscope slides showing the critical structures needed in classification, particularly the wings and male genitalia. The vast bulk of this unparalleled collection is from the United States and Canada and many, if not the greatest proportion thereof, were collected by him while on his various field excursions. A fuller account of this outstanding work is included in Dr. Hubbell's paper.

Very early in our careers, Speed and I were attracted to one another through our mutual interest in the crane-flies, and it was soon decided that he would devote his principal energies to the biology and ecology, while I hoped to give more and more of my time to a taxonomic study of the group. To further this arrangement, I at once turned over to Speed my extensive collections of the immature stages of crane-flies that had formed the basis of my report "The crane-flies of New York, II, Biology and Phylogeny." Even at that early period, Speed once wrote that "he hoped that some day the two of us might perhaps live sufficiently long to make this group the best known of all the families of the Diptera."

Because of our wide geographical separation, we had very few opportunities to meet or to enjoy joint field trips. Two outstanding meetings may be mentioned. In June 1921 we enjoyed a two-weeks' collecting trip across southern Indiana, beginning at Hanover, the family home, continuing westward across the southern counties to New Harmony on the Wabash River. This trip was rich with happy experiences for both of us. It was at New Harmony that we had the good fortune to locate many hitherto unknown data concerning Thomas Say,

which were later used by Weiss and Ziegler in their classic account of the subject.⁵ In July 1928, prior to the meetings of the Fourth International Congress of Entomology at Ithaca, N. Y., the late Dr. Fred W. Edwards of London, England, with Mrs. Edwards, visited us at Amherst for one week, and Speed came from Gainesville, Florida, for the occasion. Most enjoyable and profitable field excursions during the days, and happy evenings spent around a table pinning and papering the collected materials, provided all of us with unforgettable memories. During that time a vast range of subjects relating to the Tipulidae came under review, adding to a better understanding and appreciation for all of us.

Speed Rogers developed various students of crane-fly biology and ecology, both at Florida and later at Michigan. The more outstanding of such students include Drs. R. E. Bellamy, George W. Byers, Dennis Hynes, and Benjamin Foote. It is expected and believed that these students will carry the Roger's tradition, as it concerns the Tipulidae, far into the future. To persons such as myself, who have been privileged to a long association with Speed Rogers, a simple expression of appreciation and thanks seems quite inadequate. It is certain that the lives of all of us were vastly enriched by this association and by the priceless friendship of a great and kindly man.

The accompanying portrait of Dr. Rogers was taken by Dr. George W. Byers, in the Museum of Zoology at Ann Arbor, within a few days of his death.

CHARLES P. ALEXANDER

⁵ WEISS, HARRY B. and GRACE M. ZIEGLER. Thomas Say, early American Naturalist, pp. xiv-260, 27 illustrations; 1931. (Reference, p. 231.)

Redescriptions of Ewing's Oribatid Mites, I—Families Zetorchestidae, Hermannieillidae (Acarina: Oribatei)¹

By TYLER A. WOOLLEY, Department of Zoology, Colorado
A. & M. College, Fort Collins, Colorado

Two summers ago the writer received a series of pencil drawings of Ewing's type oribatids from Dr. E. W. Baker, Curator of Acarina at the U. S. National Museum. Dr. Baker suggested that the recipient finish the drawings and redescribe the mites for publication. Following this suggestion the redescrptions were begun.

Originally the author planned to incorporate these drawings and redescrptions in reviews or revisions of the various families involved. This was done in a few minor instances. Subsequently, however, the writer became convinced that such delay would defer the publication of these drawings for too long a time; that early publication of the redescrptions and drawings would be an asset to anyone whose research might require exact knowledge of Ewing's species.

The writer, therefore, proposes to submit a series of articles on Ewing's type oribatids for publication. The redescrptions and discussions of these forms will be presented in a somewhat cursory fashion, without attempts to do much more than identify and illustrate the mites. It may be possible later to incorporate these data into more effective arrangements, such as reviews or revisions of families or genera.

The author has attempted to utilize the same general sequence of description as employed by Ewing. Some statements of the latter are incorporated in the redescrptions in more modern terms by the use of current acarological terminology. Discrepancies or minor variations in the descriptions are indicated by parenthetical means.

It should be noted that while the current article is first in the numerical designation of the series, several redescrptions

¹ Research supported by a grant-in-aid from the National Science Foundation.

preceded this writing (Woolley & Higgins, 1955; Woolley, 1955; Woolley, 1956).

The writer expresses his sincere appreciation to Dr. E. W. Baker for the drawings of Ewing's type oribatids, recognition of which is made by initials on the finished plates.

FAMILY ZETORCHESTIDAE MICHAEL, 1898

According to Baker and Wharton (1952) the principal characteristic of the family Zetorchestidae is the pronounced development of the fourth pair of legs, which enables these mites to jump. Grandjean (1951) cites this feature and other details in his descriptions of the family and its genera *Zetorchestes*, *Saxicolestes*, *Diorchestes*, *Belorchestes* and *Litholestes*.

The two species known by Ewing were *Zetorchestes micronychus* Berlese, 1888 and *Zetorchestes equestris* Berlese, 1908. Ewing (1909b) cites the collection of a specimen of the former species by C. R. Crosby at Columbia, Missouri, but no date is indicated. Dr. Baker's drawing is of the latter species, which was collected by C. R. Crosby in trash at Columbia, Missouri. Its description follows.

***Zetorchestes equestris* Berlese, 1908. (Figs. 1, 2)**

Color black; rostrum blunt; rostral hairs stout, simple, curved at tips, inserted in short peduncles. Lamellae roughened plates at sides of propodosoma, divided by a suture mid-way between insertion of lamellar hair and base of pseudostigmata. Lamellar hairs long, simple, incurved, extended beyond anterior tip of rostrum, twice as long as rostral hairs, narrower. Surface of propodosoma with small knobs. Interlamellar hairs fine, decurved, inserted half their lengths from medial edges of lamellae at level of pseudostigmata, about four times their lengths apart. A glandular area posterior and medial to insertions of interlamellar hairs. Pseudostigmata large, cup-like, contiguous with posterior width of lamellae. Pseudostigmatic organ clavate, about twice as long as interlamellar hairs, setose at tips.

Hysterosoma almost circular in outline (specimen broken on right side), with a prominent posterior tubercle. Seven pairs

of prominent, simple bristles on dorsum (Fig. 1). Two pairs of glandular fissures, one pair antero-laterad of c:2 bristles (antero-lateral corner); second pair posterior and laterad of large tubercle at distal end of hysterosoma.

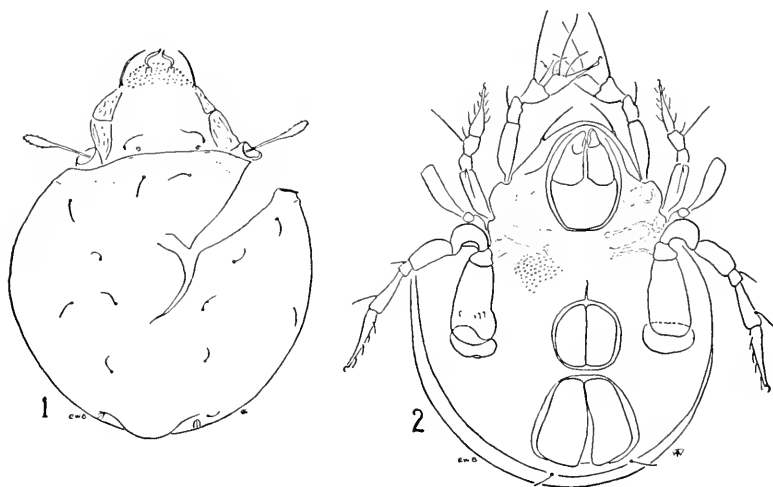


FIG. 1. *Zetorchestes equestris* Berlese, 1908, from the dorsal aspect. Specimen broken on right side by pressure of coverslip.

FIG. 2. *Zetorchestes equestris* Berlese, 1908, from the ventral aspect.

Venter with a prominent camerostome; chelicerae stout. Pedunculate insertions of lamellar hairs visible antero-laterad of camerostome.

Surface of ventral plate covered with small knobs. Genital opening nearly circular, close to anal opening and about three-fourths as long as latter. Anal opening broadly triangular; anal plates agape in specimen due to pressure of coverslip. A single pair of adanal setae posterior to anal opening.

Apodemata I curved posteriorly adjacent to camerostome at level of base of chelicerae. Tibia of leg I an expanded triangle, with long tactile bristle (Fig. 2). Tarsi of leg I ending in a single claw, setal arrangement incompletely shown in Fig. 2. Apodemata II and III extended medially, parallel and close to each other; insertions of legs II and III close together. Distal

parts of legs II and III incompletely illustrated in original drawings. Insertions of legs IV at level of middle of genital aperture. Leg IV modified for jumping; coxa with triangular cap; trochanter greatly curved; genu short, between stout femur and distally expanded tibia; tarsus attenuated, ending in a single claw.

Length 400 μ , width 300 μ .

DISCUSSION. Ewing (1909) indicates both *Zetorchestes micronychus* and *Z. equestris* as having been collected in trash by C. R. Crosby at Columbia, Missouri. Berlese's original description of *Z. equestris* (1908) is rather terse and without an accompanying figure. He cites the location as Columbia, which Grandjean (1951) indicates to be in Canada.

FAMILY HERMANNIELLIDAE GRANDJEAN, 1934

The distinctive characteristic of this family is a projected lateral peduncle on each side of the opisthosoma. This peduncle constitutes the opening of an oil gland duct.

Four varieties of the genus *Hermanniella* Berlese, 1908, are listed by Ewing (1918), two of which are redescribed below as separate species.

Hermanniella robusta Ewing, 1918. (Figs. 3, 4)

Rostrum depressed, rostral hairs not visible. Dorsum of propodosoma with two prominent humps on anterior face, surface pitted; an elevated shelf anterior to pseudostigmata; a median trough near hysterosoma, between pseudostigmata. Interlamellar hairs erect, barbed, inserted between pseudostigmata on each side of median trough. Pseudostigmata prominent cups (Figs. 3, 3A); pseudostigmatic organs erect, with barbed tips.

Hysterosoma oval in outline (specimen slightly tilted), with pitted surface; with nine pairs of stout, erect hairs, all hairs of equal size. Glandular tubercle as in Fig. 3.

Chelicerae stout, beneath propodosomal prominences (as seen in tilted specimen). Apodemata broad plates in anterior part of venter, apparently flattened. Setal insertions as shown in

Fig. 4. Genital aperture nearly circular, genital plates oval, with four pairs of setal insertions visible; g:2 remote from medial margin of plates, other insertions approximating medial margin of plates. Anal aperture separated slightly from genital opening, broadly oval; anal plates somewhat triangular, with two pairs of simple setae near median margin of plates. Two adanal setal insertions laterad of anal aperture.

Insertions of legs I and II in conical sheaths; coxae of legs III and IV expanded distal to insertions.

Length 800 μ , hysterosoma 642 μ ; width (tilted position) 470 μ .

H. E. Ewing collected a single specimen from Mary's Peak, Oregon.

Hermanniella occidentalis Ewing, 1918. (Figs. 5, 6)

Propodosoma broadly triangular, dorsum pitted. Rostrum bluntly pointed, rostral hairs short, incurved. Lamellar hairs erect, stiff, directed forward, inserted half their lengths from and almost directly behind rostral hairs. Posterior part of propodosoma elevated and rounded between pseudostigmata. Interlamellar hairs nearly twice as long as lamellar hairs, erect, slightly outcurved, inserted laterad of rounded summit of propodosoma, closer to pseudostigmata than to median line. Pseudostigmata depressed cups, rims of cups continuous with surface of propodosoma. Pseudostigmatic organ clavate, setose at tip, with darkened center (Fig. 5A).

Hysterosoma broadly oval, dorsum pitted, with nine pairs of strong, erect setae; median posterior pair of dorsal setae heavier than others. Lateral oil gland ducts pedunculate, extended from lateral surface between legs III and IV, about mid-way between anterior and posterior margins (Fig. 5).

Camerostome triangular, two setae posterior to chelicerae. Apodemata and setal insertions as shown in Fig. 6. Genital opening nearly circular, slightly oval; aperture medial, between legs IV; genital plates with straight medial margins, rounded lateral edges, each plate with five setal insertions along medial margin, subequally spaced. Anal opening about twice as large

as genital aperture; anal plates with straight medial margins, rounded lateral sides; each plate with two long setae inserted remote from medial margin. Three pairs of adanal setae, two pairs near antero-lateral margin of anal aperture (Fig. 6); a pair adjacent to posterior margin of anal aperture.

Legs I and II with triangular coxae; coxae of legs III and IV expanded; setation of legs as in Fig. 5.

Length 666 μ , hysterosoma 500 μ ; width 400 μ at tubercles.

Dr. Ewing collected two specimens under a rotting log on the top of Mary's Peak, Oregon.

DISCUSSION. The original description of *Hermanniella punctulata* Berlese, 1908, consists of five words that describe the minute pits in the dorsal integument. The description is followed by the measurements (540 μ long, 380 μ wide) and a statement that the species is smaller than *H. granulata* (650 μ long, 450 μ wide). Van der Hammen (1952) points out that the sculpturing of the hysterosoma varies and that some of Berlese's measurements are contradictory.

Ewing (1918) indicates that *H. punctulata* var. *robusta* differs from Berlese's type in size, but his variety also shows other differences than those indicated for the European species. The writer is convinced that both of the varieties which Ewing describes are separate species. *H. robusta* Ewing, 1918, differs from *H. punctulata* Berlese, 1908, in the prominent knobs and dorsal median trough on the propodosoma (Fig. 3). There is an additional distinction in the integumental reticulations, which vary in both European and American species.

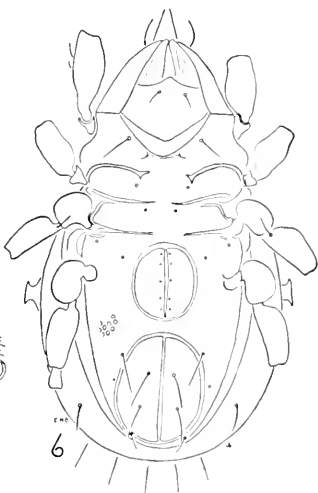
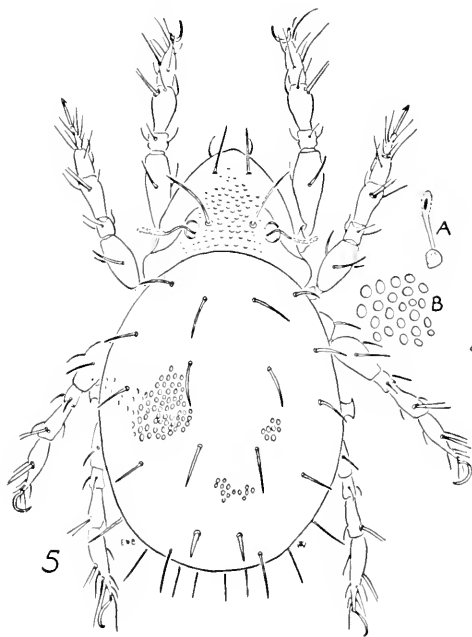
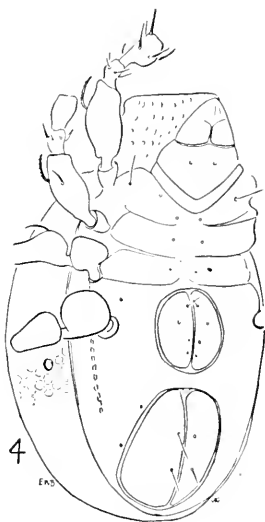
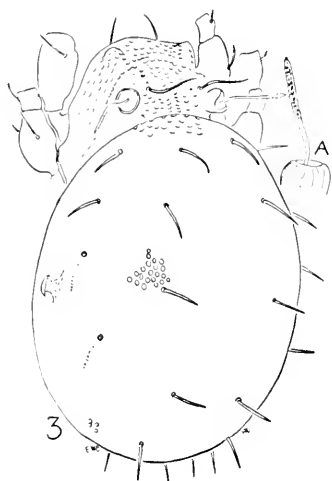
Hermanniella occidentalis Ewing, 1918, is considered a separate species because of the rounded, relatively inornate propodosoma, which lacks knobs and a median groove; the sunken

FIG. 3. *Hermanniella robusta* Ewing, 1918, from the dorso-lateral aspect. A. pseudostigmata and pseudostigmatic organ (after Ewing 1918).

FIG. 4. *Hermanniella robusta* Ewing, 1918, from ventro-lateral aspect. Legs partially shown.

FIG. 5. *Hermanniella occidentalis* Ewing, 1918, from the dorsal aspect, showing legs. A. pseudostigmatic organ (after Ewing, 1918); B. enlarged drawing of depressions of hysterosomal integument.

FIG. 6. *Hermanniella occidentalis* Ewing, 1918, from the ventral aspect, most of legs omitted.



pseudostigmata, differences in pseudostigmatic organs; the posterior pair of stout hysterosomal bristles; and the difference in setation of the genital covers.

Possibly *Hermanniella subnigra* (Ewing), 1909, should be considered as a separate species inasmuch as Ewing's descriptions and illustrations indicate it is in this genus instead of *Hermannia* (Nic.). The writer does not have a drawing or specimen of this species for comparison, however, and therefore defers exact placement.

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Nomenclature Notice

All comments relating to the following should be marked with the Commission's File Number, and sent to Francis Hemming, 28 Park Village East, Regent's Park, London N.W.1, England.

Bithys and **Chrysophanus** Hübner, 1818 (generic names of neotropical Theclids), suppression of (Order Lepidoptera) (File No.: Z.N. (S.) 802).

Cephalomutilla Andre, (1908), designation of type species for, in harmony with accustomed usage (Order Hymenoptera) (File No.: Z.N. (S.) 902).

For details see: Bull. Zool. Nomencl. Vol. 13, Part 1.

A New Brazilian Species of *Campsomeris* (Hymenoptera: Scoliidae)

By J. CHESTER BRADLEY

Campsomeris tenebrica, n. sp.

♀. Color entirely black, including all vestiture, except whitish puberulence on sides of scutellum and of metanotum, and on the propodeum. Wings black with strong violaceous reflection.

Clypeus convex, wrinkled, its basal margin and depressed sides coarsely punctate and bristly; a narrow impunctate strip below each antenna; area frontalis and spatium frontale not separated, the former with a small median smooth tubercle, the latter with a larger median tubercle, densely punctate and bristly, the bristles extending into the sinus ocularis but not to its apex; lamina frontalis prominent; fissura frontalis distinct; front polished with a few small punctures; ocellar furrow distinct, curved, a weakly indicated furrow extending caudad from behind each of its ends. Vertex, including occipital surface, impunctate and polished, except for a group of fine punctures at corners of the eyes; temples polished, impunctate, except for a line of small punctures bordering the eyes; upper surface of scape punctate.

Dorsal surface of pronotum and the scapulae finely and densely punctate, scapulae becoming much more coarsely and less densely punctate posteriorly; mesonotum impunctate and polished, except for small, sparse punctures on the parapsides and a strip within the parapsidal furrows; median anterior groove distinct; scutellum and metanotum impunctate, polished, the lateral pieces finely punctate and puberulent; mesopleura with a distinct ridge which is strongly punctate on its anterior slope, and the lower part of the lower plate on its posterior slope, its upper plate punctate and hairy except on the lower border, the tubercle pronounced. Metapleura impunctate, polished, but with a little appressed pubescence.

Area horizontalis medialis broad and very short, with neither carina nor tubercle at apex, entirely impunctate and polished;

areae horizontales laterales each with a transverse strip of small punctures and apical puberulence; area posterioris impunctate, smooth, but with some whitish puberulence; areae laterales punctate along their upper and posterior borders.

Terga polished; sternum 3(2) rounded at base; lateral teeth of hypopygium small but distinct.

Longer hind tibial spur spatulate, its proportion to the length of the metatarsus as 8:11.

Length 29 mm., of forewing 23 mm.

Types.—BRAZIL: *Espirito Santo*, 2 ♀♀ (Frühstorfer—holotype, Mus. Comp. Zool., Harvard Univ. and paratype 1, Cornell Univ.); *Bahia*, 1 ♀ (Frühstorfer—paratype 2, Mus. Comp. Zoology, Harvard Univ.); *Para*, 1 ♀ (C. F. Baker—paratype 3, Mus. Comp. Zool., Harvard Univ.), 1 ♀, 6, 11 '99 (A. Ducke—paratype 4, Cornell Univ.); *Minas geras*, 1 ♀, 1897 (Frühstorfer—paratype 5, Hungarian Nat. Mus.); Rio Grande, 1 ♀ (paratype 6—Brit. Mus.); "Brazil," 1 ♀ (Frühstorfer—paratype 7, Mus. Comp. Zool., Harvard Univ.).

The holotype and paratype one are entirely black.

Paratypes 5 and 7 have a minute yellow fleck in the center of the metanotum.

Paratype 2 has a larger fleck in the same location.

Paratype 4 has a transverse yellow spot in the center of the metanotum and a minute fleck on the scutellum.

Paratype 6 has a similar spot on the metanotum, and a transverse, interrupted spot, very small, on the scutellum.

Paratype 3 has a transverse yellow spot on the pronotum, and a round yellow spot on the scutellum.

This is a rare species.

New American Muscoid Diptera ¹ (Sarcophagidae, Tachinidae)

By H. J. REINHARD, College Station, Texas

The new forms herein described were received for study from several sources as mentioned below and also include some material from my collection. Types of new species based upon the latter are retained and the remainder are returned to the Snow Collection, University of Kansas and to the U. S. National Museum.

***Phytodes inconismus*, n. sp.**

Similar to *P. hirculus* (genotype) but readily distinguished by the shining black pollenless abdomen and the wholly black antennae.

Male. Head thinly grayish to brown pollinose on black background; broad cheek groove red, this color extending upwards on inner part of parafacial to base of antennae; front strongly produced forward in profile and at vertex 0.38 of head width; frontal bristles stopping at antennal base; ocellars proclinate; verticals and orbitals two pairs; antennae unusually small, about one-fourth as long as face, apical segments subequal; arista short, micro pubescent; subbulbous near base; parafacial with a row of bristles extending obliquely downward from inner upper extremity to near lower level of eye and with scattered black hairs outside of latter; cheek equal or exceeding eye height; narrow epistoma produced downward and receding; proboscis short; palpus blackish, short and stoutish.

Thorax and scutellum black, notum with thin subopaque greenish gray pollen, vittae not defined; three post dorsocentral and three sternopleural bristles; prescutellars differentiated; postnotal slope bare; scutellum with three lateral and a small or hairlike apical pair, discs barely differentiated. Wing with a light uniform tawny tinge; first vein bare third setulose almost to small cross vein; first posterior cell closed, petiole reaching

¹ Contribution No. 2590, from the Department of Entomology, Texas Agricultural Experiment Station.

costa a little before wing tip and a trifle shorter than last section of fourth vein; hind cross vein about midway, last section of fifth vein less than one-half length of preceding section; costal spine long; calypters rather small and narrow. Legs black, weakly bristled; claws and pulvilli shorter than apical segment.

Abdomen long ovate, hairs on upper surface appressed; one or two median marginal bristles on second segment and a marginal row on each of last two; sternites exposed; hypopygium black, retracted, forceps thin and slightly bowed in profile, rather broad at base, tapered distally with prongs separated on apical fourth; lobes of fifth sternite small and retracted.

Female. Head and thorax more densely pollinose, palpus usually paler, last three abdominal segments often subpollinose on basal margin; otherwise as in male.

Length, 5.5–7 mm.

Holotype male and *allotype* female, del Maiz, San Luis Potosi, MEX., 4700 ft., Aug. 22–23, 1954, Univ. Kans. Mex. Expedition in the Snow Collection, Univ. of Kansas; *Paratypes*, 6 males and 4 females, same data as type and 2 males, "Valles, Mex., Aug. 9, 1930."

BAROMYIA n. gen.

A minute fly with cephalic characters approaching those of *Procattharosia* and wing venation similar to *Gymnophania* but differing from both in having a longer, more slender, subtubular abdomen.

Female head wider than high, frontal profile equal to facial, antennal axis at or slightly above eye middle and barely longer than vibrissal which is close to ventral margin of head; clypeus deeply depressed widened downward, short epistoma full width and gently bowed forward from clypeal plane; faciale almost vertical with one or two bristly hairs on lower extremity; vibrissae long, decussate, on oral margin; frontals short, rather weak, in a single row extending two bristles beneath antennal base; two proclinate and one reclinate orbital and two vertical pairs; proclinate ocellars small but distinct; antenna reaching nearly to epistoma, third segment widened from base to broadly

rounded apex and hardly one-half longer than second, first segment very short; arista a little longer than antenna, thickened near base thence slender and micro pubescent to tip, basal segments short; bare parafacial narrow above middle becoming linear below; eye bare, not quite reaching vibrissal level; proboscis short, labella fleshy; palpus rather short, spatulate; cheek about one-sixth eye height. Thoracic chaetotaxy poorly developed, only the middle supraalar, hindmost postalar and the single lateral scutellar approach macrochaetal size; prescutellars and outer presutural differentiated; dorsocentral 2, 3 (barely larger than surrounding hairs); humeral 3-4; sternopleural 2; hypopleural row distinct, pteropleural absent; postscutellum very prominent; propleuron bare; postnotal slope setose along attached edge of calypter. Legs stoutish, weakly bristled; fore tarsus longer than corresponding tibia; claws and pulvilli shorter than apical tarsal segment. Wing extending about to tip of abdomen; third vein with two minute hairs near base; fourth vein only slightly curved beyond middle or without a defined cubitulus and reaching costa a trifle beyond extreme wing tip leaving first posterior cell open; costa broken near apex of subcostal vein, spine absent; calypters well developed. Abdomen widest on basal third thence tapering to a narrow truncate tip; anal segment much shorter than preceding ones and all segments destitute of macrochaetae; sternites covered.

Genotype. *Baromyia mitis*, n. sp.

***Baromyia mitis*, n. sp.**

Female. Front uniformly broad from antennal base to vertex, latter 0.37 of head width; frontalia red, widened before ocelli and extending on either side of triangle to vertex; parafacial gray to subplumbeous, with only a few minute hairs anteriorly which extend to or beneath lowermost frontal, antenna reddish to arista thence black to apex; arista reddish on thickened base, black beyond; parafacial and cheek gray pollinose, latter sparsely black setose; palpus brownish to almost black.

Thorax brownish in ground color, notum lightly dusted with opaque gray pollen, not vittate, pleura subshining; scutellum concolorous with notum; halteres pale yellow, rather short and

strongly enlarged at tip. Legs black, femora moderately thickened; tarsi beset above with a vestiture of suberect short black hairs, basal segment short. Wing clear with a slight yellowish tinge apparent anteriorly; veins yellow including costa which bears somewhat longer and denser spinules before break than beyond; calypters more or less infuscated with margin and sometimes middle area of both lobes a little paler.

Abdomen brownish black in ground color with narrow hind edge of last three segments pallid and upper surface of each (in well preserved specimens) showing thin gray pollen at sides and forming a pollinose median vitta when viewed in a flat rare angle; anal cerci forceps like; genitalia retracted.

Length, 1.75–2 mm.

Holotype female, Kerrville, TEXAS, June 16, 1953 (L. J. Bottimer) in the U. S. National Museum. *Paratypes*, 3 females, same data as type.

Parepalpus labeosus, n. sp.

Much darker in general aspect than *P. flavidus* Coq. (gender type), from which it differs further in having a red abdomen, marked with a distinct but interrupted black median vitta; wings and calypters distinctly infuscated, etc.

Male. Head densely yellow pollinose, parafrontal darker, clothed with longish black hairs outside and inside main frontal row, which is doubled anteriorly with about three bristles beneath antennal base; vertex 0.32 of head width; verticals two pairs, inner decussate; ocellars absent; frontalia red, narrower than parafrontal; antenna yellow to base of third segment, latter black about one-third longer than second and strongly convex on front edge; arista black, thickened on basal two-fifths, middle segment moderately elongated; parafacial fully one-half clypeal width, sparsely clothed with intermixed pale and black hairs; faciale flattened with three or four bristles next to vibrissae; latter well above the nasutely produced epistoma; cheek slightly over three-fifths eye height, beset with long pale hairs; proboscis a little over head height; palpus papilliform, bearing several black setae of unequal length; eye bare; back of head clothed with pale yellowish pile.

Thorax black with moderately dense greenish gray pollen, mesonotum marked with four narrow dark vittae, outer one interrupted at suture and stopping well before base of scutellum; latter wholly reddish and lightly sprinkled with white pollen. Chaetotaxy: acrostichal 3, 3; dorsocentral 3, 3; intraalar 3; supraalar 3; presutural 2; posthumeral 2; humeral 4-6; postalar 3; sternopleural 3; pteropleural 2 (as large as sternopleural); scutellum with 2 lateral, 1 decussate apical, 1 preapical and 6-8 discal pairs, besides numerous erect bristly hairs on basal half; prosternum and postnotal slope bare; propleuron black setose. Legs yellow, rather long and slender, well bristled; yellow black-tipped claws subequal to length of last tarsal segment. Wing uniformly fuscous throughout; first posterior cell open well before wing tip; hind cross vein oblique, joining fourth much nearer to cubitulus than small cross vein; costal spine vestigial; epaulet red, subepaulet pale yellowish; calypter reddish brown.

Abdomen short ovate, wider than thorax and practically pollenless on upper surface which bears a vestiture of erect fine black hairs; one pair of median marginals and discals on second segment, a complete marginal row and one pair of discals on third; anal segment with several irregular rows of discal on apical half above besides a row of weaker marginals; hypopygium small and retracted; forceps broader than long, fused nearly to tips which are separated by a small V-shaped excision, hind surface convex and beset with longish wavy black hairs; accessory process yellowish on broad basal part, much narrowed or fingerlike distally; fifth sternite black, lobes hardly divergent along median excision, clothed with fine black hairs; sternites two to four well exposed beset with black hairs and bristles.

Female. Similar to male except for sexual differences; genitalia retracted within anal orifice, terminating in a fleshy or soft-textured bunt tip.

Length, 9.5-10 mm.

Holotype male, Cuernavaca, Mex., 3-22-34 (S. E. Jones). *Allotype* female, "West Slope Cortez Pass, Mex., 9000', 7-13-54, Univ. Kans. Mex. Expedition." *Paratypes*, 2 males and 1 female, same data as allotype, two collected by R. R. Dreisbach

and 1 male, "Cuernavaca, Mor. Mex., 7100', 7-15-54, Univ. Kans. Mex. Expedition."

Plagiomima euethes, n. sp.

Pollen on abdomen disposed in evident crossbands as in *alternata* Ald., from which it differs most obviously in the conformation of the genital forceps.

Male. Front at vertex 0.45 of head width and only slightly wider at antennal base; head pollen subsilvery with a yellowish or slightly golden cast on parafrontal; latter with scattered black setae which continue downward on parafacial; vibrissae on oral margin with only three or four hairs on ridge next above; two pairs of large verticals, proclinate orbitals and preverticals; ocellars divaricate, proclinate; two frontal bristles beneath antennal base; cheek bare about one-third eye height; proximal antennal segments red, third wholly black, stout, a trifle over twice length of second; arista bare, short, thickened nearly to tip, second segment about twice longer than wide; haustellum slender, nearly two-thirds head height, labella small; palpus yellow, slender to tip; occiput cinereous, rather thinly clothed with short pale hairs.

Thorax and scutellum black gray pollinose, notum marked with four vittae before suture and five behind. Chaetotaxy: acrostichal 3, 3; dorsocentral 3, 3; intraalar 3; supraalar 3; precutural 2; postalar 3 (intermediate one very stout); sternopleural 3; pteropleural vestigial; scutellum with 3 lateral (hindmost weak and middle one reaching to base of third abdominal segment), 1 preapical and 1 much larger decussate apical besides 1 discal pair behind middle with erect bristly hairs in front of latter; prosternum, propleuron and postnotal slope bare. Legs black, mid tibia with a row of unequal-sized bristles on outer front side; front tibia with two median posterolateral bristles; claws and pulvilli short. Wing gray hyaline; first, third and fifth veins setose; hind cross vein oblique and strongly retracted with last section of fifth vein subequal to preceding; cubitus with a long stump plus fold; costal spine vestigial; calypters opaque white.

Abdomen with gray pollen on last three segments in broad basal bands leaving apical third or more of each shining black; one pair of median marginals on second segment and a marginal row on third; anal segment with a submarginal and marginal row; no discals; hypopygium black, largely retracted in repose; forceps fused, black base subglobose behind thence flattened into a thin reddish bladelike structure which is thin and broadly bowed in profile; sternites covered.

Female. Antennae a little more slender than in male; genitalia retracted not adapted for piercing.

Length, 6.5–8 mm.

Holotype male and *allotype* female, Sedona, ARIZONA, September 13–16, 1955 (G. D. Butler). *Paratypes*: 1 pair, same data as type and 1 male, Flagstaff, Arizona, September 12–16, 1955 (G. D. Butler).

Plagiomima faceta, n. sp.

Aside from its larger build, this species differs from the preceding one mainly as follows:

Male. Head pollen wholly grayish yellow on pale background; vertex 0.47 of head width; red frontalia diverging upwards and much wider than parafrontal above middle; third antennal segment nearly three times longer than second; ocellars divaricate; three proclinate orbitals but middle one weak; parafacial subequal clypeal width, beset with short inconspicuous pale and black setae; cheek two-fifths eye height; haustellum slender, about three-fifth head height. Thoracic chaetotaxy as in preceding species; postnotal slope setose, propleuron bare. Wing pale yellowish costobasally; first and third veins setulose, fifth bare; costal spine subequal to small cross vein. Abdomen with gray pollen extending nearly to hind margin on intermediate segments but stopping at apical third of last leaving apex shining black; fused genital forceps strongly compressed and bladelike straight from base to tip on ventral edge as viewed from side with hind apical margin bowed obliquely forward to a blunt reddish tip; accessory process as wide as forceps but a trifle longer, with apex more broadly rounded and hind margin

sulcate; fifth sternite with a broad median excision, lobes black with longish fine black hairs along inner margin.

Female. Anal segment of abdomen strongly deflexed and without any macrochaetae, polished black on apical half above; genitalia retracted, terminating in a compressed blunt-tipped larvipositor; otherwise similar to male.

Length, male 12 mm; female 10.5 mm.

Holotype male and *allotype* female, Plainview, TEXAS, 9-25-48 (F. A. Cowan).

The species belongs in *Siphoplagiopsis* (type *similis* Townsend), if the latter, based chiefly upon female characters, is accepted as valid.

Phorocera pellecta, n. sp.

Close to *P. indivisa* A & W, but the abdomen is more extensively pollinose; the male front is wider and there are decisive differences in the genitalia.

Male. Head bright silvery pollinose becoming opaque on parafrontal; vertex 0.35 of head width; inner verticals and two preverticals stout and reclinate; ocellars long, proclinate, frontal rows widely divergent beneath antennal base and descending to level of arista; latter black, bare, long and slender, with short proximal segments; antenna black, third segment rather broad and over three times length of second; facia strongly bristled to upper third or more; vibrissae on oral margin; eye pilose; cheek a little over one-fifth eye height; palpus yellow; proboscis short; occiput cinereous, pale-haired.

Thorax and scutellum black, with moderately heavy gray pollen marked with 4-5 changeable vittae on notum; chaetotaxy as in *indivisa*. Legs black; fore tibia with one stout posterolateral and mid tibia with two anterodorsal bristles; claws and pulvilli subequal to length of last tarsal segment. Wing gray hyaline; first posterior cell open well before wing tip; cubitus subrectangular, without a distinct stump or fold; third vein with 3 to 6 setulae near base; costal spine small; calypters white.

Abdomen black with changeable subsilvery pollen on basal half or more of last three segments above; one pair of median

marginal bristles on first and second segments; a marginal row on third and fourth besides a discal row on latter, which is also beset with erect bristly hairs on most of upper surface; hypopygium black, smallish and retracted with tip of anal segment; forceps with a deep groove behind which is densely clothed with a vestiture of pale or whitish hairs. In the undescribed male of *indivisa* the forceps compared with the present species, are broadly expanded basally, flattened behind and thickly clothed with soft short black hairs.

Female. Front at vertex 0.36 of head width gradually diverging forward into facial angle; two pairs of proclinate orbitals; outer verticals differentiated; abdomen with heavier pollen and anal segment more narrowed apically than in male; claws and pulvilli shorter than last tarsal segment.

Length, 6.5–8 mm.

Holotype male and *allotype* female, Brown's Cn. Baboquivari Mts. ARIZ., August 19, 1955 (F. G. Werner & G. D. Butler). *Paratypes*, 7 females, "Catalina Mts., Ariz. Htchk. Hwy. Mi. 1, August 22, 1955, G. D. Butler & F. G. Werner."

Phorocera stolidia, n. sp.

Traces to *P. coccyx* (equals *P. heros* Schiner = *Masicera longiuscula* Walker) in Aldrich and Webber's key (Proc. U.S.N.M., 63, 1924: 46, 52), from which it differs chiefly in genital features as listed below.

Male. Vertex 0.27 of head width, front equibroad on upper half thence widening gradually into facial angle; parafrontal yellow pollinose, uniformly clothed with fine black hairs; frontals in a single row, three or four bristles beneath antennal base, two uppermost reclinate and but little shorter than inner vertical; proclinate ocellars strong, usually more or less parallel and reaching beyond mid front; frontalia reddish black, narrower than parafrontal; black antenna as long as face, third segment unusually compressed and widened, nearly five times longer than second, which barely equals one and one-half times length of first segment; bare arista black, uncommonly long, thickened on proximal fourth thence flattened and slender to tip, basal

segments short; clypeus and faciale cinereous, latter with strong infracinate bristles ascending above level of lowest frontals; vibrissae on oral margin; bare yellowish parafacial becoming grayish below; proboscis short, haustellum subequal length of spatulate yellow palpus; cheek gray pollinose, clothed with fine black hairs, about one-sixth eye height; eye large and thickly long pilose; occiput with a heavy vestiture of yellowish white pile.

Thorax black scutellum with a reddish tinge in ground color, gray pollinose; notum with four narrow dark vittae before suture and five behind. Chaetotaxy: acrostichal 3, 3; dorso-central 3, 4; intraalar 3; supraalar 4; humeral 5-6; post-humeral 3; presutural 2; postalar 2; intrapostalar strong; sternopleural 3; pteropleural 2 (smaller than hindmost sternopleural); scutellum with 3 lateral, 1 wide-spaced appressed discal and 1 strong usually decussate apical pair directed backward. Legs long but not very slender; mid tibia with two strong bristles before middle on outer front side; fore claws and pulvilli subequal combined length of last three tarsal segments. Wing gray hyaline; third vein setulose one-fourth to halfway to small cross vein; cubitulus rectangular without stump or fold; first posterior cell open well before wing tip; costal spine vestigial; calypters translucent white.

Abdomen well tapered towards tip, black with ground color at sides sometimes showing a reddish tinge, last three segments with gray pollen which becomes thinner beyond middle on each and in some views interrupted by a vague dark median vitta; one pair of median marginal bristles on first two segments and a marginal row on last two, besides a submarginal row with numerous shorter discals and erect bristly hairs in front of latter on anal segment; hypopygium blackish, rather small and retracted; fused forceps rather thick in profile and in rear view equibroad to middle thence tapered to a sharp beaklike tip, deeply excavated behind with surface of latter bearing dense yellow hairs, which are replaced on either side near base by a fascicle of longer black hairs directed obliquely forward and terminate in pale wavy tips; fifth sternite with a broad and deep

median excision, lobes black, large and prominent. Female unknown.

Length, 12-14 mm.

Holotype, Amherst, OHIO, August 28, 1930 (H. J. Reinhard).

Paratypes, 2 males, same data as type and 1 male, Blood Mt., Ga., September 20, 1945 (P. W. Fattig) in the U. S. National Museum.

Phorocera noera, n. sp.

Smaller in build than *stolida*, differing chiefly in the structure of the male genitalia as noted below. Other minor differences may be listed as follows:

Male Only. Length 10 mm. Head pollen bright silvery becoming somewhat brassy on parafrontals; third antennal segment nearly equibroad from base to tip and four times longer than second; five narrow notal vittae; median one well defined to base of scutellum; mid tibia with one strong median antero-dorsal bristle; fore pulvilli subequal to combined length of last two tarsal segments; abdomen with moderately heavy gray pollen above on basal three-fifths of segments two and three and on basal half of last, remainder of each subshiny black; hypopygium well exposed in repose, second segment reddish; fused forceps strikingly slender from base to acute apex, hind surface grooved with a low but sharp median carina extending outwardly from base about halfway to tip; lateral margin of forceps sparsely clothed with black hairs and base behind more thickly so; fifth sternite deeply incised, lobes widely exposed, bearing some longish black hairs on inner basal margin.

Holotype: Male, "Cuernavaca, MEXICO, August 6, 1942."

This specimen has been in my collection for some time awaiting additional material. The species is included here since it is closely allied to the preceding form.

Euceromasia floridensis, n. sp.

Readily distinguished from *E. solata* by the wholly reddish legs and abdomen and the presence of defined patches of dense

appressed hairs on venter of third abdominal segment in the male.

Male. Front well narrowed above middle, at vertex 0.22 of head width; frontalia deep red, narrower than parafrontal; frontals reclinate above mid front, three bristles beneath antennal base; proclinate ocellars weak or hairlike; verticals (inner) erect, as large as upper frontals; head pollen gray on dark background; parafrontal sparsely setose outside frontal row; bare parafacial moderately narrowed downward; vibrissae large, on oral margin, with bristly hairs on ridge above extending up on about basal third; antennal segments one and two pale reddish yellow, third black, rather slender but less than twice length of second; arista brownish, micro pubescent, thickened on about proximal fourth thence tapered and very slender to tip, both basal segments short; cheek about one-fifth eye height, clothed with black hairs and several bristles near middle, eye bare, rather large and descending to vibrissal level; proboscis short, stoutish, labellum large and fleshy; palpus pale reddish yellow, slightly flattened and beset with short stubby black hairs before apex; occiput flat, grayish pollinose, with a vestiture of rather short sparse pale hairs.

Thorax and scutellum black, gray pollinose, humeri pleura and apex of scutellum with a reddish tinge in ground color; notum marked with four narrow black vittae, outer pair interrupted at suture and inner ones stopping shortly behind; acrostichal 3, 3; dorsocentral 3, 4; intraalar 3; supraalar 3; humeral 3; posthumeral 2; presutural 2; postalar 2; intrapostalar well developed; sternopleural 3 (almost in horizontal row); pteropleural 1 (shorter than hindmost sternopleural); scutellum with 3 lateral, 1 discal and 1 weak non-decussate suberect apical pair; postnotal slope bare. Mid tibia with one good-size bristle on outer front side beyond middle; hind tibia subciliate or with a row of rather widely spaced uneven bristles on outer posterior edge; claws and pulvilli equal to or exceeding length of last tarsal segment. Wing hyaline with a faint yellowish tinge except on hind margin; veins including costa yellow, third with two to four hairs near base; cubitulus broadly rounded, without stump or fold; first posterior cell open shortly before wing tip;

calypters tawny, semitransparent; epaulet and subepaulet reddish.

Abdomen conical, somewhat thickened in profile, last three segments gray pollinose above but thinly so behind middle on two and three; one pair median marginal on basal segments, one median and four or more lateral discals besides a marginal row on third; anal segment with two or more irregular discal, one submarginal and a marginal row; anal orifice narrow and slitlike; sternites covered.

Female. Front at vertex 0.28 of head width, diverging rather strongly downward into facial angle; two proclinate orbitals; outer verticals vestigial; calypters whitish tinged with yellow; claws and pulvilli shorter than apical tarsal segment; one discal and one marginal row of bristles on fourth abdominal segment; genitalia retracted, not adapted for piercing.

Length, 5.75–7 mm.

Holotype male and *allotype* female, "Seabreeze, FLA., Host: *Trichostiba parvula*," in the U. S. National Museum. *Paratypes*, 1 male and 2 females, same data as type; 1 female, Ormond Beach, Florida, 6-5-55 Cat. No. P-248b, ex: *T. parvula*, and 1 female, "College Station, Texas, July 1916."

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NATURAL ENEMIES OF INSECT PESTS directed by Dr. C. A. Fleschner, Department of Biological Control, Univ. of California. 16 mm. color and sound, 27 minutes. Educational Film Sales Department, University Extension, University of California, Los Angeles 24, Cal. Price: \$195.00. Rental: \$6.00.

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and **Stizini** (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

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By Philip P. Calvert

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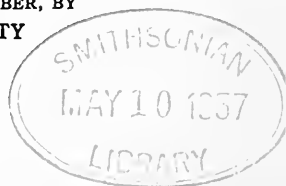
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CONTENTS

Woolley—Redescriptions of Ewing's Oribatid mites, II	113
Pechuman—A <i>Tabanus</i> from the United States	118
Sinha—Oenocytes of <i>Oryzaephilus mercator</i>	119
Selander—A new Mexican <i>Eupompha</i> (Col.)	123
Chamberlin—A new <i>Henicopid</i> chilopod	126
Morse and Blickle—List of New Hampshire Trichoptera	127
Notes and News in Entomology	131
Dancing bees at the equator, and nocturnal dances. Zoogeography of Pacific insects. Budapest Museum	
Reviews	135
The Neotropical species of the "Subgenus <i>Aeschna</i> ," sensu Selysii 1883 (Odonata). The biology of the Heteroptera	

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Redescriptions of Ewing's Oribatid Mites, II— Family Carabodidae (Acarina: Oribatei) ¹

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This article is the second in a series of redescrptions suggested by Dr. E. W. Baker, Curator of Acarina at the U. S. National Museum. Two of Ewing's type oribatids are delineated below.

FAMILY CARABODIDAE WILLMANN, 1931

Two of the diagnostic features of this family usually comprise broad lamellae and highly sculptured integument. According to Willmann (1931), and Baker and Wharton (1952) femora I and II in these mites exhibit thin stalks and swollen distal ends, also. Many of these mites, in addition, possess a cerotegument, which covers the body and sometimes the legs in such thickness that details of the propodosoma and hysterosoma are obscured.

Carabodes flavus (Ewing), 1918, nov. comb. (Figs. 1, 2)

Cotype: *Cepheus flavus* Ewing, 1918, p. 86.

Description: Propodosoma nearly rectangular, about a fourth as long as hysterosoma; surface highly sculptured and roughened due to presence of cerotegument. Rostrum obscured by cerotegument of broad lamellae, which extend along the lateral length of propodosoma and are broadly joined medially at an-

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terior end to form a hood-like structure above the rostrum. Lamellar hairs not visible. No translamella. Interlamellar hairs not observed. Pseudostigmata cup-like, with deep bowl, inserted at latero-posterior aspect of propodosoma in angle formed by projecting shoulders of hysterosoma. Pseudostigmatic organs clavate with a short, bent pedicel; projected postero-laterad, finely setose at tips. Tectopodia I anterior to level of pseudostigmata, closely appressed to propodosoma.

Hysterosoma broadly oval in outline, with roughened surface and slightly scalloped lateral and posterior margins, dorsal cover hexagonally reticulate. The roughened surface evidently a cerotegument, which stands above the actual body surface and obscures some details of the understructure. Beneath this cover the integument is pitted with even, round pits. The only hysterosomal setae visible in the type specimen are four, short, simple bristles at posterior margin of hysterosoma (Fig. 1).

Camerostome oval in outline, with two simple bristles posterior to chelicerae. Apodemata II, III and IV darkly sclerotized transverse bars, IV angled slightly posteriorly from anterior edge of genital aperture. Genital opening subcircular in outline, slightly smaller than anal opening; each genital cover with four setal insertions on medial edge; g:1 and g:2 subequally spaced from each other; g:3 and g:4 farther apart. Anal aperture trapezoidal in outline, anal covers open slightly in type specimen: each anal cover with two setae; a:1 near middle of medial edge, a:2 close to medio-posterior corner of cover.

Legs as in Figs. 1 and 2. Leg IV does not extend to posterior margin of hysterosoma. Legs tridactyle, all tarsal claws subequal in length.

Length 785 μ , hysterosoma 556 μ ; width 486 μ .

Ewing (1918) indicates that the specimens were collected from the top of Mary's Peak, Oregon and from Corvallis, Oregon, in both instances beneath logs. He mentions that the type is one of the specimens from Corvallis collections and differs slightly from the examples from Mary's Peak.

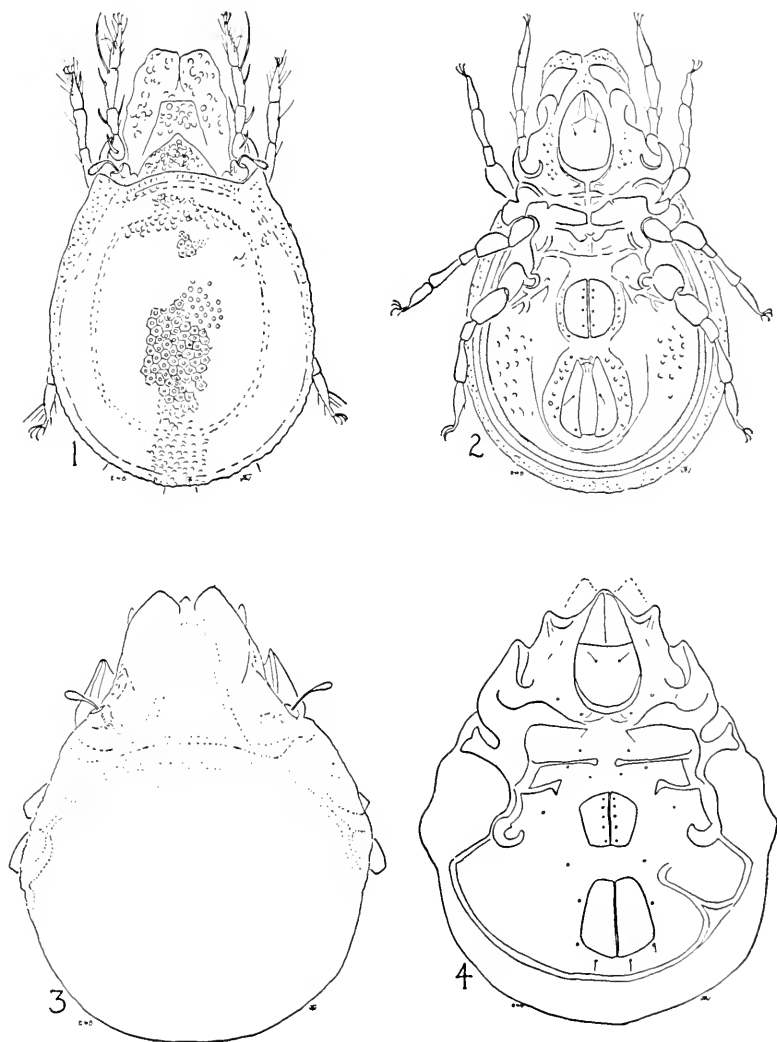


FIG. 1. *Carabodes flavus* (Ewing), 1918, from the dorsal aspect; legs shown.

FIG. 2. *Carabodes flavus* (Ewing), 1918, from the ventral aspect; legs shown.

FIG. 3. *Cepheus subniger* (Ewing), 1917, from the dorsal aspect; legs omitted.

FIG. 4. *Cepheus subniger* (Ewing), 1917, from the ventral aspect; legs omitted.

Cepheus subniger (Ewing), 1917, nov. comb. (Figs. 3, 4)

Cotype: *Tegeocranus subniger* Ewing, 1917, p. 163.

Description: Dark brown, almost black. Propodosoma and hysterosoma covered with secretion or cerotegument which obscures details beneath. Rostrum slightly visible between distal ends of lamellae; rostral hairs not visible. Lamellae very large, covering lateral aspects of propodosoma from pseudostigmata to base of rostrum; about as wide as length of pseudostigmatic organ and apparently covered with secretion. Lamellar and interlamellar hairs not visible; no translamella. Pseudostigmata cornuate, extended mediad about half the width of a single lamella; rim margin apparently continuous with margin of lamella. Pseudostigmatic organ clavate, slightly recurved, with pectinate head and about as long as width of lamellae at level of pseudostigmata. Tectopodia I extended forward from level of pseudostigmata half the length of lamella, sclerotized dorso-medial margins.

Hysterosoma broader than long, broadly rounded behind; with a few minute hairs dorsally, according to Ewing. A pteromorph-like band of secretion between base of leg IV and proximal end of lamellae, extended in a shoulder expansion, with undulating margins and reticulate surfaces.

Camerostome attenuated anteriorly, with two ventral setae. Setal insertions of ventral plate as in Fig. 4. Apodemata II long and narrow, medial ends approximated near mid-line. Genital opening between apodemata III and IV, about three-fourths as large as anal aperture, two-thirds the length of genital covers anterior to anal opening; genital covers nearly rectangular, wider at level of g:2, with five setal insertions visible on medial margin of each cover; g:1, g:2, g:3 and g:4 subequally spaced on medial margin of each cover; g:5 more widely separated from g:4 and close to medio-posterior corner of cover. Anal aperture trapezoidal, narrowed anteriorly. No anal setae visible. Three pairs of adanal setae, insertions as in Fig. 4.

Legs large; anterior pair extending beyond tip of rostrum nearly full length of tarsi; tibiae of anterior legs without ante-

rior tubercles; legs IV extending beyond posterior margin of hysterosoma; all tarsi with a single, stout, curved claw.

Length 771 μ (to tip of rostrum), hysterosoma 412 μ ; width 542 μ .

Ewing (1917) indicates that this species was collected under pieces of old board at Ames, Iowa.

Discussion: The generic designation of *Carabodes flavus* (Ewing) is as exact as is presently possible because of the cerotegument, which prevents description of other details. This species is much larger than known species of *Carabodes*, but possesses three tarsal claws and four pairs of genital setae, which are distinctive for the genus. The notations on the cotype slide in the writer's possession designate this specimen as "*Cepheus favus*, n. sp." The "f" is missing in the specific name. Collection data on this same slide indicate: "Top of Mt. Chintimini, Or., Sept. 12, '12; by myself. Under rotting log. Bal. H. E. Ewing."

The specific position of *Cepheus subniger* (Ewing) is as exact as is possible at present because the cerotegument obscures other details. The species corresponds in size to other representatives of the genus. Its generic placement is based on size, presence of single tarsal claws and five pairs of genital setae. Baker and Wharton (1952) synonymize *Tegeocranus* Nic., 1855, the genus in which Ewing originally described this species, with *Cepheus* Koch, 1836. This synonymy substantiates the writer's conclusion. The author does not have access to the cotype specimen of this species, the description of which was executed from Dr. Baker's pencil drawings in consolidation with Ewing's original description.

Both of the above species differ from known representatives of their respective genera in their possession of heavy cerotegument.

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A *Tabanus* not Previously Known from the United States (Diptera: Tabanidae)

By L. L. PECHUMAN, Lockport, New York

Occasional female *Tabanus* of the *lineola-vittiger* group from south Florida and the Keys show characters which have made it impossible to place them as any of the forms of this group known from continental United States. Most workers have placed them with a question as an anomalous form of *Tabanus lineola scutellaris* Walker. Specific placement in this group is more difficult with females than with males and until recently no associated males had been collected.

A series of both sexes collected at Cape Sable, Florida, as prey of the wasp *Bembix cinerea* (Handl.) by Prof. H. E. Evans of Cornell University seems to have established the identity of this form. The hairy, enlarged upper facets of the eye of the male places them as *Tabanus vittiger* Thomson. In Fairchild's (1942) revision of the group, the south Florida specimens key out to subspecies *caymanicus* Fairchild. A series of both sexes of *caymanicus* from the type locality, the Cayman Islands, loaned by Prof. Joseph Bequaert of the Museum of Comparative Zoology, compare closely with the Florida specimens.

It is the writer's belief, however, that *caymanicus* is the same as *Tabanus bellardii* described by Szilady (1926) from Cuba. Szilady's description and figures match the specimens on hand in every detail.

The Cape Sable specimens were collected on 24 March 1954. Females of *Tabanus vittiger bellardii* seen from other Florida localities include: Homestead, March, 1953; Key West, 8 July 1952; Big Pine Key, 25 July 1947.

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A Study of Oenocytes in *Oryzaephilus mercator* (Fauvel). (Coleoptera, Cucujidae) with Phase Microscopy¹

By R. N. SINHA,² Department of Zoology, McGill University, Montreal, Canada

Oenocytes are large cells associated with the fat body, and occurring exclusively in insects (Richards, in Roeder, 1953). Unlike fat cells oenocytes are ectodermal in origin and are well defined (Wigglesworth, 1953). In the present paper the location, arrangement, and histology of the oenocytes of imagines of *Oryzaephilus mercator* (Fauvel) are given. A description of this nature seems to be important because of our complete lack of knowledge of the specialized tissues in the hemocoel of species of the coleopteran family Cucujidae.

The insects studied were reared in oats under controlled conditions of temperature and humidity (30° C and 75% R.H.). The imagines were approximately two weeks old and were taken from an inbred culture maintained for the last three years by Dr. J. Stanley at the Department of Zoology, McGill University. They were fixed in Mukerji's fluid (Mukerji, 1937). Serial sections of the entire body of the insect, four to eight μ in thickness, were made in transverse and longitudinal planes (Sinha, 1953). Unstained sections were cleared in cedarwood oil and mounted in permount.

Phase microscopy has been used in different fields of biology (Richards, 1956), but its use in insect histology, especially in the study of fixed materials, is rather new. The author has found the following advantages in the use of phase microscopy. Unstained sections of fixed materials are as good as, or, in some respects, better than stained sections for the study of the morphology of cells. Greater detail in fine structures is often observed in an unstained section studied with phase microscopy than in a stained section with ordinary microscopy. This con-

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² Postdoctoral Research Fellow, National Research Council of Canada.

clusion was reached by comparing a large number of unstained sections of the same species of insect with sections stained with Mallory's triple stain, and with Delafield's hematoxylin and eosin respectively. The elimination of a lengthy and complicated staining process enables one to avoid certain artifacts, and to examine a large number of slides in a reasonably short time. Of course, staining is important in the study of physiological and biochemical aspects of specific cells. Phase microscopy (Zeiss Winkel) with oil immersion was used with success in the study of the oenocytes described below. The drawing was made with the aid of a camera lucida.

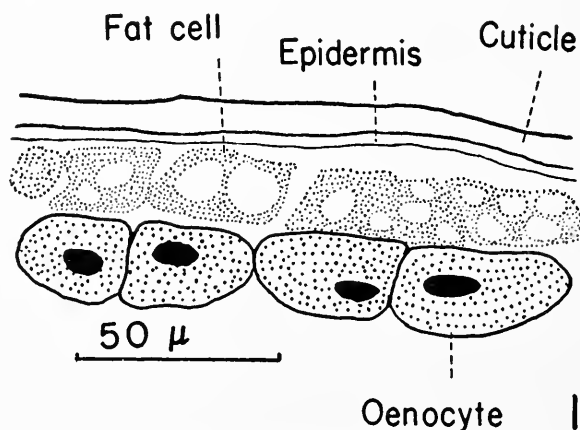
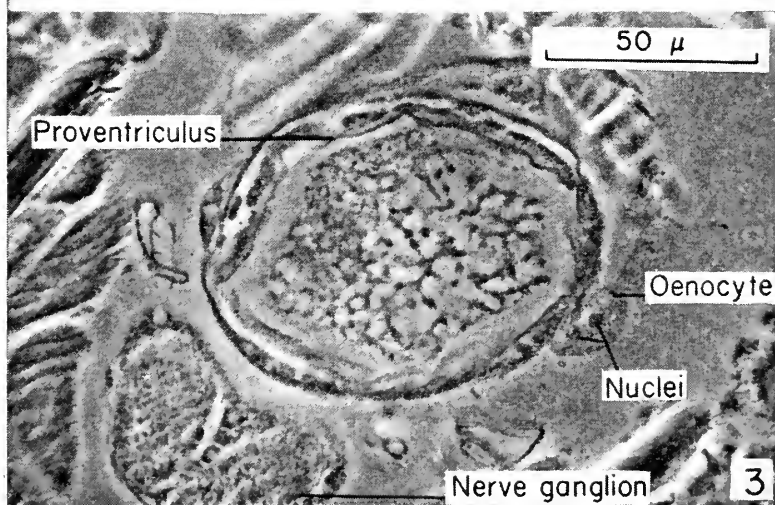
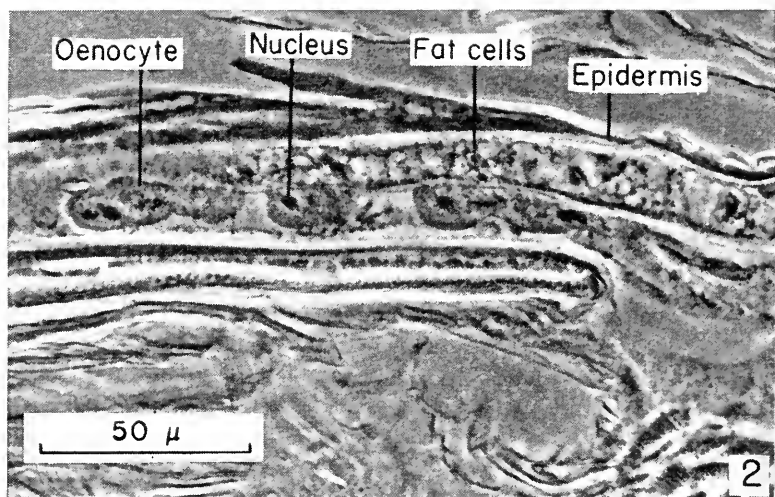


FIG. 1. A longitudinal section through the body wall, in the middle of the abdomen (elytra excluded), of an adult *Oryzophilus mercator*.

The oenocytes in *O. mercator* are distinct cells found along the dorsal side of the abdomen and not extending caudad beyond the penultimate segment. In some areas they are more aggregated than in others, and usually they are separated from the

FIG. 2. A longitudinal section through the dorsum of the posterior part of the abdomen (elytra excluded).

FIG. 3. A transverse section through the anterior part of the abdomen showing the alimentary canal, ventral nerve cord and the binucleate oenocyte in natural position.



SECTIONS OF ADULT *ORYZAEPHILUS MERCATOR*

thin layer of epidermis by one or more layers of the fat body. In some cases a few scattered oenocytes have been observed lying against the dorso-lateral wall of the gut, especially in the region of the proventriculus (Fig. 3).

The oenocytes lie close together, often with adjacent walls. The individual cells are usually elliptical, 20 to 45 μ long by 7 to 11 μ wide, and have a distinct cell wall. The cytoplasm is granular throughout and there is usually a single nucleus, although in some cells two or three nuclei have been observed (Fig. 3). The size of the nucleus varies, and it may be either rounded (Fig. 3) or elliptical (Fig. 2) in outline. Although studied in fixed materials these oenocytes lack the spindle shaped clefts or the radiating canals observed in other species of beetles (Wigglesworth, 1953).

The author is grateful to Dr. H. R. Scott, Professor of Histology, McGill University for giving helpful suggestions and to Mr. J. W. Pollock, Department of Zoology, McGill University, Montreal, Canada, for taking the photomicrographs used in this paper.

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A New Mexican *Eupompha* (Coleoptera, Meloidae)

By RICHARD B. SELANDER, Illinois Natural History
Survey, Urbana

The only species of *Eupompha* LeConte (= *Calospasta* LeConte) previously known to occur in southern México is *sulcifrons* (Champion), which has been recorded from two localities in the Rio Balsas region of Guerrero (see Selander, 1954, Jour. Kansas Ent. Soc. 27: 84). It is consequently of some interest that among the material collected by the Hoogstraal Mexican Biological Expeditions of 1940 and 1941 there are representatives of a new species of *Eupompha* from Michoacán.

Eupompha (*Eupompha*) *terminalis*, new species

Orange. Apex of mandibles, eyes, scutellum, apical fifth of elytra, and under surface black. Under surface with a greenish luster. Antennae (except basal three to five segments) and coxae infusate; pronotum is one specimen with a median and two lateral infusate marks at apex. Wings colorless except for brown apical area. Pubescence pale throughout. Length: 12–14 mm.

Vertex and upper frontal area smooth, shiny, sparsely micro-punctate, moderately, coarsely, sparsely punctate, clothed with short pubescence; under side of head more finely, densely punctate, clothed with longer pubescence. Antennae filiform, moderately compressed; segments not at all globular. Pronotum elongate, one-fourth to nearly two-fifths longer than wide; disk regular, impressed anteriorly and on midline at base; surface and pubescence of disk as on vertex, with longer pubescence on deflexed sides. Scutellum impunctate, glabrous. Elytra finely, confusedly scabro-punctate; pubescence evenly, densely distributed, semi-erect, moderately long, as long and as conspicuous as that on under surface of abdomen. Outer hind tibial spur greatly thickened, obliquely truncate, acute or subacute at apex; inner spur like outer but more acute, shorter, only about half as wide. Tarsal claws as in Fig. 9. Under surface densely punctate and pubescent; pubescence longer on thorax than on abdomen. First segment of all tarsi clothed with regular cloth-

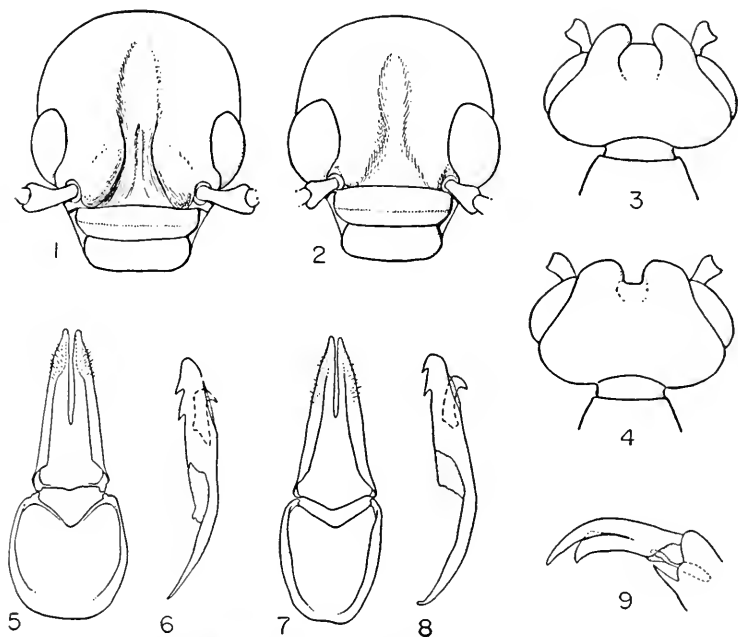
ing setae beneath, lacking the more erect, sericeous pubescence which on other segments constitutes the tarsal pads.

Male: Antennae extending five segments beyond occiput, weakly tapered to apex. Front of head (Figs. 1, 3) with a very broad, very deep, impunctate, glabrous channel extending from epistomal suture to near center of vertex (not attaining occiput); a well-marked sulcus on midline at bottom of channel between eyes; frontal area from top of eyes to epistomal suture greatly swollen on each side of channel to form a pair of large callosities which are strongly undercut by channel; top of callosities very finely punctate, sparsely clothed with a few minute setae. First four segments of fore tarsi greatly thickened; dorsal side swollen, subimpunctate, glabrous, not sulcate. Sixth abdominal sternum moderately deeply, obtusely emarginate. Genitalia as in Figs. 5-6.

Female: Antennae extending three segments beyond occiput, not tapered. Front of head deeply impressed along midline from epistomal suture to near center of vertex; midline itself clearly indicated at bottom of this impression. Sixth abdominal sternum shallowly, triangularly notched at apex.

Type Material: *Holotype* male from Apatzingán, 1200 ft., Michoacán, August 13, 1941, [H.] Hoogstraal. *Allotype* female, same data but August 21, 1941. *Paratypes*: one female, same data but August 18, 1941; one male, one female, same locality, semi-desert scrub, August 5, 1940, [H.] Hoogstraal and [K.] Knight. Holotype and allotype in the U. S. National Museum.

This species is readily distinguishable from all other species of *Eupompha* on the basis of color. It is in all respects most similar to *sulcifrons*. In structural characters *sulcifrons* differs from *terminalis* mainly as follows: frontal channel of male lacking sulcus at bottom, not undercutting frontal callosities (Figs. 2, 4); frontal impression of female wider, more evenly rounded in cross-section; eyes larger, more prominent; elytral pubescence distinctly shorter and sparser; first four segments of male fore tarsi proportionately wider; male genitalia (Figs. 7-8) with gonocoxal (basal) piece proportionately narrower, gonostyli separated for less than half their length, and ventral hooks of aedeagus more apical in position.



FIGS. 1, 3. *Eupompha terminalis*, frontal and dorsal views of male head. FIGS. 2, 4. *E. sulcifrons*, same. FIGS. 5-6. *E. terminalis*, ventral view of male gonoforceps and lateral view of aedeagus. FIGS. 7-8. *E. sulcifrons*, same. FIG. 9. *E. terminalis*, tarsal claw (middle leg).

The morphological distinctness of *terminalis* and *sulcifrons* notwithstanding, the possibility that these two forms are races of a single species cannot be overlooked. So far as known, both are confined to the hot, arid valley system of the Río Balsas. The few distributional data available suggest allopatry, *sulcifrons* presumably ranging along the valley of the Río Balsas proper and being replaced by *terminalis* in the valley of the Río Tepalcatepec, a tributary of the Río Balsas. In all probability the ranges of the two forms are in contact, in which case it will be possible to determine their true taxonomic status through further field work.

For a description of the physiography and vegetation of the Apatzingán area see Leavenworth (1946, Amer. Midland Nat. 36: 137-206, illus.).

A New Henicopid Chilopod from Peru

By RALPH V. CHAMBERLIN, University of Utah

The types of the henicopid herein described were collected by E. R. Ross and E. I. Schlinger in the course of the California Academy of Sciences expedition to the northern Andes areas of South America in 1954-55. These types are deposited in the California Academy. Records are also given for a previously known species of the same genus.

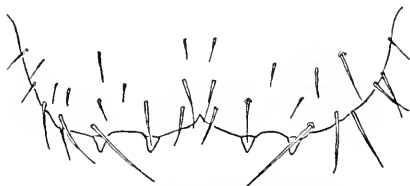
ORDER LITHOBIIDA

Family Henicopidae

Lamyctes cerronus new species

Reddish brown or somewhat chestnut. Length, 6 mm.

A species agreeing with *L. rectus* in lacking any definite ectodont on the prosternum, although a slight obtuse prominence may show in the place usually occupied by the ectodont when present in related species. The median sinus separating the dental series of the prosternum is wide as in *rectus*, but in *cerronus* there is an acute incision at the middle of the sinus not present in the other species. Prosternal teeth 2-2. Cf. the accompanying figure.



Prosternum of *Lamyctes cerronus* n. sp.

Whereas in *rectus* tibial spines are present on leg 13, in the present form these are present only on the first twelve pairs of legs. In *rectus* the anal legs have the tibia equal in length to the first tarsal joint, but in *cerronus* it is longer than that joint in about the ratio 5:4.

Locality.—Peru: 5 mi. NE of Cerro de Pasco, the holotype taken Dec. 29, 1954; 48 mi. S. of Carhuamayo, Dec. 30, 1954, one specimen; and 16 mi. NW of Chamay, Loma Lachay, Sept. 11, 1954.

Lamyctes anderis Chamberlin

Localities.—Peru: 27 mi. E of Carhuamayo, Sept. 11, 1954, one; Carhuamayo, Dec. 20, 1954, one; 48 km. E of Carhuamayo, Dec. 30, 1954, two; 16 mi. NW of Chamay, Loma Lachay, Sept. 11, 1954, one. Ecuador: 17 mi. S of Cayamba, Pichincha, Feb. 16, 1955, one.

Additions and Corrections to the List of New Hampshire Trichoptera

By W. J. MORSE and R. L. BLICKLE¹

Since the list of New Hampshire Trichoptera was published forty-one species, new to the state, have been collected. These, along with certain corrections to be made in the 1953 list, are as follows:

RHYACOPHILIDAE

Rhyacophila Pictet

vibox Milne, Winchester (WJM), June 28.

PSYCHOMYIIDAE

Polycentropus Curtis

carolinensis Banks, Lee, Plymouth (1t), July 7–Aug. 6; **clinei** (Milne), Lee, Jaffrey (1t), July 8–24; **elarus** Ross, Lee (1t), Aug. 3; page 70, delete the following locality records for **maculatus** Banks, Lee, Plymouth, July 15–Aug. 6; **melanae** (Ross), Durham, Lee, Plymouth (1t), June 21–July 31; **pici-cornis** Steph., Durham, Lee, Jaffrey, Plymouth (1t), June 18–

¹ Published with the permission of the Director as Scientific Contribution No. 204 of the New Hampshire Agricultural Experiment Station.

July 24; **weedi** Bickel & Morse, Bow, Lee (1t), June 15–Aug. 5.

HYDROPSYCHIDAE

Cheumatopsyche Wallengren

pinaca Ross, Plymouth (1t), July 29.

HYDROPTILIDAE

The known distribution of certain species of Hydroptilidae is greatly increased by the following data. The pattern is in two forms, one extending southward and roughly paralleling the Appalachian Mountains and the other extending westward across the northern states. Several species known only from Florida, Georgia and New Hampshire and two species recorded from British Columbia and New Hampshire accentuates the lack of Trichoptera collecting, especially in the Hydroptilidae.

Ochrotrichia Mosley

Page 72, **shawnee** (Ross), delete, this was a misdetermination; **denningi** Bickel & Morse, Plymouth (1t), June 9–July 16.

Oxyethira Eaton

abacatica Denning, Bow, Durham (1t), June 25–Oct. 5, also recorded from Georgia; **aeola** Ross, New Durham (1t), Sept. 12, also recorded from British Columbia; **coercens** Morton, Lee (1t), Aug. 28, also known from Illinois, Indiana, New York and Oklahoma; **michiganensis** Mosely, Bow, Durham, Hopkinton, Jaffrey, Plymouth (1t), June 16–Oct. 5, known also from New York, Michigan and British Columbia; **obtatus** Denning, Bow, Durham, Lee (1t), June 22–Oct. 5, also recorded from Minnesota; **rivicola** Bickel & Morse, Bow, Durham, Lee, Plymouth (1t), June 15–Sept. 22; **sida** Bickel & Morse, Bow, Lee, Durham (1t), June 21–Sept. 22; **verna** Ross, Bow, Durham, Plymouth (1t), June 25–Aug. 24, ranges from New Brunswick to Louisiana.

Orthotrichia Eaton

instabilis Denning, Durham, Lee (1t), June 16–Aug. 21, known previously from Florida.

Hydroptila Dalman

amoena Ross, several female specimens are on hand which appear to be this species. The records in the 1953 list should be referred to the following species; **ampoda** Ross, Durham, Lee, Plymouth (1t), June 4–Sept. 22, see note under *H. amoena* Ross; **armata** Ross, Durham (1t), June 20–July 28, previously recorded from the middlewest; **consimilis** Morton, Plymouth (1t), June 11, a very widely distributed species now recorded from the state; **lonchera** Blickle & Morse, Durham, Lee (1t), Aug. 10–25; **metoeca** Blickle & Morse, Durham, Lee (1t), June 14–Sept. 4; **novicola** Blickle & Morse, Durham, Plymouth (1t), June 30–July 8; **quinola** Ross, Bow, Durham, Lee (1t), June 24–Sept. 25, previously recorded from Ontario; **remita** Blickle & Morse, Durham, Lee (1t), July 24–Sept. 22; **rossi** Blickle & Morse, Bow (1t), Aug. 5; **salmo** Ross, Bow, Lee, Plymouth (1t), Aug. 5–13, an interesting extension of range since this species is known from Wisconsin; **spinata** Blickle & Morse, Durham, Lee, Plymouth (1t), June 30–Aug. 25; **strepha** Ross, Plymouth (1t), June 30, previously known from Pennsylvania; **valhalla** Denning, Bow, Durham, Lee (1t), June 24–Aug. 16, previously known from Michigan and Minnesota; **wyomia** Denning, Colebrook (WJM & RLB), Durham, Lee (1t), June 21–July 28, another “middlewestern” species now recorded from the state; **virgata** Ross, Lee (1t), Winchester (WJM), June 28–Aug. 28, other records from Arkansas, Illinois and Oklahoma; **xoncla** Ross, Bow (1t), Aug. 13.

Neotrichia Morton

okopa Ross, Durham, Plymouth (1t), Aug. 7–25, known previously from Illinois, Ohio, Oklahoma and Pennsylvania.

Mayatrichia Mosely

ayama Mosely, Durham (1t), July 16, this widespread species is recorded east of the Appalachian Mountains for the first time.

PHRYANEIDAE

Agrypnia Curtis

improba (Hagen), Plymouth (1t), June 19.

Eubasilissa Martynov

Page 73, **paradalis**, change to **pardalis** (Walker).

LIMNEPHILIDAE

Limnephilus Leach

Page 98, **curtis**, change to **curtus** (Banks).

sublunatus Prov., Lee (1t), July 24.

Pycnopsyche Banks

Page 98, **antica** (Walker), a synonym of **scabripennis** (Rambur).

divergens (Walker), New Durham (Merrymeeting Lake) (JGC), Sept. 13.

Page 99, **Neophylas**, change to **Neophylax**.

LEPTOCERIDAE

Athripsodes Billberg

annulicornis (Steph.), Colebrook (RLB & WJM), Durham (1t), Pittsburg (RLB), June 15-22.

BRACHYCENTRIDAE

Micrasema McLachlan

rusticum (Hagen), Durham (1t), June 21-July 11.

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Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Dancing Bees at the Equator and Nocturnal Dances. To those of our readers who have been following the amazing discoveries on communication in honey bees by Professor KARL VON FRISCH¹ and his students, the latest experiments of Dr. MARTIN LINDAUER² will be of great interest.

In a number of publications, from 1946 to the present, von Frisch has revealed the dominant rôle that the sun plays in the orientation of bees, and that the shortcomings of the sun as a compass—the fact that it is at times obscured by clouds and that it is constantly changing its position in the sky—the bees know how to circumvent. For bees living in the latitudes between the tropics of Cancer and Capricorn there is still another problem, for here there are the times, twice a year, when the sun passes through the zenith and is then useless as a means of orientation.

In Peradeniya, on Ceylon, as the sun approached the zenith, dances continued throughout the day up until April 2, when the sun at noon came to within $2\frac{1}{2}^{\circ}$ of the zenith. On these days bees normally discontinued their flights between 11.40 and 12.30. When nevertheless induced to fly during the noon hour, the dances between 11.55 and 12.20 were disoriented. This shows that when the sun's position makes it useless as a compass, the bees are without any means for giving information on direction;

¹ Brief articles on these appeared in Ent. News: 66: 263, and earlier. See also the book by VON FRISCH: The dancing bees. Harcourt, Brace & Co., N. Y., 1955, \$4.00.

² LINDAUER, M. 1957. Sonnenorientierung der Bienen unter der Äquatortonne und zur Nachtzeit. (Dedicated by Dr. Lindauer to his professor, K. von Frisch on the occasion of his 70th birthday, Nov. 20, 1956.) Die Naturwissenschaften 44: 1-6.

they may, however, continue to visit the food, orienting their flights by means of the landscape.

There are also other observations cited that help to determine exactly how close the sun may be to the zenith while the bees are still able to measure its azimuth accurately. Disoriented dances occurred only on the six days before and after the sun's passage through the zenith. Also, the dates were recorded when the change of dance direction around noon would be from the counterclockwise to clockwise, due to the sun passing now to the south instead of north of the zenith. All evidence indicates that the sun's azimuth is clearly observable by bees even when the sun is only $2\frac{1}{2}^{\circ}$ from the zenith.

The faceted eyes of the bee thus represent a remarkably efficient apparatus for astronomical measurements. In this connection, it is noted that observations published years ago show that the angle of divergence of the ommatidia in the dorsal region of honey bee's eyes is likewise $2\frac{1}{2}^{\circ}$!

Nocturnal Dances. Several years ago, while observing dances on the surface of swarms, Lindauer had found bees dancing at night, and that these dances were correctly oriented according to the (nocturnal) position of the sun at the time of the dance.

In the present paper he describes the training of bees to two different stations. One and the same group of bees was trained to frequent a place east of the hive one hour before sunset, and a place west of the hive one hour after sunrise. When these bees now dance during the night, which place will their dances refer to? Perhaps to the place last visited, the afternoon station? Actual records taken throughout the night showed that the nocturnal dances before midnight refer to the afternoon station, those after midnight to the morning station, while close to midnight the dances are disoriented. This behavior is indeed a remarkable exhibition of memory and association.

The problem of how the bees obtain their sure knowledge of the sun's position during every hour of the day and night called for further investigation. Is it congenital or do they learn it on their daily flights?

In one experiment, a hive was flown overnight from Ceylon, on this day $5^{\circ} 35'$ south of the sun's path, to a locality near Bombay $5^{\circ} 35'$ north of the sun's path. It was found that now

the bees confused their directions corresponding to the altered position of the sun in the sky. It was, moreover, also found that after several weeks the bees become adjusted to the new position of the sun.

The fact that bees must acquire their knowledge of the sun's path by direct repeated observations, even in their native latitude, was also demonstrated. For this purpose, bees eclosed in an incubator and combined into a colony that was kept in a cellar with artificial illumination for four weeks were used. This hive was brought out and opened one day at noon, and that afternoon trained to a feeding place. The next morning these bees were unable to find the feeding place and were completely disoriented. After a week in the open, a similar experiment showed that most bees were able to locate the next morning a place they had been trained to the evening before, but there was still some uncertainty.

Finally, Lindauer found that a thorough familiarity with a part of the sun's diurnal path suffices to permit a bee to derive the complete path of the sun inclusive of the nocturnal portion. A second colony, likewise of bees eclosed and kept in the dark, was brought outdoors daily at noon and permitted to fly freely only during the afternoons. After 35 days of this, the hive was transferred to a new locality, opened at noon, and during the afternoon trained to a feed place. That night the hive was transferred to still another locality and now opened at 8 A.M. Although this was the first time these bees had ever been out in the forenoon, the majority of bees flew in the correct direction to seek their food. If they can thus calculate the position of the sun during the morning, a time when they had never before seen it, there is no reason they should not be able to calculate its position during the night also. It is true the nocturnal dancers do not take into account the small irregularities in the rate of angular movement of the azimuth. In our latitudes the azimuth curves (azimuth plotted against time) are small, but near the equator they become very steep, and it remains to be determined how accurately nocturnal dancers in the tropics relate their movements to the sun's position.—R. G. SCHMIEDER.

Zoogeography of Pacific Insects, the project bearing this title (see Ent. News 67: 79, March, 1956) has been enlarged.

Mr. WILLIAM W. BRANDT has been employed jointly by the Bishop Museum and the Administration of the Territory of Papua and New Guinea, and has started last October with work on Normandy I. and Woodlark I. Next he will go to the Owen Stanley Mts. Lepidoptera collected will go to Canberra; other insects to the Bishop Museum, with duplicates to Port Moresby. The plans for 1957 also include: J. L. GRESSITT to New Hebrides, E. Solomons, N. New Guinea, N. Borneo and Thailand; C. W. SABROSKY (Bishop Museum with cooperation of U.S.D.A. and Office of Naval Research) to Palau, Yap, and Guam, in April through June; D. E. HARDY to New Guinea, by the Museum; and E. G. MUNROE to New Guinea, with Canada Dept. of Agriculture cooperating.

Of the "Insects of Micronesia," 16 issues have already appeared, two more are about to appear, and others are in press.

Budapest Museum. A recent letter from Dr. ZOLTAN KASZAB of the Hungarian National Museum carries additional depressing news of the disastrous damage in October and November. The Paleontology and Mineralogy sections suffered great destruction. Among the zoological exhibitions lost was the African Diorama, 25 meters long and modern in workmanship. More serious losses, scientifically regarded, are: 30,000 herps, 10,000 fishes, 40,000 birds, 30,000 eggs, 500,000 molluscs, and mammalian bones, including the African material of Kittenberger. The insect collections were also damaged, especially the Diptera, of which 250,000 specimens (including 1,000 types), 1,500 volumes and 6,000 separates were burned.

Dr. Kaszab writes that the Museum Annals will probably be published this year as usual but includes in his letter the following (free translation):

"The replacement of the destroyed collections and renewal of scientific work in the museum surpasses our own resources and will be possible only through the sympathetic help of foreign institutes and foundations, zoological and entomological societies. We ask of anyone who is able, help us! I also ask you to make the contents of my letter widely known. The zoologists at the museum are all alive and working strenuously to salvage everything worth saving."—H. F. STROHECKER, University of Miami.

Reviews

THE NEOTROPICAL SPECIES OF THE "SUBGENUS AESCHNA" SENSU SELYSII 1883 (Odonata). Memoirs of the American Entomological Society, Number 15 (Academy of Natural Sciences of Philadelphia). By Philip P. Calvert, Professor Emeritus of Zoology, University of Pennsylvania, and Editor Emeritus of the Entomological News.

For many years odonatologists have been aware of the need of an adequate revision of the many species of *Aeshna* (sensu lato) of South and Central America. For some years past, however, it has been well known that Dr. Calvert was working on this project and now this gap in our knowledge of dragonflies has been filled.

Dr. Calvert's report is an imposing document of 251 pages of text, 614 figures arranged on 47 plates, 19 tables of venational and other measurements and 7 maps showing both geographical and altitudinal distribution of all the species and subspecies treated in the study.

Thirty-eight species comprise the neotropical members of the three genera recognized, but forty are actually considered, since two species of *Hesperaeschna*, a typically neotropical subgenus of *Aeschna*, are unknown south of Baja California, Mexico, one of these being the type species, *Aeshna* (*H.*) *californica* Calvert.

The main body of the study is divided into seven parts, the first and by far the largest part dealing with the adult dragonflies, the second with the larvae, while the remaining parts are brief dissertations on the following topics: III Relationships of the Neotropical Aeshnas to the North American fossils; IV Relations of the South American Aeshnas to Palearctic and Australian species; V The Geological Age and Geographical Distribution of the Ancestors of the Odonata and Mammalia; VI Relations of the Neotropical Aeshnas to each other; and VII The Seasonal Distribution of the Neotropical Species of *Aeshna*.

In the introductory pages of Section I a full account is given of the historical events leading to the fixation of the generotype of *Aeshna* Fab. as *A. grandis* L. by Cowley in 1934. This is followed by an all-inclusive key to genera, subgenera, species and

subspecies. Being of the descriptive kind, a number of characters are used, not only venational and genitalic but also many others from various regions of the body, including color pattern. Such a key may be more time-consuming than the usual shorter kind but is far more reliable. Immediately following the key a number of abdominal details are described, these having been used as taxonomic characters for the first time in the present work.

No pains have been spared to make this study as complete and accurate as possible. In the descriptive part the treatment of each species includes an apparently complete list of references in chronological order, numbered consecutively, and detailed statements as to sources of material and distribution of species and subspecies, not only geographical but also altitudinal and seasonal. Under the caption "Ecology" are various field notes, often copied as exactly as possible from the collector's label, this being usually necessary since adequate accounts of the habits or haunts are rarely available in published form. Finally, under "discussion" are considered the numerous problems, chiefly taxonomic, which inevitably arise in a work of this kind, particularly in the case of little-known species.

A total of 40 species of the "subgenus *Aeshna*" sensu Selysii 1883 are treated in this work. These include some more recently described species belonging to the same "subgenus" and, as already stated, two that are not actually Neotropical in distribution.

As now classified, these 40 species belong to three genera, *Aeshna*, *Coryphaeschna* and *Castoraeschna*. *Coryphaeschna* was separated from *Aeshna* in 1903 by E. B. Williamson, the generotype being *A. ingens* Rambur and other species of *Aeshna* were transferred to the new genus by various workers, including Calvert. Six species are now referred to *Coryphaeschna*, all inhabiting the Neotropical Region, although *C. ingens* penetrates North America as far as North Carolina.

The only new genus that appears in the present study is *Castoraeschna*, although it should be noted that Dr. Calvert published preliminary diagnoses of this new genus and his new subgenera of *Aeshna* in 1952 (Ent. News, 63). Five species belong to *Castoraeschna* and all but one of them had been placed

in *Coryphaeschna* by Ris or Kinnuns, including the generotype *Aeshna castor* Brauer.

The remaining species are placed in the genus *Aeshna*, but this genus, as represented in the Neotropical Region, is now subdivided into six nominal subgenera, namely, *Aeshna*, *Hesperaeschna* Cockerell, *Rhionaeschna* Foerster, *Schizuraeschna* Calvert, *Marmaraeschna* Calvert, and *Neureclipsa* Navas. Only two species are referred to the typical northern subgenus *Aeshna* and these are both too little known to give much assurance that they actually belong to this subgenus. *Rhionaeschna*, represented by a single species not seen by Calvert is doubtfully distinct from *Hesperaeschna*, the dominant neotropical subgenus. This leaves thus four well defined and well established subgenera of *Aeshna* in the region considered.

The largest and most widely distributed of these subgenera is *Hesperaeschna*, whose 14 species together have an unbroken range from Terra del Fuego (*A. variegata*) to southern British Columbia (*A. californica*), a latitudinal range of 102 degrees. None of the other subgenera or even genera approach *Hesperaeschna* in latitudinal range. *Coryphaeschna* comes second with 66 degrees, and likewise entering North American (North Carolina), while the third is the subgenus *Schizuraeschna* (60°), which ranges even farther north than *Hesperaeschna* (*A. multicolor* to southern British Columbia), although the southward extension of its range is only to Panama or possibly Venezuela (*A. jalapensis*). There are only four species each of the subgenera *Marmaraeschna* and *Neureclipsa*, and three of *Schizuraeschna*, so that the total number of species of *Aeshna*, including two in the subgenus *Aeshna* and one of *Rhionaeschna* is 28. The 7 species of *Coryphaeschna* and 5 of *Castoraeschna* make the total number of species described 40.

Comparatively little larval material was available for Dr. Calvert's study but that little has been most carefully investigated. The key to the larvae is modified from the keys of Wright and Peterson (1944, Ohio J. Sci.: 151-161) and Needham and Westfall (1955, Manual N. Amer. Drgfls.: 253-255). Although the larva of *Coryphaeschna ingens*, the generotype of this genus, is strikingly unlike the typical *Aeshna* larva, the difference between larvae of these two genera may be very slight.

Castoraeschna is still unknown in the larval state and, as far as any of the genera are concerned, larvae of less than a dozen species and subspecies are known with certainty. This is, however, as many as could be expected in a group whose larvae have not yet been systematically collected or reared.

Dr. Calvert's study is profusely illustrated, partly from photographs, partly from line drawings, but the great majority of the figures are from pencil drawings, reproduced in halftone. These drawings are most carefully and accurately executed, but the lack of contrast of pencil drawings is increased in the reproduction, so that they appear somewhat dull and flat. Nevertheless, the figures perform their main function, accurately representing the parts which they illustrate.

The final impression left on the mind of the reviewer after a careful scrutiny of this work is that of an extremely exact and detailed study in which nothing has been done hastily and no opinion expressed on any problem without due consideration of every one of its angles.

Besides being a work that every serious odonatologist will desire to possess, this monograph will doubtless be wanted for entomological libraries everywhere, particularly those in Central and South America.—EDMUND M. WALKER.

THE BIOLOGY OF THE HETEROPTERA; by N. C. E. Miller. Pp. 162, 64 figs. Leonard Hill Ltd. 9 Eden Street, London N.W. 1. 30 s.

This small book by Professor Miller will be of considerable value to the general entomologist and the specialist in Heteroptera as it contains numerous fine illustrations of adult and immature stages of many species of the suborder. For almost the first time, all of the heteropterous families are brought together and discussed in a single volume and the author as a result of his extensive work in the tropics of the Eastern Hemisphere has been able to avoid the over-emphasis upon Holarctic species so evident in most general works. A useful list of family and subfamily names and their synonyms is included. Particularly valuable is the extensive section on the Reduvoidea of which group Dr. Miller is one of the great authorities.

From specialists in the group have come expressions of regret on account of many errors and omissions, and the poor balance of the work. For example, 101 of the some 152 pages of text are devoted to discussions of the various families. The Reduvoidea are treated in 40 pages, the Tingidae receive three-fourths of one page, the Coreidae four pages, the Lygaeidae slightly less than three pages and the Miridae (the largest family of Heteroptera) are treated in two and one-half pages.

Any book of this type must, of course, be highly selective, but in view of some of the very limited references included it is surprising to find no mention of such important biological papers as Bailey's on the Tingidae, Esselbaugh's on Pentatomidae, Blatchley's "Heteroptera of E. N. America," Reuter's classic work on the Heteroptera of Palearctic Conifers and a great many others.

Much important biological information is lacking. To take two examples, maternal care in Heteroptera is very casually discussed without reference to the important papers on the subject by Bequaert, Frost & Haber and Kirkaldy among others and there is no consideration of the important Mullerian and Batesian mimicry phenomena exhibited by some members of the suborder.

Statements of the geographic distribution of the various families is unfortunately most misleading. The Isometopidae are said to be Palearctic and Oriental, the Berytidae Ethiopian and Indo-Australian, the Aradidae Palearctic and Nearctic, and the Saldidae Nearctic and Palearctic.

Economic workers will certainly object to the omission or summary treatment of such destructive species as *Antestia lineaticollis*, *Anasa tristis*, *Blissus leucopterus*, *Nysius ericae* and *Nysius vinitor* among others.

The book appears to be valuable for students of the Reduvoidea and for general workers in providing an overall view of the groups of Heteroptera and for its excellent illustrations. It must, however, be used with great caution and by no means represents a definitive work upon the biology of the Heteroptera.

—R. G. S.

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By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeshna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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No. 6

CONTENTS

Michener—Biology of a parasitic bee	141
Laboratory Training Courses	146
Woolley—Redescriptions of Ewing's Oribatid mites, III	147
Nomenclature Notice	156
Buscemi—Endochironomus overwintering cocoons	157
Linsley—New longicorn beetles from Texas	159
Ignoffo—Records of mammal-lice associations	162
Balduf—Weight of puparia of Rhagoletis basiola	163
Brown—Distribution and variation of Formica dakotensis	165
Change of policy on separates	167

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Notes on the Biology of a Parasitic Bee, *Isepeolus viperinus* (Hymenoptera, Anthophorinae)¹

By CHARLES D. MICHENER²

The purpose of this paper is to present information on the biology of the South American parasitic bee, *Isepeolus viperinus* (Holmberg). The observations are fragmentary but, in view of the interesting structural and behavioral parallelisms that occur among various parasitic bees, it seems worth publishing them, especially since very little has been known previously of the biology of any *Protepeolini*.

The so-called parasitic bees that inhabit nests of solitary bee hosts are inquilines after the manner of cuckoos. They lay their eggs in the cells of the host; each larva destroys the egg or young larva in a cell of the host, then eats the food stored by the host. When a parasite locates a host nest, she revisits it from time to time in order to lay an egg in each cell, or at least in more than one cell. Even though the parasites occur in

¹ Contribution number 958 from the Department of Entomology, University of Kansas, Lawrence, Kansas.

² The field work for this study was possible thanks to a John Simon Guggenheim Memorial Fellowship and aid kindly made available by the Campanha Nacional de Aperfeiçoamento de Pessoal de Nível Superior, Rio de Janeiro; the Conselho Nacional de Pesquisas, Rio de Janeiro; and the Rockefeller Foundation, New York. In particular, thanks are due to Father J. S. Moure for the use of facilities of the Seção de Zoologia, Faculdade de Filosofia, Universidade do Paraná, Curitiba, Paraná, Brazil, and for identification of the bees concerned. Early completion of the manuscript and figures was made possible by a grant from the National Science Foundation.

different families, they exhibit a remarkable series of parallelisms. Some of those relating to adult morphology have been treated by Grütte (1935), Michener (1944), and others. A most remarkable parallelism concerns the first stage larva, which in various parasites is equipped with an enormous head and jaws which are used to destroy the egg or young larva of the host. This modification occurs in such parasites as *Coelioxys* (Megachilidae), *Melecta*, *Oreopasites*, *Epeolus*, *Tricpeolus*, and *Nomada* (Anthophorinae). It is possible that this character is an indication of phylogenetic relationship of the last three, but must have arisen independently in *Coelioxys* and *Melecta*, and probably in *Oreopasites*. Another parasitic bee, *Stelis*, however, has nearly normal first stage larvae. It is interesting to find that *Isepeolus* has a large head and jaws in this stage, just as do its parasitic relatives in the Anthophorinae.

The genus *Isepeolus* has been recorded as a parasite of *Colletes* previously (Claude-Joseph, 1926; Ruiz, 1942, 1944, under the name *Epeolus luctuosus* Spinola), but information on immature stages has been limited to notes on the mature larva by Claude-Joseph.

The observations here recorded concern its parasitism of *Colletes kerri* Moure. The ethology of this species has been discussed elsewhere (Michener and Lange, 1957).

Among 25 occupied cells of *C. kerri* collected from nests in an earth bank at Araucaria, Paraná, Brazil, on January 13, 1956, 6 were occupied by cocoons of *Isepeolus*, the others by pupae of the *Colletes*. The *Isepeolus* cocoons are 11 to 12 mm. long, 6 mm. wide, strong, firm, made of coarse brown fibers sometimes as much as .02 mm. in diameter, criss-crossed, fused at points of crossing. These form an outer layer separable with difficulty from a second layer of finer fibers partially imbedded in an amorphous membrane. This layer is easily separable from a third which is similar to the second. The fourth and innermost layer, separable with difficulty from the third, is very thin, almost without fibers or with only very fine pale ones, and is thus mostly amorphous material. It is very smooth and shining on the inner surface except near the anterior end where it is more

fibrous, less smooth, and with some open interspaces among the fibers. The thickness of the whole cocoon wall is about .28 mm. The outside of the cocoon is fairly uniformly covered with a layer of fecal matter and perhaps unused pollen. This layer is .1 to .2 mm. thick, and blackish; separate fecal pellets cannot be recognized.

At the time that these cocoons were collected one adult was already chewing its way out through one end of its cocoon. Others were still pupae, but all had emerged by January 25.

Other observations on the relations between *Isepeolus viperinus* and its host were made in a series of banks near Curitiba, Paraná, Brazil, which are termed for our purposes the Barigui roadside banks. They are described in detail by Michener, Lange, Bigarella, and Salamuni (1958). On February 26, a female *Isepeolus viperinus* was seen to enter a known nest of *Colletes kerri*. The nest was left undisturbed, but on March 4 it was excavated. It contained two cells, both of which were occupied by young *Isepeolus* larvae. The latter were straight (unlike the curled *Colletes* larvae) and floated at the surface of the semiliquid provisions. They had killed the *Colletes* larvae, but the remains of the latter were uneaten in the mass of provisions; apparently *Isepeolus* larvae do not eat those of their host.

A young *Isepeolus* larva is shown in fig. 1, with a young *Colletes* larva drawn to the same scale in fig. 2. The two drawings were traced from a photograph of living larvae removed from the cells. The young larva of *Isepeolus* is remarkable for being nearly straight, the body with thick projecting lateral folds, especially posteriorly, which disappear in larvae of the same stage which have fed and are more distended. The body is remarkable among Anthophorinae for having a few hairs, especially in the anterior half. The large, depressed, heavily sclerotized head is also rather hairy. Sclerotization extends back as a spreading shield over the anterior part of the prothorax, especially ventrally, as shown in figs. 3 and 4, where membranous areas are stippled. The pointed labrum, relatively long antennae, absence of palpi, and the large sickle-shaped

mandibles are noteworthy features. However, the fusion of the labium, maxillae and hypopharynx to form an undivided ventral plate which is completely fused with the head capsule and has the salivary opening exposed on its ventral surface is a most remarkable modification of the pattern seen in related nonparasitic Anthophorinae (e.g., *Anthophora*, see Michener, 1953). A deep midapical emargination in this plate is surrounded by downflexed margins (fig. 5). The posterior tentorial pits are reduced to a pair of inconspicuous depressions, from which exceedingly slender tentorial rods extend anteriorly; no tentorial bridge was seen, nor were anterior tentorial pits located.

The head is so differently modified from that of *Oreopasites* (Rozen, 1954), another parasitic anthophorine whose young larval head has been studied with some care, that it may be that the head enlargement and sclerotization in *Oreopasites* and *Isepeolus* larvae have been independent. In *Oreopasites* the labrum is deeply bifid, the antennae and palpi are small but recognizable and the maxillary and labial area is separated from the rest of the head. These are primitive features which agree with bee larvae in general. Hence it is reasonable to state that the primary larvae of *Oreopasites* are less specialized than those of *Isepeolus*. Unfortunately, those of other parasitic Anthophorinae have not been described in sufficient detail to permit comparison.

One might imagine that larvae so modified could only kill the egg or larva of the host and could not feed on the stored food. This is not the case, for one small larva, presumably first stage, had the body distended with pollen.

Finally, it should be noted that a prepupa of *Isepeolus viperinus* was found in a cocoon in the nest of an unknown species of *Colletes* (not *kerri*) near Restinga Seca, 20 km. east of Palmeira, Paraná, Brazil, on January 27, 1956. This prepupa pupated in mid-February and emerged in the laboratory in early March. Apparently this individual belonged to a population not synchronized with *Colletes kerri* but rather with its own host.

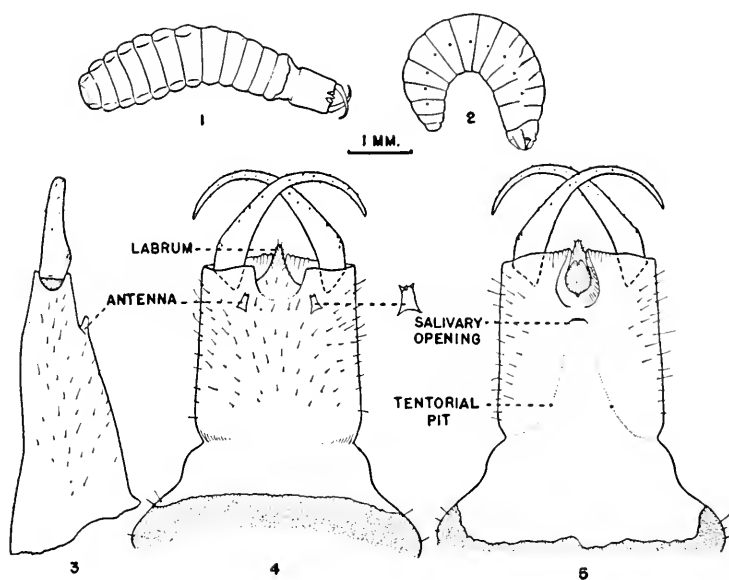


FIG. 1. Young (probably first stage) larva of *Isopcolus viperinus* (Holmberg), dorsal view.

FIG. 2. Side view of larva of the same age of the host, *Colletes kerri* Moure.

FIGS. 3-5. Lateral, dorsal and ventral views of head of young larva of *Isopcolus viperinus* (Holmberg).

Morphologically it agreed with specimens reared from nests of *C. kerri*.

As the pupa of *Isepcolus* has not been described, the following notes may be useful: No pubescence; no spines on coxae or elsewhere; a pair of tubercles on vertex near ocelli; a pair of large tubercles behind middle of mesoscutum. This pupa, as can be seen from the study of bee pupae by Michener (1954), has fewer spines and projections than any other bee pupa known. Perhaps this is because the adult is largely devoid of long hairs; in the paper mentioned above it is suggested that pupal spines serve principally to provide space for the development of the long hairs characteristic of most nonparasitic bees.

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Laboratory Training Courses

A schedule of the Laboratory Refresher Training Courses that will be given by the Laboratory Branch of the Communicable Disease Center during the period September 9, 1957 to March 28, 1958 has been issued. About twenty different courses on laboratory diagnoses of the various viral, bacterial, rickettsial, fungous, protozoan, and other parasitic diseases of man and animals are included. Each course runs from one to four weeks at designated periods; a few are repeated. For detailed information, and for application forms write to the Laboratory Training Services, Communicable Disease Center, U. S. Public Health Service, P.O. Box 185, Chamblee, Georgia.

Redescriptions of Ewing's Oribatid Mites, III— Family Eremaeidae (Acarina: Oribatei)¹

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This paper delineates several redescrptions of oribatid mites, the original accounts of which were made by the late Dr. Henry E. Ewing. The article is a sequential part of a series proposed by Dr. E. W. Baker of the U. S. National Museum. The writer follows Ewing's descriptions as far as possible, but uses modern acarological terms.

FAMILY EREMAEIDAE WILLMANN, 1931

According to Willmann (1931) this family of aptyctimous mites is characterized by the lack of pteromorphae, legs shorter than the body and leaf-like or ridge-like lamellae. Legs III and IV are usually inserted at the lateral margins of the hysterosoma.

The first three species redescrbed below are representatives of the genus *Lucoppia* Berlese, 1908, in which the narrow, ridge-like lamellae converge, the pseudostigmatic organ is capitate, with a globe on a short, thin stalk. The last species discussed in this paper is in the genus *Eremacus* Koch, 1836, which is characterized by reduced, parallel lamellae, short tarsi with three claws and apodemata IV fused into a sclerotized band which surrounds the genital aperture.

Lucoppia magnipilosa (Ewing), 1909. (Figs. 1, 2)

Type: *Damaeus magnipilosus* Ewing, 1909, p. 130.

Description: Olive brown in color, integument rough, with small, raised kernels. Propodosoma triangular (specimen tilted on slide), rostrum rounded anteriorly; rostral hairs simple, incurved at tips, inserted half their lengths posterior to rostral tip. Lamellae not noticeable except as slight ridge on right

¹ Research supported by a grant-in-aid from the National Science Foundation.

side. Lamellar hairs a third longer than rostral hairs, erect and inserted two-thirds their lengths directly posterior to rostral hairs. Interlamellar hairs simple, about same size as lamellar hairs, erect, inserted between pseudostigmata. Pseudostigmata cylindrical, low, slightly raised above surface of propodosoma, cornuate beneath. Pseudostigmatic organs small, erect, with narrow, short peduncle and globose head. Tectopedia I lateral, between levels of pseudostigmata and lamellar hairs.

Hysterosoma oval, wider anteriorly in tilted specimen, longer than broad. Dorsum with eleven pairs of long, fine, simple setae. Each seta finely serrate as shown in fig. 1. Two posterior median pairs of setae shorter than others. Ewing's description states: "At the posterior margin of the abdomen are situated two pairs of short, stout, fusiform bristles, characteristic of this species; the upper two are about twice as long as the lower two, and both pairs are inclined away from the median plane." In the specimen from which this description is constructed these dorsal hairs are fine and not stout. There are, however, two short, fusiform adanal hairs on the venter, which Ewing may have viewed from above, but none of the setae on the dorsum is stout.

Camerostome oval as seen in tilted specimen, with two simple bristles posterior to chelicerae. Other bristles as shown in fig. 2. Ventral plate shield shaped, anterior margin of shield formed by curved apodemata IV. Genital opening oval, nearly three times its length from anal aperture, anterior margin contiguous with curved front margin of ventral plate adjacent to apodemata IV. Each genital plate longer than broad and with five simple setae inserted closer to lateral margin than to medial (fig. 2); g:1 inserted on anterior margin of genital plate; g:5 inserted in middle of posterior edge; g:2, g:3, g:4 and g:5 equidistant from each other, a slightly wider separation between g:3 and g:4. Anal aperture nearly square; anal plates nearly three times as large as genital plates, longer than broad, with two anal setae; a:1 inserted laterally on plate, a:2 shorter and closer to median and posterior margin of plate (fig. 2).

According to Ewing the anterior pair of legs are as long as entire body, the leg segments less swollen than in other species. He describes all legs with stout, curved, pectinate hairs and leg IV as the longest of the legs.

Length 725 μ , hysterosoma 528 μ ; width 428 μ .

Discussion: The original description by Ewing (1909a) is slightly different in some respects from the current redescription. The specimen described above is not the type, but bears the same identification as the type. According to Ewing the type species was collected by J. D. Hood at Urbana, Illinois, under the bark of soft maple. The specimen described above is one collected by C. R. Crosby at Columbia, Missouri, and mounted June 19, 1908.

Lucoppia curviseta (Ewing), 1909. (Figs. 3, 4)

Type: *Notaspis curviseta* Ewing, 1909, p. 105.

Description: Dark reddish brown, integument thick and hard. Propodosoma narrowly triangular, about one third as long as body, expanded laterally in outline by projection of tectopodia I and II. Rostrum rounded; rostral hairs simple, erect, about half as long as lamellar hairs, inserted three-fourths their lengths from tip of rostrum at lateral margins. Lamellae narrow, convergent bands or ridges on surface of propodosoma, extended from base of pseudostigmata to level of anterior margin of tectopodia I, expanded distally for insertion of lamellar hairs. Lamellar hairs about as long as propodosoma, finely serrate (Ewing states: "pectinate"), directed forward. No trans-lamella. Interlamellar hairs about three-fourths as long as lamellar hairs, simple, erect, but curved outward and upward, inserted near lamellae, antero-mediad of pseudostigmata. Pseudostigmata small, circular pits, slightly larger in diameter than width of lamella. Pseudostigmatic organ short, directed antero-laterad, with straight, narrow pedicel, a spherical head at level of tectopodia II. Tectopodia I and II as shown in fig. 3.

Hysterosoma subglobose, slightly broader in front, anterior margin indented laterally to form a small scallop around insertion of first pair of setae directly behind tectopodia II; first

pair of setae straight, directed laterad; dorsum with thirteen pairs of simple, curved setae (Ewing says: "pectinate"). Four pairs of areae porosae, one pair posterior to shoulder of hysterosoma, three pairs postero-lateral in position (fig. 3). A glandular fissure postero-laterad of fourth pair of hysterosomal bristles.

Camerostome subtriangular, two setae immediately posterior to chelicerae. Other setae as in fig. 4. Apodemata I and II long, narrow, directed mediad; apodemata III and IV short, curved, extended mediad a fourth the distance to genital opening. Anterior margin of genital aperture contiguous with apodemata II, opening nearly square in outline, about three times its length anterior to anal aperture. Each genital plate rectangular, with straight, medial margin, rounded lateral corners; four short, fine genital setae on each plate; g:1 and g:2 anterior, g:3 and g:4 posterior (fig. 4). Anal aperture nearly three times as large as genital opening, somewhat polygonal in outline. Anal covers with two fine, curved hairs inserted closer to medial margin than to lateral. Two pairs of stout, fusiform, adanal setae, one at postero-lateral corner of anal aperture, second pair posterior to aperture near posterior margin of ventral plate, projected posteriorly beyond margin of hysterosoma.

Legs subequal, posterior pair not extended beyond hind margin of hysterosoma.

Length 766 μ , hysterosoma 566 μ ; width 533 μ .

Ewing (1909b) states that several specimens of this species were collected at Arcola and Homer, Illinois.

EXPLANATION OF FIGURES

FIG. 1. *Lucoppia magnipilosa* (Ewing), 1909, from dorso-lateral aspect; A. pseudostigmatic organ (after Ewing 1909); legs omitted.

FIG. 2. *Lucoppia magnipilosa* (Ewing), 1909, from ventral aspect; legs omitted.

FIG. 3. *Lucoppia curviseta* (Ewing), 1909, from dorsal aspect; legs omitted.

FIG. 4. *Lucoppia curviseta* (Ewing), 1909, from ventral aspect; legs omitted.



FIGS. 1-4.

Lucoppia boletorum Ewing, 1913, p. 120. (Figs. 5, 6)

Description: Light yellowish brown. Propodosoma longer than broad, rostrum blunt. Rostral hairs inserted in slight prominences a third their lengths from rostral tip. Lamellae less than half the length of propodosoma, low sclerotized ridges apparently extending to pseudostigmata, but interrupted by insertion of interlamellar hairs. Lamellar hairs pectinate, curved; inserted in low crescentic pits at anterior end of lamellae, reaching nearly to insertion of rostral hairs. Interlamellar hairs pectinate, divergent, a third longer than lamellar hairs, inserted in slightly curved, medial projections of lamellae, closer to pseudostigmata than to lamellar hairs. No translamella. Pseudostigmata cup-like; pseudostigmatic organs short, with narrow pedicel and subglobose, simple head.

Hysterosoma somewhat oval (except for broken dorsum on right side), surface irregular, but not pitted; dorsum with eleven pairs of slightly pectinate, curved setae (fig. 5). Areae porosae as shown in fig. 5.

Venter misshapen due to breakage of specimen. Apodemata I curved around base of camerostome; apodemata II directed medio-posteriorly from between tectopodia I and II. Apodemata III nearly horizontal at level anterior to genital aperture, not extended to margin of latter. Genital opening about two and one-half times its length from anal aperture, rounded; genital covers with straight medial margins, rounded laterally; genital setae not visible, a single setal insertion in postero-lateral corner of left cover. Anal opening about twice the size of genital opening, each anal cover with a single visible seta. An adanal seta adjacent to postero-lateral margins of anal aperture.

EXPLANATION OF FIGURES

FIG. 5. *Lucoppia boletorum* Ewing, 1913, from dorsal aspect, hysterosoma broken on right side; legs partially shown.

FIG. 6. *Lucoppia boletorum* Ewing, 1913, from ventral aspects; legs omitted.

FIG. 7. *Eremaeus brevitarsus* (Ewing), 1917, from dorsal aspects; legs omitted.

FIG. 8. *Eremaeus brevitarsus* (Ewing), 1917, from ventral aspect; legs omitted.



FIGS. 5-8.

Length 614 μ , hysterosoma 470 μ .

Ewing (1913) states that this species was collected by J. E. Guthrie at Jordan, Minnesota.

Discussion: According to Ewing (1913) this species is similar to *L. pilosus* (Banks), but he differentiates *L. boletorum* on the basis of an almost circular hysterosoma and shorter lamellar hairs. The fact that the specimen of the latter species is broken makes exact comparisons difficult.

Eremaeus brevitarsus (Ewing), 1917, nov. comb. (Figs. 7, 8)

Cotype: *Damaeus brevitarsus* Ewing, 1917, p. 164.

Description: Propodosoma large, bluntly triangular in outline, narrower than hysterosoma and about two thirds as long, with small tubercles on lateral and posterior surfaces (fig. 7). Rostrum broad and blunt, rostral hairs inserted in slight notches at lateral edges of propodosoma approximately half their lengths from anterior tip. Lamellae small, elongated, triangular prominences, about as long as rostral hairs, located on dorsal surface of propodosoma, with anterior cusp that projects above surface of propodosoma. Lamellar hairs short, about one-fourth as long as lamellae, each inserted in tip of anterior lamellar cusp and slightly decurved. Translamellae reduced to small medial projections on inner edges of lamellae. Interlamellar hairs stouter than lamellar hairs, but about same length, pectinate, inserted antero-mediad of pseudostigmata. Pseudostigmata circular and pit-like, as wide as half the length of interlamellar hair, nearly three times their diameters from anterior margin of hysterosoma. Pseudostigmatic organ elongate, club-like and pectinate, extending almost directly laterad from pseudostigmata.

Tectopodia I prominent, posterior to level of lamellar hairs, but directly laterad of lamellae. Tectopodia II a prominent, notched lateral tubercle at postero-lateral angle of propodosoma between legs II and III.

Hysterosoma longer than broad, swollen and slightly oval in outline, truncate anteriorly, anterior margin apparently flattened behind propodosoma, shoulder regions sclerotized; nine pairs of fine, dorsal setae; integument smooth (fig. 7).

Posterior margin of camerostome angular; setal insertions at level of tectopodia I and medial. Apodemata II and III transverse bars, each ending in curved, sclerotized coxal insertions; apodemata IV coalesced with sclerotized margin of genital aperture. Two pairs of setal insertions anterior to genital aperture on each side of sclerotized bar between apodemata III and IV, a single setal insertion mediad of coxal insertion IV. Genital aperture oval in outline, surrounded by sclerotized ring formed by apodemata IV; each genital cover subrectangular, with six genital setae in a row near medial edge of cover. Anal opening trapezoidal, each cover somewhat triangular, opened slightly in cotype specimen (fig. 8), with two setae; two pairs of adanal setae, fine, simple, subequal in length.

Ewing (1917) describes the legs of this species as follows: "Legs . . . with short, globose tarsi; femora swollen but not globose though pedicellate at their bases. Anterior pair of legs extending beyond the tip of the rostrum by about two thirds their length; tarsi slightly shorter than the tibiae; tibiae each with distal tubercle and long tactile hair which extends beyond the tip of the tarsus. Tarsi of posterior legs strongly globose scarcely two thirds as long as the tibiae; tibiae not globose, bearing each a very long tactile hair distally which extends beyond the tips of the tarsi. Ungues of all tarsi unequal."

Length $580\ \mu$; width $300\ \mu$.

Ewing mentions that a single specimen was found by him beneath an old piece of wood at Ames, Iowa.

Discussion: Two discrepancies exist between the Ewing's original description and the cotype described above. Ewing indicates the lamellar hairs as large, straight, simple bristles which extend beyond the rostrum. The pencil drawing of the cotype indicates these as short and decurved. Ewing's original illustration shows four setae in the shoulder region; the cotype exhibits three. Minor differences in the lamellae also exist as illustrated here and as drawn by Ewing.

This species resembles *Eremacus foveolatus* Hammer, 1952, but differs in the shorter length of the interlamellar hairs, lack of pits on the hysterosoma and the shorter, cusped lamellae.

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Nomenclature Notice

All comments relating to the following should be marked with the Commission's File Number, and sent to Francis Hemming, 28 Park Village East, Regent's Park, London N.W.1, England.

Dictyoploca Jordan, 1911, validation of (Order Lepidoptera) (File No.: Z.N.(S.) 1072).

Staphylinus Linnaeus, 1758, designation of *Staphylinus erythropterus* (emend. of *erythropterus*) Linnaeus, 1758, as type species of (Order Coleoptera) (File No.: Z.N.(S.) 242).

Anopheles Meigen, 1818, designation of type species for, in harmony with accustomed usage (Order Diptera) (File No.: Z.N.(S.) 1165).

picta Walckenaer, 1802 (Aranea), validation of, and of **Theridium** (emend. of Theridion) Walckenaer, 1805, validation of (Class Arachnida) (File No.: Z.N.(S.) 1006).

For details see: Bull. Zool. Nomencl. Vol. 13, Double-Part 2/3.

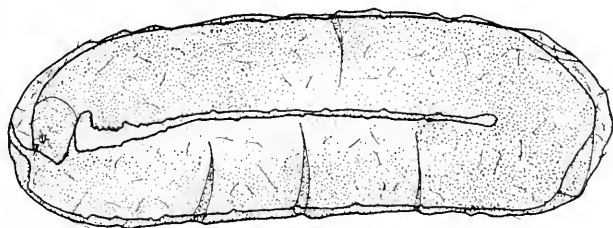
Toxorhynchites Theobald, July 1901, validation if (Order Diptera) (File No.: Z.N.(S.) 1166).

For details see Bull. Zool. Nomencl. Vol. 13, Part 4.

First Record of *Endochironomus subtendens*
(Townes) Larval Overwintering Cocoons
from North America (Diptera:
Tendipedidae)¹

By PHILIP A. BUSCEMI, Department of Biological Sciences,
University of Idaho

During the course of a year-round study of the bottom fauna of Parvin Lake, Colorado (located in Larimer County at an altitude of 8200 feet), an unusually large number of overwintering cocoons of *Endochironomus subtendens*² larvae were collected from the plant detritus of *Elodea canadensis* in the inlet bay. To date, they have been reported only four times from certain European lakes: by Harnish (1922) from a pond of the Silesian plain, by Alm (1922) from Yxtasjön in central Sweden, by Decksbach (1933) from the Russian Pereslawskoje Lake, and by Thienemann (1954) from some north German lakes. This, then, is the first North American record for such overwintering cocoons of *Endochironomus*.



Overwintering cocoon of *Endochironomus subtendens*, $\times 20$

Cocoons were collected by the writer as early as October 20, 1952, but the great majority were taken between November 28, 1954 to May 8, 1955. Most of the cocoons were found at depths of 0.3 to 3.0 m. They thus occurred over a slightly

¹ Contribution No. 29, Limnology Laboratory, Dept. of Biology, University of Colorado.

² Kindly identified by W. W. Wirth, U. S. National Museum.

greater depth range than that reported by Thienemann, who collected them only between 1.0 and 2.0 m. The maximum concentration on the bottom of the inlet bay was recorded at 1.0 m. (4928 per sq. m.) on February 26, 1955. The cocoons averaged 4.0 mm. long and 1.6 mm. wide (i.e., somewhat smaller than those described by Thienemann). They are weakly concave along the mid-line, and the ends are approximately semi-circular in shape (fig.). The larvae are bent at 180° at the mid-point of their length, and the head and caudal regions occupy the same end of the cocoon.

A number of cocoons measuring only 1.4 mm. in length were also collected in the samples, so that apparently all three larval stages have the ability to build overwintering cocoons. The cocoon is closed on all sides and is constructed of silk-like oral secretions to which bits of inorganic detritus and diatoms adhere. Their color is dark yellow to brown.

On the basis of near-bottom water temperature data, larvae of *E. subtendens* start to build cocoons shortly after the minimum daily water temperature falls to 10° and the mean daily water temperature falls below 13° . This latter temperature was first recorded in the inlet bay on November 20, 1954. Eight days later cocoons were found in the dredgings. Conversely, the mean critical temperature for reactivation of the larvae in the spring must lie between 5 and 9° . Over 50 per cent of the larvae had become active on April 22, 1955, when the mean daily water temperature was 5.3° , and over 70 per cent were active by May 8, 1955, when the mean temperature had increased to 9.3° .

Representative specimens are in the collections of the United States National Museum.

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New Longicorn Beetles from Texas (Coleoptera, Cerambycidae)

By E. GORTON LINSLEY, University of California, Berkeley

The following species are described in order that the names may be available in connection with another study.

Heterachthes texanus Linsley, new species

Male: Form slender, small; integument uniformly dark brown, surface subglabrous except for very long erect pale setae which are longer than greatest width of femora; elytra without pale markings. *Head* coarsely, irregularly punctate between eyes; antennae very heavy, exceeding elytral apices by about three segments, segments three to six greatly swollen, thicker than scape, apically ciliate but not carinate, segments seven to eleven filiform. *Pronotum* dull, coarsely, rugosely punctate, a little more than one and one-half times as long as basal width; prosternum shining, subglabrous; metasternum shining, glabrous practically impunctate. *Elytra* dullish, with scattered coarse punctures bearing very long setae; apices separately rounded. *Legs* moderate; femora clavate, with scattered long erect setae. *Abdomen* shining, subglabrous, almost impunctate. Length, 4.5 mm.

Holotype male (Calif. Acad. Sciences, Entom.), from the Chizos Mts., Big Bend, TEXAS, July 5, 1942 (E. C. Van Dyke).

This is a small, obscure species, easily known by the uniform dull coloration above, shining impunctate ventral surface, extremely heavy basal segments of the antennae and the very long erect setae of the elytra and legs.

Crossidius inflaticollis Linsley, new species

Male: Form large, subparallel; integument dull, red, antennae, legs, scutellum, and sterna of meso- and metathorax black, elytra with a broad parallel-sided anteriorly pointed bluish area, humeri narrowly black. *Head* densely, coarsely punctate above;

antennae eleven-segmented, exceeding elytral apices by about three segments, basal segments sparsely ciliate internally, finely punctate, eleventh segment elongate, vaguely appendiculate. *Pronotum* large, a little narrower than elytra (11:12), less than one and one-half times as broad as long (11:8), sides tumid or very feebly subtuberculate, surface uneven, impressed on each side of disk, coarsely, shallowly, densely and somewhat confluent punctate, pubescence long, erect, moderately dense; prosternum finely densely punctate with coarser punctures superimposed, densely clothed with long erect pale hairs, meso- and metasterna finely, densely punctate. *Elytra* about two and one-third times as long as basal width, sides subparallel, surface thinly clothed with moderately long suberect hairs, closely and rather coarsely punctate but the basal punctures distinctly smaller than those of pronotum, becoming finer, denser apically; apices sinuate truncate, inner and outer angles distinct but not produced. *Legs* finely punctate, thinly clothed with suberect pale hairs. *Abdomen* very finely and densely punctate, clothed with long, pale, suberect hairs. Length, 18.5 mm.

Holotype male (Calif. Acad. Sciences, Entom.), from Chinati Mt., Presidio Co., TEXAS, October 29, 1928 (E. R. Tinkham).

This species superficially resembles those of the *corallinus-cruentus* group but may be recognized at once by the large pronotum without a prominent lateral tubercle and the long pubescence of the upper and lower surfaces. The blue area of the elytra is unusually extensive for males in this genus.

***Amannus atriplicis* Linsley, new species**

Male: Form robust; integument black, elytra testaceous, basal margin and suture black, median black vitta extending from near apex to humerus; pubescence dense, pale. *Head* rather finely punctate at base, clothed with moderately long, appressed hairs; antennae twelve-segmented, exceeding elytral apices by from two to three segments, third segment a little longer than fourth, fourth segment subequal to fifth, segments five to eleven successively slightly shorter, twelfth segment distinctly shorter than eleventh, attenuate, segments three to seven carinate in-

ternally. *Pronotum* nearly one and one-third times as wide as long, sides obtusely rounded or subtuberculate, surface moderately coarsely, densely punctate, densely clothed with long appressed hairs which obscure the surface sculpture; scutellum densely clothed with long appressed hairs; pro-, meso-, and metasterna densely clothed with long, appressed pubescence which obscures the surface. *Elytra* about two and one-fourth times as long as basal width, finely costate; surface rather tate, clothed with suberect pale hairs which are a little longer coarsely, densely, contiguously and somewhat confluent punctate near base; apices rounded to suture, very slightly dehiscent. *Legs* slender; femora clothed with long appressed pubescence. *Abdomen* very densely clothed with long appressed hairs. Length, 10.5 mm.

Female: Antennae not quite reaching to base of abdomen; abdomen with apical margins of sternites evident but not broadly arcuately denuded. Length, 9-12 mm.

Holotype male, *allotype* female and two *paratypes*, male and female (United States National Museum), from Presidio, TEXAS, May 7, 1944, on *Atriplex canescens* (no. 44-12184), collected by J. H. Russell.

This species is related to *A. vittiger* Le Conte, but is a little larger and more robust with the elytra only about two and one-fourth times as long as basal width, the pubescence of the pronotum appressed, rather than erect, and obscuring the surface, and the abdomen of the female without broadly arcuate denuded apical margins on the sternites. The elytra are margined with black at the base and along the suture and the median black vitta attains the humerus.

New Records of Mammal-Lice Associations¹

By CARLO M. IGNOFFO

Eight living lice collected from a freshly killed cottontail rabbit, *Sylvilagus audubonii* (Baird), in the Great Salt Lake Desert region south of the Cedar Mountains, Tooele County, Utah, were identified as *Haemodipsus setoni* Ewing. Although Ferris² mentions collecting this louse "from an undetermined species of cottontail presumably a species of *Sylvilagus* . . . from the state of Montana," this is believed to be the first definite record of this association.

Other new records of lice parasitizing mammals from this same area are:

Neohaematopinus laeviusculus (Grube)

Townsend ground squirrel, *Citellus townsendii* (Bachman)

Neohaematopinus citellinus Ferris

Antelope ground squirrel, *Citellus leucurus* (Merriam)

Hopopleura hesperomydis (Osborn)

Pinyon mouse, *Peromyscus truei* (Shufeldt)

Canyon mouse, *Peromyscus crinitus* (Merriam)

Hopopleura arboricola Kellogg and Ferris

Cliff chipmunk, *Eutamias dorsalis* (Baird)

Least chipmunk, *Eutamias minimus* (Bachman)

Fahrenholzia reducta Ferris

Great Basin pocket mouse, *Perognathus parvus* (Peale)

Fahrenholzia pinnata Kellogg and Ferris

Ord kangaroo rat, *Dipodomys ordii* Woodhouse

Little pocket mouse, *Perognathus longimembris* (Coues)

¹ This work was supported by U. S. Army Chemical Corps contract, No. DA-18-064-CML-2639, with the University of Utah.

² FERRIS, G. F. 1951. The Sucking Lice, Mem. Pacific Coast Ent. Soc., 1: 179.

The Weight of Puparia of *Rhagoletis basiola* (O. S.). (Trypetidae, Diptera)

By W. V. BALDUF, Urbana, Illinois

INTRODUCTION

In a previous investigation (in press), I found that the puparia of this rose hip fly varied widely in length from 3.0 to 6.9 mm. and in ratio of length to diameter from 2.00:1.00 to 2.74:1.00. Thus, curiosity prompted me to inquire briefly also into the nature of their variation in weight. The 222 individuals involved here developed from larvae in the hips of *Rosa blanda* and *R. carolina* near Chetek, Wisconsin. Whereas the hips were picked on September 5, 1950, pupariation of the materials concerned here occurred at Urbana, Illinois, on September 17 to 22 and 26 to 28. The nine daily samples were weighed each day and kept separated in shell vials stored out-of-doors but sheltered from direct sun and rain.

RESULTS

The puparia were found to vary in two ways: (1) in their initial weights taken at the time of pupariation, i.e., within 24 hours after the mature larvae emerged from the hips, and (2) in the subsequent period of 35 to 40 days during which they were subjected to "dry" and wet conditions, alternately.

Original Weights. The initial weight of the 222 puparia totalled 3.310 grams, which gave an average value of .0149 gr. per individual. The nine daily samples consisted of 9 to 33 puparia. The initial average weight per puparium for these samples was as follows, in chronological order: .0179 (Sept. 17), .0166, .0155, .0159, .0133, .0145, .0167, .0141 and .0096 (Sept. 28). These data, in general, show a tendency of the puparia to decrease gradually in weight from the beginning to the end of the over-all period of pupariation, September 17 to 28. One condition that probably contributed to this decline was the deterioration of the stored hips which formed the food of the advanced larval instars from September 5 to 28. However,

some hips remained in a well-preserved state, while others deteriorated to varying extents. These differences in the condition of the hips may well explain the chronological irregularity of the observed decline in weight of the puparia.

Parasitism probably was another factor in the observed decline. The hymenopterous endoparasites, *Halticoptera rosae* Burks, *Opius baldufi* Mues. and *O. rosicola* Mues. attacked this fly significantly in several years at Chetek. However, the present puparia were not dissected to learn the rate of incidence of the parasites, nor the manner in which they affected the weights of the hosts.

Weights and Humidity. Because some puparia of all but two of the nine samples died in the course of the weighings, and because such fatalities probably prejudice the results of the tests, I am presenting here only the data for the two whole samples. Yet, the excluded samples have some informational value since they reflect the same general type of variations as the included two, namely, (1) a decided increase in weight with exposure to water, and (2) a marked decrease in weight under "dry" conditions.

The two samples for which I have complete records involve 56 puparia. On the days of pupariation, they were placed on cotton in normally dry atmosphere and weighed daily until they ceased to lose weight. During this period of 17 to 20 days, their combined initial or original weight—.9404 gr., fell off to .6990 gr., which represents a decline of 25.67 per cent.

Next, the dry puparia were transferred at once to a water-saturated wad of cotton in a vial. At the end of seven days, their weight had levelled off and had increased from .6990 gr. to .8248, i.e., 15.26 per cent. However, they still were 12.29 per cent short of their initial weight of .9404 gr.

Now the puparia were again kept on air-dry cotton until the daily records showed their weight had again become constant. This condition had developed on the twelfth day, when they weighed .6903 gr. This figure represents a loss of 16.31 per cent from the previous saturated weight of .8248 gr., and of 26.60 per cent from the initial weight of .9404 gr.

DEDUCTIONS

The observed pattern of changes suggests the following deductions:

First, the living puparia have the capacity to vary sharply in weight, the increases noted here being due to the absorption of environmental water, and the decreases to the evaporation of body fluids through the cuticle.

Second, the fact that the weight achieved at the termination of the seven-day wet period fell short, by 12.29 per cent of the initial weight, indicates the puparia tend to lose some of their capacity to regain by absorption. However, since mortality in puparia is not readily detected, it is possible that some of this loss of ability to regain all the previously lost weight was apparent, not real.

Third, a change in color, texture and specific gravity accompanies the variations in weight that arise from alternate wetting and drying. When newly pupariated, the puparia were normally dark ocherous and rubbery, tough; when they reached the extreme of dryness imposed in the treatment, they had turned pale stramineous, rigid and fragile. The darker flexible condition is restored with wetting. Dry puparia float lightly on water; wet ones float deeply.

Fourth, these variations in color, texture and weight, or specific gravity, are extrinsic and inconstant, hence have only negative taxonomic significance for segregation of species in the puparial stage.

Distribution and Variation of the Ant *Formica dakotensis* Emery

By W. L. BROWN, JR., Museum of Comparative Zoology,
Harvard University

Our understanding of *Formica dakotensis* Emery has been advanced considerably by Creighton (1950, Bull. Mus. Comp. Zool. 104: 480, 484-486) who cites data and references I need not repeat here. The easternmost record for *dakotensis*, doubted

by Creighton, was based on a mixed series from Digby, Nova Scotia (J. Russell leg., MCZ), consisting of eight workers mounted on two pins. By coincidence, the top two workers on each pin happened to be *F. subnuda* Emery, the bottom two on each pin, *F. dakotensis*. Evidently Creighton saw these top workers only, and assumed that the pins had been misplaced in a group of the wrong species; at my first glance, I also made the assumption that the series was homogeneous *subnuda*, and it was only after an intensive study of *subnuda* was begun that I found that instead it was a mixture of these two superficially similar species. There seems to be no reason any longer to doubt that both species occur as far east as Nova Scotia, especially in view of the considerable range extensions that are reported next below for *F. dakotensis*.

Variation in *dakotensis* includes a "race *montigena*," said to differ by having erect hairs on petiolar margin and gula. A series from Bluff Prairie, London, Ohio (C. H. Kennedy leg.), has from 3-5 erect hairs on the dorsal petiolar border; the Nova Scotia specimens have 1-5 per border.

A long series from Fairbanks, Alaska (W. Briggs leg.), is like the eastern lots in lacking gular hairs entirely, and generally has fewer on the petiolar border, often lacking hairs here completely. The samples with both gular and petiolar hairs erect are found in the Colorado Rockies, Idaho, Montana, Alberta Rockies and British Columbia, but there is as much variation in series from Alberta and Montana as in the rest of the distribution combined; some series from this region are extreme "typical" *dakotensis*, others are extreme *montigena*, and still others are intergradient and/or mixtures of the extremes.

Since the distributional patterns of the gular hairs and the petiolar hairs are strongly discordant, it is obvious that they cannot be used together to define geographical races. Considered alone, the gular hairs are characteristic in Colorado, but are less so farther north. The evidence for intergradation in this character alone is not quite good enough to rule out the possibility that *montigena* is a Rocky Mountain sibling that meets the east-west range of *dakotensis* in Montana and Alberta. The few females available do not provide very good support for

this hypothesis, although the considerable variation they show may fall into line when better material comes into evidence. Everything considered, it seems likely at this time that *montigena* should pass into the synonymy of *dakotensis*; at least, the burden of proof should fall on those who wish to maintain *montigena* as an independent taxon.

Change of Policy on Separates

Greatly increased production costs have finally made necessary a change in policy as regards separates of articles in ENTOMOLOGICAL NEWS. Faced with a choice of having the printer almost double the prices on reprints purchased by authors, or of ourselves paying the costs of the 25 gratis copies furnished, we have decided on the latter course. We shall continue the old custom of accepting suitable articles from any author, and will publish these without cost to the author. However, the author will not be entitled to the usual 25 gratis separates unless he is a member of our Society. Every author may, of course, order reprints from the printer, and the prices of these are very reasonable considering present day costs and the high quality of the work.

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This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and **Stizini** (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

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By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeshna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipa*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipa* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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No. 7


CONTENTS

Allen—A Japanese weevil in the Philadelphia area	169
Review—General and Applied Entomology	174
Rehn—Removal of certain Decticinae to Listrosclinae	175
Woolley—Redescriptions of Ewing's Oribatid mites, IV	177
Ross—New oak-inhabiting Erythroneura	183
Nomenclature Notice	190
Krombein—Synonymy of two North American Chrysis	191
Judd—Chalcidoid wasps from bullet galls	193

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A Japanese Weevil Abundant in the Philadelphia Area

By H. W. ALLEN^{1, 2}

The Japanese weevil, *Pseudocnecorhinus bifasciatus* Roelofs, appears to be increasing in numbers near Philadelphia. In 1956 it was one of the most abundant defoliating insects in this area, and despite its inconspicuous nature an increasing number of homeowners are becoming aware of its work.

Although injury to cultivated plants was first reported from Connecticut in 1924 (Britton), the earliest record of the weevil's occurrence in the United States is from specimens collected in 1914 in Philadelphia but not identified until years later (Buchanan 1946). Infestations of this insect in several heavily populated areas of the Eastern States are discussed by Smith (1955). According to Buchanan (1946), it occurred in Lansdowne, Pa., in 1940 and in Germantown in 1944. The author found it present in damaging numbers at Moorestown, N. J., in 1946 and again in 1948 (Allen 1948).

This weevil is distinctly polyphagous, and many host plants have been listed, but little has been published on its life history and habits. Buchanan dissected 55 specimens from Moorestown and found that only females were present. Smith (1955) noted that the beetles have fused wing covers and cannot fly, and that they deposit their eggs in partially eaten, curled leaves. He found that weevils infesting plants can be killed by application of dusts containing 5% of heptachlor or 2.5% of aldrin.

¹ Entomology Research Branch, Agricultural Research Service, U.S.D.A.

² E. L. Plasket assisted in the observations.

Observations by the author on food plants of the adult weevils are reported below. In the Philadelphia area privet hedges are commonly heavily infested and defoliated. Other plants that may be severely defoliated include azalea, perennial phlox, fire-thorn, and occasionally abelia, Japanese barberry, rose, climbing honeysuckle, Japanese quince, shrubby althea, forsythia, redbud, coralberry, hazelnut, flowering dogwood, chrysanthemum, and the sprouts or young plants of oak, sycamore, flowering crab, and walnut. Several large-leafed ornamentals not often defoliated, such as rhododendron, mountain laurel, English ivy, and lilac, are conspicuously disfigured by the feeding of the weevils. Feeding has been observed also on *Spiraea vanhouttei*, *Euonymus radicans*, coral bell, perennial veronica, geranium, germander, wild sweet-william, and several common weeds including wild aster, lamb's-quarters, *Persicaria*, and northern bugleweed.

In 1956 a few adults were found on June 9. Thereafter they were observed frequently throughout the season until after the first heavy frosts. The peak of abundance was in late July, but beetles were still plentiful in late September, and feeding continued throughout that period. Early in August one side of a section of moderately infested privet hedge about 3 feet high was jarred over a 90-inch length of sheeting and 70 beetles were knocked down. On September 26, 170 beetles were collected in a few minutes from about 60 feet of azalea and privet, but on October 12 only one could be found on the same shrubs. In an indoor cage at room temperatures nearly all these beetles were alive and vigorous on October 25.

Although samples of soil from beneath heavily infested bushes and around the roots and crowns of adjacent weeds and grasses were examined several times between June and October, no larvae or pupae were found. Egg pods were found first on September 21, but may have been present earlier, since well-developed ovarian eggs were found in 2 of 20 females on August 2, and 14 of 20 on August 23. Among beetles collected on September 26 maximum oviposition occurred from September 28 to October 9. There seems to be no diapause in the egg

stage. By October 22 nearly all the eggs deposited from September 27 to 30 and kept at room temperatures had hatched. October hatching also occurred among eggs kept in an outdoor insectary. In late October one newly hatched larva was found in the soil beneath heavily infested privet. However, eggs deposited early in the month and bedded in dead leaves in the shade had not hatched by October 22. It appears that this insect starts hibernation in the egg stage, and also as small larvae in the soil.

The adult (Fig. 1) is a robust, brownish-gray weevil, 4.5 to 7 mm. long, with two broad, transverse black bands across the elytra. The snout is broad and only slightly longer than wide. Adults are sluggish and unable to fly; hence their dissemination must be chiefly by transport. Of 42 dissected during July and August none had membranous wings and all were females. No males have yet been found.

The adults are usually found in shaded areas. They frequent the foliage and twigs of host plants and the ground beneath them. They are present on foliage both day and night, and on both fair and rainy days. They may remain quiescent for long periods in the angle between leaf petioles and the stem of a twig, where they resemble axillary buds. They feed at the edge of the leaf, cutting out small sinuses and sometimes giving it a ragged, coarsely serrate appearance. Feeding continues from June to October, and may cause nearly complete defoliation by late summer. The beetles have a tendency to form clusters, and bunches of 3 to 20 may be seen on heavily infested plants. Defoliation is always progressively less from the ground level upward, and heavy feeding is not often found more than 6 feet from the ground. When there are many beetles feeding on a bush, the leaves below them are usually spotted with black, adhesive, more or less cylindrical fragments of excrement.

When infested shrubs are slightly jarred, most of the beetles drop to the ground, and some will drop when the shadow of a hand passes quickly before them. Beetles that have dropped to the ground are inactive for a minute or two, when they may be rolled about like small pellets of earth, but they soon regain activity and crawl away.

When the egg is first laid it is white, with a thin, translucent, flexible, unsculptured shell. It is about 1.1 mm. long by 0.35 mm. wide, and slightly enlarged at the posterior end. As the embryo develops, the egg becomes creamy yellow, and the light-brown mandibles of the larva are visible through the shell.

The eggs are usually deposited in inconspicuous folds at the margins of dead leaves or leaf fragments, but some have been found over the midrib near the petiole, and a few eggs have been found on green leaves. The free edge of the fold is sealed to the basal portion of the leaf fragment, enclosing the eggs like seeds in a pod. There may be one to eight eggs in a fold. In the natural habitat a few egg pods were found in the dead margins of leaves on azalea and lilac bushes. Several more were found in scattered leaf fragments under a privet hedge nearly free of trashy mulch, and others were located by diligent search in the copious leafy trash under infested rose and azalea. Caged beetles deposited eggs more freely in leaf fragments on the ground than in leaves or leaf fragments attached to the twigs in the feeding area, and this condition is probably true in the natural habitat. Of a total of 168 egg clusters deposited by caged beetles, 72% were found in the leafy debris on the ground.

Newly hatched larvae are creamy yellow with light-brown heads. They are footless, with long, sparse pubescence. On hatching they crawl from the egg pods, drop to the ground, crawl an inch or less over the surface, enter some depression, and quickly burrow into the soil. In a cage at room temperature several young larvae that were more than twice the size of the eggs were found in moist soil containing pieces of lilac roots. There seems to be little doubt that the larval stage develops in the soil under or close to the plant where the egg pods were deposited.

Moderate to heavy feeding on ornamentals by *P. bifasciatus* adults was observed in 1956 in Mt. Holly, Burlington, Moorestown, Maple Shade, Merchantville, Haddonfield, Palmyra, Riverton, Rummelmede, Woodbury, Paulsboro, Williamstown, and Hammonton, N. J.: Langhorne, Bustleton, Germantown, Chestnut Hill, Whitmarsh, Conshohocken, and Phoenixville,

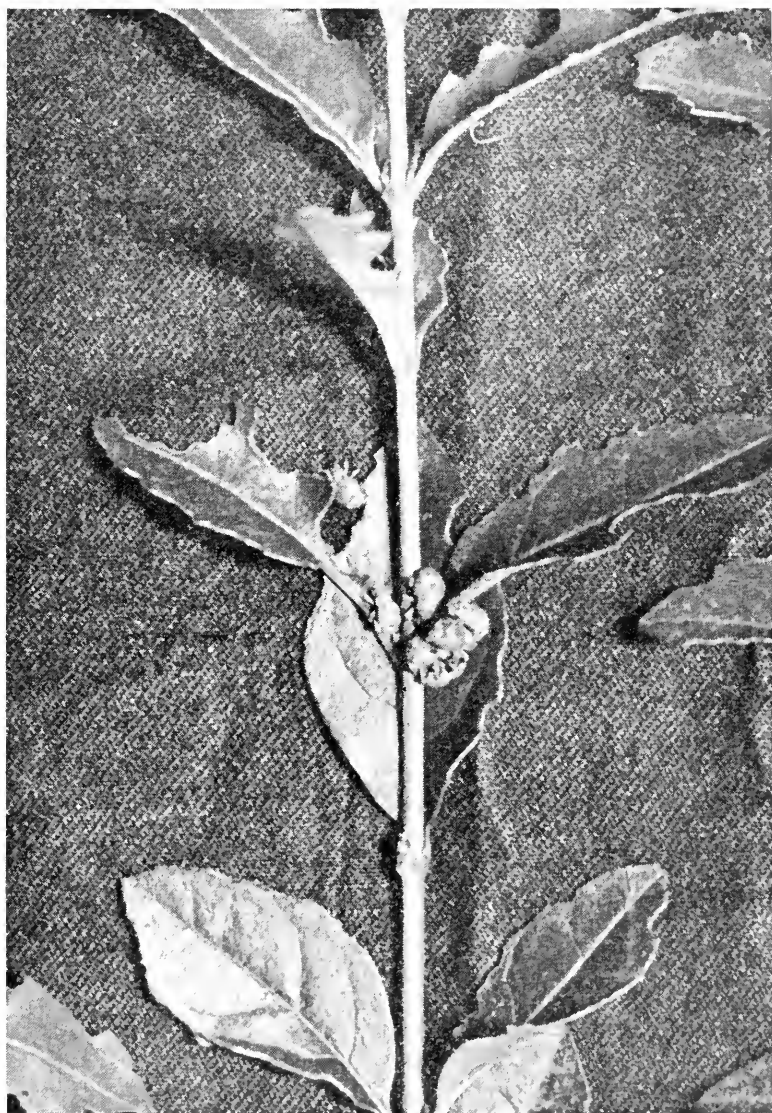


FIG. 1. A cluster of *Pseudoecorhinus bifasciatus* adults on a twig of privet.

Pa. These towns enclose an urban area of about 900 square miles. Infestation is apparent chiefly in built-up residential sections, particularly where there are well-shaded gardens bordered by shrubs and perennial plantings or by hedges. This area includes almost completely urban Philadelphia and Camden, and scores of towns, villages, and residential developments where the weevil thrives. It also includes more sparsely populated countryside where weevils are absent or not easily found.

In nearly all the towns listed above, more than half the privet hedges were found to be moderately to heavily infested. In Moorestown, N. J., interspersed among the many infested properties were gardens in which no beetles could be found. There were even hedges with practically no evidence of weevil injury directly across the street from heavily infested hedges.

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Review

GENERAL AND APPLIED ENTOMOLOGY. By V. A. Little; A. and M. College of Texas. Pp. vii + 543; 323 figs. Harper and Brothers, 1957, New York 16, N. Y. Price: \$7.00.

Most students take but one course in entomology. If this has to be one in applied entomology, we have here a book that will serve well as a text. It includes 35 pages of anatomy and physiology, and about that many on the principles of control; the rest is chiefly classification and biology. Each order has keys to principal families, and under each family one or more species is taken up in detail. When a family contains economic insects it is these that are chosen, and all the commoner pests receive adequate attention, *each under its proper order and family*.

In some applied texts, one studies in succession the pests of corn, cotton, etc., etc.; one never, for example, takes up aphids as aphids, since they are scattered about in the book under their host plants, and juxtaposed to entirely unrelated insects, which seems, somehow, a curious way to study entomology. Is this

(Continued on p. 192)

On the Removal of Certain New World Genera from the Decticinae to the Listroscelinae (Orthoptera; Tettigoniidae)

By JAMES A. G. REHN, Curator of Insects, Academy of
Natural Sciences of Philadelphia

In 1900 the present author described a very unusual species of tettigoniid from the hot Rio Balsas valley of Guerrero, Mexico, as a new species (*imperfectus*) of the genus *Capnobotes*,¹ which latter was then and has since been consistently referred to the subfamily Decticinae. The other species of *Capnobotes* were then, and are yet, considered to be limited to the southwestern United States, but they undoubtedly also occur in arid northwestern Mexico. In 1901, after study of material of true *Capnobotes* not previously available, the author erected the new genus *Neobarrettia* for the species *Capnobotes imperfectus*,² dedicating it to the collector of the original material, Otis W. Barrett. In 1907, my friend and colleague, Mr. A. N. Caudell, in a revision of the North American Decticinae, established the genus *Rehnia*,³ assigning to it two new species, *R. victoriae*, from Victoria, Guerrero, Mexico, and *R. spinosa*, from Texas. We now know *victoriae* from a relatively broad range of localities extending northward as far as Kansas, and *spinosa* conversely extending down into eastern Mexico. Two species have been added subsequently to *Rehnia*—*R. cerberus* Rehn and Hebard, from western Texas, and *R. sinaloae* Rehn and Hebard, from Sinaloa, Mexico.⁴

For some years past I have had the impression that both *Neobarrettia* and *Rehnia* were misplaced in the Decticinae, but only recently has it been possible for me to make the needed series of comparisons to prove or disprove this belief. It is now possible to say definitely that both genera do not belong to the Decticinae, but are instead members of the Listroscelinae, an

¹ Trans. Amer. Entom. Soc., XXVII, p. 89.

² Entom. News, XII, p. 16.

³ Proc. U. S. Nat. Mus., XXXII, pp. 288, 305.

⁴ Trans Amer. Entom. Soc., XLVI, pp. 234-244, (1920).

otherwise chiefly pan-tropical subfamily very well developed in South America.

The evidence for this conclusion has been drawn from the following structural features of the two genera, which fully agree with what we find in other representative genera of the *Listroscelinae*, and accordingly disagree with typical members of the *Decticinae*: (1) the very narrow, strongly and lamellately compressed fastigium; (2) the general structural pattern of the pronotum; (3) the strongly developed and paired spiniform processes on the prosternum, mesosternum and metasternum, not just on one or the other element, but on all; (4) the distinctly tuberculate or subspiniform process found on the internal surface of the coxae, particularly of the median and caudal limbs; (5) the well spined character of both of the ventral margins of the cephalic and median femora, and the relatively marked development of the spines on the ventral margins of the corresponding tibiae; and (6) the relative expansion and depplanation of the ventral surfaces of the cephalic and median femora, the latter a condition strongly developed in *Listroscelis* and other members of the subfamily.

The criteria used in the past for the separation of the subfamilies of the *Tettigoniidae* have frequently been the presence or absence of certain limb spines, which, increasingly, we know are of less diagnostic value than long supposed. For instance, the presence of a disto-dorsal spine on the external (caudal) margin of the cephalic tibiae often has been given much weight. In twenty-nine specimens of *Ncobarrettia imperfecta* I find this spine present in twenty-eight, but in one individual curiously it is absent from the external margin but has shifted to the otherwise unspined internal (cephalic) margin. In fourteen individuals of *Rehnia sinaloae* this spine is present on both cephalic tibiae in all but one, in which it is present on one limb and absent from the other. In sixty specimens of *Rehnia victoriae* this spine is present on both cephalic tibiae. Absence can be a matter of early injury, hence have a teratological background. Thus it is increasingly desirable that morphological features of more fundamental character be found and utilized to define generic or suprageneric categories.

It is quite evident that *Rehnia* and *Neobarrettia* are closer to some of the Neotropical genera of the Listrosclinae with which they have been compared, such as *Arachnoscelis*, than they are to the more divergent lines represented in tropical America by *Phlugis*, and in the Old World tropics and subtropics by *Xiphidiopsis*.

The removal of *Neobarrettia* and *Rehnia* from the Decticinae to the Listrosclinae is here made only after a comparative study of all the North American genera of the former subfamily and a considerable number of the extra-limital ones. Except where the Sonoran element penetrates into northern Mexico I know of no unquestioned decticines from the whole of America south of the United States. The present investigation carries the Listrosclinae definitely into North America as usually defined politically. I believe *Neobarrettia* and *Rehnia* represent a relatively early invasion of our territory from a more southern center of the subfamily, and that they have developed individually in their respective areas of arid or semi-arid conditions. The Rio Balsas valley, the home of *Neobarrettia*, is regarded by meteorologists as the hottest area of Central America.

Redescriptions of Ewing's Oribatid Mites, IV— Family Achipteriidae (= Notaspidae) (Acarina: Oribatei)¹

By TYLER A. WOOLLEY, Department of Zoology, Colorado
A. & M. College, Fort Collins, Colorado

This article is another in the series which deals with redescrptions of Ewing's type species of oribatid mites. Pencil drawings were prepared by Dr. E. W. Baker of the U. S. National Museum and made available to the writer. Acknowledgment of the drawings is indicated by the initials on the finished plates. Ewing's original descriptions are followed as closely as possible, but modern acarological terms are substituted where necessary. The article is presented in somewhat cursory

¹ Research supported by a grant-in-aid from the National Science Foundation.

fashion since it is the intention of the writer to incorporate details later in a review or revision of the family.

FAMILY ACHIPTERIIDAE VAN DEN HAMMEN, 1952
(= NOTASPIDIDAE OUDEMANS, 1900)

The anteriorly projecting cusps on the pteromorphae and the broad, medially-fused lamellae are the principal characteristics of this family of pterogasterine mites.

Both Grandjean (1936) and van der Hammen (1952) conclude that the name *Notaspis* is improperly used in this family since the generic designation as originally indicated by Hermann (1804) is applicable to eleven different mites. According to the former authors the genus *Achipteria* Berlese, 1885, more properly designates the type genus in this family, and is characterized by slit-like pores on the dorsum of the hysterosoma.

This paper deals principally with two species in the genus *Achipteria* which were described by Ewing (1918) from collections in Oregon. In other publications (1909, 1910) he discusses several species of *Notaspis*. In this paper the writer proposes changes in the generic designations of these species and discusses their taxonomic relationships.

***Achipteria oregonensis* Ewing, 1918. (Figs. 1, 2)**

Description: Cotype broken on left side of hysterosoma. Dark brown. Lamellae broad at base, completely obscuring rostrum and other aspects of propodosoma; each lamella with incurved antero-lateral margin and blunt tip, sclerotized medial margins from insertions of lamellar hairs to base of lamellae; a narrow U-shaped cleft between anterior half of sclerotized medial margins of lamellae, cleft extending from insertions of lamellar hairs half the distance to hysterosoma. Lamellar hairs about as long as widest width of lamellae, extended from insertions beyond anterior tip of lamellae, minutely pectinate and curved laterally at tips. Translamella a brief sclerotized bar at posterior margin of U-shaped cleft between lamellae. Interlamellar hairs barbed along entire length, about as long as lamellae, inserted close to

mesal edge of lamellae near anterior margin of hysterosoma, incurved at tips. Pseudostigmata deep, cup-like, in notch formed by latero-posterior margin of lamellae and curved medial bases of pteromorphae. Pseudostigmatic organs three-fourths as long as cusp of pteromorph, somewhat fusiform, with minute spines, projected forward between lamellae and pteromorphae.

Surface of hysterosoma smooth (broken on left side in cotype specimen), broadly oval in outline with angular shoulders and rounded posterior margin. Each pteromorph with an anterior cusp; cusp projecting forward, outward and downward at distal tip, about two-thirds as long as lamella, not reaching level of anterior margin of propodosoma. A single, simple dorsal bristle directly posterior to inner proximal margin of pteromorph cusp, inserted its length posterior to hysterosomal margin; another simple bristle near latero-posterior margin of pteromorph. Other bristles and glandular fissures as shown in Fig. 1.

Camerostome broadly oval. Ventral plate distorted and broken in cotype specimen. Setae of ventral plate and apodemata as seen in Fig. 2. Genital opening nearly square, about two-thirds as large as anal opening; genital covers with 7 pairs of setae; g:1 and g:2 inserted in anterior margin of each cover; g:3, g:4, g:5, g:6 inserted in a longitudinal row in middle of cover; g:7 inserted mediad of this row and near posterior margin of cover. Anal aperture about twice as large as genital opening, each anal cover trapezoidal in outline and with two setae. Insertions of anal and adanal setae as in Fig. 2.

Legs described by Ewing (1918) as long and heterodactyle.

Length 771 μ , hysterosoma 614 μ ; width 530 μ .

Several specimens were collected by H. E. Ewing from the ground beneath an old piece of wood at Corvallis, Oregon.

Achipteria borealis Ewing, 1918, nov. comb. (Figs. 3, 4)

Type: *Achipteria oregonensis* var. *borealis* Ewing, 1918, p. 84.

Description: Lamellae broad at base, tapered to a sharp point anteriorly, a deep V-shaped cleft between anterior tips and extending nearly half the distance to base of lamellae; medial

margins sclerotized from insertions of lamellar hairs posteriorly, where lamellae are separated slightly anterior to hysterosomal margin. Lamellar hairs simple, stouter than interlamellar hairs, projected slightly beyond anterior points of lamellae, inserted their lengths from anterior ends of lamellae in frontal tip of sclerotized medial margin. Interlamellar hairs nearly as long as lamellae, fine, simple, inserted in meso-posterior margin of lamellae, distal tips curved inward. Pseudostigmata cornuate beneath surface of hysterosoma at base of lamellae. Pseudostigmatic organs not seen.

Hysterosoma smooth, broadly oval; pteromorphae extended nearly two-thirds the length of lateral margin; anterior cusps nearly straight, projected forward about half the length of lamellae. Six pairs of setal insertions and two pairs of glandular fissures as shown in Fig. 3.

Details of ventral aspect obscured by dark color of specimen except for those shown in Fig. 4. Tectopodia I similar to the same structure in *A. oregonensis*, but ribbed on lateral margins. Genital and anal apertures as figured; genital and anal setae not visible.

Length 571 μ , hysterosoma 470 μ ; width 356 μ .

Ewing (1918) collected a single specimen of this species under a rotting log at the top of Mary's Peak, Oregon.

Discussion: Ewing's original description (1918) of *Achipteria oregonensis* is accompanied by a single text-figure of the right pteromorph cusp of one of the cotypes from Corvallis, Oregon. As originally described *A. borealis* differs in size and shape of the pteromorph cusp. Further differences are noted, however, in the sclerotization of the lamellae and pteromorphae; in the lengths of lamellar and interlamellar hairs, which are stout and pectinate in *A. oregonensis* and simple in *A. borealis*; in the relative size of the two species, *A. borealis* is the smaller of the two. Ewing (1918) used the pteromorph cusp to distinguish his described variety from the species. These other marked differences, however, are sufficient to justify the elevation of the variety to specific rank, in the opinion of the writer.

Both *A. oregonensis* and *A. borealis* differ from the known European species and from the Canadian species, *A. nivalis*

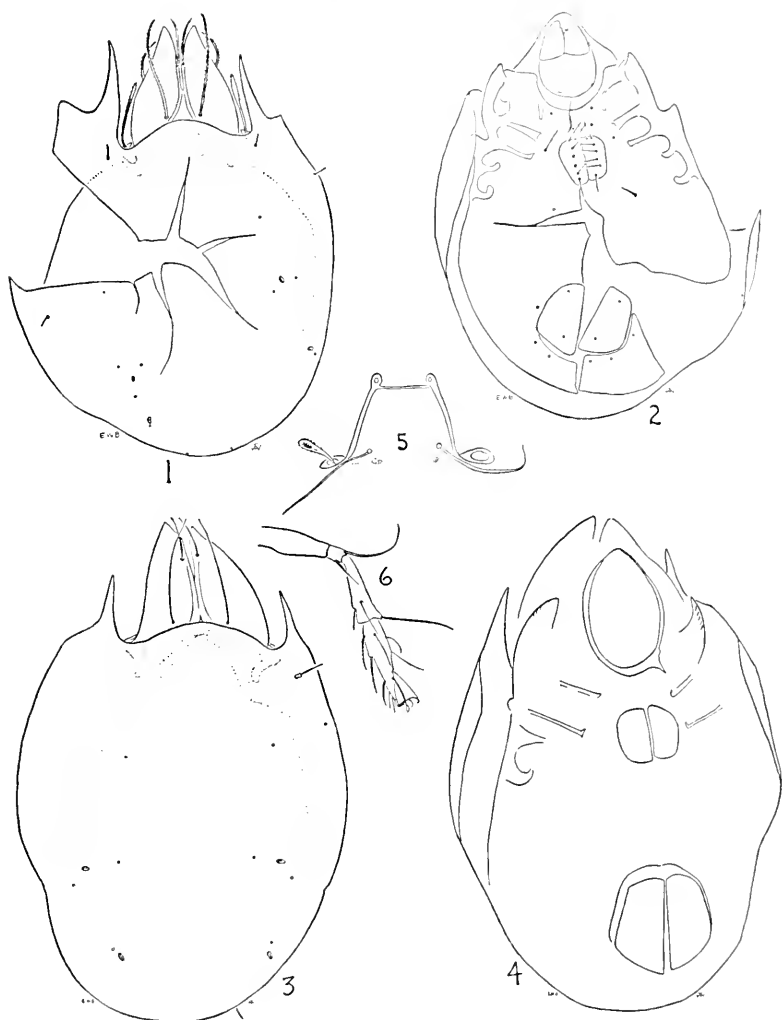


FIG. 1. *Achipteria oregonensis* Ewing, 1918, from the dorsal aspect. Left side of hysterosoma crushed.

FIG. 2. *Achipteria oregonensis* Ewing, 1918, from the ventral aspect. Left side of ventral plate broken.

FIG. 3. *Achipteria borealis* Ewing, 1918, from the dorsal aspect.

FIG. 4. *Achipteria borealis* Ewing, 1918, from the ventral aspect. Details obscured because of darkened specimen.

FIG. 5. *Notaspis texana* Ewing, 1909, part of propodosoma.

FIG. 6. A leg of *Notaspis texana* Ewing, 1909.

Hammer, 1952, in size and arrangement of lamellae, lamellar and interlamellar hairs.

Ewing (1909) describes other species of *Notaspis* which should be discussed. All cotypes of one of these, *Notaspis texana* Ewing, 1909, are smashed. The writer has drawn part of the propodosoma and the leg of one of these cotypes (Figs. 5, 6). The lamellae, pseudostigmata and interlamellar hairs indicate that this species is definitely not *Notaspis* nor *Achipteria*. It probably belongs in the genus *Zygoribatula*, but the condition of the specimens makes final determination impossible.

Notaspis brevirostris Ewing, 1910, and *Notaspis depilis* Ewing, 1909, also are species of indeterminate position. Neither appears to belong to *Achipteria*. The former is illustrated by a photograph which is not detailed enough to allow critical diagnosis. Analysis of the verbal description, in which there is no mention of pteromorphae, indicates that it is definitely not a species of *Achipteria*. The lamellae are short with free cusps, also in contradistinction to the large plates typical of *Achipteria*. Furthermore, the genital and anal apertures are nearly contiguous, a condition which is not characteristic of this genus. *Notaspis depilis* is much more characteristic of the genus *Zygoribatula*. In the opinion of the writer, these facts constitute sufficient justification to infer taxonomic misplacement of these two species. Their exact designation cannot be determined, however, until all of the specimens can be examined and compared with known species.

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New Oak-Inhabiting Species of *Erythroneura* from Illinois (Hemiptera, Cicadellidae)

By HERBERT H. ROSS, Illinois Natural History
Survey, Urbana

Among the oak-inhabiting species of *Erythroneura* found in Illinois, those with a rigid restriction to shingle oak (*Quercus imbricaria*) and the black oaks (*Quercus nigra* group) are proving to have been the least understood. This situation is due to the relatively infrequent occasions when the collector encounters large populations of *Erythroneura* on these hosts. By good fortune, in the last two years we have found a few groves of these oaks having moderate to large leafhopper populations. On the basis of the large numbers of individuals thus available for study, it is now apparent that certain observed structural differences, previously suspected of being only variations of one or two species, in reality demark distinctive species segregates. It is these species which are described in this paper.

ERYTHRONEURA LENTA complex

In *Erythroneura lenta* and its immediate allies the body markings are scattered red bars and dots on a pale background, typical for the great majority of species in the *maculata* group; the style has either no posterior point or a minute one; the aedeagus is simple, deeper than thick; and the pygofer hooks are slender and either nearly straight, curved, or only moderately sinuate. To this complex belong *lenta* Beamer, *longa* Knull, *patris* Ross and DeLong, and several other species, some of them apparently undescribed.

Erythroneura marilandicae new species

Most closely related to *longa*, this species may be distinguished by the shorter, tapering shaft of the aedeagus and the more curved dorsal aspect of the pygofer hooks. In *longa* the latter are almost straight.

Color and general structure as in typically spotted members of the *lenta* complex. Male genitalia as in Fig. 1. Pygofer hook slender, extending considerably beyond pygofer, the latter aspect slightly curved ventrad, the dorsal aspect bowed, the two hooks converging toward apex. Style without posterior point (as in Fig. 3E). Aedeagus with curved internal apodeme; phallicata short, straight, and slightly tapering, lateral aspect only moderately deep, ventral aspect narrow.

Holotype ♂.—Meredosia, ILLINOIS, Sept. 8, 1954, on *Quercus marilandica*, Ross and Stannard. *Paratypes*.—All from Illinois; same data as holotype, 9 ♂; Forest City, Sept. 11, 1953, on *Q. marilandica*, Stannard and Ross, 1 ♂; same, but Sept. 8, 1954, 4 ♂; n. of Marion, Sept. 21, 1950, on *Q. velutina*, Ross and Evers, 1 ♂; Rocky Branch Cr., Oliver, Apr. 22, 1949, Ross and Stannard, 2 ♂; Starved Rock St. Pk., Sept. 7, 1951, on *Juglans cinerea*, Mills and Ross, 1 ♂; W. Vienna, Jn. 5, 1951, on *Ulmus alata*, Ross and Richards, 1 ♂.

***Erythroneura econa* new species**

Based on general proportions of aedeagus and pygofer hooks, this species also is most closely related to *longa*, but differs in that the pygofer hooks diverge at apex and have an apparent twist to the apical portion, Fig. 2A, B, resulting in the apical half being abruptly narrowed in dorsal view.

Color and general structure as for typically spotted members of *lenta* complex. Male genitalia as in Fig. 2. Pygofer process extending just beyond apex of pygofer; in lateral view the base is narrow and the apical half is slightly wider (in some specimens this enlargement is not seen until the abdomen is rotated a few degrees from a strictly lateral position); in dorsal view the base is relatively thick and the apical half is abruptly thinner. Style without posterior point. Aedeagus with short, straight internal apodeme; shaft slender, moderately long, and almost straight.

Holotype ♂.—Neoga, ILLINOIS, Sept. 2, 1955, on *Quercus imbricaria*, Ross and Stannard. *Paratypes*.—Newton, Ill., Sept. 12, 1956, on *Q. imbricaria*, Ross and Selander, 8 ♂.

Erythroneura metopia new species

The ventrally-curved pygofer hook indicates a close relationship between this species and *patris*, from which *metopia* can be diagnosed by the angulate rather than gently curved pygofer hook and the very short aedeagal shaft.

Color and general structure typical for the *lenta* complex. Male genitalia as in Fig. 3. Pygofer hook slender, extending to end of pygofer and bent relatively sharply ventrad at midpoint; the two hooks, seen from dorsal view, converge slightly toward apex. Style without posterior point. Aedeagus with short internal apodeme; shaft unusually short for the complex, tapering and both shallow and narrow.

Holotype ♂.—Shawneetown, ILLINOIS, July 14, 1948, on *Quercus imbricaria*, Mills and Ross. *Paratypes*.—All from Illinois; same data as holotype, 3 ♂, 5 ♀; Danville, July 23, 1949, on *Q. imbricaria* and *Q. velutina*, DeLong and Ross, 2 ♂; n. of Marion, Sept. 21, 1950, on *Quercus* sp., Ross and Evers, 3 ♂; Fairfield, June 12, 1934, DeLong and Ross, 1 ♂; Newton, Sept. 11–12, 1956, on *Q. imbricaria*, Ross and Selander, 15 ♂.

Erythroneura alicia new species

On the basis of genitalic structures this species is closest to *longa* and *marilandicae*, from both of which it differs in the more sinuate pygofer hooks and sinuate aedeagal shaft. From all members of the *lenta* complex *alicia* differs in possessing three pink transverse bands across the dorsum, in position like the darker bands of *trivittata*.

Color pale with three transverse pink bands across the folded tegmina, one at the base including also the scutellum, one across the middle, and the third slightly before the apex. General structure typical for complex. Male genitalia as in Fig. 4. Pygofer hook slender and tapering, extending slightly beyond apex of pygofer, moderately sinuate from either lateral or dorsal view. Style without posterior point. Aedeagus with short internal apodeme; shaft short, only moderately deep, its lateral aspect definitely sinuate, its ventral aspect narrow.

Holotype ♂.—Neoga, ILLINOIS, Sept. 2, 1955, on *Q. imbricaria*, Ross and Stannard. *Paratypes*.—All from Illinois on *Q. imbricaria*; same data as holotype, 2 ♂, 7 ♀; nw. of Casey, Sept. 8, 1955, Ross, 2 ♂, 1 ♀; Dahlgren, Sept. 24, 1952, Ross and Evers, 2 ♂; Fairfield, June 12, 1934, DeLong and Ross; Newton, Sept. 12, 1956, Ross and Selander, 2 ♂, 1 ♀; Raymond, Sept. 29, 1955, Ross, 1 ♂.

ERYTHRONEURA TRIVITTATA complex

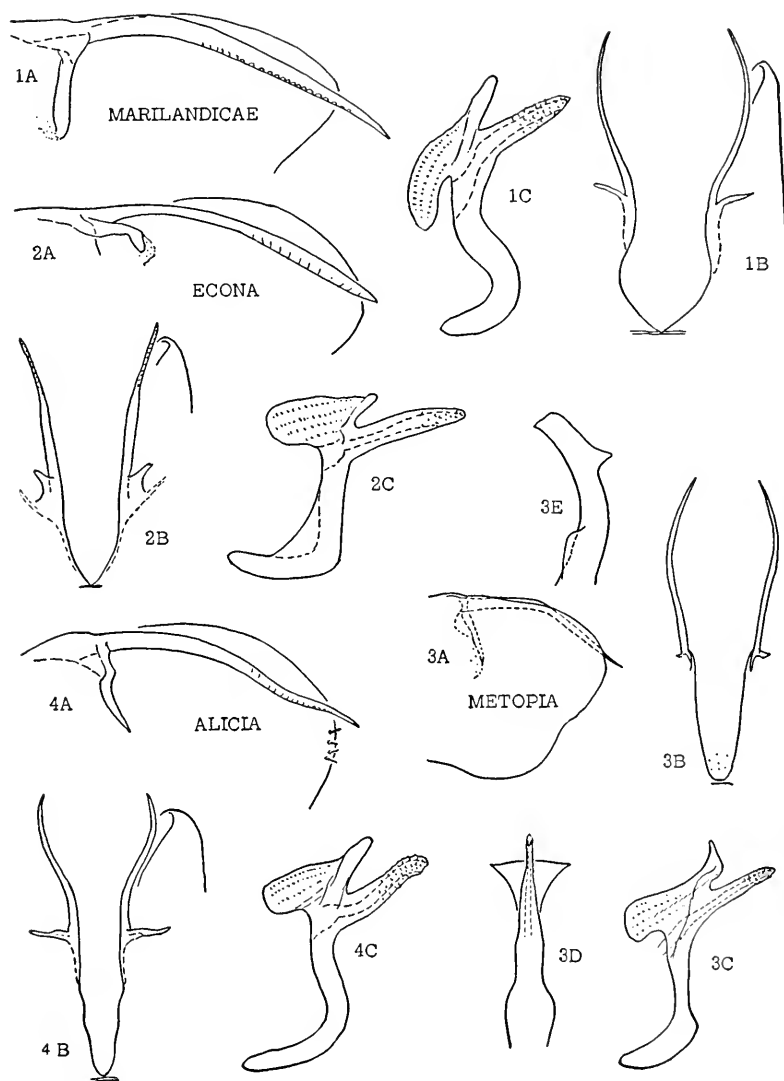
Two previously described species, *confirmata* McAtee and *trivittata* Robinson, form a distinctive small complex in which the style has both a posterior and anterior point, both slender and pointed, Fig. 5E. In *confirmata* the dorsal aspect (with wings folded) has an exquisite red saddle-like pattern, whereas in *trivittata* the dorsal aspect has a light ground color crossed by three nearly black transverse bands. Previously this banded pattern was considered diagnostic for the species *trivittata*, but we have discovered two additional species described below possessing this pattern. Shingle oak is the host for all four species of the complex.

Erythroneura amethica new species

This and the following species are close relatives of *trivittata* Robinson, possessing in common with it three conspicuous transverse red and black bands across the tegmina. *E. amethica* differs from the other two banded species in the shape of the pygofer hooks, which converge at the apex.

Male genitalia as in Fig. 5. Pygofer hook elongate, of nearly uniform thickness to near curved apex; dorsal aspect gently sinuate. Style with sharp anterior point and sharp, narrow posterior point. Aedeagus with base unusually large; phallicata nearly cylindrical, the apical half and most of the ventral margin spiculate; ventral aspect slightly irregular.

Holotype ♂.—Shawneetown, ILLINOIS, July 14, 1948, on *Quercus imbricaria*, Mills and Ross. *Paratypes*.—All from Illinois on *Q. imbricaria*; Dixon Springs, April 21, 1935, T. H.



FIGS. 1-4. Male genitalia of *Erythroneura*. A, B, pygofer hooks, lateral and dorsal aspects; C, D, aedeagus, lateral and ventral aspects; E, apical portion of style.

Frison, 1 ♀; Edgewood, June 5, 1955, Ross and Richards, 1 ♂; Sesser, Aug. 5, 1954, Ross and Moore, 2 ♂.

Erythroneura arpegia new species

Color and general structure as in the preceding species. Male genitalia as in Fig. 6. Pygofer hook quite unlike that of *trivittata* and *amethica* in that it is widened into a broad blade just before the middle, and the dorsal aspect is sharply angled laterad at the point of widening very much as in *paluloides* Ross. Style exactly as in *trivittata*, the posterior point being only half as long as in *amethica*. Aedeagus also very much as in *trivittata*, the base of normal size and the phallicata nearly cylindrical, with a scattering of short spicules.

Holotype ♂.—Adams County, ILLINOIS, north of Kinderhook, Sept. 9, 1954, on *Quercus imbricaria*, Ross and Stannard. *Paratypes*.—All from Illinois on *Q. imbricaria*; same data as holotype, 1 ♂; nw. of Casey, Sept. 8, 1955, H. H. Ross, 10 ♂; Danville, July 23, 1949, DeLong and Ross, 1 ♂; Neoga, Sept. 2, 1955, Ross and Stannard, 1 ♂.

ERYTHRONEURA TUMIDA complex

The species *tumida* Knull is unusual in the *maculata* group of *Erythroneura* in possessing a sickle-shaped style, much as in Fig. 7E. Two closely related species are here described, bringing to three the number of known species possessing this character.

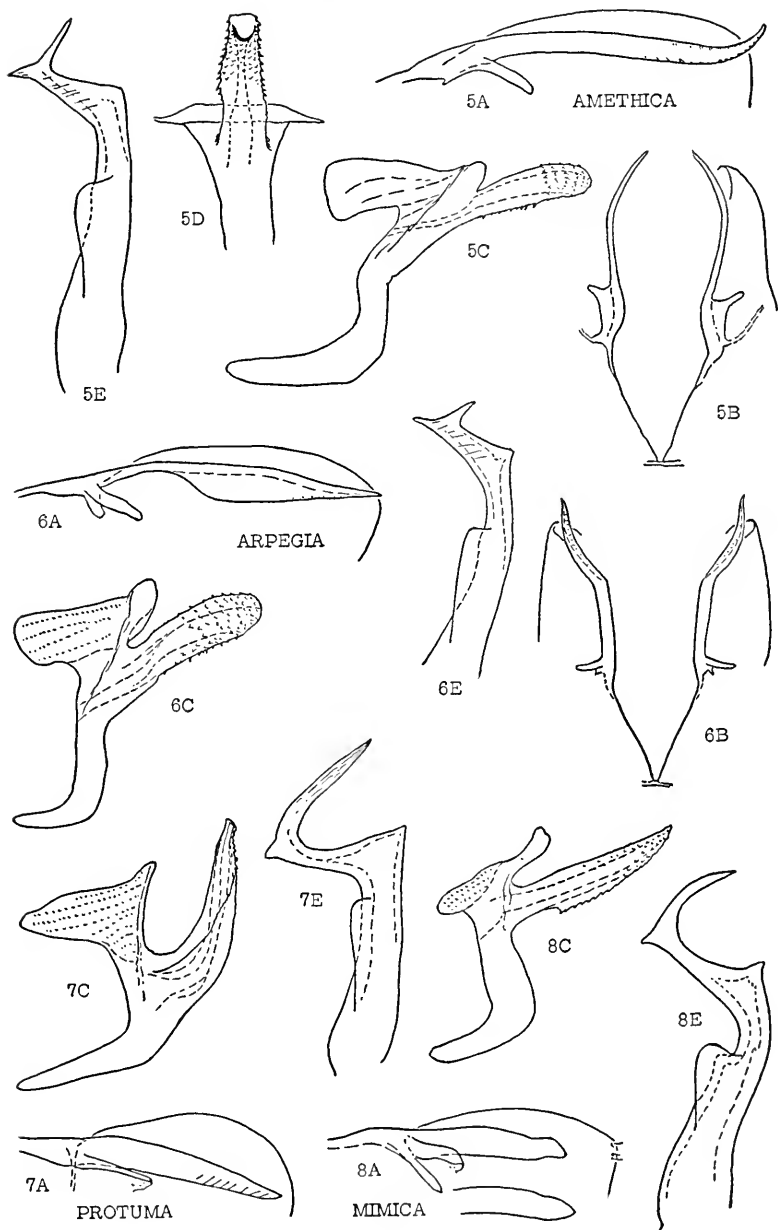
Erythroneura protuma new species

In structure of style and pygofer process this species resembles *tumida*, but differs markedly in the tapering flanges of the aedeagus.

Color pale with the usual pattern of red spots and bars found in most species of the *maculata* group. General structure typical

EXPLANATION OF FIGURES

FIGS. 5-8. Male genitalia of *Erythroneura*. A, B, pygofer hooks, lateral and dorsal aspects; C, D, aedeagus, lateral and ventral aspects; E, apical portion of style.



for genus. Male genitalia as in Fig. 7. Pygofer process short and bladeliike, almost straight, and not reaching apex of pygofer. Style with posterior point long and curved over foot so that the entire apex of the style is sickle shaped. Aedeagus with large, triangular internal apodeme; shaft arising from ventral area of socket, upturned, massive, and having lateral flanges which are moderately wide at the base and taper into the body of the shaft a short distance from the apex; apical portion of the shaft with a few small lateral teeth.

Holotype ♂.—Oregon, ILLINOIS, Sept. 27, 1956, on *Quercus borealis*, Ross and Stannard. *Paratypes*.—Same data, 4 ♂; same, but Sept. 15, 1955, on *Quercus alba*, 4 ♂.

Erythroneura mimica new species

This species resembles the preceding most closely but differs from it in the chubby apex of the pygofer hooks and the dorsal position of the aedeagal shaft on its socket.

Color and general structure as in the preceding species. Male genitalia as in Fig. 8. Pygofer hook short, ending some distance before the apex of the pygofer, and connected at its base with a strong surface thickening of the pygofer; the apical portion of the hook is slightly constricted just before the tip, and the latter is blunt. Style sickle-like, with long, curved posterior point. Aedeagus with small internal apodeme; shaft arising near dorsal part of socket, straight and tapering, its lateral margins forming serrate flanges which taper gradually to the tip of the shaft.

Holotype ♂.—Oregon, ILLINOIS, Sept. 15, 1955, on *Quercus borealis*, Ross and Stannard. *Paratypes*.—Same data, 2 ♂.

Nomenclature Notice

All comments relating to the following should be marked with the File Number, and sent in duplicate to Francis Hemming, 28 Park Village East, Regent's Park, London N.W.1, England.

Mansonia Blanchard, 1901, validation of (Order Diptera)
(File No. Z.N.(S.) 553).

The Synonymy of Two Species of North American *Chrysis*, sens. str. (Hymenoptera, Chrysididae)

By KARL V. KROMBEIN, Entomology Research Branch,
United States Department of Agriculture,
Washington, D. C.

The synonymy proposed below is a result of a recent comparison of the types of several species of typical *Chrysis* described by Viereck and by Rohwer with those described by Aaron in the Academy of Natural Sciences of Philadelphia.

Chrysis (*Chrysis*) *pattoni* Aaron

Chrysis Pattoni Aaron, 1885. Trans. Amer. Ent. Soc. 12: 235.
Chrysis (*Tetrachrysis*) *decepta* Rohwer, 1909. Psyche 16: 90.
NEW SYNONYMY.

The unique type of *decepta*, a female from Boulder, Colorado, in the U. S. National Museum, is extremely similar to the unique type of *pattoni*, a female from Colorado, differing in only a few details of infraspecific importance. The type of *pattoni* has the facial carina a little weaker and not so curved downward in middle, head in frontal view but quite so strongly arched above, and small area immediately basad of median apical emargination of third tergum flatter.

Chrysis (*Chrysis*) *propria* Aaron

Chrysis propria Aaron, 1885. Trans. Amer. Ent. Soc. 12: 238.
Chrysis (*Tetrachrysis*) *kahli* Viereck, 1906. Trans. Amer. Ent. Soc. 32: 194. NEW SYNONYMY.
Chrysis (*Tetrachrysis*) *pattonella* Viereck, 1906. Trans. Amer. Ent. Soc. 32: 194. NEW SYNONYMY.

The unique male type of *kahli* from Kansas and of *pattonella* from Hamilton County, Kansas, both in the University of Kansas collection, are very similar to each other in details of the sculpture and vestiture. They differ in color, that of *kahli* being blue, while that of *pattonella* is green. Both agree very well in

all details of sculpture with the male lectotype (selected by Cresson) of *propria* from Montana.

The type series of *propria* is a mixed one, and includes representatives of at least two and possibly three species. Four of the available paratypes are females, and two are males (the original type series consisted of eight specimens).

One male and two females from Montana and one female from Colorado are conspecific with the lectotype. A male from California is perhaps different—the facial carina is absent, the head and thorax are not so closely punctate, and the apical teeth of third tergum are shorter. The female from Arizona is certainly a distinct species—it is the only member of the type series having the pronotum longer than the head (shorter than the head in the others), and the pronotal punctures are much larger and the median pronotal groove extends almost to the posterior margin.

I am indebted to G. W. Byers of the Department of Entomology, University of Kansas, for making available the types of typical *Chrysis* described by Viereck.

(Continued from p. 174)

method really so "practical?" Every farmer and grower knows his pests, and his local store will provide the latest insecticide with full instructions. It is when a new insect appears, or when one has a plant not in the book, or one is confronted with some other novel situation that one must draw on whatever general knowledge and understanding of insects that one may have. This fundamental (often called theoretical or impractical) knowledge then turns out to be the truly useful, and can be applied to the specific situation.

This book, with its truly entomological approach, is a valuable addition to our list of applied text-books; it represents a return to the method of the renowned John B. Smith's "Economic Entomology" of a past generation. It is hoped that it will be followed by other editions, or other applied texts, in which, *in fairness to the student*, still more general entomology is set forth, including, particularly, more of the general ecological side of insect life.—R. G. SCHMIEDER.

**Chalcidoid Wasps (Eulophidae, Eurytomidae)
Reared from the Bullet Gall Caused by
Disholcaspis mamma (Cresson)
(Cynipidae)**

By W. W. JUDD, Department of Zoology, University of
Western Ontario, London, Ontario

On March 31, 1956, several galls were collected from twigs on a sapling of Bur Oak, *Quercus macrocarpa*, in a copse of hardwood trees on the north shore of Fanshawe Lake in London Township, Middlesex County, Ontario. The galls were in three clusters on the twigs with 11, 3 and 7 galls, respectively, in the three clusters. They were identified with keys in Felt (1940) as the Rough Bullet Gall caused by the cynipid wasp *Disholcaspis mamma* (Cresson). This species is included as a gall-maker on *Q. macrocarpa* by Muesebeck *et al.* (1951). Most of the galls were about 1.5 cm. in diameter, a few of them being smaller than this. When the galls were dissected after the rearing of insects from them had been completed it was found that each gall consisted of a solid, woody exterior wall about 5 mm. thick and, within this, a separable central capsule with a tough, thin wall. This capsule could be rolled out of the gall intact and resembled a small, yellow pea 4 mm. in diameter. The capsule from one of the galls, opened on the day of the collection, contained 26 small, white hymenopterous larvae. Only one gall showed an emergence hole, 1.5 mm. in diameter.

Each of the remaining 20 intact galls was placed in a cotton-plugged vial of dimensions 60 mm. \times 15 mm. and kept on a rack in a laboratory. Each day the vials were examined for the presence of emerged insects and these were pinned and labelled or preserved in fluid. On January 31, 1957, the galls were split open and insects remaining in them were removed. Of the 20 galls, 4 yielded adults of the wasp *Eurytoma querci-globuli* (Fitch), 1 showed an emergence hole perhaps made by *E. querci-globuli*, 9 yielded adult wasps, *Tetrastichus phagus* Burks, 3 contained molded contents in their capsules and 3 were small

and undeveloped with aborted central capsules. The numbers of wasps that emerged from or were found in the galls are presented in Table 1. All specimens are deposited in the collection of the Department of Zoology, University of Western

TABLE 1. Numbers of wasps reared and collected from the galls

Date 1956	<i>Tetrastichus phagus</i>			<i>Eurytoma querci-globuli</i>
	♂	♀	Total	♀
May 30	9	9	18	
31	7	14	21	
June 1	7	14	21	
3	1	14	15	
4	0	1	1	
5	19	18	37	
18				1
22				1
28				1
July 3				1
1957				
Jan. 31	22	47	69	
Total:	65	117	182	4

Ontario except 1 female *E. querci-globuli* and 3 male and 4 female *T. phagus* which are deposited in the United States National Museum.

EULOPHIDAE

***Tetrastichus phagus* Burks**

Nine of the galls yielded 65 male (36%) and 117 female (64%) *T. phagus*. Many of these emerged from six of the galls between May 30 and June 5 (Table 1) and the remainder were found in three galls when they were dissected. The wasps emerged from the galls through circular holes in the wall 0.7 mm. in diameter. In some galls all the wasps emerged from a single hole in the gall and in other galls from two or three holes. Those wasps which failed to emerge from three of the galls

were found dead in the central capsule of one gall and jammed between the wall of the capsule and the solid exterior wall in two galls. The distribution of sexes of the wasps from each of the nine galls was as follows: (11 ♂♂, 13 ♀♀), (1 ♂♂, 14 ♀♀), (19 ♂♂, 18 ♀♀), (8 ♂♂, 11 ♀♀), (9 ♂♂, 12 ♀♀), (6 ♂♂, 14 ♀♀), (14 ♀♀), (9 ♂♂, 13 ♀♀), (2 ♂♂, 8 ♀♀). *T. phegus* is a wasp described by Burks (1943) from specimens reared from cynipid galls of the genera *Disholcaspis* and *Heteroecus*, including paratypes from *D. mamma*.

EURYTOMIDAE

Eurytoma querci-globuli (Fitch)

Four female *E. querci-globuli* emerged from four galls between June 18 and July 3 (Table 1), after *T. phegus* had ceased emerging, and no gall yielded these two species. *E. querci-globuli* emerged through a circular hole 1.5 mm. in diameter in the wall of the gall. In addition one gall, examined on the day of collection, showed an emergence hole of the same diameter. *E. querci-globuli* is included by Muesebeck *et al.* (1951) as a parasite of galls of the genus *Disholcaspis*.

ACKNOWLEDGMENT

Dr. B. D. Burks, United States National Museum, kindly examined and identified the wasps, *T. phegus* and *E. querci-globuli*, and specimens of the gall, *D. mamma*.

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MUESEBECK, C. F. W., K. V. KROMBEIN, H. K. TOWNES *et al.* 1951. U. S. Dept. Agric., Agric. Monogr. No. 2.

EXCHANGES

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By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeschna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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ENTOMOLOGICAL NEWS

OCTOBER 1957

Vol. LXVIII

No. 8

CONTENTS

Mockford—Psocoptera from Tikal, Guatemala	197
Porter—A new subspecies of <i>Megarhyssa atrata</i>	206
Burks—A new <i>Profenusa</i> (Hym.: Tenthred.)	207
Woolley—Redescriptions of Ewing's Oribatid mites, IV	177
Sanderson—Status of the tortoise beetle <i>M. ormondensis</i>	222
Nomenclature notice	223
Books received	223

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ENTOMOLOGICAL NEWS

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No. 8

Some Psocoptera from Tikal, Guatemala

By EDWARD L. MOCKFORD, Illinois Natural History Survey,
Urbana, Illinois

The psocids discussed in this paper were collected at Tikal, Department of Peten, Guatemala, in late winter and spring of 1956 by Dr. Irving J. Cantrall of the University of Michigan Museum of Zoology, Ann Arbor. The material consists of seven specimens representing seven species, seven genera, and four families. Five of the species are new and are described below; the other two may be new. To my knowledge, these are the first published records of Guatemalan psocids. The meagre information on psocids of Central America in general suggests that a very rich fauna must exist in that region.

Two genera used in this paper have not previously appeared in the New World literature. The genus *Ghesquierella* Badonnel is based on African material, but the similarities between the Guatemalan species and the African genotype are sufficiently striking to indicate a probable close relationship. The genus *Psocidus* Pearman was erected to include all forms in the Psocidae which cannot be placed in one of the existing genera. Until the relationships of such forms become better understood, it seems advisable to continue using *Psocidus* in this way rather than to erect new genera.

FAMILY PTILONEURIDAE

Loneura splendida new species (♀)

Diagnosis: Near *L. brasiliensis* Roesler, differing in the following forewing characters: cell R_{2+3} proportionally much

longer; a premarginal band of connected spots from vein M_5 to R_{4+5} ; each spot centered on a vein. Clouded area below vein Cu_1 much larger than in *L. brasiliensis*, extending below vein An.

Measurements: Total body length 2.97 mm.; forewing length 4.93 mm.; hindwing length 3.24 mm.; posterior tibia length 2.07 mm.; posterior tarsus length— T_1 0.84 mm., T_2 0.06 mm., T_3 0.15 mm.

Morphology: Ocelli close together on a prominent ocellar interval; anterior ocellus smaller than posteriors. $IO/D = 1.22$, $PO/D = 0.78$. Lacinia broad distally, with an apical toothed area separated by a notch from a large preapical tooth. Maxillary palpi long and slender; terminal segment nearly as long as the preceding two segments together. Middle and posterior tarsi each with a single row of ctenidia, with the numbers per segment as follows: middle tarsus— T_1 17, T_2 1, T_3 3; posterior tarsus— T_1 24, T_2 1, T_3 4. Wing venation and ciliation similar to that of *L. brasiliensis*, the chief differences being in forewing, where Rs from the point where it leaves *r-m* crossvein to the point where it forks proportionally much shorter than in *L. brasiliensis*, whereas radial fork proportionally much longer; vein M_5 branched in right wing, the anterior branch rebranching in left wing. Subgenital plate with rounded posterior margin; pigmented area of subgenital plate in form of a broad U, ends of which are curved outward. Gonapophyses (Fig. 7): first valvula slender, about three-quarters length of second valvula, bearing a few tiny spines near apex; second valvula with recurved apex, bearing numerous slender spines; rudimentary third valvula bearing only a few hairs. Interior genital plate (Fig. 8) nearly as large as subgenital plate. Paraprocts bearing many hairs and near their median margins numerous small, slender spines. Epiproct bearing numerous hairs.

Color (in alcohol): Compound eyes black. Body generally straw colored, marked with deep brown distributed as follows: entire clypeus and labium; a band across vertex immediately above ocelli, but dipping down to include ocellar interval; large blotches involving most of thoracic pleura and terga (some blotches pale brown on terga); all coxae and femora, except a

pale preapical band on each femur. Antennae straw colored with a colorless apical band on each flagellar segment. Wings marked as indicated in the diagnosis and in Figs. 1 and 2.

Type locality: GUATEMALA: Department of Peten, Tikal. April 5, 1956, at light, I. J. Cantrall collector. The type is in my collection.

Triplocania spinosa new species (σ)

Diagnosis: Differs from the other neotropical species of its genus in wing markings, possessing a premarginal band in the forewing from vein M_3 to R_{4+5} , in contrast to a marginal band in *T. magnifica* Roesler, *T. reflexa* Roesler, and *T. marginipicta* Roesler, and no band in *T. lucida* Roesler and *T. dolosa* Roesler. Curvature of veins in forewing most similar to that of *T. reflexa*, but differing in the marked flexure of R_{2+3} , M_2 , and M_3 , and in the less marked flexure of the distal edge of the areola postica.

Measurements: Total body length 2.32 mm. (abdomen contracted); forewing length 4.44 mm.; hindwing length 3.18 mm.; posterior tibia length 2.07 mm.; posterior tarsus length— T_1 0.90 mm., T_2 0.21 mm.

Morphology: Compound eyes very large and prominent, IO/D = 0.93, PO/D = 1.00. Mouthparts typical of the Epi-psocetae, as described for the preceding species. Middle and posterior tarsi each with a single row of ctenidia, with their numbers per segment as follows: middle tarsus— T_1 20, T_2 3; posterior tarsus— T_1 30, T_2 4. Hypandrium (Fig. 3) with a small, weakly sclerotized central lobe and a pair of well sclerotized lateral lobes curving medially and bearing numerous denticles. A complex set of phallic sclerotizations dorsal to the parameres (Fig. 12).

Color (in alcohol): Compound eyes and ocellar interval black. Body generally straw colored, marked with various shades of brown. Deep brown lines indicating some of the clypeal striations; but not attaining mid-line. Bands of deep brown around antennal bases. Forewings marked as indicated in Fig. 4 and in the diagnosis. Antennae mostly straw colored with deep

brown basal and preapical bands on each of the flagellar segments, except no basal band on f_1 , and a colorless apical band on each flagellar segment.

Type locality: GUATEMALA: Department of Peten, Tikal. February 14, 1956, at light, I. J. Cantrall collector. The type is in my collection.

FAMILY EPIPSOCIDAE

Epipsocus petenensis new species (♀)

Diagnosis: A species of the subgenus *Epipsocus*, near *E. latistigma* Roesler and *E. serenus* Roesler, differing markedly from either of these in the shape and color pattern of the pterostigma, and in the much larger size of the dark spot associated with the distal end of the anal vein in both fore- and hindwings.

Measurements: Total body length 2.64 mm.; forewing length 3.51 mm.; hindwing length 2.46 mm.; posterior tibia length 1.59 mm.; posterior tarsus length— T_1 0.75 mm., T_2 0.15 mm.

Morphology: IO/D = 1.33, PO/D = 1.00. Mouthparts of usual form for the Epipsocetae. Middle and posterior tarsi each with a single row of ctenidia, the numbers per segment as follows: middle tarsus— T_1 22, T_2 0; posterior tarsus— T_1 34, T_2 4. Pterostigma decidedly clavate; venation otherwise normal for the genus. Subgenital plate of usual form for the genus. Gonapophyses as in Fig. 9; second valvula bearing numerous tiny denticles on its inner edge.

Color (in alcohol): Compound eyes and ocellar interval black. Body generally straw colored marked with brown. A brown

EXPLANATION OF FIGURES

FIGS. 1-2. *Loncura splendida* n. sp. ♀, 1. forewing, 2. hindwing.

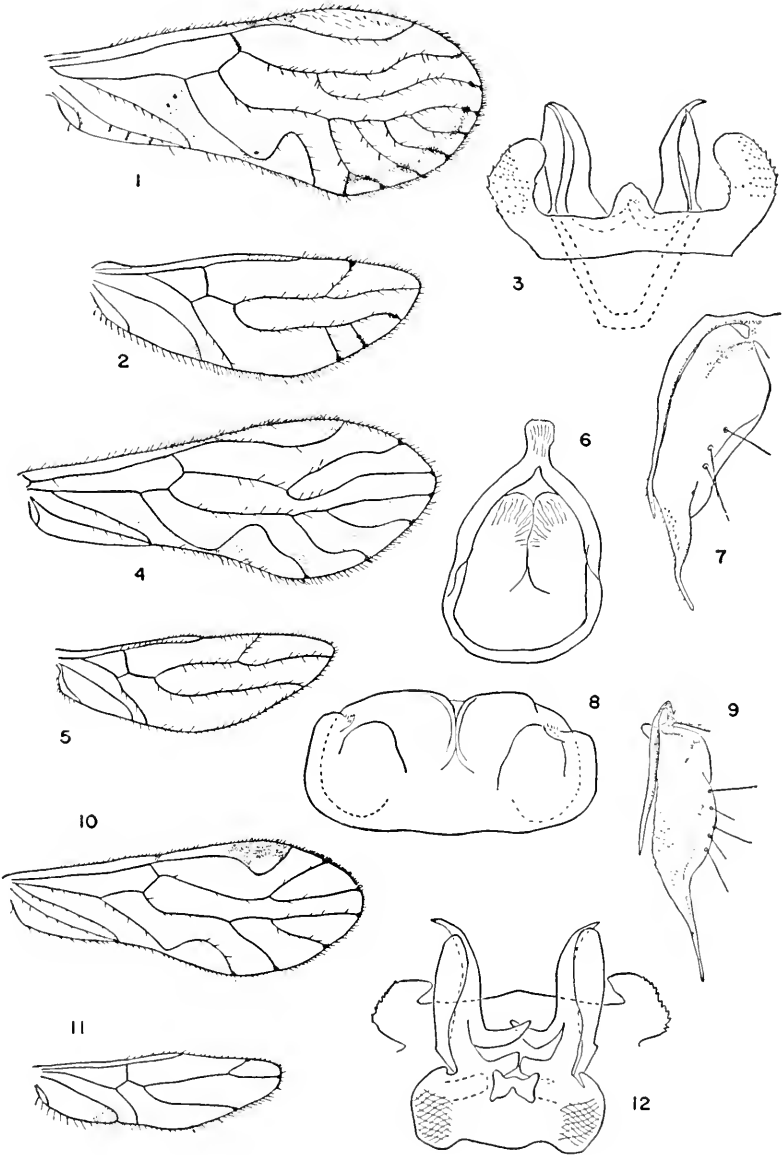
FIGS. 3-5. *Triplocania spinosa* n. sp. ♂, 3. hypandrium and phallic sclerites, ventral aspect, 4. forewing, 5. hindwing.

FIG. 6. *Ghesquierella cantralli* n. sp. ♂, phallic frame.

FIGS. 7-8. *Loncura splendida* n. sp. ♀, 7. gonapophyses, 8. interior genital plate.

FIGS. 9-11. *Epipsocus petenensis* n. sp. ♀, 9. gonapophyses, 10. forewing, 11. hindwing.

FIG. 12. *Triplocania spinosa* n. sp. ♂, hypandrium and phallic sclerites, dorsal aspect.



blotch around each antennal base, extending to ocellar interval. Brown lines along upper clypeal striae. A pair of brown spots postero-lateral to ocelli. Thoracic pleura and coxae mostly brown. Femora brown basally, paling apically. Wings mostly hyaline with brown markings as indicated in Figs. 10 and 11, and in the diagnosis. Antennae colorless.

Type locality: GUATEMALA: Department of Peten, Tikal. March 24, 1956, on laboratory table in camp, I. J. Cantrall collector. The type is in my collection.

FAMILY MYOPSOCIDAE

Lichenomima sp.

A single female was taken at a light, February 8, 1956. Although it may represent a new species, it is very similar in wing markings and genitalia to *L. sparsa* (Hagen) and an undescribed U. S. species.

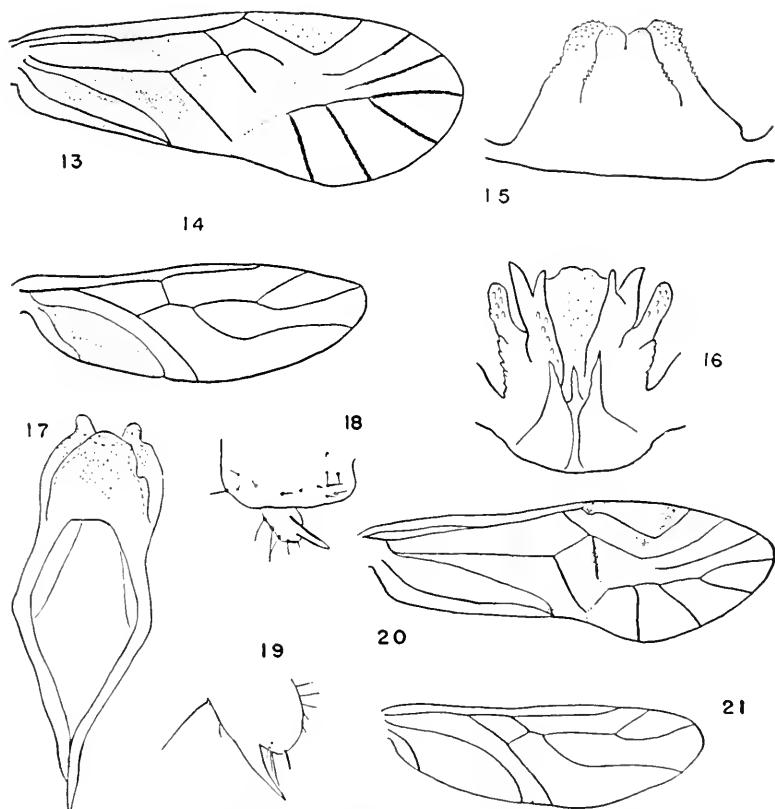
FAMILY PSOCIDAE

Psocidus tikalus new species (♂)

Diagnosis: Probably belongs in subfamily Psocinae, but its relationships otherwise unknown.

Measurements: Total body length 3.45 mm.; forewing length 4.29 mm.; hindwing length 3.18 mm.; posterior tibia length 1.86 mm.; posterior tarsus— T_1 0.60 mm., T_2 0.21 mm.

Morphology: Compound eyes very large; $IO/D = 1.06$, $PO/D = 1.00$. Ocelli large, the ocellar interval decidedly prominent. Antennae clothed in short hairs; first flagellar segment slightly thickened basally, gradually becoming narrower apically; the thickened portion bearing three discoid sensillae (flagellum broken off in second segment on left side and after third on right). All tarsi with a single row of ctenidia, the numbers per segment as follows: anterior tarsus— T_1 15, T_2 0; middle tarsus— T_1 20, T_2 0; posterior tarsus— T_1 31, T_2 5. Wing venation as in Figs. 20 and 21; forewing with tapering apex. Weak, unpigmented section of vein R_s restricted to base of R_{4+5} . Fu-



FIGS. 13-15. *Ghesquiereella cantralli* n. sp. ♂, 13. forewing, 14. hindwing, 15. hypandrium.

FIGS. 16-18. *Psocidus tikalus*, n. sp. ♂, 16. hypandrium, 17. phallic frame, 18. apex of paraproct.

FIG. 19. *Ghesquiereella cantralli* n. sp. ♂, apex of paraproct.

FIGS. 20-21. *Psocidus tikalus* n. sp. ♂, 20. forewing, 21. hindwing.

sion of R_s and M in forewing very short. Pterostigma deep and angular. Hypandrium (Fig. 16) nearly symmetrical, produced into three processes on each side, the processes and central area denticulate. Phallic frame shaped as in Fig. 17, apex denticulate. Each paraproct with a slender, pointed process on its apex as in Fig. 18.

Color (in alcohol): Compound eyes and ocellar interval black. Body generally pale gray marked with brown as follows: striations on upper half of clypeus; two transverse bands on vertex between eyes (both passing through ocellar interval); pair of spots on vertex postero-lateral to ocelli; anterior portions of alinota; irregular blotches on pleural regions of thorax; narrow segmental rings on abdomen. Wings marked as in Figs. 20 and 21. Legs pale gray except for cloudy apical band on each femur, and brown second tarsal segments on all legs. First flagellar segment pale brown; remainder dark brown (broken off beyond third flagellar segment).

Type locality: GUATEMALA: Department of Peten, Tikal. April 3, 1956, I. J. Cantrall collector. The type is in my collection.

Ghesquierella cantralli new species (σ^7)

Diagnosis: Agrees with genotype, *G. calensis* Bad., in structure of the hypandrium, shape of forewing and of most of its cells (notable exceptions being the narrower, bent cell R_{2+3} and narrower An in *G. cantralli*), presence of a mark below pterostigma and another below that in cell R_5 , and pattern of dark-bordered veins in forewing. Differs from the genotype in possessing a pair of spiny lateral areas on hypandrium, a fumose basal portion of forewing, and in shape of the apex of the phallic frame. In forewing, vein Sc joins radial stem in *G. cantralli* but not in *G. calensis*.

Measurements: Total body length 3.36 mm.; forewing length 4.93 mm.; hindwing length 3.60 mm.; posterior tibia length 2.04 mm.; posterior tarsus— T_1 0.57 mm., T_2 0.24 mm.

Morphology: Compound eyes small; IO/D = 2.33, PO/D = 0.90. Ocellar interval not prominent. Anterior ocellus smaller

than posteriors. Antennae clothed in rather long, curved hairs. First flagellar segment with two discoid sensillae near its base. Antennae broken off, but probably much longer than forewing as right antenna to basal part of f_4 equals length of forewing. Distribution of tarsal ctenidia: none on anterior tarsus; middle tarsus— T_1 15, T_2 4; posterior tarsus— T_1 23, T_2 5. Wing venation (Figs. 13 and 14) much as in the genotype, differing as indicated in the diagnosis. Hypandrium (Fig. 15) nearly symmetrical, produced apically into a central lobe bordered on each side by a row of spines, and a spiny lobe on each side. Phallic frame as in Fig. 6, its apex shaped somewhat as in *Psococerastis*. Paraprocts each with a large sensory area about midway between base and apex, and a slightly curved apical process (Fig. 19).

Color (in alcohol): Compound eyes, inner rims of ocelli, flagella, and distal two segments of maxillary palpi black. Body generally orange. Legs straw colored basally, becoming nearly black on tarsi. Forewings fumose basally, hyaline apically except for dark borders of veins and two spots below pterostigma; pterostigma orange. Hindwings hyaline except for faintly fumose anal cell.

Type locality: GUATEMALA: Department of Peten, Tikal. February 14, 1956, I. J. Cantrall collector. The type is in my collection.

Metylophorus sp.

A single male was taken April 6, 1956. It is very similar to *M. novaescotiae* (Walker), a species common throughout Eastern U. S. The only differences noted were the slightly smaller body size and proportionally much larger size of the compound eyes of the Guatemalan form. There may be differences in the numbers of teeth on the hypandrial ridges, but the extent of variation in these numbers in *M. novaescotiae* is not known. These differences may prove to be clinal or subspecific when additional material becomes available.

A New Subspecies of *Megarhyssa atrata* (Fabricius) (Hymenoptera: Ichneumonidae)

By CHARLES C. PORTER

The subject insect was discovered as a result of a more or less preliminary study of the Rhyssini in the collection of the American Museum of Natural History. At the outset, therefore, I express my thanks to Miss Alice Gray and Dr. C. H. Curran of that institution, the two of whom very kindly made it possible for me to pursue these investigations, and to Dr. H. K. Townes for his help in verifying my findings.

The subspecies may be recognized as follows:

Megarhyssa atrata lineata, new subspecies

Exactly similar to typical form in structure, size, and general habitus. Distinguished by the following color characteristics: A line on the upper margin of prothorax, similar line on its lower front margin, pair of central vittae on mesonotum, scutellum except extreme base, the postscutellum, spot below tegulae of both anterior and posterior wings, thin lateral line on first two sternites and their apices narrowly, yellow. General color somewhat more brownish than in typical form, central lobe of mesoscutum anteriorly especially so, forming a marked contrast with the black lateral lobes. Wings perfectly hyaline, with no trace of the deep infumation so characteristic of *M. atrata atrata*. Color otherwise precisely as in typical form.

The type series consists of two females collected by Mrs. A. T. Slosson at Franconia, New Hampshire. Types are deposited in collection of American Museum of Natural History.

In conclusion, it would seem that this represents the extreme northern development of *M. atrata*. In this conclusion Dr. Townes fully concurs. Certainly there is nothing like it among the many specimens I have examined from more southerly localities.

A New *Profenusa* from the California Plane Tree (Hymenoptera, Tenthredinidae)

By B. D. BURKS, Entomology Research Division, Agricultural
Research Service, United States Department of Agriculture

In the fall of 1956 I received from Dr. L. R. Brown, of the University of California at Los Angeles, specimens of a small sawfly for identification. These had been reared by Mr. Clark O. Eads at Santa Barbara and Santa Monica, California, from leaf mines on the California plane tree, *Platanus racemosa*, during May and June of 1956. The information supplied with the specimens was that they had developed from larvae which lived in leaf mines superficially resembling those made by the graci-lariid moth *Lithocolletis felinella* (Heinrich) on the same tree. Both the moth and the sawfly make blotch mines.

Study of these sawfly specimens showed that they represented an undescribed species of the genus *Profenusa* MacGillivray, as defined by Benson (1941, Proc. Roy. Ent. Soc. London, ser. B, 10: 85-90). This genus in the Nearctic region contains the species *alumna* (MacGillivray), which mines *Betula* leaves; *canadensis* (Marlatt), mining *Crataegus* leaves; *inspirata* (MacGillivray), the host of which is unknown; and *lucifer* (Ross), also of unknown host. The host likewise is unknown for the closely related *Setabara histrionica* (MacGillivray).

Profenusa platanae, new species

This species most closely resembles *P. inspirata* (MacGillivray) in being mostly black and in having the ovipositor sheaths exerted. The two differ in that the sheaths in *inspirata* are broad and short, while they are slender and long in *platanae*, see Fig. 4. In *inspirata* (see Ross, 1936, Trans. Ill. Acad. Sci. 29: 264, Fig. 2) the lancet of the saw has the ventral margins between the apical 4 lobes minutely serrulate, while these margins are smooth in *platanae*, Fig. 1; the lobes in *inspirata* have extremely minute sub-denticles, but in *platanae* each lobe bears 4 relatively large teeth. *P. platanae* differs from *Setabara his-*

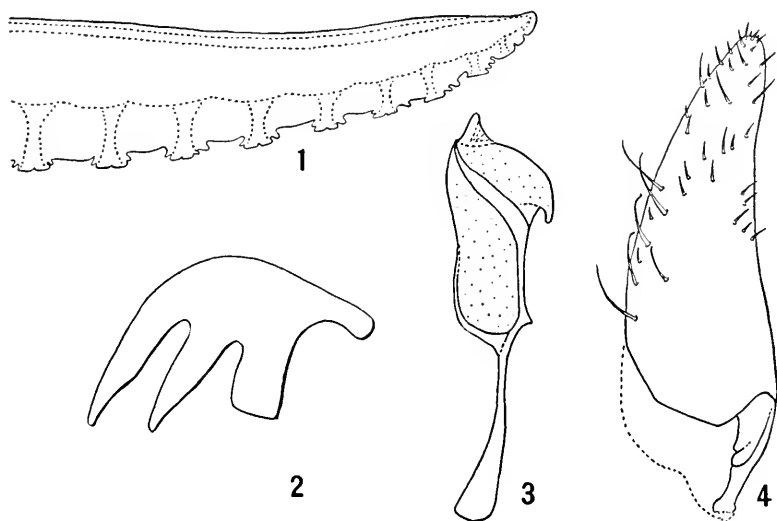
trionica (MacGillivray) in having cell R_1 of the hind wing open rather than closed; the two differ also in that *histrionica* does not have the ovipositor sheaths exerted and has the hind tibia almost completely brown. The hind tibia in *platanae* is almost entirely yellow.

Female: Length, 4.0 mm. Head and body black; antenna black, with narrow band at apex of pedicel yellow and apical segment of flagellum very dark brown; tegula mostly yellow, a small dorso-basal area black; wings hyaline with venation brown; apices of all femora, fore and middle tibiae, and all tarsi yellow, coxae and basal area of each femur black, second trochanter of each leg dark brown, hind tibia yellow with apex shaded with dark brown.

Surface of head and body smooth, shining; fronto-vertex and temples of head densely clothed with fine, golden hair; clypeus, labrum, and normally exposed portions of mandibles clothed with slightly sparser and longer golden hair; pronotum laterally setose, mesonotum glabrous, dorsal half of mesepisternum finely setose, this sclerite ventrally glabrous; all coxae apically setose, trochanters densely setose, femora sparsely setose, tibiae and tarsi very densely setose; dorsum of abdomen glabrous, venter very sparsely setose; exerted ovipositor sheaths each with 6 to 8 rather long, slightly curved setae and a few short hairs, Fig. 4.

Head with genae acarinate laterally; relative proportions of parts of antenna: Scape 33, pedicel 25, first flagellar segment 50, second 35, third 30, fourth 30, fifth 25, sixth 25, seventh 25; pedicel twice as long as wide. Forewing with crossvein $2r$ joining R_s basad of $3r-m$, first abscissa of R_s wanting or very faintly indicated, $2r-m$ very short; vein M with portion between $1m-cu$ and $2r-m$ and just distad of $2r-m$, and crossvein $2m-cu$ minutely fractured, similar minutely fractured sectors in $2r$ and $3r-m$; vein $2A$ very weak near its apex, vein $3A$ straight, but obsolescent. Hind wing with 11 or 12 hamuli, basal ones widely spaced; cell R_1 open; anal cell present, vein $3A$ represented by a straight stub. Hind tarsus three-quarters as long as hind tibia; tarsal claw with a large basal lobe, Fig. 2. Lancet of saw with 4 pointed teeth on lobes, Fig. 1.

Male: Length, 3.5 mm. Color as in female except that tegula is mostly black, yellow only at apex and lateral margin; pubescence as in female. Relative proportions of parts of antenna: Scape 30, pedicel 25, first flagellar segment 50, second 30, third 30, fourth 25, fifth 25, sixth 25, seventh 25. Legs and wings as in female. Penis valve as in Fig. 3.



Profenusa platanae, n. sp. Fig. 1, saw; Fig. 2, tarsal claw; Fig. 3, penis valve; Fig. 4, ovipositor sheath.

Type locality: Santa Barbara, CALIFORNIA.

Types: U.S.N.M. No. 63460.

Described from 6 ♀ and 6 ♂ specimens, as follows: *Holotype*, *allotype*, and 2 ♀ and 4 ♂ *paratypes*, Santa Barbara Calif., May 20, 1956, reared from *Platanus racemosa*, Clark O. Eads; 3 ♀ and 1 ♂ *paratypes*, Santa Monica, Calif., June 12, 1956, reared from *Platanus racemosa*, Clark O. Eads. All specimens deposited in the U. S. National Museum collection.

Mature larva: Thorax only slightly thicker than abdomen and of the same width. Length 9.0 mm., width of head 1.1 mm.,

width of metathorax 1.9 mm., width of third abdominal segment 1.9 mm., width at anterior margin of ninth abdominal segment 1.25 mm., width at posterior margin of ninth segment 1.1 mm. Head and legs very pale brown, mandibles brown, body cream colored, dorsal and ventral thoracic shields wanting. Labrum bearing 2 bristles near either lateral margin, a pair of sublateral, arcuate rows of brown micro-denticles borne on lower, inner face of labrum, and a row of smaller, more widely set micro-bristles extending across outer ventral margin of labrum. Each mandible bearing one bristle at base. Clypeus bearing one bristle near either dorso-lateral angle. Antenna with 2 segments, basal one large and almost as broad as long, apical one minute, papilliform. A row of 6 bristles extending across fronto-vertex between the 2 ocellaræ. Surface of body obscurely shagreened, not spinulose; spiracles slit-like, not winged; thoracic legs 4-segmented; prolegs present on abdominal segments 2 to 8, and very poorly developed, lacking spines or setae; anal larvopod wanting. Abdominal tergites 2 to 8 each with 2 well-marked annulets, anterior annulet one-third as long as posterior one; posterior end of body blunt.

This is the larva that leaves the mine and drops to the ground to pupate in an earthen cell.

Penultimate larval instar: Thorax wider and thicker than abdomen. Length of body 7.5 mm., width of head 1.1 mm., width of metathorax 1.5 mm., width of third abdominal segment 1.4 mm., width at anterior margin of ninth abdominal segment 1.25 mm.

This is presumably the last larval instar that feeds.

Mine: Begun as a serpentine mine, developing into a blotch mine, the blotch mines commonly multiple and coalescent, in the leaves of *Platanus racemosa*. Excrement in young mines concentrated in the center, in mature mines tending to form bands near lateral margins.

Redescriptions of Ewing's Oribatid Mites, V— Families Belbidae and Opiidae (Acarina: Oribatei)¹

By TYLER A. WOOLLEY, Department of Zoology, Colorado
State University, Fort Collins, Colorado

This paper is the fifth in a series which deals with redescrptions of Ewing's type oribatid mites. The accompanying figures were completed from pencil drawings sent to the writer by Dr. E. W. Baker of the U. S. National Museum. Acknowledgement of these drawings is made by Dr. Baker's initials on the finished plates. Ewing's original descriptions are followed as closely as possible, but the writer incorporates modern acarological terms where needed.

Both Grandjean (1936) and Strenske (1955) indicate features which can be employed to differentiate the genera of the Belbidae. The solenidions, or tactile hairs, constitute one of these morphological features; other characters also are mentioned by these authors. Many of these diagnostic features were not known to Ewing. Most of his descriptions were accompanied by an illustration or two, but in many instances the figures represented single diagnostic features such as a pseudo-stigmatic organ, lamella, leg, etc. In many cases Ewing did not illustrate the entire mite, which is the situation in some of the belbids described by him.

The descriptions in this paper are as detailed as possible with the information available from Ewing's figures and descriptions and the drawings from Dr. Baker. The figures show the whole body of the mite and the proximal segments of the legs. Solenidions and other critical details are lacking in the descriptions and figures because the writer does not have access to the type specimens. It is impossible to be absolutely certain of the generic designations of all of these mites, but the writer has placed them as accurately as possible. He has used Ewing's designations for some of them until such time as the

¹ Research supported by a grant-in-aid from the National Science Foundation.

type specimens can be examined critically for solenidions and other details. Despite the latter difficulties, these redescriptions should be of value because the fragmentary accounts and illustrations of these mites have been embellished in this paper.

FAMILY BELBIDAE WILLMANN, 1931

These apterogasterine mites are distinguished by legs which are longer than the body and frequently consist of bead-like segments. Legs III and IV are usually inserted in the lateral margins of the body and the dorsal surface of the hysterosoma is not reflected ventrally. In some instances the cast nymphal skins are carried on the dorsum of the hysterosoma.

Genus **HETERODAMAEUS**, n. g. (Figs. 1, 2)

Description: Sclerotized sculpturing on dorsum of propodosoma between and anterior to the pseudostigmata; a transverse suture on dorsum of propodosoma at level of insertions of rostral hairs; pseudostigmatic organs large, clavate, setose; dorsum of hysterosoma with four posterior setae in a transverse row adjacent to posterior margin of hysterosoma; surfaces of propodosoma, hysterosoma and legs with many small tubercles; a large spine projecting laterad from the rim of camerostome to the edge of tectopodia I anterior to level of coxae I.

Heterodamaeus magnisetosus (Ewing), 1909. (Figs. 1, 2)

Cotype: *Damacus magnisetosus* Ewing, 1909, p. 129.

Description: Chestnut brown; propodosoma about two-thirds as long as hysterosoma and about three-fourths as wide, somewhat triangular in shape, surface pebbled with many small tubercles. A transverse, sclerotized ridge and suture between insertions of rostral hairs. Rostrum blunt, depressed; rostral hairs inserted in lateral margins of sclerotized transverse ridge which runs between them, about as long as transverse ridge, stout and pectinate, curved medially until they nearly meet anterior to tip of rostrum. Lateral margins of propodosoma expanded in prominent tectopodia of legs I and II; tectopodia I

larger and directed anteriorly. Lamellae absent. Lamellar hairs fine, simple, inserted about half their lengths anterior to pseudostigmata and directly laterad of antestigmatic bar. Interlamellar hairs not visible, but insertions of these hairs are mediad and anterior of pseudostigmata. Three sclerotized bars or ridges on dorsum of propodosoma anterior to pseudostigmata (fig. 1). Anterior bar curved posteriorly at lateral ends, curved apex at level of tectopodia I in mid-dorsal area of propodosoma. A posterior bar behind and forming an eye-like loop (fig. 1). Two antestigmatic bars which extend between insertions of lamellar and interlamellar hairs and end at antero-lateral margins of pseudostigmata (fig. 1). Pseudostigmata large pits with sclerotized rims at posterior end of antestigmatic bar, mediad of level of tectopodia II, cup projected above surface of propodosoma. Pseudostigmatic organs about as long as leg II, clavate, the head nearly as wide as opening of pseudostigmatic cup and about one-third as long as entire organ, setose (Ewing says: "pectinate"), with a long, thin pedicel, slightly curved, but extended laterally.

Hysterosoma globose, surface pebbled like propodosoma, evidently covered with an exudate, lateral margins bent ventrally slightly; four pairs of visible setae in a transverse row near medio-posterior margin; a pair of glandular fissures (?) in mid-lateral surfaces of dorsum (fig. 1).

Ventral margins of propodosoma with a prominent lateral spine anterior to leg I, extending from lateral rim of camerostome to margin of tectopodia I. Ventral plate circular in outline, about as broad as long, broken on right side in cotype specimen. A single pair of setal insertions visible anterior to genital opening (fig. 2). Genital aperture subrectangular, at level of leg IV. Genital covers as wide as anal covers, but half as long; genital setae not visible. Anal aperture nearly twice as long as genital opening, separated from genital aperture by half the width of a genital cover. Anal covers slightly opened in cotype specimen; no visible anal setae.

All legs with pebbled, tuberculate surface. Ewing (1909) states: "First pair of legs as long as the body; second pair about

three fourths as long as the first pair; third pair equal to the first, and the last pair of legs the longest of all. Tarsus of leg I shorter than the tibia. The tibia of leg I is peculiar in this species in that it possesses a large process or tubercle at its dorsal distal aspect from which arises a large, long, tactile hair. Ungues tridactyle, situated on very long and slender tarsal pedicels; dactyles unequal."

Length 560 μ , hysterosoma 360 μ ; width 330 μ .

Specimens of this species were collected in moss by C. A. Hart at Pulaski, Illinois and by H. E. Ewing at Arcola, Illinois.

Discussion: Ewing (1909) considers this species remarkable because of the large pseudostigmatic organs, the tibial projection on leg I, and the shorter length of the second pair of legs. The writer contends that the sclerotized ridges on the propodosoma, the large pseudostigmatic organs, the ventral spines lateral to the camerostome and the four dorsal posterior setae are valid evidences for the generic designation of this species.

Damaeus michaeli Ewing, 1909, p. 129. (Figs. 3, 4)

Description: Chestnut brown; propodosoma broadly triangular in outline, insertions of legs I and II making posterior two-thirds broader than anterior end. Rostrum with a sclerotized margin, somewhat square in outline; rostral hairs curved, stout, inserted in antero-lateral corners of sclerotized margin. Lamellae absent, lamellar hairs inserted twice the width of insertions posterior to rostral hairs; lamellar hairs stout, curved, nearly as long as width of rostrum. Interlamellar hairs inserted between pseudostigmatic organs, directed anteriorly. Pseudostigmata funnel-shaped, placed mediad of space between legs I and II in lateral margin of propodosoma, with a sclerotized rim. Pseudostigmatic organs flagelliform and barbed (Ewing says: "pectinate"), directed laterad and upward. Tectopodia III with stout spines projecting somewhat anteriorly near margin of propodosoma. Spinae adnatae stout, slightly decurved at tips, arising at level of leg III, projected anteriorly from beneath anterior edge of hysterosoma (fig. 3).

Hysterosoma globular, about twice as long as propodosoma, lateral edges curved ventrally, surface brittle, almost smooth, with eight pairs of curved, stout, pectinate bristles in two medio-lateral rows on dorsum (fig. 3).

Camerostome pyramidal, with two fine, short bristles near chelicerae. Venter of propodosoma with sclerotized margins, four pairs of bristles lateral and posterior to camerostome (fig. 4), posterior margin of propodosoma with two short, blunt spines which project posteriorly and evidently fit into small recesses in venter of hysterosoma. Genital opening subglobose in outline, about as long as anal aperture, but slightly wider; genital covers rectangular, each cover with six genital setae in a row closer to medial edge than to lateral; g: 1 close to anterior margin of cover; g: 2-g: 6 equally spaced posteriorly. Two pairs of adgenital setae as in fig. 4. Anal opening slightly narrower than genital aperture, oval in outline, covers narrower than genital covers; each cover with two pairs of anal setae; a: 1 closer to anterior margin of anal cover than a: 2 is to the posterior margin (fig. 4). Two pairs of adanal setae near postero-lateral curve of anal aperture. Two pairs of fine, simple setae on decurved surface of dorsal plate, each pair postero-laterad of adanal setae, but with more widely separated insertions.

Ewing (1909) states: "Legs stout; femora with narrow peduncle and large clavate head; each segment bears several stout, curved, pectinate bristles. Portions of cast skin generally carried on the dorsum of the abdomen."

Length 495 μ , hysterosoma 380 μ ; width 320 μ .

Many specimens of this species were collected by H. E. Ewing in moss and under bark of logs at Homer, Illinois.

Damaeus globifer Ewing, 1913, p. 120. (Figs. 5, 6)

Description: Chestnut brown. Propodosoma about two-thirds as long as hysterosoma, broadly triangular. Rostrum blunt, cone-like; rostral hairs inserted about a third their lengths posterior to rostral tip on lateral edges, incurved so that tips nearly meet. Laniellae wanting. Lamellar hairs inserted

about a third their lengths posterior and medial to rostral hairs; a sclerotized, raised lateral prominence between rostral and lamellar hairs (fig. 5). Sclerotization of insertions of legs I prominent, visible at lateral margins of propodosoma. Interlamellar hairs inserted medial to pseudostigmata, long, filiform, broken at tips in type specimen. Pseudostigmata prominent, funnel-shaped, between expanded insertions of legs I and II and on slightly raised prominence lateral to insertions of interlamellar hairs. Pseudostigmatic organ long, stout, slightly pectinate. Spinae adnatae stout, curved laterad at tips, inserted about twice their lengths posterior to pseudostigmata. (Ewing (1913) states that these spine-like spurs curve inward, but his illustration in the same article shows them curved outward in the fashion indicated in fig. 5.)

Hysterosoma spherical, smooth, with nine pairs of stout, curved, simple setae on dorso-lateral aspects, their raised insertions arranged in an elongated oval on the dorsum; tips of some bristles broken in type specimen.

Camerostome trapezoidal, a pair of setae posterior to chelicerae and medial to tectopodia I. Apodemata II narrow, decurved bars, medial portion indistinctly projected medio-posteriorly beneath integument. Three simple setae inserted in a diagonal line on each side from level of tectopodia II to level of lateral spine between legs II and III (fig. 6). A large curved, lateral spine at junction of propodosoma and hysterosoma between legs II and III; a small lateral spine projects anteriorly close to base of the large lateral spine. A long lateral spine between legs III and IV. A simple decurved bristle anterior to coxa IV; other ventral setae as shown in fig. 6. Genital opening rectangular, directly between legs IV, each corner rounded, entire aperture ringed with a sclerotized margin; each genital cover with six setae in a row down middle of cover; g:1 inserted close to anterior margin of cover; g:2, g:3, g:4 equidistant from each other; g:5 closer to g:6 than to g:4; all genital setae simple and decurved; a diagonal sclerotized bar in each genital cover and transecting insertion of g:2 (fig. 6). Anal aperture nearly twice the width of peripheral genital band

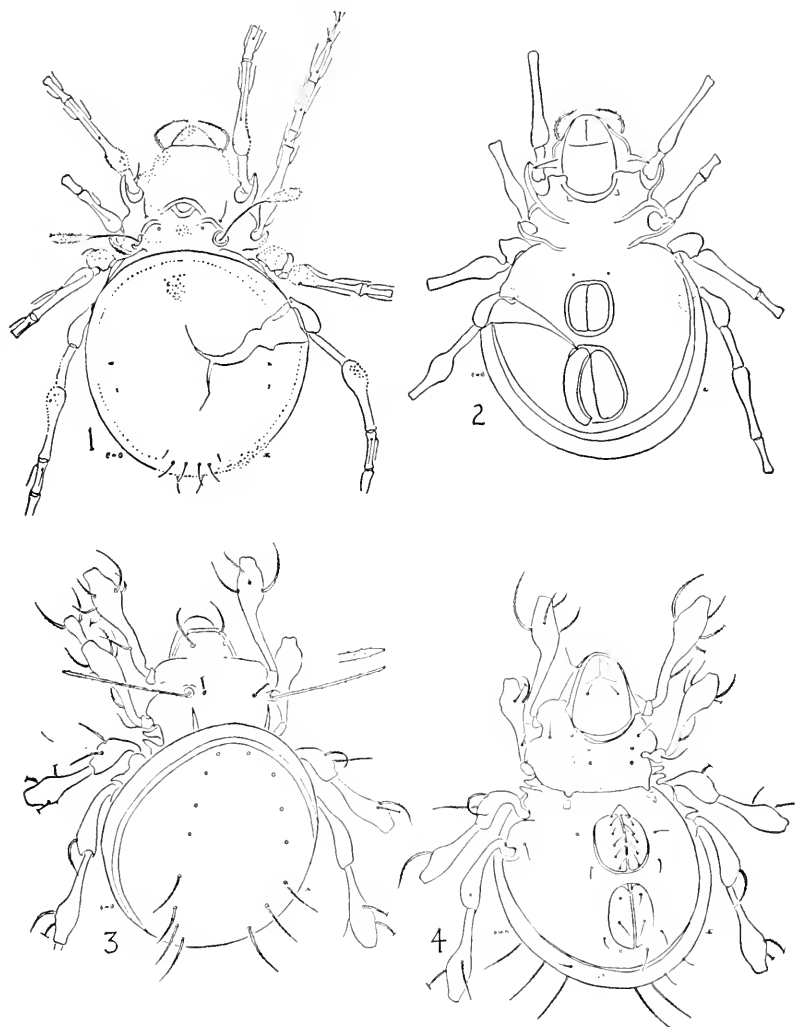


FIG. 1. Dorsal view of *Heterodamascus magnisctosus* (Ewing). Hysterosoma broken on right side.

FIG. 2. Ventral view of *Heterodamascus magnisctosus* (Ewing).

FIG. 3. Dorsal view of *Damacus michaeli* Ewing.

FIG. 4. Ventral view of *Damacus michaeli* Ewing.

from genital aperture, oval in outline; anal covers opened slightly, each with two simple bristles in medial aspects of cover. Adanal setae as seen in fig. 6.

Ewing's descriptions of the legs is as follows: "All segments of the legs with a swollen portion; second pair of legs subequal to the others. Femora of legs with a thin proximal part; distally suddenly enlarged. Anterior pair of legs about as long as the whole body. Distal end of tibia of leg I without a large tubercle bearing a tactile hair. Femur of leg IV with a very long, tactile bristle at its distal end."

Length 711 μ , hysterosoma 500 μ ; width 500 μ .

The type specimen was collected by J. E. Guthrie on decaying mushrooms at Jordan, Minnesota.

Discussion: Ewing indicates that this species is similar to *D. sufflexus* Mich., but the hairs on the dorsum of the hysterosoma are "about twice as long as those of *sufflexus*." With the current use of solendridions and minute details for differentiation of genera and species, better comparisons cannot be made without study of the type specimens of these belbid mites.

FAMILY OPIIDAE GRANDJEAN, 1953

The opiid mites constitute the smallest of the Oribatei. Their coloration is usually light yellowish brown, their legs are like those of most eremacids, but their body size seems to separate them rather easily from the latter and from other Oribatei. Ewing (1917) used *Damaeus* as the generic designation of one of his mites, which would place it in the family Belbidae. Its propodosomal configurations and its size, however, indicate that it belongs in the Family Opiidae as designated by Grandjean (1953).

Oppia minuta (Ewing), 1917. (Figs. 7, 8)

Type: *Damaeus minutus* Ewing, 1917, p. 164.

Description: Minute; light yellowish brown, shiny. Propodosoma bluntly pointed anteriorly, with nearly parallel sides, broadest immediately anterior to pseudostigmata, a raised dorsal



FIG. 5. Dorsal view of *Damaeus globifer* Ewing.
FIG. 6. Ventral view of *Damaeus globifer* Ewing.
FIG. 7. Dorsal view of *Oppia minuta* (Ewing).
FIG. 8. Ventral view of *Oppia minuta* (Ewing).

platform circumscribed by a narrow lateral ridge which extends from pseudostigmata almost to anterior tip of rostrum. Rostrum blunt, rostral hairs short, pilose, strongly curved. Dorsum of propodosoma smooth except for shallow depressions; upper surfaces of tectopodia I and II with small raised tubercles (fig. 7). Lamellae thin lines mediad of pseudostigmata, anterior tips remote from lamellar hairs; lamellar hairs simple, about their lengths apart, inserted on dorsum of propodosoma about twice their lengths from anterior end. Interlamellar hairs absent. Dorsum of propodosoma with three large depressions on either side of raised platform posterior and lateral to lamellar hairs; three pairs of smaller depressions on dorsum between pseudostigmata, arranged in a linear fashion (fig. 7). Pseudostigmata wide cups in postero-lateral margins of propodosoma, with heavily sclerotized rims; pseudostigmatic organs clavo-lanceolate, pectinate, almost straight, extended laterally, with a long, narrow pedicel.

Hysterosoma oval in outline, about two-thirds as broad as long, bluntly pointed posteriorly, smooth and rounded dorsally, with seven pairs of long, curved simple setae; left side of specimen broken.

Camerostome rounded with two long ventral setae in posterior third. Apodemata I and II heavily sclerotized, curved; apodemata III straight bars; apodemata IV curved posteriorly, forming an arch anterior to genital covers; a pair of setal insertions near top of arch; ventral plate broken on right side (fig. 8). Genital opening rectangular, situated at level of leg IV, anterior border partially circumscribed by arch of apodemata IV. Genital covers rectangular, about twice as long as broad; each cover with four genital setae; g:1 and g:2 inserted in middle of anterior half of cover; g:3, g:4 inserted near postero-lateral corner of cover, g:4 closer to posterior margin than g:3 (fig. 8). A pair of setal insertions posterior to genital opening, separated the length of one genital cover. Anal aperture twice as large as genital aperture, rectangular; anal covers slightly broader posteriorly than anteriorly, each cover with two setae; a:1 near lateral margin of cover and a third the length of a single

cover from anterior end; a: 2 inserted in medio-posterior corner of each cover.

Ewing (1917) states that the "legs (are) prominent, but short for the genus; anterior pair extending beyond the tip of the rostrum by over one-half their length, tarsi longer than tibiae, tibiae each with a long tactile hair at its tip above, which extends beyond the tip of the tarsi. Coxae of third pair of legs sub-spherical in shape, each with a small tubercle on its anterior aspect and a single strongly curved, singly pectinate bristle. Posterior legs extending beyond the tip of the (hysterosoma) by the full length of their tarsi. Most of the segments of the legs are moderately swollen toward one end, and pedicellate at the other end."

Length 293 μ , hysterosoma 207 μ ; width 153 μ .

This species was collected in Illinois, but the locality and the collector are unknown. Dr. Ewing had a single specimen "of this very minute and rare species."

Discussion: It seems obvious from the comparisons of this species with drawings and descriptions of genera in Belbidae that the species described above does not belong in any of the belbid genera. Its size and other features of the body conform to the characters of the genus *Oppia*, for which Grandjean (1953) designated the family Opiidae. The configurations on the propodosoma are unlike those of any others the writer has seen in the literature and he therefore considers this to be a valid species in the genus *Oppia*.

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The Status of the Tortoise Beetle *Metriona ormondensis* Blatchley

By MILTON W. SANDERSON, Illinois Natural History
Survey, Urbana

In 1920 Blatchley (Can. Ent. 52: 71) described *Metriona ormondensis* on the basis of two specimens taken on wild morning-glory (possibly *Ipomoea*) at Ormond, Florida, April 13, 1913. He mentioned that Barber (1916, Proc. Ent. Soc. Wash. 18: 125) had called attention to a larger, more depressed and more highly colored Florida specimen in the Schaeffer collection which Barber regarded as a local race of *Metriona purpurata* Boh. but which Blatchley thought represented his new species. Schaeffer (1925, Jour. N. Y. Ent. Soc. 33: 233) stated that *ormondensis* possibly was only a variety of *purpurata*. Thus the question of the status of *ormondensis* has remained for more than 30 years.

Through the courtesy of the Department of Entomology at Purdue University, I have been permitted to examine the two Blatchley specimens of *ormondensis*, and I am therefore able to offer some information to support its specific status. Sanderson and King (1951, Jour. Kans. Ent. Soc. 24(4): 125-128) noted the value of the structure of the tarsal claws for sex and species recognition in some species of *Metriona*. Blatchley did not mention the claws of *ormondensis* nor did he indicate the sex of his specimens but examination of the types has disclosed that the type female and the paratype male differ with respect to claws, and that these differ from both sexes of *purpurata*. The anterior claws of both sexes of *ormondensis* each has an inner marginal basal angulation or tooth (hereafter referred to as tooth); one posterior claw is toothed, the other untoothed; both middle claws of the male of *ormondensis* are untoothed; and in the female one claw only is toothed. The female of *purpurata* has all claws toothed except for one untoothed middle claw. These differences for both sexes of the two species are expressed in the following key:

Mettriona ormondensis and *purpurata*

1. Each tarsal claw with a broad basal angulation or tooth on inner margin; female.....*purpurata* Boh.
At least one claw of middle tarsus untoothed.....2
2. Both middle tarsal claws untoothed; male.....
.....*ormondensis* Blatch.
Only one middle claw untoothed.....3
3. Only one posterior claw untoothed; female.....
.....*ormondensis* Blatch.
Both posterior claws toothed; male.....*purpurata* Boh.

In addition to the foregoing differences, the dorsum of *ormondensis* is duller, and the beetle averages a little larger than *purpurata*.

Nomenclature Notice

All comments relating to the following should be marked with the File Number, and sent in duplicate to Francis Hemming, 28 Park Village East, Regent's Park, London N.W.1, England.

Oeobia Hubner, 1825, and its emendation *Oecbia*, suppression of (Order Lepidoptera) (File No. Z.N.(S) 1149).

Attention is also drawn to the proposed adoption of **Declarations**:—(a) clarifying and extending the provisions of the "Code of Ethics" (Z.N.(S) 763); (b) determining the gender attributed to generic names having the terminations "-ides," "-ites," and "-oides" (Z.N.(S) 951); (c) clarifying the procedure to be adopted when a specific name is published in an abbreviated form (Z.N.(S) 1042); (d) clarifying certain problems arising in connection with names published in works written in Latin (Z.N.(S) 1223).

Books Received

BAILEY, S. F. The thrips of California. Part 1, Suborder Terebrantia. Bull. of the California Insect Survey. Vol. 4, No. 5, pp. 143–220. Univ. of Cal. Press, 1957. Price: \$1.50.

BOHART, R. M. and E. I. SCHLINGER. California wasps of the genus *Oxybelus* (Hym. Sphecidae). Bull. of the California Insect Survey. Vol. 4, No. 4, pp. 103–134, 8 pls. Univ. of Cal. Press, 1957. Price: \$.75.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and **Stizini** (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

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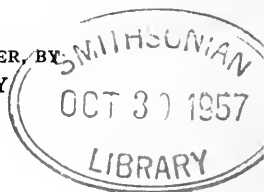
Vol. LXVIII

No. 9

CONTENTS

Bechtel and Schlinger—Ectemnius and their Ogcodes prey	225
LaRivers—A new Ambrysus from Mexico	232
Whitaker—Trichobius (Streblidae) in West Virginia	237
Brown and Wilson—A new parasitic Monomorium, and status of the genus Epixenus	239
Nomenclature Notice	246
Roback—New records of Plecia	247
Notes and News in Entomology	
Meetings of the American Entomological Society	250
Publication of "Official Lists," and "Official Indexes"	251
Books Received	251

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Biological Observations on *Ectemnius* with Particular Reference to their *Ogcodes* prey (Hymenoptera: Sphecidae.—Diptera: Acroceridae)

By ROBERT C. BECHTEL¹ and EVERT I. SCHLINGER²

It is known that various species of crabronid wasps provision their nests with adult flies. Accurate reports of these associations are not numerous, however, and there are apparently no published records of specifically identified American crabronid wasps associated with the dipterous family Acroceridae. For this reason preliminary observations are presented which indicate that there may be a frequent predator-prey relationship between certain species of the crabronid genus *Ectemnius* Dahlbom and the acrocerid genus *Ogcodes* Latreille. Future observations and research should uncover additional facts needed to understand fully these relationships.

The first apparent record of crabronid wasps storing acrocerid flies as food for their larvae was by Westwood (1840) who stated that van Heyden and Audouin had observed that numerous specimens of *Ogcodes gibbosus* (Linnaeus) were selected as food for the progeny of a species of *Crabro*. Other authors reporting similar relationships were: Tournier (1878), Sahlberg (1883), Gorham (1902), Enslin (1922), Maréchal (1934), Leclercq (1941, 1954), Bristowe (1948) and Sabrosky (1948). Our knowledge of these relationships through 1954 was summarized by Leclercq (1954: 318-319). We infer from this that only crabronid wasps of the genus *Ectemnius*, subgenus

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Hypocrabro Ashmead, are known to have this relationship with the Acroceridae. Furthermore, all of the above records (except Sabrosky (1948) which refers to a Nearctic species) pertain to a restricted association with the widespread Palearctic crabronid, *Ectemnius* (*Hypocrabro*) *rubicola* (Dufour and Peris), even though other species of this subgenus are found in the same region.

Another important fact is that all of the recorded acrocerid prey belong to the genus *Ogcodes*. These are *O. gibbosus* (Linnaeus), *marginatus* (Meigen) (= *pallipes* Latr.), *pallipes* Latreille and *zonatus* Erichson. As normal *Ogcodes* specimens appear to be of a suitable size for use by these wasps, it is likely that certain of the Holarctic genera *Acrocera* Meigen, *Opsebius* Costa and *Pterodontia* Gray would be satisfactory also. In addition to size, abundance of the prey may be paramount in the selection of *Ogcodes*, rather than any preferential selection of flies. This is substantiated by the fact that species of fourteen families of Diptera have been recorded as hosts for *Hypocrabro*. On the other hand, we do not have adequate observations on the biologies of the various crabronids and perhaps future work will demonstrate that other genera and/or species provision their nests with acrocerids.

To our knowledge only two published articles have reported the use of acrocerid flies as hosts for Nearctic wasps, and only one specified association with a crabronid. James (1938) recorded that a wasp (species unknown), collected at Boulder, Colorado, February 28, 1933, by C. H. Hicks, stocked its nest with specimens of *Ogcodes albicinctus* Cole. Some of these specimens have been examined and are males of *O. eugonatus* Loew. The second report was made by Sabrosky (1948) who recorded that ten male specimens of *O. pallidipennis* Loew (western subspecies) had been collected from a crabronid nest at Oak Creek Canyon, Arizona, June 8, 1940. The collector, G. E. Bohart, noted that "this species of wasp was not seen to use any other species of fly." An examination of these specimens showed them to be a new species of *Ogcodes* (species No. 1, Schlinger MS.).

Two other observations record *Ogcodes* species from wasp nests, but as far as we have been able to determine the wasps were probably spider-killing forms. Champlain and Knull (1923) recorded adults of "*Oncodes dispar* (Macquart)" in a wasp nest from a decaying log at Wildwood Park, Harrisburg, Pennsylvania, in August. They stated that "The wasp apparently caught the spiders that were infested by the larvae of *Oncodes*, stored them in cells with her eggs, sealed the gallery and departed. The *Oncodes* larvae consumed the spiders and possibly the wasp larvae, then transformed and were unable to get out. Remains of the spiders were present in the cells." Cole (1919) reported that a specimen of *O. palidipennis* Loew had been bred from a nest of *Sceliphron cementarius* collected at Coulterville, Illinois.

As previously mentioned, no positive information other than the verified record of Sabrosky (1948) has been published on the association of crabronids and acrocerids in the Nearctic region. It was of interest, therefore, when several nests of *Ectemnius* (*Hypocrabro*) *spiniferus* (Fox) were found to contain specimens of *Ogcodes eugonatus* Loew. *E. spiniferus* is confined to the western part of the Nearctic region and is common in California. For a more detailed distribution see Krombein (1951: 1027) and Leclercq (1954: map 30).

In attempting to ascertain the association of crabronids with this dipterous family, the excellent "Monographie . . . Crabroniens" of Leclercq (1954) was consulted. This work gave only a single Palearctic species, *E. (H.) rubicola*, as utilizing acrocerid flies. On the basis of various characters, we assumed that *E. spiniferus* could be closely related to *E. rubicola*. This assumption was verified by J. Leclercq (in litt., 1956) who stated that "From a morphological point of view it is certain that *Ectemnius* (*Hypocrabro*) *spiniferus* and *E. (H.) rubicola* are closely allied. I should say however that the closest relative of *spiniferus* in the Palearctic region is by all means *laevigatus* (DE STEFANI)."

He also stated that there was little information on the habits of *laevigatus*, and it probably provisioned its nests with acro-

cerids. Leclercq (in litt., 1956) also mentioned that if species groups were erected in *Hypocrabro*, one such group would include *laevigatus*, *rubicola*, and *spiniferus*.

The prey species, *O. eugonatus* (= *O. albicinctus* Cole, of authors), is not common in California north of the Tehachapi Mountains. We have examined specimens only from Turlock (Stanislaus County) and Davis, Elkhorn Ferry, and Putah Canyon (Yolo County) in northern California. This species is distributed throughout North America where it ranges from Canada to southern Mexico, but it appears to be most common in the great plains and eastern United States. Furthermore, *eugonatus* may be conspecific with the European *O. zonatus* Erichson. If this conspecificity should prove to be correct, it would be of particular interest in that the close relationship of *rubicola* and *spiniferus* would be further substantiated biologically.

The material upon which the following new biological data presented in this paper are based was collected at Elkhorn Ferry, Yolo County, California, February 12, 1956, by R. C. Bechtel.

The linear nests of *spiniferus* were located in dead or injured and dying twigs of blue elderberry, *Sambucus coerulca* Rafinesque. The cells and their respective partitions of macerated elderberry pith were found at the inner end of the tunnels. These tunnels varied in length from 19–36 mm. Details of the cell contents are summarized in table 1.

The length of the cells varied greatly, ranging from 8–22 mm., whereas the diameter of the cells varied only from 5–7 mm. The partitions exhibited a variation in length (4–7 mm.) similar to that of the cells, but these lengths appeared to have no correlation with the associated cells.

An examination of the cell contents indicated that they could be divided into six groups as follows: Crabronids only; crabronid cocoons only; fly prey of crabronids (*Hylemya*, *Ogcodes* and *Sphacrophoria*); crabronid cocoons, fly prey of crabronids and scavenger flies (*Megaselia*); parasite (*Monodontomerus*) or predator (*Cymatodera*) of crabronids and fly prey; and fly prey and scavenger flies.

Certain cells, other than those which harbored a parasite or predator, or from which no *spiniferus* adults emerged, contained cocoons in which dead crabronid larvae were found. The *Megaselia* apparently did not cause the death of the larvae since these flies did not occur in all of the cells. Also, there was no evidence of cocoon penetration when they did occur. Therefore, the cause of death was unknown.

Approximately one-half of the specimens of *O. eugonatus* were in good condition. The other half were partly or almost entirely eaten. Some of them lacked the head or legs, while others were more completely mutilated, with only part of the

TABLE 1. Cell Contents of *Ectemnius* (*Hypocrabro*) *spiniferus* (Fox)

Twig	Cell	<i>Ect.</i>	<i>Ogc.</i>	<i>Hyl.</i>	<i>Sph.</i>	<i>Mon.</i>	<i>Cym.</i>	<i>Meg.</i>
1	1		7 ♂♂		1			
	2		10 ♂♂	1				
	3	1 ♀						
2	1		2 ♂♂	5				31
	2		2 ♂♂	5				19
	3	1 ♂						
3	1	1 ♂						
	2	1 ♂						
	3	1 ♂						
	4	Coc.						
	5	Coc.						
	6	Coc.						
4	1	Coc.	5					4
	2		2 ♂♂					
	3	Coc.	3 ♂♂			1		6
	4	Coc.	8 ♂♂					5
	5	1 ♂						
5	1		2				1	

Abbreviations:

Ect.—*Ectemnius* (*Hypocrabro*) *spiniferus* (Fox).

Ogc.—*Ogcodes eugonatus* Loew.

Hyl.—*Hylemya* sp.

Sph.—*Sphaerophoria* sp.

Mon.—*Monodontomerus* n. sp.

Cym.—*Cymatodera ovipennis* LeConte.

Meg.—*Megaselia* sp.

Coc.—Cocoon.

abdomen and/or thorax and wings present. As a result, we were not able to determine the sex of several specimens.

Individuals of the other fly prey, an anthomyiid (*Hylemya*, det. C. W. Sabrosky) and a syrphid (*Sphacrophoria*, det. W. W. Wirth), were in such poor condition that specific identification was impossible. The numerous wings and body fragments in the cells indicated that additional specimens of these genera had been present, however.

A single specimen of a new species of the torymid genus *Monodontomerus* (det. P. H. Timberlake) was reared from one *Ectemnius* cocoon. Peck (1951: 528-529) listed various Hymenoptera as hosts for *Monodontomerus*, but no Crabronini were included. Therefore, this appears to be a new host record for the genus.

A clerid predator, a larva of *Cymatodera oxipennis* LeConte, was found in one twig. This larva had chewed a hole in a *spiniferus* cocoon, eaten approximately $\frac{2}{3}$ of the crabronid larva, and was later observed to consume the remainder of it. There were indications also of two additional cells which the predator presumably had destroyed.

Several of the cells contained larvae and pupae of a phorid, *Megaselia* sp. (det. W. W. Wirth). Various authors have reported a parasitic relationship of *Megaselia* species with insects (Clausen, 1940: 385-386), but this species appeared to be a scavenger. It is of interest that in the cells in which the crabronid larvae failed to develop, the adult *Ogcodes* specimens were not used as food by the phorids, while the other host specimens were almost entirely consumed. Also, some of the cells in which this scavenger occurred had a blackened appearance due to the presence of a fungus.

In addition to the above observations, two other instances of a crabronid-acrocerid relationship have been noted. Four male specimens of *O. cugonatus*, collected at La Mesa, San Diego County, California, January 22, 1953, by F. X. Williams, were examined. A label on these specimens included the data "in *Crabro* wasp nest." Williams (in litt., 1956) stated that his notes read "La Mesa . . . also a nest of *Crabro* sp. with many

dead (last year's) acrocerid flies only, of one species in cells, and *Crabro* cocoons; . . . likewise in dead *Salvia* stems (*Salvia apiana* Jepson)." He stated also that he used the name *Crabro* in a general way, that the wasp could have been *Ectemnius* and that only the better acrocerids were retained.

Also, we have studied four male and three female specimens from Escagnoles Alpes, France, labeled "ex. *Crabro* nest." This record was of interest since it was the first time that female *Ogcodes* specimens have been found in a crabronid nest. Female *Ogcodes* seldom fly, but males make short, rapid flights at frequent intervals and are more subject to capture by female crabronids.

Another unverified association was found during the examination of twelve male specimens of a new species of *Ogcodes* (species No. 2, Schlinger MS.). The specimens were collected in San Bernardino County, California, elevation 6,000 ft., August 2, 1940, by J. A. Comstock. Labels on the specimens referred to a museum note which read, "12 Hymenopterous cocoons in the pith of *Sambucus relutina*. In one cell were the stored remains of 15 little flies (Cyrtidae), of which, though mouldy, a chloroform treatment made 12 available for mounting. All of these wasps had stored the same fly, but in case the larval wasp had matured, the flies were all consumed."

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A New *Ambrysus* from Mexico (Hemiptera, Naucoridae)

By IRA LA RIVERS, University of Nevada, Reno

Subfamily AMBRYSINAE Usinger, 1941

Genus *Ambrysus* Stål, 1862

Ambrysus drakei, sp. nov.

General appearance: A rather large, robust species with the mottled coloration typical of *Ambrysi*. Size 12.0-13.0 mm. long and 7.5-9.0 mm. wide. Dorsum lighter over prothorax and head, where the background color is light yellowish, darker brownish over hemelytra; embolia the only prominently light area in the otherwise dark hemelytra; scutellum with a faint reddish caste. Venter light yellow, slightly darker on abdomen, legs whitish-yellow.

Head: Sparsely punctate, shiny, comparatively flat; vertex only very faintly protuberant before eyes, forming an almost smooth, nearly flat contour between leading angles of the eye. Eyes essentially flush with general head surface; outer and posterior eye margins not forming a smooth, uninterrupted semicircle, but showing a slight angulation at their meeting points, which is the anterior inception of the thin but prominent border of the posterior eye margin. Labrum smoothly rounded, but its outline, rather than being an even semicircle, suggests a pointing of the tip; ratio of length-to-width 23:40 (58%), uniform in color; mouthparts similar to head in color, darkening toward tip. Head ratios are:

- (1) total length to width (including eyes) 43::68 (63%)
- (2) anterior distance between eyes to posterior distance 32::40 (80%)
- (3) anterior distance between eyes to inner eye length 31::28 (90%)
- (4) posterior distance between eyes to greatest length of head posterior to this line 40::10 (25%)

Pronotum: Moderately punctate, shiny; background color light yellowish, bearing five prominent brownish areas within the disc, composed of aggregations of brown spots in the manner typical of *Ambrysi* in general; posterior border rather broad, separated from disc by thin black line; lateral edges smooth, non-pilose, weakly curved, curvature more pronounced at hind angle (postero-lateral angle)—per cent of curvature (viewed perpendicular to the frontal plane of section of the animal as a unit) about 12% (av. 68::8); venter light yellowish, prominently pilose along posterior edge, particularly centrally, about the keel and the procoxal cavities; keel ridged anteriorly, flatly sloping posteriorly beneath median union of propleura, the slope smooth except for suggestion of transverse rugulosity—ratio of anterior keel ridge to total keel length (including posterior sloping face) 45::70 (64%). Prosternum free from propleura, and disappearing caudad beneath the latter. Propleura united along median line just posterior to prosternum. Pronotal ratios are:

- (1) width between anterior angles to width between posterior angles 68::135 (50%)
- (2) median length to greatest width 44::135 (33%)
- (3) distance between anterior and posterior angles on same side to perpendicular distance between anterior angle and baseline of pronotum 65::62

Scutellum: A pale reddish brown with light yellow area at posterior angle and some lightening in color laterally; ratio of three sides, anterior and two laterals, 90::68::68.

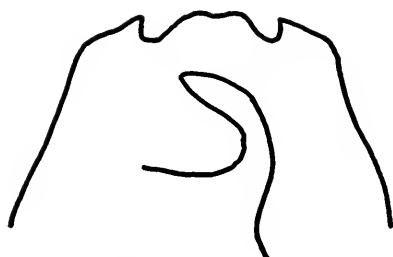
Hemelytra: Background color nearly unicolorous brown-black, with some light yellowing, most prominently on embolia; rather shiny, punctate, each puncture with a whitish spot; embolium well defined at its posterior edge, rather broad for the genus (length-to-width $75:28 = 37\%$); emboliar crease very weak, barely noticeable in anterior one-fifth—embolium typically bicolored, light yellow in anterior two-thirds, reddish brown posteriorly with rather pronounced contrast between the two areas. Hemelytra rather markedly exposing lateral connexival spinose margins posterior to embolia, and attaining abdominal tip. Wings functional, as long as hemelytra, and possessing the usual large, "costal" cell.

Venter: The prothoracic venter has been discussed above. All connexival segments moderately spinose except Segment I, the angles being acutely prolonged posteriorly; Segment I angle is right-angulate, not protruding laterad of general body outline, and is non-spinose. Connexival Angles II–IV are the most prominent, becoming progressively larger anterior-to-posterior; lateral connexival edges essentially smooth, non-serrate, even with considerable magnification. Tip of female subgenital plate quadrisinuate in terminal outline, the two inner sinuosities grouped together as two low, rounded angles, the two outer sinuosities sharp-angulate and not reaching as far caudad as the median portion. Actually, this tip outline is a combination of the characteristics of *A. mexicanus* (*A. dilatus*, *A. hintoni*) and *A. fuscus*; the sinuation is indistinguishable from that of *A. fuscus*, and the left lateral asymmetry of *A. mexicanus* may be quite evident (see illustration). The male genital process is prominently developed, and greatly resembles that of a small *A. guttatipennis* or a large *A. mexicanus* (see illustration).

Legs: Prolegs—coxa and trochanter usual for the genus. Femoral incrassation about average, ratio of length to greatest median width $60:36$ (60%); tibia average, combined tibiotarsus, when closed, just attaining adjacent (proximal) end of femur.

Mesolegs—coxa and trochanter usual; femoral ratio of length to greatest median width $60:11$ (18%)—length 2.6 mm.; tibia

with usual spination for the subgenus *Ambrysus*—distal end ventrally with two prominent transverse rows of spines set across tibial width, the terminal row set solidly across apex, the secondary or proximal row extending only about half way across tibial width—ratio of length to median width 55:8 (15%)—length 2.5 mm.; tarsus long, narrow, whitish, 3-segmented, the first segment very small and usually hidden by terminal spines, third segment terminating in two prominent, moderately curved claws.



DRAKEI

Ambrysus drakei, holotype female and allotype. The enclosing, top outline represents the terminal configuration of the female subgenital plate as seen in ventral view with caudum at top; the slender, left-pointing structure below this outline is the male genital process.

Metalegs—coxa and trochanter usual; femoral ratio of length to median width 82:12 (15%)—length 4.0 mm.; tibia essentially an enlargement of mesotibia, although comparatively more elongate—ratio of length to median ventral width 93:9 (10%)—length 4.6 mm.; tarsus an enlargement of mesotarsus, and more conspicuously armed beneath with large, sparse bristles.

Distribution: See types.

Type locality data: MEXICO—Durango (*Durango*, 6(viii)50, C. J. Drake & F. C. Hottes).

Location of types and etymology: Holotypic male, allotype and several paratypes in the collection of Dr. C. J. Drake, Ames, Iowa, to whom the species is dedicated; paratypes in the California Academy of Sciences, San Francisco; and in the collection of the author, Reno, Nevada.

Comparative data: *Ambrysus drakei* is a member of the *signoreti* group of the genus, and while it is an easily separable species, presents the rather interesting appearance of being intermediate between two of the rather subtle and un-named, but broadly recognizable, sections of the genus. The *signoreti* group *per se* is one in which broadness of form, including emboliar inflation, prominent maculation and quite often pronounced connexival spination, is the rule; whereas the closely related section typified by *A. mexicanus*, is somewhat slimmer, more uniformly colored and relatively or entirely spineless along the connexival margins. In general ovality, noticeable color contrast and lateral connexival spination, *A. drakei* is undeniably a typical part and parcel of the *signoreti* group; in its pronounced *A. mexicanus* type of female subgenital plate outline, it is rather aberrant and closely linked to this latter group. Fortunately, at least with present material, the species is not as confusing as the above comparison may sound, and it readily segregates from its relatives by the insertion of the following auxiliary couplet in the published key to Mexican Ambrysi—

- 27 (26). Lateral apical angles of female subgenital plate prominent, sharp, even with median, low-rounded angles or sinuosities; median angles set close together, their width across tips 40% or less of total width between lateral apical angles; male genital process either narrowing conspicuously and pointedly toward tip, or weakly goosehead-shaped. . . 27A
- Lateral apical angles of female subgenital plate weak, although even with median, low-rounded angles or sinuosities, which latter are hardly more than flattened curves along mid-line of tip; median angles wide, their width across tips more than 50% of total width between lateral apical angles; male genital process not distinctive, weakly-to-moderately curved and not shaped as above.
- *signoreti-porthoe*
- 27A (27). Connexival angles non-spinose; smaller species, 8.5–9.5 mm. long; lateral apical angles of subgenital plate long, comparatively narrow, sharp and spinosely produced, the concavity between them and the median angles deep; male genital process progressively narrowing to tip, inner terminal corner enormously produced into a straight-edged

- long process, somewhat like a greatly exaggerated, thin foot.....*fuscus*
 — Connexival angles spinose; larger species, 12–13 mm. long; lateral apical angles of subgenital plate shorter, broader, although with rather sharp tips, the concavity between them and the median angles rather shallow; male genital process not as above, but much like *guttatipennis*, i.e., somewhat goosehead-shaped.....*drakei*

For those specimens of *A. drakei* which show a slight asymmetry of the left side of the female subgenital plate such as occurs conspicuously in *A. mexicanus*, the spinosity of the connexival angles, size and increased inflation of the embolia (width more than 35% of length) will readily separate them from *A. mexicanus* (= emboliar width less than 35% of length).

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Trichobius (Streblidae) in West Virginia (Dipt.)

By J. O. WHITAKER, JR., 34 East Street, Oneonta, N. Y.

On March 23 and 24, 1957, I found Streblid flies of the genus *Trichobius* on the long-eared bat (*Corynorhinus rafinesquii rafinesquii*) in Pendleton County, West Virginia. There is some disagreement as to the taxonomic standing of this parasite. It is considered as *Trichobius major*, variety *quadrisetosus*, by Kessel (1925), as *Trichobius quadrisetosus* by Curran (1935), and as *Trichobius corynorhini* by Jobling (1938), who considers this and Kessel's variety, *quadrisetosus*, as synonyms. In the key by Kessel, the only difference between *corynorhini* and *major* is the dark line marking the transverse suture in *major*. I am inclined to agree with Jobling, and would designate the West Virginia specimens as *T. corynorhini*, possibly as subspecies *quadrisetosus*.

In the two caves of West Virginia in which I made my collections, Sinnit and Minor Rexrode, I found this fly to be very

common. There were from zero to six flies crawling on each *Corynorhinus*, with an average of about three per bat. This population was marked by very little variation in the taxonomically important characters, with the exception of the number of eye facets. Thirty-seven specimens were examined, and the following results were obtained.

a. The transverse suture of the mesonotum was marked by the dark line in every case.

b. In 33 cases the median line of the mesonotum extended to the transverse suture. In three it extended .8 of that distance, and in one it extended .9 of that distance.

c. The number of scutellar bristles was four in every case.

d. The number of eye facets varied from 12 to 16, with an average of 13.08, and a standard deviation of 1.10.

e. Pubescence was comparatively sparse in all.

f. The sex ratio seemed to be 1:1, with 18 females and 19 males.

In contrast to this, 16 specimens of *Trichobius major*, from Fort Hood, Texas (Host: *Myotis velifer*), collected by H. E. Evans and E. G. Matthews on July 1, 1956, were also examined. According to Dr. Evans these flies were found on the walls of the cave, near the bats. The results were as follows:

a. The transverse suture was dark in 12 of the 15, but light in three. However, the other three were in teneral condition, and I assumed that this line would darken on maturation.

b. The distance the median line extended to the transverse suture on the mesonotum varied from .7 to 1.2, with a mean of 1.1, and a standard deviation of .16.

c. The number of bristles on the scutellum varied from 6 to 9, with an average of 7.75, and a standard deviation of .68.

d. The number of eye facets varied from 6 to 9, with a mean of 7.81, and a standard deviation of .63.

e. Pubescence ranged from very sparse to very dense.

f. This sample contained 8 males and 8 females.

The Texas population is probably much closer to the center of origin and has not been as long isolated from the rest of the *Trichobius* group, thus has not had fixation of characters to

such an extent as the West Virginia group. I would like to examine specimens from Kansas, where both species are known to occur in the same caves, and even on the same individual bat (Jobling, 1949). I would also like to know the extent of the range of the nearctic *Trichobius* (*corynorhini* and *major*) east of Kansas, and whether it is continuous with the range of *Corynorhinus* between Kansas and West Virginia.

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A New Parasitic Ant of the Genus *Monomorium* from Alabama, with a Consideration of the Status of Genus *Epixenus* Emery

By W. L. BROWN, JR., and E. O. WILSON, Harvard University, Cambridge, Massachusetts

The specimen described below was found in a nest of *Monomorium minimum* (Buckley) at Tuscaloosa, Alabama. Although we have only a single example, the characters are so distinct that it is evident that we have here another aberrant inquiline species of the kind now becoming almost a commonplace discovery among the Myrmicinae. It has become the custom to consider parasitic forms of this degree of differentiation from the host species as "new" genera in almost every case found, but we shall give reasons below to show that the designation of new generic names for myrmicine parasites has been a greatly overworked practice, due for critical review.

Monomorium metoecus sp. nov.

Holotype ergatogyne: TL 3.0, HL 0.67, HW 0.54, pronotal W 0.41, WL (alitrunk L) 0.88, petiolar W 0.35, postpetiolar

W 0.36, W first gastric tergite, somewhat collapsed and widened 0.93 mm. Cephalic index 81, scape index 93. W pronotum 0.41, W petiole 0.35 mm.

Head quadrate, without clypeus just about as long as broad; sides nearly parallel (very slightly narrowed behind eyes), feebly convex; occipital margin transverse, straight in full-face view; occipital angles gently rounded. Clypeus convex behind, the median lobe bicarinate, the carinae continued as two acute teeth, each tooth longer than broad at base and inclined very slightly mesad. Space between teeth semicircularly excised, impressed. Compound eyes intermediate in size between those of the worker and female of *M. minimum*, greatest diameter 0.12–0.13 mm. Antennal scapes slender, curved gently flexad, gently incrassate toward tips; exposed length 0.50 mm.; when laid straight back, apices surpassing the occipital border by less than the apical scape width. Funiculus like that of *M. minimum*, but a little more slender. Segment I long and slender, II–VIII small, as broad as long, or broader; IX, X, and XI forming a distinct club, IX and X subequal, both longer than broad; XI (apical segment) longer than IX and X taken together. Mandibles with 4 teeth, increasing in size apicad. Minute vestiges of ocelli present, but exceedingly indistinct, the anterior one connected to clypeus by a feeble sulcus. The head in all respects is intermediate between that of the worker and the female of *Monomorium minimum*, except for the longer clypeal teeth (reminiscent of those of *M. viridum* Brown) and the slender antennae.

Form of alitrunk, petiole, postpetiole and base of gaster as shown in fig. 1. Points of greatest interest are the higher and more convex promesonotum and propodeum (as compared to the *M. minimum* worker), the deep metanotal groove, and particularly the curiously hypertrophied nodes of petiole and postpetiole. The postpetiole is produced on each side below as a subacute conule, each conule bearing at its summit a spiracle. Gaster broad and somewhat collapsed.

Integument smooth and shining, with scattered inconspicuous piligerous punctures. Frontal lobes and extreme anterior corners of head longitudinally striate. Striate areas of alitrunk indicated in the figures, as well as the reticulostriate parts of the postpetiole. Center of mesonotum with a small, transversely oval pit or puncture, the detailed structure of which cannot be made out.

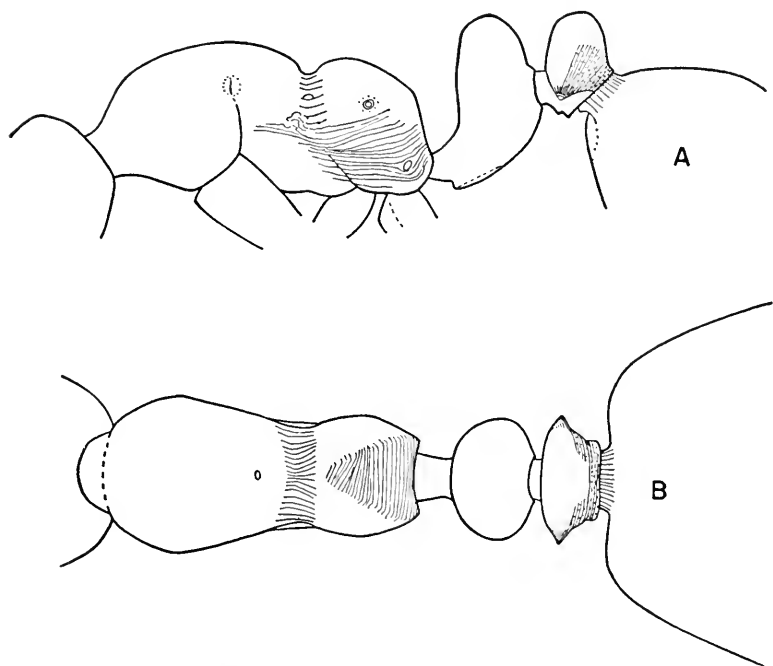


FIG. 1. *Monomorium metoccus* sp. nov., ergatogyne, holotype. A. Side view, and B. dorsal view of alitrunk, petiole, postpetiole and base of gaster. Drawing by Nancy Buffler.

Pilosity abundant, fine, whitish, erect, uneven in length and widely distributed over head, scapes and body. Legs with dilute pubescence of fine appressed hairs. Pilosity intermediate in abundance and conspicuousness between that of the host species workers and queens. Color dark reddish-brown, to the

naked eye appearing blackish; legs, antennae and mandibles tan, shading to yellowish on tarsi.

The holotype, a unique, was taken in a colony of *Monomorium minimum* (Buckley) (*sensu* Creighton) nesting under the loose bark of a living pine tree, just above the ground level, in disturbed open pine woods called "Smith Woods," on the University of Alabama campus at Tuscaloosa, Alabama (E. O. Wilson leg., No. M-178). In the bark of the same tree was found a nest of *Leptothorax bradleyi* Wheeler. The host *Monomorium* nest contained numerous workers, brood, and at least two normal dealate females of the *minimum*, the host species; both females are preserved with workers under the number M-178 in the Museum of Comparative Zoology, which is also the depository for the *M. metoecus* type.

With the exception of the very aberrant petiole and postpetiolar structure, plus other minor details of sculpture, etc., *M. metoecus* is exactly intermediate in every detail between the worker and female castes of *M. minimum*. In fact, if it were not for the form of the nodes, the new species might well have been taken for an ergatoid or pseudogyne of *minimum*; worker-female intermediates are very commonly met with among the species of *Monomorium*, with or without dealate queens, and in quite a few species the ergatogyne is the only functional queen. From these facts, it is clear that the ergatoid condition is in itself no generic character.

This raises the question of the relationship of *Monomorium* to *Epixenus* Emery. *Epixenus* was originally based on an ergatogyne found in the nest of *Monomorium venustum* André in Palestine, and on a doubtful male from Crete, taken separately (Emery, 1908). Forel (1910) added *E. biroi*, based on an ergatogyne found with *M. creticum* Emery, a member of the *salomonis* complex (referred to *salomonis* as a subspecies by Emery in 1922) from Crete. These ergatogynes differ from *Monomorium* ergatogynes only in the form of the petiolar and postpetiolar nodes, which are more than usually anteroposteriorly compressed, and therefore tend to be somewhat scale-like. However, this characteristic shape of the nodes is more a matter

of degree than of absolute qualitative difference, and other *Monomorium* females can be found that more or less approach the condition of the *Epixenus* so far as the nodes are concerned. *M. metoccus*, in fact, has the postpetiolar node more aberrant in form than in any of the *Epixenus* species. From these facts alone, it would seem that *Epixenus* is at best very doubtfully distinct from *Monomorium* at genus, or even at subgenus, level.

Against this background, we can consider the recent contributions by Bernard (1952, 1955) to the taxonomy of *Epixenus*. Bernard first described *E. guineensis* from workers taken in West Africa, and then, in his 1955 review of *Epixenus*, he described *E. algiricus* from workers and females from each of a series of colonies taken in Algeria. The figure of the female does not show clearly whether wing stumps are present or absent, though the alitrunk is very narrow and like those of some ergatogynes of other species; Bernard says only that the females are "reines désailées" taken in the nests, and the situation seems to make it fairly certain that these females are not just parasites in the nest of a host species represented by the *E. algiricus* workers (though the parasite hypothesis is not yet entirely to be discarded until a larger number of nests can be examined). Although Bernard emphasizes in his description and figures (especially fig. 1d) the scale-like structure of both nodes, our comparison of two workers from the *algiricus* type series with other workers of the genus *Monomorium* indicates that *algiricus* is only very slightly more extreme in this character than are workers of some other species of *Monomorium*, among which are *M. hesperium* Emery and *M. creticum* Emery. It seems to us that on the basis of worker characters alone, *algiricus*, *creticum* and *hesperium* could scarcely be put into different species-groups, let alone genera! And it must be remembered that *E. biroi* Forel was described from the nest of *M. creticum*, which suggests that the relationship of these two forms needs to be reexamined, keeping in mind the possibility that *biroi* may be just an ergatoid form of *creticum*.

In discussing the biology of *algiricus*, Bernard makes clear that this species usually nests independently of other ants, and

he believes that in the rest of the cases, it is associated only as a kind of thief-ant with other ant species (other species of *Monomorium* are supposed to follow lestoproct habits, e.g., *M. andrei* *fur* Forel). This information eliminates the supposed parasitic habits of *Epixenus* as a group character, even if such habits were ever considered to define a genus in this case at a time when the *Epixenus* workers were still unknown.

Consideration of the above details will, we think, show that what has been considered to constitute a distinct genus, *Epixenus*, is in fact nothing more than a heterogeneous collection of a few species of *Monomorium* that tend to have the nodes more strongly compressed than usual for the genus. Some of these species (e.g., *andrei*) may represent workerless ergatogynousinquilines derived from their host species, while others, such as *algericus*, seem to be rather average species of *Monomorium*. The larval characters described for *algericus* by Bernard may be a little unusual for *Monomorium*, but we must remember that only a trifling fraction of the *Monomorium* species have been described in the larval state, and the other *Epixenus* larvae also remain unknown. We offer below the formal synonymy of *Epixenus* with *Monomorium*, and the new combinations necessary after this change.

MONOMORIUM Mayr

Monomorium Mayr, 1855, Verh. zool.-bot. Ver. Wien, 5: 452.

Type: *Monomorium minutum* Mayr, monobasic.

Epixenus Emery, 1908, Deutsch. ent. Zeitschr., p. 556. Type:

Epixenus andrei Emery, by designation of Wheeler, 1911.

NEW SYNONYMY.

***Monomorium advena* nom. nov.**

pro *Epixenus andrei* Emery, 1908, Deutsch. ent. Zeitschr., p. 557, fig. 5a-c, female, nec *Monomorium andrei* E. Saunders, 1890, Ent. Mon. Mag., 26: 204, worker.

***Monomorium biroi* (Forel) comb. nov. (nom. praeocc.)**

Epixenus biroi Forel, 1910, Ann. Soc. Ent. Belg., 54: 21, female (ergatogyne), nec *Monomorium biroi* Forel, 1907, Ann. Mus. Nat. Hungar., 5: 19, worker.

We are deliberately entering this name in *Monomorium*, even though it is preoccupied there, because we do not wish to propose a new name where the distinct possibility exists that the *E. biroi* of Forel, 1910, is only the female caste of *Monomorium creticum* Emery, with which it was found. The same applies to the male originally described as *Epixenus creticus* by Emery (see below).

Monomorium creticum (Emery) comb. nov. (nom. praeocc.)
Epixenus creticus Emery, 1908, Deutsch. ent. Zeitschr., p. 558, male, ?nec *Monomorium Abeillei* var. *creticum* Emery, 1895, Mem. Accad. Sci. Bologna, (5) 5: 298, worker. As stated above, it may well turn out that *Epixenus creticus* is the male of *Monomorium creticum* Emery, 1895.

Monomorium guineense (Bernard) comb. nov.
Epixenus guineensis Bernard, 1953 (1952), Mém. Inst. Franc. Afr. Noire, Dakar, 19: 238, fig. 10f-i, worker.

This is an aberrant species, with unusual conformation of propodeum and nodes, and very small in body size. Its relationship to the other species of *Monomorium* requires further study.

Monomorium algiricum (Bernard) comb. nov.
Epixenus algiricus Bernard, 1955, Insectes Sociaux, 2: 274, worker, female.

We have made no study of the species of *Monomorium* in order to exhaust the possibilities of synonymy between *algiricum* and the numerous small forms of the genus occurring in North Africa and southern Europe. However, a cursory check of the Museum of Comparative Zoology collections revealed no exactly similar species. *M. hesperium* and *M. creticum* Emery (I) seem to be closely related.

In checking casually through some of the now rather large number of parasitic myrmicine genera, most of which are "satellites" of large genera such as *Myrmica*, *Solenopsis*, *Monomorium*, *Tetramorium*, *Crematogaster*, and especially *Leptothorax*, one is impressed by the flimsy nature of the characterizations upon which the parasite names rest. In some cases, such as *Teleutomyrme*x or *Anergates*, little doubt about generic

status can be entertained, but in many of the rest, it seems that the known or presumed parasitic habits of the ants have been given undue weight at the generic level. When rigorous taxonomic investigation of these satellite genera is begun in earnest, it seems likely that many of them will go the way of *Epixenus*.

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Nomenclature Notice

All comments relating to the following should be marked with the File Number, and sent in duplicate to Francis Hemming, 28 Park Village East, Regent's Park, London N.W.1, England.

padi Linnaeus, 1758 (*Aphis*), validation of, for the European bird cherry aphid (Homoptera) (File: Z.N.(S) 1225).

anonyma Lewis, 1872 (*Limnitis*), suppression of (Lepidoptera) (File: Z.N.(S) 1180).

For the above, see Bull. Zool. Nomencl. Vol. 13, Pt. 8.

Pentila Westwood, [1851], validation of, and designation for, and for **Leptina** Westwood, [1851], of type species, in harmony with accustomed usage (Lepidoptera) (File: Z.N.(S) 476).

Centris Fabricius, 1804, designation of type species for, in harmony with accustomed usage; **dimiata** Fabricius, 1793 (**Apis**), validation of (Hymenoptera) (File: Z.N.(S) 770).

For the above see: Bull. Zool. Nomencl. Vol. 13, Pt. 9.

New Records of *Plecia* (Diptera: Bibionidae)

By SELWYN S. ROBACK, Assistant Curator, Department of
Limnology, Academy of Natural Sciences of
Philadelphia

The specimens herein reported are all in the collection of the Academy of Natural Sciences of Philadelphia. The specimen of *Plecia alacris* Curran was taken by the author during the course of the Catherwood Foundation Peruvian Amazon Expedition in 1955. The remaining material was already in the Academy's collection. The author would like to acknowledge gratefully the gift of a male paratype of *P. alacris* by Dr. C. H. Curran of the American Museum of Natural History.

Plecia (*Plecia*) *alacris* Curran

Of this species, previously recorded from British Guiana and Paraguay, a single male was taken by the author at Iquitos, Peru, October 20, 1955. This specimen has been compared with the paratype. The description of the species is rather brief, and hence some additional descriptive material is herewith presented.

The male antenna is nine segmented, fig. B, with segments four—eight as wide as long and about equal in length. The maxillary palpus is four segmented with the segments in the ratio of 1.4:2.0:2.1:3.3. The sternopleuron bears a patch of blackish hairs above its middle. The femora are thickened apically and the tibiae swollen in the basal half. The tarsal segments of the foreleg are in the ratio 6.5:2.5:1.7:2.0. Vein R_5 of the wing (fig. A) curves slightly upward to meet the costa rather than curving down with it. The median process of ninth sternum is distinctly truncate apically and is upcurved at its apex (fig. C).

Plecia (*Plecia*) *americana* Hardy

A single male from Encero Vera Cruz, S. of Jalapa, Mexico, July 17, 1932 (Hobart Smith). A single paratype is in the

Academy's collection (Philadelphia Academy of Science in Hardy, 1940).

***Plecia (Plecia) curvistylata* Hardy**

This species was described by Hardy (1942) from Cuernavaca, Mexico. There is in the Academy's collection a series of eight males and one female collected July 4, 1932 by Hobart Smith from near Taxco, Guerrero, Mexico, which is close to the type locality. Since the species was described on the basis of only two males, there is offered here a brief description, and figures of the genitalia (figs. D, E) of the female in the Academy's collection. The female genitalia, particularly the form of the eighth sternite, supports Hardy's placement of this species with the *collaris* group (see fig. 135B in Hardy, 1945).

Female.—5.4 mm. long; antenna 10 segmented: flagellar segments 2–7 short and broad ($1.66 \times$ as wide as long); antennae, palpi, thoracic pleurae, sternum, and abdomen dark brown; mesonotum red-orange; darkened anteriorly but not as distinctly as in the male; wing 6.0 mm.; lightly infuscated; stigmal area not too clearly differentiated; R_{3+4} not as sharply curved as in male; halteres black, shaft brownish; female genitalia, figs. D, E.

***Plecia (Rhinoplecia) nearctica* Hardy**

A common species represented in the Academy's collection by a series of 24 males and 22 females collected by Rehn, Pate, and Rehn, September 4, 1937 between Beaumont, Texas and New Iberia, Louisiana. There are also two paratypes from Hardy's original series in the Academy's collection (listed as Philadelphia Academy of Science in Hardy, 1940).

***Plecia (Plecia) plagiata* Wiedemann**

One female from Juan Vinas, Costa Rica, 2,300 feet, July 22, 1909 (P. P. Calvert).

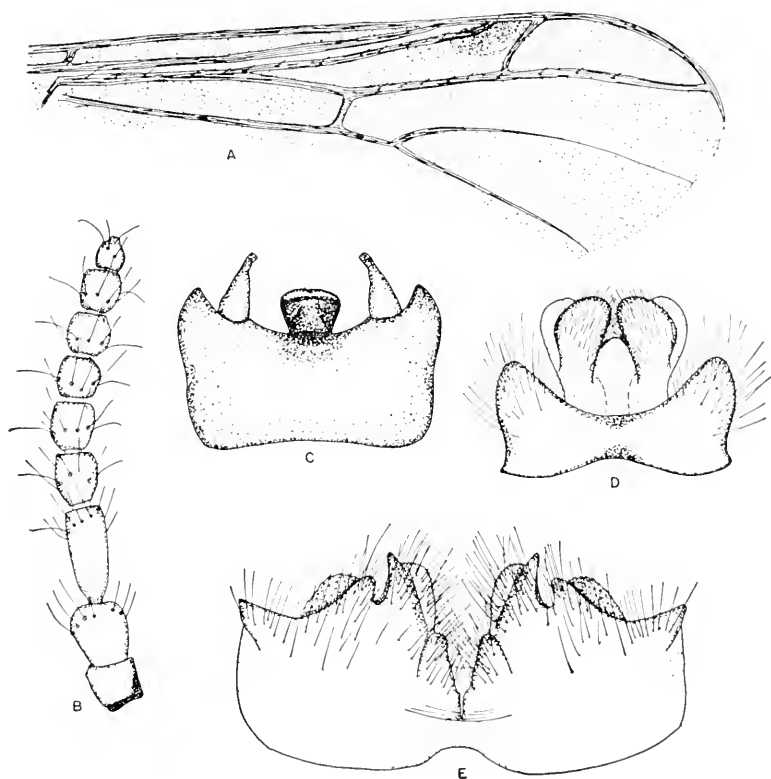
***Plecia (Rhinoplecia) rostellata* Loew**

A series of six males originally determined as *P. rostrata* Bell. by Cresson. These are from Alayuella, Rio Brasil, Costa Rica,

December 9, 1909 (P. P. Calvert). This is a considerable extension of the range of this species.

***Plecia (Rhinoplecia) rufithorax concava* Hardy**

A single male from Piedras Negras, Peten, Guatemala, IV-VI, 1936 (L. Satterthwaite, Jr.).



Plecia alacris Curran. Male. Figures A-C.

A. Anterior portion of wing. B. Antenna. C. Hypopygium, ventral view.

Plecia curvistylata Hardy. Female. Figures D-E.

D. Genitalia, dorsal view. E. Eighth sternum.

LITERATURE

- HARDY, D. ELMO. 1940. J. Kans. Ent. Soc. 13, No. 1: 15-27.
—, 1942. Can. Ent. 74: 105-116.
—, 1945. U. Kans. Sci. Bull., 30, Part 2, No. 15: 367-547.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Meetings of the American Entomological Society. Years ago, the NEWS contained a section entitled "Doings of the Societies," which reported the minutes or other matters of interest from this and other societies. Believing that even now there may be some general interest in such things, it may be recorded that at our meetings during the past year, in addition to the minor reports and discussions by those in attendance, there was always an invited speaker of prominence. For the nine meetings, Sept. 1956 to June 1957, we enjoyed the following, each an entomologist of highest competence in the particular field: Dr. RANDALL LATTA, on insect problems in marketing agricultural products; Dr. SELWYN S. ROBACK, on phylogenetic aspects in Diptera; Dr. WALTER FLEMING, on an entomological trip to South America; Mrs. MARGARET M. CARY, on effects of geographic isolation on the evolution of the Sphingidae; Dr. BAILY B. PEPPER, on teaching and research at Rutgers University; Mr. JOHN WILCOX, on the biology and control of ticks; Dr. NEAL A. WEBER, on fungus cultures from ant's nests; Mr. O'DEAN L. KURTZ, on identification of fragments in cereals.

For the current year, the program includes, for September, Dr. THOMAS E. SNYDER, on termite biology, control, trends; for October, probably Dr. GEORGE H. BRADLEY, on some phase of the malaria, or the typhus problem in the U. S.; for November, Dr. HUBERT FRINGS, on the sounds of insects; for December, Dr. JOHN W. H. REHN, on pest control in the U. S. Navy; for January, Dr. HARRY S. SMITH, on plant pest problems in the northeast; and for February, Mr. R. C. BROWN, on forest insect research in the northeast.

The Society welcomes visitors. All with an interest in insects are cordially invited to attend our meetings, especially entomologists from other parts of the country who happen to be passing through Philadelphia. The meetings are at 7.45 P.M. at the Academy of Natural Sciences, s.w. corner of 19th and

Race Streets, on the fourth Thursday of each month from September through May, except in November and December when they are on the third Thursday.

The International Trust for Zoological Nomenclature announces the immediate publication in book-form of the first instalment of each of the "Official Lists" of valid zoological names and of the corresponding "Official Indexes" of rejected and invalid names, together with the first instalments of the "Official Lists" of works approved as available for zoological nomenclature and of the "Official Index" of rejected and invalid works. The categories of names covered by these "Lists" and "Indexes" range from specific names to ordinal names. The total number of entries contained in the instalments now to be published amounts to about five thousand. These entries have been promulgated from time to time by the International Commission on Zoological Nomenclature in individual "Opinions" and "Directions" but owing to the large number of documents so involved it has become increasingly difficult for specialists to ascertain what names have so far been registered under this system. This difficulty will completely disappear on the publication of the instalments now in the press, each of which will be supplied both with a full alphabetical index and also with alphabetical indexes arranged by major groups.

All enquiries in regard to the above publications should be addressed to the International Trust for Zoological Nomenclature at its Publications Office (41 Queen's Gate, London S.W.7.).—FRANCIS HEMMING.

Books Received

FORSTER, W. and TH. A. WOHLFAHRT. Die Schmetterlinge Mitteleuropas. Lieferung 7 and 8. These represent the first two of the seven that will comprise Volume III (Bombycids and Sphingids) of the butterflies of Europe. The two Lfs. are each 32 pages and have a total of 7 colored plates. Price, DM 10. each. Franckh'sche Verlagshandlung, Stuttgart-0, Pfizerstr. 5—7.

Volume I (Biology), and Volume II (Diurnals) are complete. Price, DM 23. and DM 53. See ENT. NEWS for July 1952, and Feb. 1955.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and **Stizini** (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Dominick J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

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By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeschna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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DECEMBER 1957

Vol. LXVIII

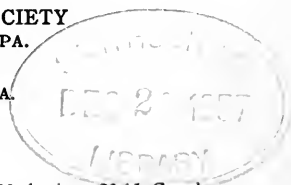
No. 10

CONTENTS

Stahnke—A new species of scorpion	253
Arnaud—Salmacia in the Hawaiian Islands	259
Judd—Seasonal distribution of the black fly	263
Crabill—Identity of <i>Paroryza valida</i> Cook	265
Review: Die Larvalsystematik der Blattwespen	267
Indexes and title page to Volume LXVIII	269

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ENTOMOLOGICAL NEWS

VOL. LXVIII

DECEMBER, 1957

No. 10

A New Species of Scorpion of the Vejovidae: *Paruroctonus*¹ *mesaensis*

By HERBERT L. STAHNKE, Arizona State College,
Tempe, Arizona

Living specimens of *Paruroctonus mesaensis* have uniformly very pale yellow cauda, appendages and carapace. The pre-abdomen appears somewhat darker—an effect, in the main, produced by the darkish internal organs showing through the more or less translucent, dorsal exoskeleton. Because of this yellowish color and the rather long, slender body, the layman has often mistaken this scorpion for *Centruroides sculpturatus* Ewing, the Southwest's lethal scorpion. It is obvious that the fancied resemblance is superficial since they belong to different families—*C. sculpturatus* to the Buthidae, *P. mesaensis* to the Vejovidae. In addition to this, the sting of *C. sculpturatus* has proven lethal to children in good health up to the age 16 years, while the most severe reaction observed from *P. mesaensis* has been rather pronounced, non-ecchymotic but very painful swelling at the site of the sting.

HOLOTYPE. An adult female, A.S. No. 693.6, secured March 13, 1947, under a small slab of broken concrete in the city dump northwest of Mesa, Arizona. Soil sandy, as in other areas from which this species has been taken. Holotype collected by Floyd Parrat and I. F. Nichols.

¹ Werner offered *Paruroctonus*, in *Klassen u. Ordnungen des Tierreichs* 8(2): 283, Jan. 1934 for *N. N. Uroctonoides* Hoffmann, *Anales del Instituto de Biologica* 2(4): 405, 1931 nec Chamberlin, *Mus. Sci. Bull. Brooklyn* 3(2): 35-44, 1920. Mello-Leitão in *Ann. Acad. Bras. Sci. Rio* 6(2): 75-82, June 30, 1934, offered *Hoffmanniellus*. Werner offer accepted because of prior date.

DESCRIPTION OF HOLOTYPE: Carapace. Uniform light yellow with crescent of dark pigment on median periphery of each eye. Some living specimens with entire median ocular tubercle permeated by black pigment; others with diffuse area of brown pigment in the interocular triangle. Condition of holotype seems most common. Interocular triangle sparsely covered with coarse granules which become larger and more abundant posteriad. Lateral eyes three, which form approximately an angle of 120 degrees. Median ocular tubercle prominent. Median groove begins as a broad depression on extreme anterior border, extends as a shallow groove over ocular tubercle and ends as narrow pit-like furrow and then bifurcates at right angles into two shallower depressions on most posteriad margin.

Preabdomen: All segments covered with fine granulations. Segments 1 and 2 with few large granules scattered on extreme posterior and lateral margins. Large granules scattered over posterior half of segments 3 through 6. Large granules of segment 7 primarily on ridges of four lateral keels. Intercarinal spaces with scattered large granules. Median keel as only indistinct vestige on segments 1 and 2, becoming larger on other segments as it travels posteriad but never becoming a prominent structure and extending across only posterior half of each segment with exception of 7th where its greatest prominence is at midway point. Large, lateral granules of last segment denticulate and located on lateral edge of shelf-like lateral protrusion. Ventral abdominal surface free of large granules except for extreme marginal, denticulate granules and large granules forming two lateral keels on 7th segment. Second pair of lateral keels represented distad by a few granules. Intercarinal spaces of 7th segment with very few large and small granules. Ventral surface of other segments appears very finely punctate rather than smooth and shiny. Stigma narrow-elongate. Sternum sides sub-parallel; with very deep median furrow in posterior half; anterior third with large granules. Genital operculum partially divided into two separate halves. Pectines with more than 16 subcircular, vaulted middle-lamellae; fulcra moderate sized, teeth: 23/23. Some with 21 pectinal teeth. Most proximal

tooth a distance equal to 9 teeth from point of attachment of pecten. Densely covered with short bristles on entire ventral surface except teeth.

Postabdomen: Very slender. All caudal segments longer than wide. Segment IV shorter than carapace: ratio 1.10. Segments I-IV ventrally quite hirsute with moderately long bristles.

Dorsal keels: Coarsely granular on segments I, II, and III; sub-denticulate granules on IV. Large rounded granules on segment V.

Superior lateral keels: Like dorsal keels but incomplete on segment V. Present on 0.4 of proximal end of segment and represented by moderate sized granules.

Median lateral keels: Coarsely granular on segment I; represented by 4 or 5 large granules at distal end of segment II, and by 3 large granules at distal end of segment III; lacking on segments IV and V.

Inferior lateral keels: Coarsely granular on segment I; prominent on segment II but not distinctly granular; granules definite on segment III and large well developed granules on segments IV and V.

Median ventral keels: Not prominent and without granules on segment I; distinct but smooth on II and III; with large granules on IV and on V represented by one distinct keel with large granules.

Intercarinal spaces: Few large granules on dorsal and dorso-lateral regions of segment I through III, lacking on segment IV and sparsely represented on inferior surface of segment V.

Telson: Elongated, tear-drop in shape and smooth with few large bristles. Two large bristles located ventrally at base of aculeus. Lighter in color than other segments. Aculeus slightly more than $\frac{1}{3}$ length of telson.

Chelicera: With (fig. 1) 5 more or less truncated, uniform-sized teeth on inferior border of movable finger. These teeth vary in number from 2 to 5, sometimes several may be united to form a single very wide tooth. Two reddish, tubercle-like protuberances on inferior border of fixed finger. Some with 3 such protuberances, which are sometimes denticulate.

Pedipalps: Chela: Hand broader than thick. All dorsal keels well developed and covered with moderately large granules. Lateral keels with more and larger granules. Inferior and median surface with many large granules. Cutting edges of both moveable and fixed fingers moderately scalloped with ridges of one fitting into valleys of other. Cutting edge of both fingers with six clusters of supernumerary teeth linearly arranged with large tooth separating each of the six clusters. Each large tooth flanked medially by large tooth except (on the movable finger) distad where there are two large flanking teeth (seven in all). Fixed finger has only five flanking large teeth plus one large flanking terminal tooth. Distance between median large teeth and lateral teeth increases progressively distad. A large bristle immediately posterior to each flanking large tooth except the two most distal ones.

Brachium: With distinct and granular anterior and posterior inferior margins. 13–14 trichobothria on posterior surface.

Humerus: With only anterior inferior margin distinct and granular. Inferior surface has proximally a cluster of 8–11 moderately large granules.

Walking legs: Long tarsal claws; well developed unguicular spine; exterior and interior pedal spurs. Single row of bristles on ventral median ridge of tarsus with two larger bristles at distal end of row forming a V and a cluster of small bristles at proximal end of row. A row of very long, stout bristles on exterior margin of protarsus and tibia of first three pair of legs.

ALLOTYPE. An adult male, A.S. No. 361.26, collected September 14, 1939 under board in city dump northwest of Mesa, Arizona, by H. L. Stahnke.

DESCRIPTION OF ALLOTYPE. Carapace: Color same as female. Many large granules in interocular triangle. Greater concentration of large granules posteriad. Few scattered large granules laterally. Many fine granules throughout. Lateral eyes, ocular tubercle, median groove and keels same as female.

Preabdomen: Granulations same as female. Median and four lateral keels somewhat more pronounced than in female. Intercarinal spaces, lateral large granules and ventral surface

like that of female except for intercarinal spaces on 7th which have numerous small and large granules. Sternum like that of female. Genital papillae well developed and protrude some distance from edge of genital operculum which is divided. Pectines with more than 20 subcircular, vaulted middle lamellae. Teeth: 32/32. Some with 39 pectinal teeth. Most proximal tooth a distance of about 6 teeth from point of attachment of pectines.

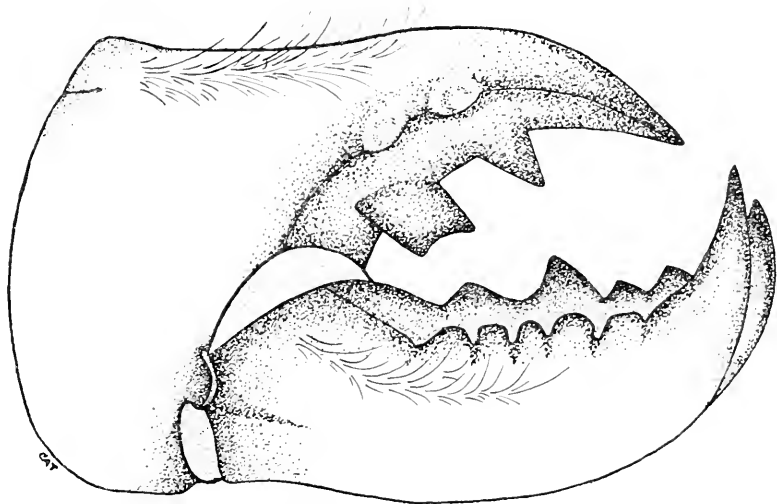


FIG. 1. Chelicera of *Paruroctonus mesaensis* n. sp. [C. Templeton, del.]

Postabdomen: General shape like female. All segments longer in proportion to width. Segment IV longer than carapace: ratio 0.85. Segments I, II, and III with keels like those of female and intercarinal spaces densely covered with fine granules and few isolated granules except on inferior surface. Segments IV and V keels same as on female with intercarinal spaces densely covered with fine granules. Telson similar to that of female.

Pedipalps: Chela: Hand not quite as broad as on female. Cutting edge of fixed and movable finger denticulated as in female but scallops are deeper, especially at proximal end. Keels

Paruroctonus mesaensis

Table of Measurements in mm., and Ratios

	Females			Males		
	Holotype	Paratypes		Allotype	Paratypes	
	No. 693.6	No. 1248	No. 1154	No. 361.26	No. 1177	No. 57-323
Total length	60.68	60.86	59.79	63.40	60.56	64.64
Carapace length	7.56	8.12	7.42	6.86	7.00	7.14
Carapace width	6.58	7.56	6.86	6.23	6.44	6.72
Mesosoma	15.35	12.70	13.35	13.00	11.70	14.80
Metasoma	37.77	40.04	39.02	43.54	41.86	42.70
*Ratios:						
CL/TL	0.13	0.13	0.12	0.11	0.12	0.11
CL/MtL	0.20	0.20	0.19	0.16	0.17	0.17
MtL/TL	0.62	0.66	0.65	0.69	0.69	0.66
PW/PT	1.33	1.27	1.30	1.24	1.25	1.32
CL/IVL	1.10	1.14	1.06	.85	.90	.88
CL/VL	0.87	0.88	0.83	0.68	0.72	0.73
IL/IW	1.21	1.24	1.27	1.42	1.38	1.37
Pecten teeth	23/23	24/25	23/23	32/32	32/32	38/39

* Abbreviations: CL = carapace length
 TL = Total length
 MtL = Metasoma length
 VL = Length caudal segment V
 IL = Length caudal segment I
 IW = Width caudal segment I
 IVL = Length caudal segment IV
 PW = width of hand of chela
 PT = thickness of hand of chela

Para- types	Sex	Date Collected	Locality	Collector
1248	female	8/27/52	Tempe, Ariz.	Kenneth Ziegler
1154	female	8/22/51	Tempe, Ariz.	Klonda Bowers
1177	male	11/15/51	Tempe, Ariz.	H. L. Stahnke
57-233	male	4/30/57	Borrego Springs, California	Jim Elliott

and granulations on dorsal surface more pronounced than on female. Intercarinal spaces densely covered with fine granules. Brachium and humerus same as female except that large granules in medial area of posterior surface lacking. Brachium stouter than in female. Chelicera and walking legs similar to those of female.

P. mesaensis differs principally from *P. gracilior* (Hoffman) as follows: ² *P. mesaensis* is uniformly light yellow whereas *P. gracilior* has a crescent-shaped spot in interocular triangle similar to *Hadrurus hirsutus*. Also, the dorsal plates of the abdomen show widespread dark spots on both sides of the middle line, which give a blackish tint to the plates. Pectinal teeth of *P. mesaensis* 32/32; *P. gracilior*, 26/28. The fourth caudal segment of the male *P. mesaensis* is considerably longer than carapace, while in *P. gracilior* this segment is a little shorter than carapace.

On *P. mesaensis* the teeth on the ventral surface of the movable finger truncated and uniform in size; *P. gracilior* has a large basal truncated tooth and 4 smaller teeth. Caudal keels more coarsely granular in general on *P. mesaensis* than on *P. gracilior*.

The Occurrence of *Salmacia longipulvilli* in the Hawaiian Islands (Diptera: Larvaevoridae)

By PAUL H. ARNAUD, JR., Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture, Washington, D. C.¹

The parasitic fly *Salmacia longipulvilli* (Tothill) has not been recorded in the Hawaiian entomological literature, although it appears to be an immigrant species from America. It was present in the Hawaiian Islands as early as 1929. Since *Salmacia longipulvilli* is similar in size to *Chaetogaedia monticola* (Bigot), the former has apparently been confused with *monticola* and remained undetected in collections.

These two species may be separated on a readily visible structural character of the head: *S. longipulvilli* has the facial ridges bare (except for several bristles immediately above and in as-

² Hoffman described only the male of the species.

¹ I should like to thank J. L. Gressitt, H. J. Reinhard, C. W. Sabrosky, G. E. Shewell, Alan Stone, and P. W. Weber for their aid and suggestions in this study.

sociation with the vibrissae); while *C. monticola* has the facial ridges bristled on more than the lower half. *S. longipulvilli* also possesses an orange-yellow abdomen with black base and apex and a median, occasionally broken, black longitudinal stripe on the dorsum of the abdomen. Females of *longipulvilli* tend to have more black on the abdomen than the males, having a broader median black stripe and more of the fourth, as well as the fifth, tergites black above. *C. monticola* in contrast has a grayish abdomen, with only slight traces of orange-yellow on the sides, and with the fifth tergite mostly orange-yellow. Figures 1 to 5 illustrate the head, wing, and terminalia of the male of *Salmacia longipulvilli*.

An annotated bibliography, Hawaiian distributional data, and host data on *Salmacia longipulvilli* follow:

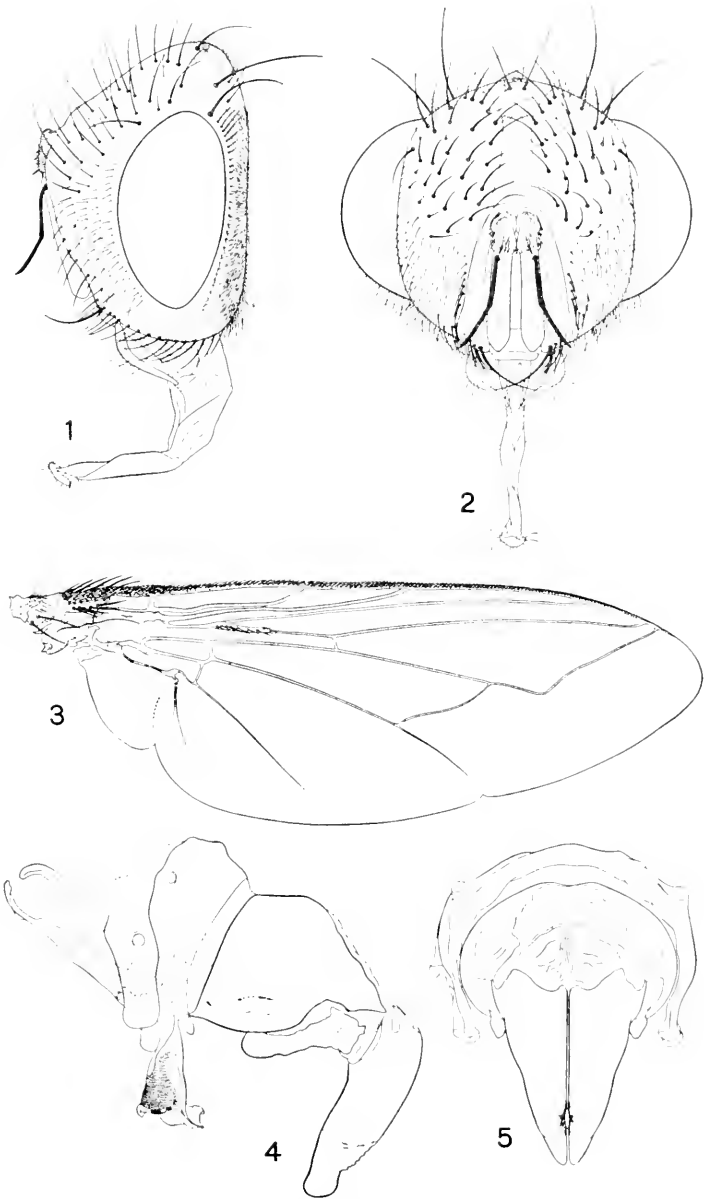
***Salmacia longipulvilli* (Tothill) 1924**

1924. *Gonia longipulvilli*, Tothill, Canadian Ent., 56(8):198, (9): 211, 212. [p. 198, key, male; p. 211, original description, holotype male from Royal Oak, British Columbia and 12 male paratypes from Alberta, British Columbia, North Dakota, Idaho, California, Arizona, Mexico; p. 212, summary of distribution, also Colorado.]
1928. *Gonia longipulvilli*, West, in: Leonard, Cornell Univ., Agric. Exper. Sta., Mem. 101: 818. [Distribution: Ithaca, New York, Ap[ril]. This is probably a misidentification.]
1933. *Gonia longipulvilli*, Rowe, Ent. News, 44(5): 126. [Distribution: Olympia, Washington.]
1940. *Gonia longipulvilli*, Morrison, Canadian Jour. Res., Sec. D, 18: 342, 354, figs. 15, 15a, 15b. [p. 342, key, male; p. 354, description of male terminalia; host *Agrotis orthogonia* in Saskatchewan.]

EXPLANATION OF FIGURES

Salmacia longipulvilli (Tothill). Male.

1. Head, lateral view. 2. Head, front view. 3. Right wing. 4. Terminalia, lateral view. 5. Terminalia, posterior view. Drawings by Mr. Kei Daishoji.



FIGS. 1-5.

(1943) 1944. *Gonia longipulvilli*, Brooks, Canadian Ent., 75 (12): 228, 229, 230. [p. 228, referred to capitata group, which is characterized and stated to be "late summer species."] Type depository: Type No. 789, Canadian National Collection, Ottawa.

Hawaiian Distribution

The 47 specimens that I have examined have originated from the following localities:

Maui: 1 ♂, Waiakoa, 3,000 feet, VIII-1941, at light (E. M. Cooke, Jr.); 2 ♂♂, 1 ♀, Waiakoa, 3,000 feet, VIII-1941 (C. M. Cooke, Jr.); 1 ♀, Kula Pipe Line, 19-III-1932, 4,500-5,000 feet (O. Bryant); [in collection of Bernice P. Bishop Museum]; West slope Polipuli, 2,300, 2-III-47, Hawaii No. 2782 (K. L. Maehler) [collection U. S. N. M.].

Hawaii: 2 ♀♀, Upper Hamakua Ditch Trail, "10-2-1929" (O. H. Swezey); 2 ♂♂, 2 ♀♀, Humuula, 30-VII-35 (E. H. Bryan, Jr.); 1 ♂, Humuula, 3-VIII-35, Sophora (R. L. Usinger); 3 ♀♀ and 1 ♂, Keanakolu, Kaula Gulch, 29-X-1952, 7,000 feet (C. P. Hoyt); [in collection of Bernice P. Bishop Museum]; 18 ♂♂, 12 ♀♀, Waimea, 22-VI-49, collected at flowers *Focniculum vulgare* L. (P. W. Weber) [in collections of the University of Hawaii, Bernice P. Bishop Museum, U. S. National Museum, Canadian National Collection, H. J. Reinhard, and the author].

Additional specimens are to be found in the Bernice P. Bishop Museum and, probably, in other collections in the Hawaiian Islands.

Host Data

Morrison (1940) has reported *Agrotis orthogonia* (Morrison) (family Phalaenidae) as a host of *longipulvilli* in Saskatchewan. In the collection of the United States National Museum there are now eight specimens labelled as paratypes [No. 28,300] of *longipulvilli* [Tothill stated there were six]. An interesting feature of five of these specimens, which originated from Tempe, Arizona, "10-8-17" (H. L. Dozier), is that they bear the labels as having been "Reared from *Feltia annexa*," an important fact which was omitted by Tothill in reporting on the type series. The name *Feltia subterranea* (Fabricius) (family Phalaenidae) is the revised name for *Feltia annexa*, according to Dr. E. L. Todd.

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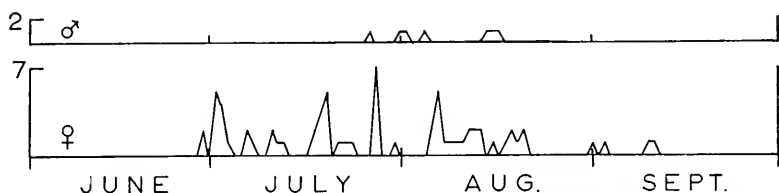
**Studies of the Byron Bog in Southwestern Ontario.
IV. Seasonal Distribution of the Black Fly,
Simulium vittatum Zett. (Diptera:
Simuliidae)**

By W. W. JUDD, Department of Zoology, University of Western
Ontario, London, Ontario

In the description of the Byron Bog (Judd, 1957) it was pointed out that one method of collecting insects in the bog was to make a circular sweep with an insect net, held at arm's length, through the tops of the bushes in the *Chamaedaphnctum calyculatae* association. The net used was one with a rim twelve inches in diameter and the radius of the circle over which the sweep was made was six feet. A single sweep was made each day from May 15 to November 15 in 1956 and all the insects collected each day were sorted and counted. Among the insects so collected were black flies which were all identified as *Simulium* (*Neosimulium*) *vittatum* Zetterstedt by Dr. D. M. Davies, McMaster University, Hamilton, Ontario. Three males and five females are deposited in the collections of McMaster University and all other specimens are deposited in the collection of the Department of Zoology, University of Western Ontario.

While the flies were in flight they were a considerable nuisance to anyone collecting in the bog, for they flew against the face, crawled into one's ears and nose and scuttled along the

crevices between the skin and clothing. At no time were they found to bite. Several authors who have investigated this species have concluded that *S. vittatum* does not bite humans at all or does so only occasionally (Davies, 1950; Davies and Peterson, 1956; Hocking and Pickering, 1954; Hocking and Richards, 1953; Twinn, 1936; Twinn *et al.*, 1948).



Seasonal distribution of males and females of *Simulium vittatum* Zett.

During the period June 29 to September 10 seventy-five flies, 7 ♂♂ (9%) and 68 ♀♀ (91%), were collected by sweeping, the maximum number caught on one day being 7 on July 27 (fig. 1). Males were caught between July 26 and August 16. The preponderance of females is in accord with the findings of Davies (1952) and Twinn *et al.* (1948) who captured more females than males in sweep collections, although a sex ratio of 1:1 was found by Davies (1950) for flies emerging into a cage set on a creek bed. Davies (1952), in reporting on a study of *S. vittatum* in Algonquin Park, records that few specimens were obtained by netting, with only a single male captured by that method. The period during which the flies were caught in the Byron Bog (June 29–September 10) is well within the period during which this species was found in flight and ovipositing (April to October) at Hamilton, Ontario, some ninety miles eastward from the Byron Bog (Davies and Peterson, 1956).

ACKNOWLEDGMENTS

This project was supported by funds from the Government of Ontario granted through the Ontario Research Foundation. The collections were made and the data assembled while the writer held a Summer Research Associateship from the National Research Council of Canada during 1956.

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-

A Note on the Identity of *Parorya valida* Cook (Chilopoda: Geophilomorpha: Oryidae)

By R. E. CRABILL, Jr., Division of Insects, United States
National Museum

Of the major geophilomorph families, Oryidae seems the most poorly represented in America north of Mexico. Indeed, only the ubiquitous *Orphnaeus brevilabiatus* (Newport) has positively been reported within the United States, where it very likely was introduced with cargo from the tropics. Neither *brevilabiatus* nor any other oryid is known to be established here, which stands in striking contrast to the situation in the American tropics where a number of endemic genera and species occur.

For this reason Cook's discovery in 1896 of an endemic new genus, *Parorya*, from Texas or Louisiana seems of extraordinary interest. Unfortunately his new form was inadequately described in an obscure publication¹ and consequently has gone unnoticed by nearly everyone for well over half a century. Although the Count von Attems cited *Parorya* in his roster of oryid genera in 1926,² he was unable to include it in his accompanying key to genera. In addition, the generic and trivial names are conspicuously absent in his celebrated 1929 world monograph

¹ Brandtia, fasc. VII, p. 33, (1896).

² KÜKENTHAL U. KRUMBACH, Handbuch d. Zoologie, IV, p. 354, (1926).

of the order.³ Thus he was aware of the existence of the name in the literature, but, confronted only with the vague and fragmentary original diagnosis, he could not place Cook's centipede with confidence within the oryid system.

Undiscovered for many years, the female holotype (U.S.N.M. Type Number 2363) recently was located in the myriapod collection of the United States National Museum. It is a specimen of the common western Mediterranean *Orya barbarica* (Gervais).⁴

All we know of this specimen's collection is that Schufelt captured it either in Texas or Louisiana, where it must have been introduced with produce from the Mediterranean, a possibility of which Cook made no mention.

Cook was well aware of its obvious similarity to the conspicuous and well-known *barbarica*, for his description is almost entirely concerned with postulated generic differences between the two. (In 1896 *barbarica* was the only known member of *Orya*.) He reported that in his specimen the apical article of the "genital palp," i.e., of the gonopod, is small but distinct, whereas that of *Orya* is rudimentary. Actually, Cook's specimen is practically identical in this feature with North African specimens of *barbarica*. He described the spiracles of *valida* as being much longer and narrower than those of *barbarica*, but I have found the proportions of the former to fall within the range of variability of the latter. His attempt to distinguish between the two on the basis of stigmopleurite shape is invalid for the same reason; the stigmopleurites of *valida* closely resemble those of older, rather than of young, *barbarica* specimens.

On the basis of the original description, perhaps his most compelling argument rests upon the relative size of the two species' pregenital sternites.⁵ He found that this sternite in *barbarica* is pronounced, and described it as rudimentary in *valida*. Ac-

³ Das Tierreich, Lief. 52, (1929).

⁴ Since *valida*, 1896 = *barbarica*, 1835, and each is the genotype of its genus by monotypy, *Parorya* Cook, 1896, is an objective junior synonym of *Orya* Meinert, 1870.

⁵ Attems', rather than Verhoeff's or Broelemann's, terminology is used. See Attems, 1929, p. 26, fig. 35, label *vpg*.

tually, the two plates are identical. Cook's specimen had simply contracted in alcohol, telescoping its rear somites and thereby largely concealing the pregenital sternite beneath the preceding ultimate pedal sternite.

Although Cook had not dissected the mouthparts, he surmised them to be the same in both forms: they are. In summary, I am entirely unable to prove Cook correct and the present disposition of *valida* incorrect. Including the complexities of the pleural sclerites, no apparent detail presents any convincing basis for considering *valida* as anything but an introduced, typical specimen of *Orya barbarica*.

Finally, it is worth mentioning that this seems to be the only report of the presence of this gigantic North African species in the United States.

Review

DIE LARVALSYSTEMATIK DER BLATTWESPEN (Tenthredinoidea und Megalodontoidea) by Herbert Lorenz and Manfred Kraus. Abhandlungen zur Larvalsystematik der Insekten, Nr. 1. PP. vi + 339; figs., 435. Akademie Verlag, Berlin, 1957. Price: paper bd., DM 38.

Compared with the first attempt at a larval classification of the sawflies (Yuasa, in Ill. Biol. Monogr., 1922), this is a more extensive work. It refers most often to Benson's classification of imagines, but for the Nematinae, and for comparisons, both Yuasa and Enslin are considered. There are pages on collecting and rearing, on biology, morphology, and coloration. The main part gives keys to the categories from superfamilies down to species, provides diagnoses and biological notes on 236 European species, and supplies a list of food plants. Recent classifications such as Benson's are largely confirmed, except for some genera in the Nematinae, and the tribes in certain subfamilies. Where difficulties exist, larval studies often suggest solutions; thus, the Dolerinae should remain a separate subfamily.

Such works as this are much needed, for although fine work has been done on some, notably the aquatic, larvae, it is appalling to think of how much remains to be done by the increasingly scarce systematists.—R. G. SCHMIEDER.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Dominick J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

Melanotus (Elateridae). Revising Nearctic species; desire to see all available specimens. Will return at end of study. L. W. Quate, Department of Entomology, University of Nebraska, Lincoln, Nebr.

INDEX TO VOLUME LXVIII

(* Indicates new genera, names, etc.)

ALLEN, H. W. A Japanese weevil abundant in the Philadelphia area	169
ALEXANDER, C. P. James Speed Rogers, 1891-1955	85
ANANTHAKRISHNAN, T. N. <i>Bamboosiella</i> nov. gen. (Phlaeothripidae, Tubulifera) from India	65
ARNAUD, P. H. The occurrence of <i>Salmacia longipuvilli</i> in the Hawaiian Islands (Diptera: Larvaevoridae)	259
BALDUF, W. F. The weight of puparia of <i>Rhagoletis basiola</i> (O. S.) (Trypetidae: Diptera)	163
BECHTEL, R. C. and E. I. SCHLINGER. Biological observations on <i>Ectemnius</i> with particular reference to their <i>Ogcodes</i> prey (Hymenoptera: Sphecidae.—Diptera: Acroceridae)	225
BLICKLE, R. L. and J. G. CONKLIN. Distribution of <i>Dermacentor variabilis</i> (Say), the American dog tick, in New Hampshire	34
(See also under Morse)	
BRADLEY, J. C. A new Brazilian species of <i>Campsomeris</i> (Hymenoptera: Scoliidae)	97
BROWN, F. M. Two early entomological collectors in Colorado	41
BROWN, W. L., JR. Distribution and variation of the ant <i>Formica dakotensis</i> Emery	165
BROWN, W. L., JR. and E. O. WILSON. A new parasitic ant of the genus <i>Monomorium</i> from Alabama, with a consideration of the status of genus <i>Epixenus</i> Emery ..	239
BURKS, B. D. A new <i>Profenusa</i> from the California plane tree (Hymenoptera: Tenthredinidae)	207
BUSCEMI, P. A. First record of <i>Endochironomus sub-tendens</i> (Townes) larval overwintering cocoons from North America (Diptera, Tendipedidae)	157
CHAMBERLIN, R. V. A new henicopid chilopod from Peru	126

CONKLIN, J. G.	(See under Blickle, R. L.)	
CRABILL, R. E., JR.	A note on the identity of <i>Paroryza valida</i> Cook (Chilopoda: Geophilomorpha: Oryidae) ..	265
DREISBACH, R. R.	A new species in the genus <i>Arachno-proctonus</i> (Hymenoptera: Psammocharidae) with photomicrographs of the genitalia and subgenital plate	72
DVORAK, R.	A character useful in separating <i>Cafius</i> (sg. <i>Bryonomus</i> Csy.) <i>seminitens</i> Horn and <i>canescens</i> Makl. (Coleoptera: Staphylinidae)	17
EVANS, H. E.	Notes on <i>Stictia</i> new to the United States (Hymenoptera: Sphecidae: Bembecini)	76
FROST, S. W.	More about Membracidae at lights	77
GRESSITT, J. L.	Pacific Science Congress	79
	Fire at the Budapest Museum	79
HEMMING, F.	Announcement: The International Trust for Zoological Nomenclature	251
IGNOFFO, C. M.	New records of mammal-lice associations	162
JUDD, W. W.	Chalcidoid wasps (Eulophidae, Eurytomidae) reared from bullet gall caused by <i>Disholcaspis mamma</i> (Cresson) (Cynipidae)	193
	Diptera (Calliphoridae, Heleidae and Chloropidae) collected from birds' nests at London, Ontario	32
	Insects reared and collected from the pond snail, <i>Lymnaea palustris</i> Müll., at London, Ontario	69
	Studies of the Byron Bog in southwestern Ontario. IV. Seasonal distribution of the black fly, <i>Simulium vittatum</i> Zett. (Diptera: Simuliidae)	263
KOLDERIE, M. Q.	(See under Richards, A. G.)	
KORMONDY, E. J.	Review: A morphological study of a relic dragonfly <i>Epiophlebia superstes</i> Selys	53
KROMBEIN, K. V.	The synonymy of two species of North American <i>Chrysis</i> , sens. str. (Hymenoptera, Chrysididae)	191
LA RIVERS, I.	A new <i>Ambrysus</i> from Mexico (Hemiptera, Naucoridae)	232
LEWIS, R. E.	Known distribution of a bat flea, <i>Nycteridopsylla chapini</i> Jordan (Siphonaptera: Ischnopsyllidae)	48

LINSLEY, E. G. New longicorn beetles from Texas (Coleoptera, Cerambycidae)	159
MICHENER, C. D. Notes on the biology of a parasitic bee, <i>Isepeolus viperinus</i> (Hymenoptera, Anthophotinae) ...	141
MOCKFORD, E. L. Some Psocoptera from Tikal, Guatemala	197
MORSE, W. J. and R. L. BLICKLE. Additions and Corrections to the list of New Hampshire Trichoptera	127
MUESEBECK, C. F. W. New World Apanteles parasitic on <i>Diatraea</i> (Hymenoptera: Braconidae)	19
PECHUMAN, L. L. A <i>Tabanus</i> not previously known from the United States (Diptera: Tabanidae)	118
PHILLIPS, M. E. How much do you pay for your fun? ..	29
PORTER, C. C. A new subspecies of <i>Megarhyssa atrata</i> (Fabricius) (Hymenoptera: Ichneumonidae)	206
PRITCHARD, A. E. Review: Beiträge zur Systematik der Itonididae (= Cecidomyiidae, Diptera)	26
REHN, J. A. G. On the removal of certain New World genera from the Decticinae to the Listroscelinae (Orthoptera: Tettigoniidae)	175
REINHARD, H. J. New American muscoid Diptera (Sarcophagidae, Tachinidae)	99
RICHARDS, A. G. and M. Q. KOLDERIE. Variation in weight, developmental rate, and hatchability of <i>Oncopeltus</i> eggs as a function of the mother's age	57
ROBACK, S. S. New records of <i>Plecia</i> (Diptera: Bibionidae)	247
Review: Evolution and classification of the mountain caddisflies	81
ROSS, H. H. New oak-inhabiting species of <i>Erythroneura</i> from Illinois (Hemiptera, Cicadellidae)	183
SANDERSON, M. W. The status of the tortoise beetle <i>Metriorhina ormondensis</i> Blatchley	222
SCHLINGER, E. I. (See under Bechtel, R. C.)	
SCHMIEDER, R. G. Hermann Weber (1899-1956)	49
Notes: New book on tropical American butterflies	80
Notes: Dancing bees at the equator and nocturnal dances	131

Review: A textbook of entomology	82
Review: Biology of the Heteroptera	138
Review: Die Larvalsystematik der Blattwespen	267
Review: General and applied entomology	174
SELANDER, R. B. A new Mexican Eupompha (Coleoptera, Meloidae)	123
SINHA, R. N. A study of oenocytes in <i>Oryzaephilus mercator</i> (Fovel) (Coleoptera, Cicujidae) with phase microscopy)	119
STAHNKE, H. L. A new species of scorpion of the Vejovidae: <i>Paruroctonus mesaensis</i>	253
STALLINGS, D. B. and J. R. TURNER. Four new species of <i>Megathymus</i> (Lepidoptera, Rhopalocera, Megathymidae)	1
STANNARD, L. J. Review: Systematics of the Suborder Tubulifera	81
STROHECKER, H. F. Budapest Museum	134
SUBLETTE, J. E. The immature stages and female of <i>Poly- pedilum</i> (<i>Polypedilum</i>) <i>obtusum</i> Townes (Tendipedidae: Diptera)	37
TURNER, J. R. (See under Stallings, D. B.)	
WALKER, E. M. Review: The neotropical species of the "Subgenus <i>Aeschna</i> " sensu Selyssi 1883 (Odonata) ...	135
WHITAKER, J. O. <i>Trichobius</i> (Streblidae) in West Vir- ginia (Dipt.)	237
WILSON, E. O. (See under Brown, W. L.)	
WOOLLEY, T. A. Redescriptions of Ewing's Oribatid mites (Acarina: Oribatei)	
I. Families Zetorchestidae, Hermaniellidae	89
II. Family Carabodidae	113
III. Family Eremaeidae	147
IV. Family Archipteriidae	177
V. Families Belbidae and Opiidae	211

GENERAL SUBJECTS

Biology of Isepeolus	141
Books received	55, 223, 251
Budapest Museum fire ...	79, 134
Chalcids from bullet galls ...	193
Colorado, early collectors in ..	41
Crabronids and their prey ...	225
Dancing bees at the equator ..	131
Development of eggs of <i>Onco-</i> <i>peltus</i>	57
ENTOMOLOGICAL NEWS, finan- cial needs	29
Grants at Oklahoma	80
Howard, Winslow J., collector	45
How much do you pay for your fun?	29
Japanese weevil in Philadelphia	169
Laboratory training courses ..	146
Meetings of Amer. Ent. Soc.	250
Nomenclature notice	
..... 40, 156, 190, 223, 246	
Pacific Science Congress	79
Separates, Change of policy on	167
Snails, insects from	69
Wood, William S., collector ..	42
Zoogeography of Pacific in- sects	133

OBITUARY NOTICES

Rogers, James Speed	85
Weber, Hermann	49

PERSONALS

Bradley, J. C.	25
Brandt, W. W.	134
Gressitt, J. L.	134
Hardy, D. E.	134
Johannsen, O. A.	25
Kaszab, Z.	134
Klotz, A. B.	80
Munroe, E. G.	134
Sabrosky, C. W.	134
Szent-Ivany, J. J. H.	79

REVIEWS

Books received	55, 223, 251
Calvert: The neotropical species of the "Subgenus <i>Aeschna</i> " sensu Selysii 1883 (<i>Odo-</i> <i>nata</i>)	135
Cott: Systematics of the Sub- order Tubulifera	81
Lindauer: Dancing bees at the equator and nocturnal dances	131
Little: General and applied entomology	174
Möhn: Beiträge zur Systematik der Itonididae (= Cecido- myidae, Diptera)	26
Natural enemies of insect pests (film)	111
Ross: Evolution and clas- sification of the moun- tain caddisflies	81
A textbook of entomology	82

GEOGRAPHICAL DISTRIBUTION

Argentina: Hym.	21
Arizona: Arach. 253; Dipt. 105, 107; Lep.	2
Brazil: Hym.	24, 97
California: Hym.	209
District of Columbia: Hym. ..	22
Florida: Dipt.	111
Guatemala: Psocopt.	197
Illinois: Homop.	184-190
India: Thysanop.	66
Mexico: Col. 123; Dipt. 100, 103, 104, 109; Hemip.	235
New Mexico: Hym. 74; Lep. 9	
Peru: Chilop.	126
Texas: Col. 159; Dipt. 102, 106; Lep.	6, 13

COLEOPTERA

<i>Aleochara</i>	69
<i>Athryoglossa</i>	70

<i>atriplicis</i> ,* <i>Amanus</i>	160	<i>nana</i> , <i>Pherbellia</i>	70
<i>bifasciatus</i> , <i>Pseudocnecorhinus</i> ..	169	<i>nearctica</i> , <i>Plecia</i>	248
<i>Bryonomus</i>	17	<i>noera</i> ,* <i>Phorocera</i>	109
<i>canescens</i> , <i>Cafius</i>	18	<i>obtusum</i> , <i>Polypedilum</i> , stages	
<i>inflaticollis</i> ,* <i>Crossidius</i>	159	of	37
<i>mercator</i> , <i>Oryzaephilus</i> , oeno-		<i>pellecta</i> ,* <i>Phorocera</i>	106
cytes	119	<i>plagiata</i> , <i>Plecia</i>	248
Omaliinae	70	<i>quadriscetosus</i> , <i>Trichobius</i>	237
<i>ormondensis</i> , <i>Mettriona</i> , key ..	223	<i>rostellata</i> , <i>Plecia</i>	248
<i>ovipennis</i> , <i>Cymatodera</i>	229	<i>rufithorax concava</i> , <i>Plecia</i> ...	249
<i>Philonthus</i>	70	<i>siala</i> , <i>Protocalliphora</i>	32
<i>Pseudocnecorhinus</i> in Phila. area	174	<i>sinuata</i> , <i>Sarcophaga</i>	70
<i>purpurata</i> , <i>Mettriona</i>	223	<i>Sphacrophoria</i> sp.	228
<i>quadrisingatus</i> , <i>Glischrochilus</i> ..	69	<i>stabulans</i> , <i>Muscina</i>	70
<i>seminitens</i> , <i>Cafius</i>	17	<i>stolida</i> ,* <i>Phorocera</i>	107
<i>sericeus</i> , <i>Chlaenius</i>	70	<i>texasus</i> , <i>Tabanua</i>	76
<i>terminalis</i> ,* <i>Eupompha</i>	123	<i>travisi</i> , <i>Culicoides</i>	33
<i>texasus</i> ,* <i>Heterachthes</i>	159	<i>vittatum</i> , <i>Simulium</i>	263
		<i>vittiger</i> , <i>Tabanus</i>	118

DIPTERA

<i>alacris</i> , <i>Plecia</i>	247
<i>americana</i> , <i>Plecia</i>	247
<i>Baromyia</i> *	100
<i>basiola</i> , <i>Rhagoletis</i> , weights of	
puparia	163
<i>corynorhini</i> , <i>Trichobius</i>	237
<i>curvistylata</i> , <i>Plecia</i>	248
Diptera from bird's nests	32
<i>eucthes</i> ,* <i>Plagiomima</i>	104
<i>eugonatus</i> , <i>Ogcodes</i>	225
<i>faceta</i> ,* <i>Plagiomima</i>	105
<i>floridensis</i> ,* <i>Eucromasia</i>	109
<i>fuscipes</i> , <i>Pherbellia</i>	70
<i>Hylemya</i>	228
<i>inconismus</i> , <i>Phytodes</i>	99
Itonididae, review of book ...	26
<i>labeosus</i> ,* <i>Parcpalpus</i>	102
<i>longiparvilli</i> , <i>Salmacia</i> (ill.) in	
Hawaii, host data and bib-	
liography	259
<i>luteiceps</i> , <i>Oscinella</i>	34
<i>Megaselia</i> sp.	228
<i>melamypga</i> , <i>Sarcophaga</i>	70
<i>mitis</i> ,* <i>Baromyia</i> *	101

HEMIPTERA

<i>drakei</i> ,* <i>Ambrysus</i>	232
<i>fasciatus</i> , <i>Oncopeltus</i>	57
<i>Oncopeltus</i> , physiology of eggs	57

HOMOPTERA

<i>alicia</i> ,* <i>Erythroneura</i>	185
<i>amethica</i> ,* <i>Erythroneura</i>	186
<i>arpeggia</i> ,* <i>Erythroneura</i>	188
<i>ccona</i> ,* <i>Erythroneura</i>	184
<i>lenta</i> , <i>Erythroneura</i>	183
<i>marilandica</i> ,* <i>Erythroneura</i> ..	183
Membracidae taken at lights ..	77
<i>metopia</i> ,* <i>Erythroneura</i>	185
<i>mimica</i> ,* <i>Erythroneura</i>	190
<i>protuma</i> ,* <i>Erythroneura</i>	188
<i>trivittata</i> , <i>Erythroneura</i>	186
<i>tumida</i> , <i>Erythroneura</i>	188

HYMENOPTERA

<i>abditus</i> ,* <i>Apanteles</i>	23
<i>advena</i> , <i>Monomorium</i>	244

<i>algiricum</i> , <i>Monomorium</i>	245
<i>auripes</i> , <i>Aphaereta</i>	69
<i>biroi</i> , <i>Monomorium</i>	244
<i>carolina</i> , <i>Stictia</i>	76
Chalcids from bullet galls ...	193
<i>Chrysis</i> , new synonymy in ...	191
<i>cinerca</i> , <i>Bembix</i>	118
Crabronids, prey of	225
<i>creticum</i> , <i>Monomorium</i>	243
Dancing bees at equator	131
<i>dakotensis</i> , <i>Formica</i>	165
<i>diatraca</i> , <i>Apanteles</i>	25
<i>deplanatus</i> ,* <i>Apanteles</i>	24
<i>Epixenus</i> , status of	239
<i>guineense</i> , <i>Monomorium</i>	245
<i>hesperium</i> , <i>Monomorium</i>	243
<i>impunctatus</i> , <i>Apanteles</i>	20
<i>kerri</i> , <i>Colletes</i> , biology	141
<i>lineata</i> * <i>atrata</i> , <i>Megarhyssa</i> ..	206
<i>mamma</i> , <i>Disholcaspis</i> , chalcids from	193
<i>mellifica</i> , <i>Apis</i>	131
<i>metococcus</i> ,* <i>Monomorium</i>	239
<i>minator</i> ,* <i>Apanteles</i>	20
<i>minimum</i> , <i>Monomorium</i>	239
<i>Monodontomerus</i>	228
<i>pattoni</i> , <i>Chrysis</i>	191
<i>phagus</i> , <i>Tetrastichus</i>	193
<i>Phygadeuon</i>	70
<i>plantanae</i> ,* <i>Profenusa</i>	207
<i>propria</i> , <i>Chrysis</i>	191
<i>querci-globuli</i> , <i>Eurytoma</i>	193
<i>signata</i> , <i>Stictia</i>	76
<i>spiniferus</i> , <i>Ectemnius</i> , prey of ..	229
Symphyla, classification of lar- vae (book)	267
<i>tenebrica</i> ,* <i>Campsomeris</i>	97
<i>variegatus</i> ,* <i>Arachnoproctonus</i> ..	72
<i>viperinus</i> , <i>Iscopolus</i> , biology ..	141
<i>viperinus</i> , <i>Iscopolus</i> , immature stages	141
<i>vireida</i> , <i>Stictia</i>	76
<i>xanthopus</i> , <i>Apanteles</i>	20
<i>sizaniae</i> ,* <i>Apanteles</i>	22

LEPIDOPTERA

<i>alliae</i> ,* <i>Megathymus</i>	1
<i>carlsbadensis</i> ,* <i>Megathymus</i> ..	8
<i>florenceae</i> ,* <i>Megathymus</i>	12
<i>judithae</i> ,* <i>Megathymus</i>	5

ODONATA

<i>Aeschnidae</i> , book on neotropical	135
<i>superstes</i> , <i>Epiophlebia</i> , book on	53

ORTHOPTERA

<i>Capnobotes</i>	175
Decticinae, removal of genera to Listroscelinae	175
<i>Neobarettia</i>	175
<i>Rhenia</i>	175

SMALLER ORDERS

Anoplura on mammals	162
<i>aribicola</i> , <i>Hoplopleura</i> (Ano- plura)	162
<i>bicoloripes</i> ,* <i>Bamboosicella</i> (Anoplura)	65
<i>cantralli</i> ,* <i>Ghesquierella</i> (Psoc- optera)	204
<i>chapini</i> , <i>Nycteridopsylla</i> (Si- phonaptera)	48
<i>citellinus</i> , <i>Neohaematopinus</i> (Anoplura)	162
<i>hesperomydis</i> , <i>Hoplopleura</i> (Anoplura)	162
<i>lacciusculus</i> , <i>Neohaematopinus</i> (Anoplura)	162
<i>Lichenomima</i> sp. (Psocoptera)	202
<i>Metylophorus</i> sp. (Psocoptera)	205
<i>petenensis</i> ,* <i>Epipsocus</i> (Psoc- optera)	200
<i>pinnata</i> , <i>Fahrenholzia</i> (Ano- plura)	162
<i>reducta</i> , <i>Fahrenholzia</i> (Ano- plura)	162
<i>setoni</i> , <i>Haemodipsus</i> (Ano- plura)	162

<i>spinosa</i> ,* <i>Triplocania</i> (Psocoptera)	198
<i>splendida</i> ,* <i>Lonicera</i> (Psocoptera)	197
<i>tikalus</i> ,* <i>Psocidus</i> (Psocoptera)	202
Trichoptera, book on	81
Trichoptera of New Hampshire, list of	127

NON-HEXOPODA

SCORPIONIDA

<i>mesaensis</i> ,* <i>Paruractonus</i>	253
--	-----

ACARINA

Archipteriidae	177
Belbidae	211
<i>boletorum</i> , <i>Lucoppia</i>	152
<i>borcalis</i> , <i>Archipteria</i>	179
<i>brexitarsus</i> , <i>Eremaus</i>	154
Carabodidae	113
<i>curviseta</i> , <i>Lucoppia</i>	149
<i>equestris</i> , <i>Zetorchestes</i>	90
Eremaeidae	147
<i>flavus</i> , <i>Carabodes</i>	113
<i>globifer</i> , <i>Damaeus</i>	215
<i>Heterodamacus</i>	212
<i>magnipilosa</i> , <i>Lucoppia</i>	147
<i>magnisetosus</i> , <i>Heterodamacus</i> ..	212

<i>michacli</i> , <i>Damaeus</i>	214
<i>minuta</i> , <i>Oppia</i>	218
<i>occidentalis</i> , <i>Hermanniclla</i> ...	93
Opiidae	211, 218
<i>oregonensis</i> , <i>Archipteria</i>	178
Oribatei, Redescriptions of Ewing's	89, 113, 147, 211
<i>robusta</i> , <i>Hermanniclla</i>	92
<i>subniger</i> , <i>Cepheus</i>	116
<i>subnigra</i> , <i>Hermanniclla</i>	96
<i>variabilis</i> , <i>Dermacntor</i>	34

CHILOPODA

<i>mesaensis</i> ,* <i>Paruractonus</i>	253
--	-----

ACARINA

<i>andris</i> , <i>Lamyctes</i>	127
<i>barbarica</i> , <i>Orya</i>	265
<i>ceronus</i> ,* <i>Lamyctes</i>	126
<i>valida</i> , <i>Parorya</i>	265

NON-ARTHROPODA

Bat, Streblidae on	237
Bats, Siphonaptera on	48
Birds, Diptera from nests of ..	32
<i>Lymanaca palustris</i> , insects from	69
Mammals (Rodents), lice of ..	162

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Vol. LXIX

No. 1

CONTENTS

Clarke—New Microlepidoptera from Japan	1
Emerson—Lectotype for <i>Goniodes minor</i>	6
Weber—Nomenclatural notes on <i>Proatta</i> and <i>Atta</i>	7
Chamberlin—Records of Chilopods from Florida	13
Crabill— <i>Geophilus proximus</i> , and key to congeners	15
Ehrlich—Lepidoptera from tundra-taiga in Alaska	17
Lauck—Notes on a new habitat for <i>Nerthra</i>	20
Medlar—Parasitism of bees by <i>Leucopsis affinis</i>	21
Arnaud— <i>Cressonomyia</i> new name for <i>Plagiopsis</i>	24
Williams—17-Year locust on Cape Cod	25
Notes and News in Entomology	
Colloquium on Zoological Nomenclature	26
Velia's clock	27-6

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No. 1

A New Genus and Two New Species of Microlepidoptera from Japan (Gelechiidae)

By J. F. GATES CLARKE, United States National Museum,
Washington 25, D. C.

The species described below were included in material submitted by Dr. S. Issiki, Entomological Laboratory, Faculty of Agriculture, University of Osaka Prefecture, Sakai, Osaka, Japan. The new species, *Chelaria sapindivora*, adds another to the long list of Oriental species, and the new genus and species, *Paralida triannulata*, augments the rapidly growing list of Japanese microlepidoptera.

PARALIDA, new genus

Type of the genus: Paralida triannulata, new species.

Head smooth; antenna simple, slightly thicker in male than in female, without pecten. Maxillary palpus short, not appressed to tongue. Labial palpus with very large, expanded tuft divided roughly into three parts; third segment erect, slightly roughened posteriorly with loose scales. Thorax smooth. Forewing long, narrow, apex produced, termen emarginate, 12 veins; 1b furcate; 2 and 3 remote, both arising well before end of cell; 4 from corner of cell; 5 distant from 6; 7 and 8 out of the stalk of 6, 6 to apex; 9, 10, 11 about equidistant, 11 from middle of cell. Hind wing without cubital pecten, termen convex, 8 veins; 2 remote from 3, 3 from before angle of cell; 3 and 4 separate, 4 from angle; 6 and 7 stalked; cross-vein between cell and vein 8 complete. Hind tibia heavily clothed with long hairlike scales. Abdomen not spined.

Male genitalia: Symmetrical; harpe simple. Uncus and gnathos well developed. Vinculum weak.

Female genitalia: Signum present. Ductus bursae membranous.

In Meyrick's key (Genera Insectorum, 1925, fasc. 184) *Paralida* runs to *Chelaria*. Meyrick's *Chelaria*, however, is composite and needs refinement. The produced apex and the absence of scale-tufts of the forewing of *Paralida* will distinguish it from anything now included in *Chelaria*.

This genus is similar to the Formosan *Phrixocrita* Meyrick but differs widely from it by the stalking of veins 6, 7, and 8 and the absence of scale-tufts of forewing; also by the greatly expanded tuft of the labial palpus. In addition, veins 2, 3, and 4 of the forewing of *Paralida* are widely separated.

***Paralida triannulata*, new species**

Alar expanse, 22-24 mm.

Labial palpus buff; second segment with slight grayish suffusion outwardly in basal half. Antenna buff with three, conspicuous black annuli near distal end. Head, thorax and forewing buff shaded with olivaceous; head and thorax with an indistinct, narrow, median fuscous line; between bases of veins 10 and 11 a distinct brown spot followed by a yellowish streak in which are a few brownish scales at end of cell; between veins 8 and 9 a slender fuscous streak; cilia buff with some grayish suffusion. Hind wing grayish-fuscous; cilia buff with considerable grayish-fuscous suffusion anally. Legs buff, shaded with olivaceous; distal tarsi fuscous.

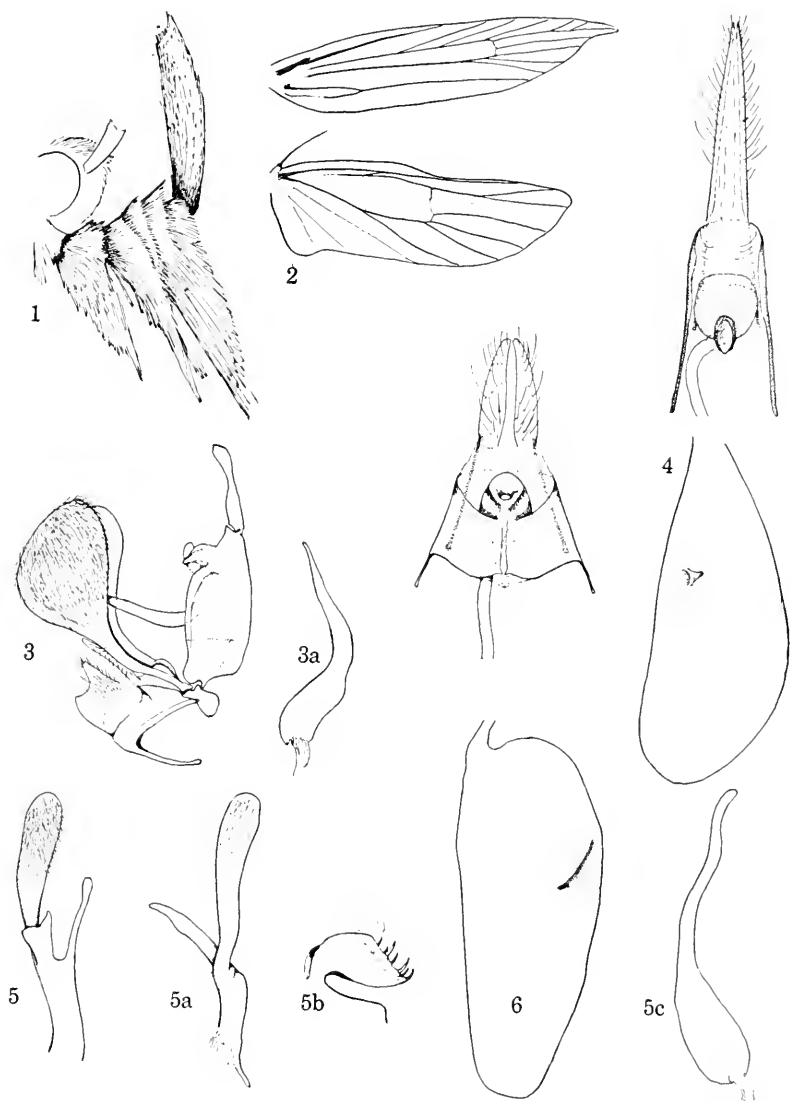
EXPLANATION OF FIGURES

FIGS. 1 to 4. *Paralida triannulata*, new species

- | | |
|-------------------------------------|-------------------------------------|
| 1. Labial palpus | 3a. Aedeagus |
| 2. Venation of right wings | 4. Ventral view of female genitalia |
| 3. Lateral aspect of male genitalia | with part of ductus bursae |
| with aedeagus removed. | removed |

FIGS. 5 to 6. *Chelaria sapindivora*, new species

- | | |
|-----------------------------|-------------------------------------|
| 5. Left harpe | 5c. Aedeagus |
| 5a. Right harpe | 6. Ventral view of female genitalia |
| 5b. Lateral aspect of uncus | with part of ductus bursae |
| | removed |



FIGS. 1-6.

Male genitalia: See figures (Slide No. 10612, type). Harpe greatly dilated distally. Gnathos a very strong hook, nearly as long as tegumen. Uncus nearly as long as vinculum, dilated distally; aedeagus curved, pointed.

Female genitalia: See figure (Slide No. 10613, paratype). Ostium elongate, oval. Signum a large thornlike process.

Type: U.S.N.M. No. 63586.

Type locality: Honsyû, Kinki, Ikeda (Em 16.ix.49) S. Issiki.

Food plant: *Melia azedarach* var. *japonica* (G. Don) Makino. (From larvae in longitudinal fold of leaves.)

Remarks: Described from the type male, one male and one female paratypes all with same data. Paratype ♀ in U.S.N.M., the paratype ♂ is in Dr. Issiki's collection.

I know of no other described gelechiid with which this striking species can be compared.

***Chelaria sapindivora*, new species**

Alar expanse 13–17 mm.

Labial palpus sordid whitish; second segment suffused ochereous inwardly, tawny-olive outwardly with some cinereous at apex; third segment with four broad grayish-fuscos annuli, separated only by narrow lines of the ground color. Antenna grayish-fuscos annulated with dull tawny. Head, thorax and ground color of forewing grayish-fuscos, the scales tipped with cinereous; thorax with a few scattered tawny-olive scales; extreme costa of forewing tawny-olive except where ground color shows through; on costa, five raised tawny-olive scale tufts mixed with grayish-fuscos and cinereous; of the five tufts, that at basal fifth is large and conspicuous, that at middle moderate, and outer three inconspicuous, scarcely discernable in some specimens; near base of wing, in costal third, a small raised scale-tuft similar to the others; three tawny-olive blotches, one at basal fifth, one at middle of wing, and another in apical third, the latter with spot of ground color in center; cilia grayish-fuscos, tipped with cinereous. Hind wing fuscous, lighter

basally; cilia grayish-fuscos. Legs ocherous-white suffused and annulated with fuscous. Abdomen fuscous with a longitudinal, ocherous-white band ventrally.

Male genitalia: See figures (Slide No. 10614, type). The left harpe is divided into three elements, the right into two. At their bases the harpes are closely involved with elements of the anellus, so much so that they appear as one structure. Around the distal edge of the uncus is a row of sharp, short setae.

Female genitalia: See figures (Slide No. 10615, paratype). The large sclerotized area surrounding the ostium characterizes this species. Inception of ductus seminalis slightly posterior to bursa copulatrix.

Type: U.S.N.M. No. 63587.

Type locality: Honsyû, Kinki, Nisinomiya (Em. 16.vi.1949), S. Issiki.

Food Plant: *Sapindus mukurossi* Gaertn. (tying leaves).

Remarks: Described from the type male, one male and two female paratypes as follows: Nara (♂, 18.vi.1956; ♀, 19.vi.1956): ♀, same data as type (14.vi.1949). One ♂ and one ♀ paratypes in U.S.N.M., and one ♂ paratype in Dr. Issiki's collection.

This species is very similar to *C. paroctas* Meyrick from Ceylon, but differs by the large, unbroken dark area before middle of forewing, the greater expanse of the tawny areas and the darker hind wing. The uncus of *paroctas* is clothed with numerous fine hair-like setae, while that of *sapindivora* has a marginal row of short, stout setae. The female of *paroctas* is not known, but the female of *petrinopis* Meyrick, from Osaka, Japan, appears to be closely related to *sapindivora*. The most conspicuous differences are the slender, membranous ductus bursae and broad, sclerotized area surrounding the ostium of *sapindivora* compared to the stout, partly sclerotized ductus bursae and narrowly sclerotized area surrounding the ostium of *petrinopis*.

Designation of a Lectotype of *Goniodes minor* Piaget (Philopteridae: Mallophaga)

By K. C. EMERSON, Stillwater, Oklahoma

In 1880, Piaget (Les Pediculines, p. 256, pl. 21, fig. 3) described and illustrated *Goniodes minor* from specimens collected from *Columba tigrina* = *Streptopelia chinensis tigrina* (Temminck), *Columba bitorquata* = *Streptopelia bitorquata* (Temminck) and pigeons domestiques = *Columba livia* "domestica." The name is preoccupied by *Goniocotes minor* Piaget, 1880 (p. 241) = *Goniodes minor* (Piaget), 1880 (p. 241). Johnston and Harrison, in 1912 (Proc. Royal Soc. Queensland, vol. 24, p. 19), proposed *Goniodes piageti* as a *nomen novum* for *Goniodes minor* Piaget, 1880 (p. 256).

Specimens from each of the hosts mentioned by Piaget have been examined. The forms are not conspecific, but all belong to the present genus *Coloceras* Taschenberg, 1882. I hereby designate as lectotype of *Goniodes minor* Piaget, 1880 (p. 256), the male specimen on slide no. 987 of Piaget's syntypes in the British Museum (NH). The lectotype and two female syntypes on this slide have the collection data "*Columba tigrina*." This form is the larger of the two species of *Coloceras* normally found on *Streptopelia chinensis tigrina* (Temminck). The female syntypes agree with the description and illustration of *Coloceras chinense* (Kellogg and Chapman), 1902 (J. N. Y. Ent. Soc., vol. 10, p. 160, pl. 13, fig. 5); and in all probability is a synonym of that species.

Nomenclatural Notes on *Proatta* and *Atta* (Hym.: Formicidae)

By NEAL A. WEBER, Swarthmore College, Swarthmore,
Pennsylvania

As a result of studies ¹ in the three chief European collections of fungus-growing ants ² synonymies and other changes are clearly indicated. Most of the several hundred forms in the literature were described by Emery, Forel and Santschi and their collections are in excellent condition.

Field work and laboratory studies of living colonies have provided information on variability within a species that was not available when descriptions were first published. It has become clear that much variation even within a nest series is normal and that many species have a considerable range within the Neotropical Region.

PROATTA Forel

1912. *Proatta*, Forel, Rev. Suisse Zool. 20: 768

Proatta butteli Forel

1912. *Proatta butteli* Forel, Rev. Suisse Zool. 20: 769

The types remaining in the Forel collection and two pins in the Santschi collection were examined. All were from Singapore and collected by v. Buttel. One of two types in the Forel collection carried the additional information "Soengi Bandan, 26. iv. 1912, v. Buttel No. 403."

While it is true that *Proatta buttelli* is strikingly like an attine, this is taken here to be an example of convergence in worker

¹ Supported by a grant from the National Science Foundation.

² Those of Forel in the Muséum d'Histoire Naturelle in Geneva, Switzerland, in charge of Dr. Ch. Ferrière; of Santschi in the Naturhistorisches Museum, Basel, Switzerland, in charge of Dr. Fred Keiser; and of Emery in the Museo Civico Di Storia Naturale, Genoa, Italy, in charge of Dr. Delfa Guiglia. Their cordial reception of the author is appreciated.

morphology and not necessarily an indication of phylogenetic relationships. The spinosity is especially like that of *Mycocepurus*, and another and unrelated ant with comparable spinosity is *Orectognathus antennatus* of New Zealand. *Proatta butteli* differs markedly from attines in having the clypeus produced as an angular lobe, which is impressed in the middle and with lateral carinae, and in having a single, large median spine on the basal surface of the epinotum anterior to the usual epinotal spines. The antenna of the worker is 12-segmented and the anterior tarsi are not dilated.

There is no evidence that *Proatta* is a fungus-grower and it is not considered here to be a member of the *Attini*. At the present time this tribe is known only to be New World in distribution.

ATTA (Fabricius), Mayr emend.

1804. *Atta* (part.), Fabricius, Syst. Piez. p. 421
1865. *Atta* (excl. *Acromyrmex*), Mayr, Novara Reise, Formic., p. 18, 78
1942. *Atta* (subg. *Archacatta*), Gonçalves, Soc. Brasil de Agron. Bol. 5: 342
1942. *Atta* (subg. *Neoatta*), Gonçalves, Soc. Brasil de Agron. Bol. 5: 346. New Synonymy.
1950. *Atta* (subg. *Palacatta*), Borgmeier, Mem. Inst. Oswaldo Cruz 48: 244. New Synonymy.
1950. *Atta* (subg. *Epiatta*), Borgmeier, Mem. Inst. Oswaldo Cruz 48: 244. New Synonymy.

The most conspicuous and economically important fungus-growing ants are those belonging to the genus *Atta*. The taxonomic studies by Gonçalves (1942) and Borgmeier (1950) and the biological studies by Autuori and others in recent years have aided considerably in our understanding of this genus. An examination of certain types in the European collections makes it possible here to fix the identity of several forms. The studies of Gonçalves and Borgmeier must be consulted for the genus itself. In as homogeneous a group of species as *Atta* contains, the present author is reluctant to use subgenera. When one considers the tribe as a whole, *Atta* forms the most

compact group of species and the similarities are overwhelmingly more significant than the differences.

Examination of the three European collections confirmed the general South and North American views on the identity of the two Linnean species, *cephalotes* and *sexdens*. Both appeared to have been described from Guiana (probably Surinam) specimens. The ecological distribution of the two in British and Venezuelan Guiana has been described (Weber, 1946, 1947). The typical *cephalotes* has been considered to occur here and in Trinidad. The soldier is large and conspicuously shiny on the occiput. Media and minor workers are shiny and a concolorous pale ferruginous. The typical *sexdens* is absent from Trinidad but Panama specimens appear identical to the Guiana specimens, a range markedly greater than indicated on Eidmann's maps (1935, 1937).

***Atta cephalotes* ssp. *isthmicola* Weber**

1941. *Atta cephalotes* subsp. *isthmicola* Weber, Rev. de Ent. 12: 127

While this form may be a synonym, the Emery, Forel and Santschi collections do not contain any types that are clearly the same. The most striking characters are the bicolored and shiny integument of the worker, the thorax being a distinctly darker ferruginous than the head and gaster. Dead as well as living ants show this clearly and parts of colonies maintained in the laboratory for many months on several occasions do not change in this respect.

The distribution of *isthmicola* includes the Cerro Campana some 50 miles southwest of Panamá City, Panamá, an area visited through the courtesy of Graham B. Fairchild and Carl M. Johnson. Above 2,000 feet in forested areas the ants build large nests in the clay soil. Males and females were secured by Dr. Fairchild and Ratibor Hartmann in May, 1957. The 1938 type colony on Barro Colorado Island disappeared before 1954 and the site is occupied by the very different *Atta colombica tonsipes*.

***Atta cephalotes* ssp. *lutea* Forel**

1893. *Atta lutea* Forel, Ann. Soc. Ent. Belg. 37: 587

The type series in the Forel collection consisted of 15 pins, two being designated as types, the remainder as cotypes. All were collected by Jeffreys in Barbados. There is no maxima worker or soldier but workers of various sizes smaller than the maxima. All are uniformly pale brownish yellow and finely punctate on the head. A pin of three workers (media to maxima) in the American Museum of Natural History and one secured by the author through exchange with Dr. Ferrière are of this type series. They have the same characters as above.

Contrary to the allocations of this as a separate species by more recent workers, it appears to be no more than a subspecies of *cephalotes*. It would seem to be a mutant developed from *cephalotes* on the pale coral sand of this small island. Perhaps it was introduced as typical *cephalotes* by way of the abundant shipping between Barbados and Trinidad and Demerara several centuries ago. I collected typical *cephalotes* in all parts of Trinidad and do not believe that *lutea* occurs there.

***Atta cephalotes* ssp. *opaca* Forel**

1904. *Atta cephalotes* var. *opaca* Forel, Rev. Suisse Zool. 12: 31.

A single pin in the Forel collection, marked "Typus," is of a soldier from St. Antonio, Colombia, collected by Forel. The anterior lateral pronotal spines are reduced to mere humps and the anterior median ocellus is bipartite. It agrees perfectly with the specimens I took at Rio Porce (Lat. 6° 40' N., Long. 75° 10' W., 3,400 ft.) Colombia in 1938, representatives of which were determined as *opaca* by Gonçalves (1942, p. 345). He gives the range of the subspecies as Colombia, Bolivia and Brasil. Borgmeier (1950, p. 258) adds Peru.

Dr. Ferrière during my visit translated the original description as follows, commenting that the language was not entirely clear:

"var. *opaca* n. var. The rear of the head is dull, and the

tufts of hair on the vertex are more dense and reclinate. Although strongly visible, this variety is insignificant and inconstant. I have collected it beside the typical form at St. Antonio, in Colombia."

If the last statement indicates the actual situation, *opaca* may be a form originating not through geographical isolation but *in situ* through mutation. An alternative explanation is that, while *opaca* may have originated in the conventional manner (i.e. geographical isolation), it later spread to the territory of typical *cephalotes*. Both factors may be involved in the presently unclear distribution of *Atta*.

***Atta cephalotes* ssp. *polita* Emery**

1905. *Atta cephalotes* subsp. *polita* Emery, Mem. Accad. Sc. Ist. Bologna 2: 18

There are five pins in the Emery collections. Four of the five are labelled "Maipiri, Boliv., Staud." and one pin with the largest ant bears the identification "*A. cephalotes* var. *polita* Emery." All five carry a tiny green square of paper which doubtless signifies type material. In the original description the only specimens available was a series of small workers 3.5–6.5 mm. in length sent by Staudinger and Bang-Haas from Mapiri, Bolivia. Emery made his comparisons with workers of equal size of the typical form.

The ants clearly are a *cephalotes* form and should not have been described without the maximum caste. The largest ant, a medium-sized media, has the bicoloration and shininess suggesting *isthmicola* (though with the head not markedly paler than the thorax) but three others are concolorous as in typical *cephalotes* and one has the gaster darker. One ant has a moderately dull and punctate head.

***Atta colombica* Guérin**

1845. *Atta colombica* Guérin, Iconogr. Règne Anim. 7: 422

The types, from Colombia, appear not to have been examined by any worker after Guérin and are now unknown. They are

not listed by Vecht (1957) in his description of Guérin types although syntypes of *Atta insularis* are. During the past century various dull-colored specimens have been referred to this species but all such identifications should be suspect. In the original description only workers were mentioned and these had the head and prothorax glabrous. Compared with *insularis* they are paler, being reddish brown. His *Atta Lebasii*, described also from Colombia and on the same page, has been considered by the European myrmecologists to be the same as *colombica*.

***Atta colombica* ssp. *tonsipes* Santschi**

1929. *Atta colombica* v. *tonsipes* Santschi, Wien. Ent. Ztg. 1929, 46: 92

Regardless of the uncertainty of what *colombica* may be, the ants that Santschi described as the variety *tonsipes* still exist and these represent the common *Atta* of the Panama Canal Zone. The Santschi collection has one pin marked type, a large worker (not a small soldier), from Bella Vista, Panama, "W.M.Wh." The initials refer to W. M. Wheeler and it was G. C. Wheeler (I studied under both of them) who collected and sent other specimens to Santschi. G. C. Wheeler has kindly loaned me other type material. For the original description Agua Clara and Colon ants were also used. The Santschi collection contains a soldier from France Field, Panama, Bierig 4. vi. 30.

Santschi had no way of determining that *tonsipes* was indeed a variant of *colombica* but, until evidence can be produced that his form is a synonym of something, his name is the best available. At the present time it appears to be the only flourishing *Atta* on Barro Colorado Island, Canal Zone and has been used repeatedly by the author in experiments.

Gonçalves (1942, p. 346) has identified specimens that I took at Juan Diaz, Panama as *tonsipes* and they are the same form as that in the Canal Zone.

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Some Records of Chilopods from Florida

By RALPH V. CHAMBERLIN

A collection of chilopods submitted to me for identification by H. A. Denmark of the Florida Plant Board contains representatives of the species listed below. Of these, those numbered from 3 to 6 are interesting in being apparently the first records of the occurrence within the limits of the United States of four species otherwise widespread in the West Indies and other tropical and subtropical regions. The type of the new *Cryptops* is for the present retained in the writer's collection.

1. *Cryptops denmarki* new species

The general color is light yellow of a slightly greenish tinge.

Cephalic plate a little overlapping the first dorsal plate; not sulcate.

Prosternum with anterior margin nearly straight, narrowly chitinated.

First tergite without a transverse or cervical sulcus; two longitudinal sulci extending over entire length of the plate. The following tergites also with paired and complete sulci.

Sternites without sulci or furrows. The last sternite with caudal corners rounded, the intervening margin nearly straight.

Coxopleurae without marginal spines; bluntly rounded behind; pores small, the area nearly attaining the caudal margin.

Prefemur and femur of anal legs bearing a patch of stout setae on mesal and mesocaudal faces. Tibiae with four teeth beneath, the first tarsal joint with two.

Locality.—FLORIDA: Madeira Point. Two specimens taken by H. A. Denmark, Mar. 19, 1955.

Differing from *C. hyalina* and other American species in lacking a cervical sulcus while possessing two complete longitudinal sulci.

2. *Scolopendra viridis* Say

Specimens of this, the most common *Scolopendra* in Florida, were taken at the following localities: Vero Beach (H. C. Burnett); Alachua Co. (H. V. Weems: Marco Id.; Sarasota (C. J. Bickner); Gainesville (H. A. Denmark, Grace Rogers).

3. *Scolopendra alternans* Leach

One specimen taken by Denmark in Collier Co., Dec. 1, 1955.

4. *Rhysida longipes* (Newport)

One taken by R. W. Swanson at South Miami on Dec. 3, 1956. The specimen is somewhat variant in the spining of the prefemur of the anal legs.

5. *Orphnaeus brevilabiatus* (Newport)

Dade Co. (E. F. Miles) and Key Largo (H. V. Weems).

6. *Mecistocephalus maxillaris* (Gervais)

Hollywood (O. D. Link); South Miami (H. W. Swanson).

7. *Geophilus mordax* Meinert

Gainesville (H. M. VanPelt).

Report of *Geophilus proximus* in North America, with a Key to its Eastern North American Con- geners (Chilopoda: Geophilomorpha: Geophilidae)

By RALPH E. CRABILL, JR., U. S. National Museum,
Washington, D. C.

Geophilus proximus C. L. Koch, 1847, is one of the most common and widely-dispersed of western European geophilids. Reportedly favoring the more temperate areas, it has been collected from Scandinavia to the Mediterranean, as well as in Siberia and North Africa. Considering such ecological versatility and the ease with which geophilids or their eggs can be transported in soil, it is not surprising to learn at last of the presence of *proximus* in temperate North America.

The single adult female, upon which this report is based, agrees closely with European conspecifics and was captured in August, 1955, in Cobden, Ontario, Canada, by Dr. Herbert W. Levi of the Museum of Comparative Zoology at Harvard University. This is actually the second American specimen I have seen. The first, in the collection of the Museum of Comparative Zoology, was taken at quarantine in Philadelphia, Pennsylvania, where it was found in the soil about the roots of *Amaryllis* plants imported from Germany. In the light of all the evidence it seems safe to suggest that further collecting will show *proximus* to be established at least in our northeastern coastlands, especially in long-settled areas and in the vicinity of greenhouses and nurseries.

The following key will facilitate the identification of *proximus* and its congeners now known to occur in northeastern North America.

- 1 (8) Coxopleural *lateral* pores absent. Pores, when exposed, limited to margins of sternite and tergite, or only of sternite. [*vittatus*, *oweni*, *mordax* (s.l.), *proximus*]2
- 2 (3) Each coxopleuron with pores opening into two pits which are usually completely or partially covered by

- the sternite margins. Carpophagus-structures absent. Dorsum with a distinctive longitudinal series of diamond-shaped markings *vittatus* (Raf.)
- 3 (2) Coxopleural pores not emptying into pits but opening under or along margins of the sternite and tergite or only of the sternite. Dorsum without such a series of diamond-shaped markings. [*oweni*, *mordax* (s.l.), *proximus*] 4
- 4 (5) With 65-77 pairs of legs. Sacculi¹ (of carpophagus-structures) weak, not consolidated. Prelabral consolidated areas present and conspicuous. Color in alcohol bright yellow to dilute yellow. *oweni* Bollman
- 5 (4) With 49-57 pairs of legs. Sacculi strongly developed, heavily sclerotized. Prelabral consolidated areas absent, or if present, minute and vague. Color in alcohol whitish yellow or some shade of red. [*mordax* (s.l.), *proximus*] 6
- 6 (7) With the exception of a single ventro-posterior pore which may be present or absent, the remaining coxopleural pores are located along or under the margins both of the sternite and tergite. Color in alcohol varying from delicate pink to brilliant crimson *mordax* Meinert (*sens. lat.*)²
- 7 (6) All coxopleural pores located along or under the margins only of the sternite; dorsal pores absent. Color in alcohol varying from whitish or dilute yellow to bright yellow *proximus* C. L. Koch (*sens. str.*)³
- 8 (1) Coxopleural lateral pores present. Pores not concentrated only along sternite and tergite margins, not emptying into pits. [*varians*, *cayugae*, *mordax* (s.s.), *ampyx*] 9
- 9 (12) Prebasal plate concealed. 57-67 pairs of legs. [*varians*, *cayugae*] 10
- 10 (11) Prelabral consolidated area present. Consolidated paxilli and sacculi absent. Ultimate legs very long, the tarsus peculiarly flattened dorso-ventrally *varians* McNeill

¹ A detailed discussion of all new terms and criteria was presented in: Crabill, Proc. Ent. Soc. Wash., 56: 173-188 (1954).

² The several *mordax*-forms discussed in 1954 (*loc. cit.*) are currently under study, additional data having come to light. A new interpretation of their status is planned for publication in the near future.

³ *sensu* Broelemann, in Faune de France, 25: 159 (1930); i.e. where *proximus* Koch, 1847 \neq *pyrenaicus* Chalande, 1909.

- 11 (10) Prelabral consolidated areas absent. Consolidated paxilli present; sacculi tiny but consolidated. Ultimate legs at most only slightly longer than those preceding; tarsus not flattened dorso-ventrally
.....*cayugae* Chamberlin
- 12 (9) Prebasal plate exposed. 45-55 pairs of legs. [*mordax* (s.s.), *ampyx*]13
- 13 (14) Sacculi large, dark-colored, heavily sclerotized, fully exposed*mordax* Meinert (*sens. str.*)²
- 14 (13) Sacculi not consolidated, very weak, concolorous with sternite, typically concealed by anterior edge of (meso) sternite*ampyx* Crabill

Lepidoptera Collected in the Tundra-Taiga Ecotone at Kotzebue, Alaska¹

By PAUL R. EHRLICH, Chicago Academy of Sciences, Chicago, Illinois

In late June of 1956 a small collection of Lepidoptera was made by the author at Kotzebue in northwestern Alaska. This locality, poorly known entomologically, is of particular interest because of its mixed arctic and subarctic fauna. Kotzebue (66° 54' N, 162° 37' W) is located at the tip of the unforested Hotham Peninsula. The peninsula is about 60 miles long, and lies between narrow Hotham Inlet on the north and east and Kotzebue Sound (an arm of the Chukchi Sea) on the west. The nearest dwarfed spruce forest is 10-15 miles north of Kotzebue in the valley of the Noatak River.

The most prominent features of the Kotzebue flora are thickets of willows and dwarf alders which reach a height of more than six feet in protected places. In all other features the area has the aspect of typical tundra.

The following species of Lepidoptera were taken (comments on the general ecological distribution of the species in North America in parentheses):

¹ This research was supported by the United States Air Force under contract no. AF 41(651)-92 monitored by the Alaskan Air Command, Arctic Aeromedical Laboratory, APO 731, Seattle, Washington.

PAPILIONIDAE

Papilio machaon Linnaeus, 1♀, VI-20 (typically Hudsonian)

PIERIDAE

Colias eurytheme Boisduval, 1♀, VI-30 (usually not found north of Hudsonian)

Colias hecla Lefebvre, 3♂♂, VI-26-27 (arctic)

Colias palaeno Linnaeus, 4♂♂ 3♀♀, VI-20-27-28 (arctic and subarctic)

Pieris napi Linnaeus, 1♂, VI-27 (typically found in taiga)

NYMPHALIDAE²

Coenonympha tullia Müller, 4♂♂, VI-27-28 (taiga, rarely, if ever, recorded from the tundra)

Erebia fasciata Butler, 2♂♂, VI-27-28 (tundra only, no records from Hudsonian)

Erebia disa Thunberg, 26♂♂ 5♀♀, VI-20-23-26-27-28 (a butterfly of spruce woods, occasionally reported in open situations near treeline)

Erebia rossii Curtis, 4♂♂ 5♀♀, VI-20-26-27-28 (arctic and Hudsonian)

Oeneis taygete Hübner, 1♂ 2♀♀, VI-25 (probably principally Hudsonian)

Boloria chariclea Schneider, 12♂♂ 1♀, VI-20-26-27 (arctic)

Boloria freija Thunberg, 5♂♂, VI-26-27 (arctic and subarctic)

Boloria frigga Thunberg, 12♂♂ 1♀, VI-20-27 (arctic and subarctic)

GEOMETRIDAE

Scopula frigidaria Moeschler, 8♂♂, VI-26-27 (probably principally taiga)

PYRALIDAE

Crambus browerellus Klotz, 2, VI-27 (Hudsonian—alpine in Colorado and Maine)

Crambus trichostomus Christoph, 2, VI-27 (arctic and Hudsonian)

² Including the subfamily Satyrinae—see Ehrlich (1958).

OLETHREUTIDAE

Olethreutes sp., 1, VI-26**Epinotia** sp., 1, VI-26

It is evident from the above list that there are strong taiga elements in the lepidopterous fauna at Kotzebue. The presence in abundance of a weak-flying woodland butterfly such as *Erebia disa* (Ehrlich 1956, 1957) indicates that the limit of the coniferous forest in this area does not have the zoogeographic significance which it seemingly has in some parts of the Eastern Arctic. The mosquito fauna of the Kotzebue region (Barr and Ehrlich, 1958) included the typical taiga species *Aedes fitchii* (Felt and Young) and *Aedes excrucians* (Walker) as well as tundra species. Similarly the avifauna showed distinct southern elements, with Gambel's white-crowned, tree and fox sparrows, robins and hoary redpolls occurring commonly (and nesting) in the company of birds more characteristic of the tundra such as semi-palmated plovers, savannah sparrows, Alaskan longspurs and Alaskan yellow wagtails. The marine bird fauna was arctic.

The above data serve to emphasize the dangers of over-dependence on treeline (which is ordinarily considered synonymous with the limit of coniferous forest) in the predicting of animal distributions. In the northern nearctic region it is often a useful tool, but its utility varies greatly from area to area and from organism to organism.

The author is indebted to the following people for aid on various facets of this work: Emmet R. Blake, Chicago Natural History Museum; George Hudson, State College of Washington; Alexander B. Klots, American Museum of Natural History; and Frederick H. Rindge, American Museum of Natural History.

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Notes on a New Habitat for *Nerthra* (Gelastocoridae-Hemiptera)

BY DAVID R. LAUCK¹ and WILSON G. WHEATCROFT

The junior author and I recently collected the genus *Nerthra* in cowdung. One male adult of *Nerthra manni* Todd and three nymphs were collected beneath cowdung in the vicinity of Guadalajara, Jalisco, Mexico, and a single female of the same group of *Nerthra* was collected in a dung paddy near Tegucigalpa, Morazan, Honduras. The latter specimen was found near the banks of a marsh, while the former specimens occurred in a dry area remote from water. They occupied paddies that were dry and encrusted externally but were moist internally and partially hollowed by dung beetles.

Although *Nerthra* has not been found previously in dung, various species have been collected in arid habitats remote from water (reviewed by Todd² 1955). The dung niche, which retains moisture, might serve as an evolutionary stepping stone from the moist shores to the dry habitat, or from dry to moist, whichever the case may have been. Future investigation may disclose more specimens and additional species of *Nerthra* in the dung niche.

¹ Department of Entomology, University of Illinois, Urbana, Ill.

² Todd, E. L. 1955. A taxonomic revision of the Family Gelastocoridae (Hemiptera). Univ. Kansas Sci. Bul. 37: 277-475.

Parasitism of Bees in Trap-nests by *Leucospis affinis* Say (Hymenoptera: Leucospidae)

By J. T. MEDLER ¹

The habits and life history of *Leucospis affinis* Say in nests of *Osmia* were reported by Graenicher (1906). Additional information on the parasite in nests of *Megachile* and *Hoplitis* has been obtained during trap-nest research in Wisconsin.

Eighty nests of *Megachile relativa* Cresson in sumac-stick traps were found parasitized by *L. affinis* during 1953-1956. The identity of the host was ascertained largely by the habitus and appearance of the nests, as only a small number of adult bees was reared for positive identification. In fifteen nests the parasites had emerged prior to collection, but a study of the empty nests showed that each cell had contained a parasite. In the other sixty-five nests, most of the cells were transferred singly to glass vials for rearing in the laboratory. The results are given in table 1. These data showed that probably more than 80 per cent of the cells in a nest were attacked by *L. affinis*, as most of the cells with mortality during rearing and those contaminated by the secondary parasite, *Melittobia chalybii* Ashm., originally contained larvae of *L. affinis*.

TABLE 1. Rearing Data from Sixty-five Nests of *Megachile relativa* Each Parasitized by *Leucospis affinis*

Cells unsuitable for rearing because of mold, prior emergence, injury, etc.....	61
Cells transferred singly to vials but with subsequent mortality.....	53
Cells transferred singly to vials and adults reared	
<i>Leucospis affinis</i>	292
<i>Megachile relativa</i>	14
<i>Melittobia chalybii</i>	42
Total cells.....	462

¹ Associate Professor in Agronomy and Entomology, University of Wisconsin, Madison. This work was supported in part by a grant-in-aid by the Research Committee of the Graduate School from funds supplied by the Wisconsin Alumni Research Foundation. The author acknowledges the assistance of T. Koerber in the rearings, and the aid of B. D. Burks in identification of specimens.

The sex of the reared adults was associated with the sequence of cells in a nest, and the data from representative nests are given in table 2. It was found that female wasps almost invariably occupied the first cells, but all females or all males were sometimes recorded. In most nests with mixed sexes, the male(s) followed a female series, but in nests 13, 15, and 16 a male was inserted in a female series. The high parasitism of the nests prevented any attempt to associate the sex of the parasite with

TABLE 2. Sequence of Sexes of *Leucospis affinis* in Nests of *Megachile relativa*

Nest Number	1	2	3	4	5	6	7	8	9	10	11	12
1	♀	*										
2	♀	♀										
3	†	♀	♂									
4	♀	♀	♀	†	♂							
5	♀	♀	♀	†	♀	♂						
6	P	P	P	♀	♀	♂						
7	♂	♂	♀	♂	♀	♀						
8	*	♀	♀	♀	♀	♀	*					
9	♀	♀	♀	♀	♀	♀	♀	♂				
10	♀	♀	♀	♀	♀	♀	♀	♀	♂			
11	†	†	†	♀	♀	♀	♀	♀	♀	♀		
12	*	*	*	♀	♀	♀	♀	♀	♀	♀		
13	♀	♀	♀	♀	♀	♀	♀	♀	♀	♀		
14	†	♀	♀	P	♀	♂	♂	♀	P	♂	♂	
15	†	P	P	†	♀	♀	♀	♀	P	♀	♀	♀ M
16	P	♀	♀	♂	♀	♀	♀	♀	♀	♀	♀	♂

M = *M. relativa*; * = cell unsuitable for rearing; P = parasitized by *Melittobia chalybii*; † = larva died during rearing.

the sex of the host bee. No information was obtained on multiple egg laying in a cell, as reported for *Leucospis gigas* Fab. in Europe by Fabre (1914).

The parasite had a summer and an overwintering generation in *M. relativa* nests. Trap-sticks placed in the field on June 28, 1956 were collected on July 28; adults of *L. affinis* were obtained on August 22. Traps brought in from the field on July 21, 1955 produced adult parasites on August 8. Most specimens of the summer generation were obtained in the middle of August. Nests collected in late August and September contained parasite larvae of an overwintering generation. These larvae were pre-

sumed to go into diapause, though cold treatment at 4.5° C. for 5, 12, 19, 26, 30, and 33 days seemed to be equally effective in subsequently producing adults. The time-temperature studies were inconclusive because of contamination by *M. chalybii* in the incubators. The larval stage was 7–10 days and the pupal stage 9–11 days at a constant temperature of 27° C.

Records obtained in nests of *Megachile inermis* Provancher and *Hoplitis producta* (Cresson) are included here because an interesting relationship existed between the size of the host and the size of the parasite as indicated by head width measurements (0.1 mm.). A nest of *M. inermis* produced 3 females and 1 male of *L. affinis* with respective head widths of 34, 32, 30, and 25. Four nests of *H. producta* were each parasitized by *Stelis* sp., which in turn was attacked by *L. affinis*. One female and 3 male *L. affinis* reared from the *Stelis* cocoons had head widths of 19, 17, 17, and 16. A study of head widths of *L. affinis* reared from *M. relativa* nests gave the following data: 134 females, 26.7 ± 1.92 , range 19–30; 49 males, 24.1 ± 1.78 , range 19–27. *M. inermis*, which is a larger bee than *M. relativa*, produced larger parasites, whereas *Stelis* sp., which is smaller, produced smaller parasites. However, the size of parasites from the *M. inermis* and *Stelis* hosts were within the extreme range of the parasites produced on *M. relativa*. These data are consistent with previous knowledge on size relationships of host and parasite.

The successful attack on cells of various bees by *L. affinis* undoubtedly is associated with the strong and relatively long ovipositor of the female. Parasitized nests were obtained only in the sumac sticks, and not in the more substantial domicile-type described by Medler and Fye (1956). Probably there is a maximum thickness of wood through which the species can oviposit. The thickness of the walls of the sumac sticks was not measured during this study, but it should be a simple matter in future research to determine the thickness necessary to prevent *L. affinis* parasitism.

Incidentally, bundles of trap-sticks frequently contained together the nests of bees, eumenid wasps and sphecids wasps, but only the nests of bees appeared to be attacked by *L. affinis*. It

is not known whether oviposition was restricted exclusively to nests of bees, or whether oviposition if it occurred in wasp nests resulted in mortality of the parasite.

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Cressonomyia New Name for Plagiopsis Cresson Preoccupied (Diptera: Ephydriidae)

By PAUL H. ARNAUD, Jr., Entomology Research Division,
U. S. Department of Agriculture

It is unfortunate that the name *Plagiopsis* Cresson, 1934, which was proposed to replace the preoccupied *Plagiops* Cresson, 1918, is itself preoccupied by two previous uses, thus requiring a further change of name. The name *Cressonomyia* Arnaud, *nomen novum*, is here proposed for *Plagiopsis* Cresson, 1934 (Trans. American Ent. Soc., vol. 60, p. 201), *non* *Plagiopsis* Berg, 1883 (An. Soc. Cient. Argentina, vol. 16, pp. 189-191), *non* *Plagiopsis* Brauer and Bergenstamm, 1890 (Denkschr. Akad. Wiss. Wien, vol. 56, p. 134). It is named in honor of the late E. T. Cresson, Jr. The type species is *Plagiops nitidifrons* Cresson, 1918.

Notes on the 17-year Locust on Cape Cod in 1957

By JOSEPH L. WILLIAMS, M.D., Philadelphia, Pennsylvania

In a wooded area at Centerville, Massachusetts, near Craigville Beach, this locust was so numerous during the second week of June that children were collecting it by the quart. Nymphal exuviae were found clinging to buildings, trees, and many types of elevated objects in the woods. Emergence holes were noted in the ground of yards cleared of grass and shrubs, lawns, and in the woods. It was an unusually dry season here and whether this was an aid to its emergence survival is not known.

The noise produced by the males was continuous beginning at about 10 A.M. daylight saving time and fading out about 5 P.M. No sounds were heard after 8 P.M. The sound would make one think that he was not very far from a pond in which many frogs were singing. Matings were noted to occur during the singing period. Several mating pairs were placed on a large board to note length of the mating act from the time they were placed there. Careful handling did not disturb the mating, which continued from one and one-half to three hours. Several unmated males and females were placed in a large jar and some of these were later observed to be mating.

In this particular area there are scrub-like oak, pine, and maple trees. Locusts were noted in the greatest number on oak, next on maple and the least or none on pine. An article in the local newspaper concerning this locust, "Cape Cod Standard-Times," Thursday, May 16, 1957, states that the female locusts prefer apple and other fruit trees, oaks, hickory, locust, such shrubs as azaleas, delphinium and hardy phlox. An examination of the tender twigs in which the females had laid their eggs revealed the greatest number of punctures in oak, very few in maple, and none in pine. Damaged twigs, mostly oak, could be seen throughout the area with dead or dying leaves attached.

At this particular site the locusts had disappeared by the

middle of the last week in June. In some nearby areas however, they were heard before they appeared in this area; and in some other nearby areas they were heard after they had disappeared elsewhere. This may be due to the fact that the locusts emerged in different areas at slightly different times.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Colloquium on Zoological Nomenclature. A colloquium on nomenclature will be held in London in connection with the Fifteenth International Congress of Zoology. It will open on Wednesday, July 9th, i.e., one week prior to the opening of the Congress. It is hoped that this body will be able to relieve the Congress of the bulk of the work in the scrutiny of the draft of the revised Code and will be able to submit to the Congress agreed recommendations as to the text to be adopted. In addition to the invitations already sent out, additional ones will be sent to any member of the Congress who expresses a desire to take part in its discussions but who has not yet received a separate invitation.—FRANCIS HEMMING, Managing Director and Secretary, International Trust for Zoological Nomenclature, 28 Park Village East, Regent's Park, London N.W.1, England.

Velia's Clock. The orientation behavior and the "internal clock" of insects have been attracting more and more interest. During the past year GEORG BIRUKOW and two co-workers have published four papers* on the behavior of the water strider, *Velia*.

When placed on a dry surface, *Velia* flees towards the south, invariably and exactly. Just why always to the south remains

* Zeitsch. f. Tierpsychologie 13: 464-84, 14: 184-203. Die Naturwissenschaften 44: 358-59, 474-75.

unexplained, but Birukow has shown that they use the sun or the blue sky as their compass. Thus, in early morning the sun would be at a great angle on their *left*. This angle diminishes to 0° at noon, and in the afternoon the angle on the insects' *right* gradually increases. Indoors, in the presence of a fixed electric light bulb, they orient towards this light as if it were the sun, and alter the direction of their escape response in accordance with the *time of day*.

In the winter, the angle through which the orientations oscillate during these shorter days is adjusted to the arc of the sun at this season. In the summer or after exposure to 3 weeks of long "days" artificially, the amplitude is correspondingly increased. *Velia* may even adapt to the rhythm of a 10-hour day (5 hours light, 5 hours darkness), something not attainable in bees, which have an intrinsic rhythm.

If *Velia* are tested after the usual hour of sunset, the angle on their right will now increase, and by midnight all individuals run due south (0°); after midnight the angle on their *left* increases until 6 A.M. when they revert to their normal behavior. Thus, during the night, their internal time-mechanism runs *in reverse*, again differing from bees (see Ent. News 68: 132). Under constant illumination, or constant darkness, the amplitude gradually decreases, and the clock stops, so to speak, at 0° .

From these and from other observations, for which see the original articles in *Zeitschr. f. Tierpsychol.*, and their English summaries, some conclusions can be drawn as to the working of the time-mechanism or "internal clock" in these insects, but the really essential features still remain a mystery. At least it does not depend on the intensity of the light, but only its duration, and it appears independent of metabolism, for this varies with temperature, and *Velia*'s clock runs accurately at all temperatures from 5° C. to 25° C.—R. G. SCHMIEDER.

NOTICE. The December, 1957 issue of ENTOMOLOGICAL NEWS was mailed at the Post Office at Lancaster, Pa., on December 6, 1957.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and **Stizini** (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Dominick J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

Melanotus (Elateridae). Revising Nearctic species; desire to see all available specimens. Will return at end of study. L. W. Quate, Department of Entomology, University of Nebraska, Lincoln, Nebr.

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THE NEOTROPICAL SPECIES OF THE 'SUBGENUS AESCHNA' SENSU SELYSII 1883 (Odonata)

By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeshna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaeartic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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FEBRUARY 1958

Vol. LXIX

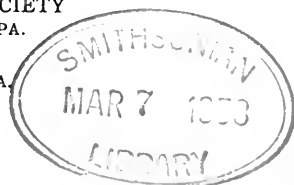
No. 2

CONTENTS

Emerson and Elbel—A new species of <i>Kurodaia</i>	29
Wilson and Brown—Worker caste of parasitic <i>M. metoecus</i>	33
Judd—Gall flies and hymenoptera from rosette galls	39
Moure—On the genus <i>Arhysosage</i> Brethes from Argentina	43
Weber—Nomenclatural changes in <i>Trachymyrmex</i>	49
Nomenclature Notice	55

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No. 2

A New Species and Subgenus of *Kurodaia* (Mallophaga: Amblycera)*

By K. C. EMERSON, Stillwater, Oklahoma and ROBERT E. ELBEL, Department of Zoology, University of Oklahoma, Norman, Oklahoma

The Ischnoceran genus *Falcolius* Clay, 1956, has been recorded only from the falconets or pygmy falcons of south-eastern Asia. This genus apparently has no affinities with any known genera found on the remainder of the Falconiformes. The first results of a study made of several collections of amblyceran Mallophaga from this interesting group of birds are herewith reported.

The amblyceran genus *Kurodaia* Uchida, 1926, as presently defined, contains a number of species found on the Falconiformes and Strigiformes. Examination of several undescribed forms from both host orders indicates that the present generic description is adequate, except for a new form found on the host genus *Microhierax*, the falconets. In general appearance, there is some doubt that the form should be included in the genus *Kurodaia*; however a majority of the generic characters normally considered in the suborder indicate a definite relationship to this genus. Due to the significant differences between the form found on *Microhierax* and the remaining species of *Kurodaia*, a new subgenus is herewith described.

* The costs of publication of this paper were defrayed by Grant E-1722 from the National Institute of Allergy and Infectious Diseases of the National Institutes of Health.—Ed.

FALCOMENOPON new subgenus

Large stout Menoponidae distinguished from the known species of the genus *Kurodaia* by the following diagnostic characters: a comb of short setae in the lateral posterior angles of the fourth abdominal sternite, the absence of prominent setae on the median posterior margin of the abdominal tergites, the expanded lateral margins of the forehead, the large prominent male genitalia, and the presence of a row of medium-length setae on the posterior margin of the female vulva.

Type species: *Kurodaia* (*Falcomenopon*) *boonsongi* new species.

Kurodaia (Falcomenopon) boonsongi new species

Male. General shape and chaetotaxy as shown in fig. 1. Male genitalia, less the genital sac, as shown in fig. 3. The genital sac is armed with prominent teeth.

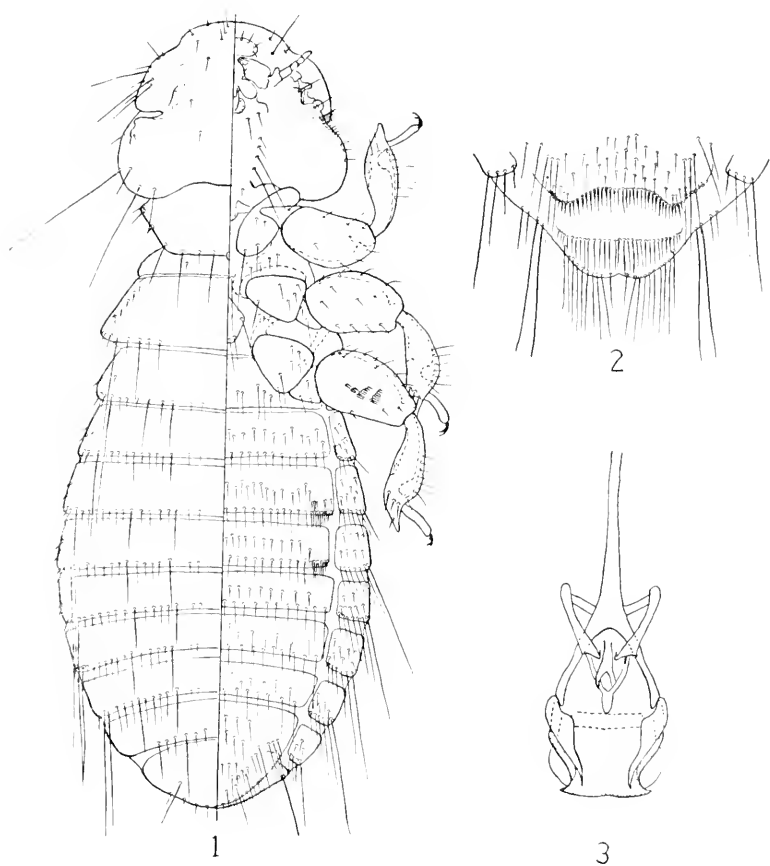
Female. General shape and chaetotaxy, except for terminal abdominal segments, similar to the male. Ventral view of terminal abdominal segment as shown in fig. 2. Dorsal chaetotaxy of terminal abdominal segments similar to that of the male.

Measurements.

	<i>Male</i>	<i>Female</i>
Length of head	0.39 mm.	0.40 mm.
Width of head	0.57	0.60
Width of prothorax	0.42	0.45
Width of mesothorax	0.61	0.65
Width of abdomen	0.72	0.91
Total length	1.85	2.06

Type host: *Microhierax caerulescens burmanicus* Swann.

Type material: *Holotype* male, *allotype* female and ten *paratypes* were collected at Ban Thung Chuak, Salok Bat, Kamp-haeng Phet, THAILAND on June 20, 1953, by Robert E. Elbel. Four paratypes were collected at Ban Na Muang, Na Hao, Dan Sai, Loei, Thailand on October 2, 1954, by Robert E. Elbel. Two paratypes were collected at Bo Phloi, Latya, Kanchanaburi,



Kurodaia (Falcomenopon) boonsongi new species.

FIG. 1. Dorsal-ventral view of male.

FIG. 2. Ventral view of terminal abdominal segments of female.

FIG. 3. Male genitalia.

Thailand on July 14, 1952, by Robert E. Elbel. One paratype was collected on Phu Kho Mountain, Kan Luang, Na Kae, Nakhon Phanom, Thailand on July 19, 1954, by Robert E. Elbel and Boonsong Lekagul. The holotype and allotype have been deposited in the U. S. National Museum.

In the British Museum (Natural History) are two male specimens collected off skins of *Microhierax fringillarius* (Drapiez), which may belong to this species. They have not been included in the type material because of their poor condition which precludes positive identification. If these records are correct, they indicate that the subgenus is not restricted to a single host.

This study was supported by research grant E-1722 from the National Institute of Allergy and Infectious Diseases of the National Institutes of Health, Public Health Service. The collections were made possible by assistance from the U. S. National Museum and the U. S. Operations Mission to Thailand.

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The Worker Caste of the Parasitic Ant *Monomorium metoecus* Brown and Wilson, with Notes on Behavior

By E. O. WILSON and W. L. BROWN, JR., Museum of Comparative Zoology, Harvard University

In a recent issue of ENTOMOLOGICAL NEWS we described the remarkable parasitic ant *Monomorium metoecus* from a single ergatogyne found in a nest of *M. minimum* (Buckley) at Tuscaloosa, Alabama (Brown and Wilson, 1957). On June 17, 1957, the type locality was revisited with the hope of obtaining additional material. Fortunately, the original collection site had not been disturbed, and *M. metoecus* was successfully located for the second time. A most interesting discovery made at this time was that *metoecus*, unlike the great majority of other permanent ant parasites, possesses a functional worker caste.

The new mixed colony was found at almost the identical spot, in open pine woods on the University of Alabama campus, where the type ergatogyne had been discovered seven years before. It was nesting in a deep vertical crevice in a partially buried, dead root stump at the base of a large loblolly pine (*Pinus taeda*), a situation that unfortunately rendered excavation very difficult and incomplete. The total adult population of the colony was roughly estimated at between one and two thousand; *minimum* workers outnumbered those of the parasite by about forty to one. Two dealate queens of *minimum* were recovered, but no queens or extreme ergatogynes (see below) of the parasite; the latter, if they existed, were presumed lost during excavation. Host and parasite workers were completely intermingled, with no apparent tendency toward concentration of either species anywhere inside or outside the nest. Following is a brief characterization of the newly discovered *metoecus* worker caste.

Worker: The six specimens studied (now deposited in the Museum of Comparative Zoology, United States National Mu-

seum, and personal collection of A. C. Cole, Jr.) are a rather heterogeneous lot, and it may be that it would better approximate their status caste-wise to consider them low-grade ergatogynes. They differ from the holotype ergatogyne in their narrower petiolar node, as seen from the rear (width 0.24–0.28 mm. vs. 0.35 mm. for the holotype; three workers of *M. minimum* from the host nest measured 0.12–0.14 mm.). The post-petiole is also proportionately narrower than in the holotype, and the ventrolateral conules are not so well developed; in fact, in several specimens the conules are not developed appreciably at all. The conules do not vary allometrically in this series, for some of the smallest specimens have them well developed, while the largest specimen has, to all intents and purposes, no conules at all. Although overall size (total length and bulk of whole body) is slightly to considerably less in the workers than in the ergatogyne, the head width measures about the same (workers, HW without compound eyes, 0.53–0.55 mm. vs. 0.54 mm. for the holotype). The alitrunk of the workers is shorter, both absolutely and proportionately (0.76–0.80 mm. vs. 0.88 mm.), and the convexity of the promesonotal and propodeal dorsal outlines is less marked than in the holotype. We may sum up by saying that the workers, if they are workers, show some discordance in their difference from the holotype, but in general are intermediate between the holotype and the host workers, and much closer to the former. The head width of three host nest workers measured is 0.38–0.41 mm.; alitrunk length (WL) 0.52–0.61 mm. (See text-figure.)

Prior to excavation of the nest, parasite workers were found in the files of *minimum* workers moving up and down the trunk of the pine tree during the day. Careful examination of these individuals at this time failed to reveal any peculiarities in their foraging behavior. Despite the fact that they are twice the size of the *minimum* workers, they followed the vertical odor trails on the pine trunk at about the same pace and with the same frequency of exploratory "side-tracking." Moreover, approximately the same percentage were carrying small dead insects (including psocids and aphids) gathered higher up in the

pine. Behavior in the vicinity of the nest, both before and after the disturbing effect of excavation, did not appear to differ significantly.

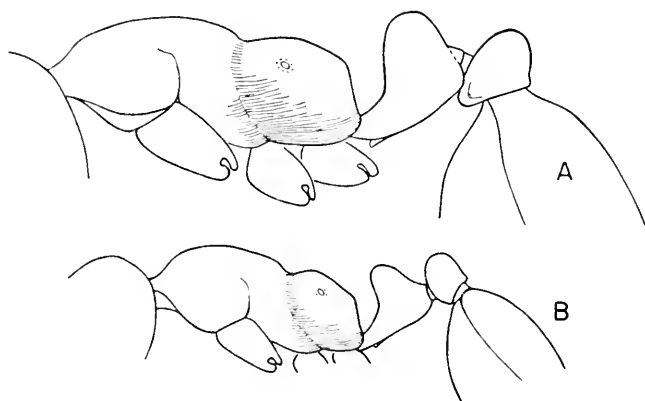


FIG. 1. A, *Monomorium metoecus* Brown and Wilson, worker alitrunk and nodes, side view. B, *Monomorium minimum* (Buckley), worker from host nest, alitrunk and nodes in side view. Both from same nest, described in text. Drawn to scale of Figure 1 in Brown and Wilson, 1957. Drawings by Nancy Buffler.

Following study in the field, most of the colony was removed and transported to Harvard University for further observation under laboratory conditions. Unfortunately, during the week-long automobile trip most of the *metoecus* workers died, only three individuals surviving to be transferred finally to an artificial nest. Once established in the nest, the *metoecus* workers continued to behave essentially like the *minimum* workers. A possible ethological difference that appeared at this time was the apparent proportionately longer periods of time spent by the three *metoecus* workers outside the nest. However, this phenomenon may have resulted in some way from the preceding heavy mortality of the parasite, e.g., the younger, nest-oriented workers may have been the first to die. Inside the nest, the *metoecus* workers were occasionally seen resting on or near the brood, but it could not be determined whether they were helping tend it. On several occasions they displayed aggressive be-

havior, in attacking alien worker ants placed near them, in defending against probing forceps tips, etc., that was apparently identical to the behavior of the host workers under similar conditions. *Metococcus* workers also fed directly on honey supplied the colony. On one occasion a parasite worker was observed exchanging food with a *minimum* worker by regurgitation, but it could not be determined whether this individual was donating or receiving. All in all, the total behavior of the parasite workers did not appear to differ in any significant way from that of the host workers within the existing limits of observation.

The question was now raised, whether the parasite worker is truly the worker caste of the previously described *M. metococcus*, as all of the morphological evidence seemed to indicate, or whether it represents instead merely another, aberrant worker caste of *M. minimum*. To test the latter hypothesis, the mixed colony, now presumed to be deprived of its parasitic reproductive form (or forms) and at first lacking brood of any sort, was maintained in the laboratory under optimum trophic conditions for a period of five months. During this time the *minimum* population more than doubled in size, but no new *metococcus* workers appeared. It was concluded that a *metococcus* reproductive form had indeed been present in the original mixed colony but had been lost during excavation and transfer to the laboratory. But of course it cannot be proved that the *metococcus* reproductive form was an ergatogyne similar to the holotype instead of a true queen or fertile worker.

The precise relationship of the parasite to its host was now considered. The large size of the *metococcus* worker suggested that the parasite might be dulotic, raiding other nests of *minimum* to increase the number of host workers. An experiment was conducted in which a small colony of *minimum* collected at Amissville, Rappahannock Co., Virginia, was placed in a common foraging arena 23 centimeters from the mixed colony. Within an hour both *minimum* and *metococcus* workers from the mixed colony began to penetrate the nest of the Amissville colony and remove brood. The invaders were actively resisted by the Amissville workers, and only after the latter had been over-

whelmed by numbers and mostly destroyed was all of the raided brood removed. The raided brood, consisting solely of large larvae and worker pupae, was completely eaten by the mixed colony within twenty-four hours after it had been transported to the mixed-colony nest. A control experiment was then conducted in which two colonies of *minimum* collected at Falmouth, Massachusetts, were placed together in a common foraging arena under conditions as similar as possible to those of the original experiment. At the time of writing these two colonies have been living together for a period of three months without a raid developing in either direction.

Despite the different outcomes of the original and control experiments, it is our opinion that *metoecus* is not a dulotic ant. There are several good reasons for arriving at this tentative conclusion. (1) The laboratory raid resulted in intense combat with complete destruction of the raided colony, and the captured brood was quickly eaten instead of being reared, conditions that suggest simple predation rather than dulosis. (2) Functional host queens were present in the mixed colony, not a normal condition associated with dulosis. (3) The *metoecus* workers show none of the modifications, either morphological or ethological, commonly associated with dulosis.

But whether the parasitism is dulotic in nature or not, it is clearly at a very primitive level. In fact, it is questionable whether on the basis of the present evidence the relationship can be properly called parasitism at all. There is at present no sure indication that the *metoecus* workers are ethologically degenerate in any way, i.e., that they do not perform their "fair share" of the work load. The relationship is reminiscent of non-parasitic parabiosis, except that in the known cases of parabiosis the participating colonies remain segregated in separate chambers within the nest and never mix their brood. It is perhaps much closer to the strange kind of symbiosis recently discovered as existing between the New Guinea dacetine ants *Strumigenys loriae* and *Kyidris yalcogyna* (Wilson and Brown, 1956). The two species live in completely mixed colonies, with *Kyidris* queens and workers forming a slight numerical minority of the adult population.

The *Kyidris* workers still perform normal tasks inside and outside the nest, but their behavior tends to be degenerate and ineffectual, and they do not carry a "fair share" of the work. For example, they hunt for insect prey along with the *Strumigenys* workers, but with very low efficiency, and they do not join in nest construction at all. Other cases of very primitive parasitism, or at least pre-parasitic symbiosis, may occur among species of the Nearctic *Formica obscuriventris* group, as described by King (1949, 1955) and King and Sallee (1951). Apparently various pairs of species of this group commonly form mixed colonies by the method of indiscriminate mutual adoption of newly-fertilized queens of one species by the established colony of another. Such mixed nests have been studied in Iowa by King and Sallee, and there is good evidence that they occur elsewhere (Brown, unpublished notes).

The cases of *Monomorium metococcus* and *Kyidris yalcogyna* suggest the possible first steps in one evolutionary pathway of permanent social parasitism. It is conceivable that parasitism of this sort starts when one species simply becomes resident with another, degenerating to the extent that it can no longer exist independently, but at first maintaining a normal, fully functional worker caste. Evolution proceeds as the worker caste ceases to function normally and is reduced in numbers, finally to be eliminated altogether.

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Gall Flies (Itonididae) and Parasitic Hymenoptera Reared from Rosette Galls of Willow

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On February 14, 1956, a collection of 200 "rosette" galls was taken from shrubs of sand-bar willow, *Salix interior* Rowlee, in an abandoned brickyard at the northwest corner of Taylor and Cheapside Streets at London, Ontario. Each gall was put in a separate, numbered, glass vial of dimensions 60 mm. \times 15 mm., plugged with cotton. The vials were kept on a rack at room temperature in a laboratory and were examined daily for the presence of insects which had emerged from the galls. The insects were pinned or preserved in fluid and labelled to show the date of their emergence and the number of the gall from which each insect emerged. After December 31 all the galls were dissected and their contents were noted and insects remaining in them were removed and preserved. The flies and wasps, respectively, were identified by Dr. J. R. Vockeroth and Dr. O. Peck, Entomology Division, Department of Agriculture, Ottawa. All the insects are deposited in the collection of the Department of Zoology, University of Western Ontario, except some specimens retained in the Canadian National Collection (CNC), as noted in the following account. Of the 200 galls 9 yielded adult flies (*Rhabdophaga* sp.), 69 yielded parasitic wasps, 16 contained dead itonidid larvae, 51 contained dead itonidid pupae and 55 were without contents. The numbers of adult insects reared and dissected from the galls are shown in table 1.

DIPTERA

Itonididae

Rhabdophaga (*rhodoides* Walsh?)

Five flies emerged from five galls between March 14 and April 3, including one male (March 14) and four females; and four females were found dead in four other galls when they

were dissected. Five specimens are deposited in the CNC. Felt (1940) records that *R. rhodoides* causes an open rosette gall on willow.

HYMENOPTERA

Torymidae

Torymus sp. (near *longistigma* (Huber))

Five wasps emerged from five galls between May 14 and June 11 and twelve more were found in twelve dissected galls. Six wasps are deposited in the CNC. Wasps of the genus *Torymus* were reared by Judd (1953, 1955, 1957) from other kinds of galls on willow in the vicinity of London.

Pteromalidae

Amblymerus (*salicis* (Grt.)?)

Two wasps emerged from two galls on March 10 and April 7 and both are deposited in the CNC. In addition, when the galls were dissected, two wasps of the tribe Pteromalini were found dead in two galls (table 1). Wasps of the genus *Amblymerus* were reared by Judd (1957) from the beaked willow gall at London and Muesebeck *et al.* (1951) record that *A. salicis* is a parasite of an itonidid gall on willow.

Tridymus sp.

One wasp emerged from a gall on April 24 and thirty-four were found dead in thirty-four galls, with a single wasp in the core of each gall, when the galls were dissected. Fourteen of the wasps are deposited in the CNC. Judd (1953) records *Tridymus* sp. as a parasite of *Rhabdophaga strobiloides* at London.

Eulophidae

Tetrastichus sp. (near *nebraskensis* (Grlt.))

Four wasps emerged on March 8 through minute holes, one-quarter mm. in diameter, in the base of the gall which later

yielded from its core a specimen of *Amblymerus (salicis?)* on April 7. The four wasps are deposited in the CNC. Wasps of the genus *Tetrastichus* were reared by Judd (1953, 1955) from other willow galls at London.

TABLE 1. Numbers of Insects Collected from Rosette Galls of Willow

Date 1957	<i>Rhabdophaga</i> (<i>rhodoides?</i>)	<i>Torymus</i> sp. (<i>ur. longistigma</i>)	<i>Amblymerus</i> (<i>salicis?</i>)	Pteromalini	<i>Tridymus</i> sp.	<i>Tetrastichus</i> sp. (<i>ur. nebraskensis</i>)	<i>Platygaster</i> sp. (<i>ur. affinis</i>)	<i>Platygaster</i> sp. (<i>ur. obscuripennis</i>)	<i>Atritolmus</i> sp.
March 8						4			
March 10			1						
March 14	1								
March 15	1								
March 26									1
March 28	1								
April 3	2								
April 7			1						
April 24					1				
May 14		1							
May 28		1							
May 30		1							
June 4		1							
June 11		1							
From dis- sected galls	4	12		2	34		40	8	
Total	9	17	2	2	35	4	40	8	1

Platygasteridae

Platygaster sp. (near *affinis* Fouts)

Forty wasps were found in four galls when they were dissected, with 8, 10, 11 and 11 wasps, respectively, crowded in the core of each gall. Four wasps are deposited in the CNC. Judd (1955) records rearing *Platygaster* sp. from willow galls caused by *Phytophaga tumidosae* at London.

Platygaster sp. (near *obscuripennis* Ashm.)

One wasp was found dead in the core of each of eight galls dissected. Three are deposited in the CNC.

Ceraphronidae

Atritomellus sp.

One male wasp emerged from a gall on March 26 and is deposited in the CNC. Muesebeck *et al.* (1951) list no known hosts of the species of *Atritomellus* reported by them and record that the host relations of few species in the family Ceraphronidae are known.

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MUESEBECK, C. F. W., K. V. KROMBEIN, H. K. TOWNES *et al.* 1951. U. S. Dept. Agric., Agric. Monogr. No. 2.

On the Genus *Arhysosage* Brèthes from Argentina¹ (Hymen., Apoidea, Panurginae)

By J. S. MOURE, C.M.F.,² Department of Entomology, University of Kansas, Lawrence, Kansas and Secção de Zoologia, Universidade de Paraná, Curitiba, Brasil

This genus of Brèthes remained unrecognized until Dr. C. D. Michener and I had an opportunity to examine the types in Buenos Aires, and found that the type species, *Arhysosage johnsoni* Brèthes, is the same as *Camptopocum ochraceum* Friese. It had not previously been apparent that *Arhysosage* belonged to the Panurginae. Another genus described by the same author which we also found to be a panurgine is *Callonychium*.

The group here called *Arhysosage* was well recognized and characterized by Timberlake who erected the genus *Ruiziella* (= *Ruizapis*) for it. His placement of it in Calliopsini was not fortunate, however. As far as known the genus is restricted to Argentina.

ARHYSOSAGE Brèthes

Camptopocum of Friese, Ducke, Schrottky, Cockerell, and Joergenson (in part).

Arhysosage Brèthes, 1922, An. Soc. Ci. Argentina, 91: 121; Sandhouse, 1943, Proc. U. S. Nat. Mus., 92: 528.

Ruiziella Timberlake, 1952, Ann. Ent. Soc. Amer., 45: 105 (not *Ruiziella* Cortés, 1951).

Ruizapis Timberlake, 1952, Ann. Ent. Soc. Amer., 45: 528 (new name for *Ruiziella* Timberlake).

¹ Contribution no. 982 from the Department of Entomology, University of Kansas.

² I wish to thank the Rockefeller Foundation (New York), the National Science Foundation (Washington) and the Campanha de Aperfeiçoamento de Pessoal de Nível Superior (Rio de Janeiro) for aid that made this study possible. Also, I wish to thank Dr. Carlos Alberto Campos Seabra of Rio de Janeiro for the stimulus and generosity which he is giving to studies of Brazilian bees, and Dr. Charles D. Michener of the University of Kansas for help in preparation of this paper.

Ruizapis Timberlake, 1953, Ann. Ent. Soc. Amer., 46: 598 (correction of spelling of *Ruziapis*).

Type species: *Camptopocum ochraceum* Friese, 1908 (= *Arhysosage johnsoni* Brèthes, 1922).

Arhysosage ochracea (Friese)

Camptopocum ochraceum Friese, 1908, Flora og Fauna, 10: 29; Jensen-Haarup, 1908, Flora og Fauna, 10: 101; Joergensen, 1909, Deutsche Ent. Zeitschr., 1908: 58; Strand, 1909, Deutsche Ent. Zeitschr., 1909: 230; Cockerell, 1909, Proc. U. S. Nat. Mus., 38: 416; (?) Strand, 1910, Zool. Jahrb., Abt. f. Syst., 29: 458; Joergensen, 1912, Zool. Jahrb., Abt. f. Syst., 32: 118; Joergensen, 1912, An. Mus. Nac. Buenos Aires, 22: 307; Schrottky, 1913, An. Soc. Ci. Argentina, 75: 244.

Psaenythia bifasciata Friese, 1908, Flora og Fauna, 10: 41; Jensen-Haarup, 1908, Flora og Fauna, 10: 101; Joergensen, 1909, Deutsche Ent. Zeitschr., 1909: 59; Holmberg, 1921, An. Mus. Nac. Buenos Aires, 31: 296, 307.

Camptopocum bifasciatum, Joergensen, 1912, Zool. Jahrb., Abt. f. Syst., 32: 118; Joergensen, 1912, An. Mus. Nac. Buenos Aires, 22: 307; Schrottky, 1913, An. Soc. Ci. Argentina, 75: 244.

Camptopocum opuntiarum Joergensen, 1912, Zool. Jahrb., Abt. f. Syst., 32: 118; Joergensen, 1912, An. Mus. Nac. Buenos Aires, 22: 307.

Arhysosage johnsoni Brèthes, 1922, An. Soc. Ci. Argentina, 93: 122.

Camptopocum castellani Cockerell, 1940, Amer. Mus. Novitates, 1080: 1.

Ruiziella ochracea, Timberlake, 1952, Ann. Ent. Soc. Amer., 45: 105.

Ruiziella bifasciata, Timberlake, 1952, Ann. Ent. Soc. Amer., 45: 105.

Ruiziella castellani, Timberlake, 1952, Ann. Ent. Soc. Amer., 45: 105.

The color variation in females of this species is very striking. In the large series of specimens in the Snow Entomological Museum, University of Kansas, is a black specimen, with only the following parts yellow: narrow lines along the inner and outer orbits, mandibular bases, an interantennal stria separate from preocellar spot, a very narrow band on the posterior mar-

gin of the scutellum and metanotum, and a broad band on the fifth tergum. There are specimens with a band also on the fourth tergum (*bifasciata*) and with interrupted bands on the first two terga. In other females the general background color of the abdomen passes to brown and in a specimen from Paso de los Funes, San Luiz, Argentina, the background is reddish, the bands reduced to small lateral spots, even on the fourth tergite, and interrupted on the fifth (*castellani*) (I saw the type of *castellani* in the United States National Museum).

The males seem quite uniform, although that described as the male of *castellani* by Cockerell makes one think of the possibility that males, too, are polychromatic.

The two species described below are exceedingly similar to *ochracea* and to one another but do not exhibit the polychromatism of *ochracea*.

Arhysosage flava new species

?*Camptopocum ochraceum* Strand, 1909, Deutsche Ent. Zeitschr., 1909: 290; Strand, 1910, Zool. Jahrb., Abt. f. Syst., 29: 458.

Male: Coloration entirely yellow, even abdomen without bands; mandibles (apices fuscous), subantennal areas and adjacent parts of clypeus white; under surface and legs very pale yellow; dark markings reduced to fine dark brown lines along notalices, scuto-scutellar suture, margins of metanotum next to tegulae, and the facial foveae. Wings hyaline; tegulae, veins, and pterostigma yellow.

Pilosity all pallid, very short, even on dorsum of mesonotum, a little longer on head and sides of thorax.

Punctuation fine and rather dense, especially on clypeus which is dull.

Width of head over twice distance from anterior margin of clypeus to lower margin of median ocellus (184:82); length of eye little over half of upper interorbital distance, this less than lower interorbital distance (75:120:165); interocellar distance slightly less than ocellocular (27:28); interantennal distance equal to length of scape and four times length of subantennal area (40:40:9), the latter distinctly broader than long (15:9);

labrum almost twice as broad as long (70:40), entirely flat, without labral plate ("basal area of labrum").

Length 10 mm.; length of wing (including tegula) 6.5 mm.; head width 3.1 mm.; abdominal width 3.5 mm.

The structure that distinguishes this species most easily from the others is the form of the clypeus of the male, which is considerably broader laterally in this species. Also, the labrum is relatively broader and shorter (70:30), in contrast to *A. ochracea* (65:40).

Female: Entirely yellow, without abdominal bands, sutures mostly finely brown on head and thorax; clypeus whitish with two small brown points; brown lines of facial foveae generally united by an equally fine brown line behind ocelli; ventral side of thorax dark brown as are coxae and trochanters, latter with yellow spots; sternites two to five with some brown spots.

Width of head more than twice distance from anterior margin of clypeus to lower margin of median ocellus (152:83); eye length a little less than upper interorbital distance which is less than lower interorbital (80:92:120); interocellar distance slightly less than ocellocular (27:29); interantennal distance equal to length of scape and 3.4 times length of subantennal area (34:34:10), the latter broader than long (13:10); labrum without labral plate, a little elevated transversely near base, twice as broad as long (60:32); clypeus approximately five times as broad as long (148:30).

Length 9.2 mm.; length of wing (including tegula) 6.0 mm.; head width 2.5 mm.; abdominal width 3.0 mm.

Distribution: Ing. Juarez, Formosa, ARGENTINA (type locality), December, 1950 (F. H. Walz); Gran Guardia, Formosa, Argentina (J. Foerster); Santiago del Estero, Argentina (Gomez); Recreo, Catamarca, December, 1951 (F. H. Walz).

Types: Holotype male and allotype female, in the Snow Entomological Museum, University of Kansas. Twenty-six paratypes in that collection, and collections of Dr. Carlos Alberto Campos Seabra (Rio de Janeiro), the United States National Museum, the American Museum of Natural History, the British Museum (Natural History), the Museo Argentina de Ciencias

Naturales "Bernardino Rivadavia" (Buenos Aires), the Departamento de Zoología, Secretaria de Agricultura do Estado de São Paulo (São Paulo), and the author's collection.

Arhysosage germana new species

This species is very similar to the two preceding, resembling more *A. ochracea* by the abdominal bands, but considerably smaller and never reaching the strong melanization common in that species. In the clypeal form of the male this species also resembles *ochracea*. I think it is not merely a case of allometry, since there is available a large number of specimens, quite uniform. The three species occur sympatrically in the region of Catamarca.

Male: Head and thorax yellow, abdomen of a light ferruginous brown with yellow bands on bases of tergites; apices of mandibles dark and sutures of head and thorax light brown; facial foveae black. Wings hyaline, veins and pterostigma yellow, vein R rather dark.

Pilosity white, a little more developed than in the preceding species.

Punctuation a little denser than in *ochracea*, resembling that of *flava*. (This character most evident in clypeal region which in *ochracea* is more shining.)

Head considerably broader than distance from clypeal margin to lower margin of median ocellus (144:80); eye shorter than upper interorbital distance, about half lower interorbital distance (64:86:126); interocellar distance longer than ocellocular (26:23); interantennal distance a little shorter than scape, three times length of subantennal area (30:32:10), the latter slightly broader than long (11:10); labrum without elevated labral plate, almost twice as broad as long (50:27); clypeus about four times as broad as long (120:29), quite narrow laterally, in this feature resembling *ochracea*; subapical inner mandibular tooth very weak, only vestigial.

Length 7.5 mm.; length of wing (including tegula) 5.9 mm.; head width 2.5 mm.; abdominal width 2.7 mm.

Female: Color as in male, markings very weak on ventral part of thorax, less defined than in *flava*, black lines of facial foveae generally united behind the ocelli; face generally with pale brown area in the form of inverted U with its base on ocelli and arms directed toward antennal sockets; mesonotum with three more or less pronounced brown lines, one median and extending to anterior border, the others on each side shortened in front, all uniting at scuto-scutellar suture; propodeum usually with brown T-shaped spot, cross bar of which is curved along base next to metanotum.

Head distinctly broader than distance from clypeal margin to lower margin of median ocellus (140:86); eye length equal to upper interorbital distance but less than lower interorbital distance (80:81:102); interocellar distance slightly more than ocellocular (21:20); interantennal distance distinctly longer than length of scape and more than 2.5 times length of sub-antennal area (27:33:10), latter practically as long as broad (10:10); labrum without labral plate almost twice as broad as long (50:27); clypeus little over three times as broad as long (100:31), distinctly narrowed toward sides.

Length 7.2 mm.; length of wing (including tegula) 5.5 mm.; head width 2.3 mm.; abdominal width 2.8 mm.

Distribution: Recreo, Catamarca, ARGENTINA (type locality), December, 1951 (F. H. Walz); Rio del Valle, 580 meters altitude, Catamarca, Argentina, November 5, 1951; Catamarca, November, 1951 (J. Foerster); Catamarca, December 8, 1951 (A. Martinez); Catamarca (without other data, from Museo Argentino de Ciencias Naturales "Bernardino Rivadavia").

Types: Holotype male and allotype female in the Snow Entomological Museum, University of Kansas. Eighty-two paratypes in that collection and in collections of Dr. Carlos Alberto Campos Seabra (Rio de Janeiro), the United States National Museum, the American Museum of Natural History, the British Museum (Natural History), the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (Buenos Aires), and the Departamento de Zoología, Secretaria de Agricultura do Estado de São Paulo (São Paulo), the Museu Nacional (Rio de Janeiro), and the author's collection.

Nomenclatural Changes in *Trachymyrmex* (Hym.: Formicidae, Attini)

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Trachymyrmex, one of the largest genera of fungus-growing ants, has been difficult to characterize because of its similarity to some *Acromyrmex* and *Sericomyrmex* and because of the diversity of its species. From *Acromyrmex* it differs principally in its feeble or no polymorphism and generally greater spinosity and pilosity; *Sericomyrmex* has a cordate head with rounded occipital lobes and long, abundant, silky hairs. The species of *Trachymyrmex* vary in size from 2 mm. to about 5 mm. and normal infraspecific variability was seldom realized when descriptions were first published. Examinations of the three chief European collections of fungus-growing ants^{1,2} and field work and laboratory studies of living colonies have made possible the following nomenclatural changes in the genus.

Trachymyrmex cornetzi Forel

1912. *Atta* (*Trachymyrmex*) *cornetzi* Forel, Mem. Soc. Ent. Belg. 19: 183.
1912. *Trachymyrmex cornetzi* var. *naranjo* Forel, Mem. Soc. Ent. Belg. 19: 184. New Synonymy.
1922. *Trachymyrmex cornetzi* var. *bivittatus* Wheeler, Am. Mus. Novitates, No. 45, p. 13. New Synonymy.
1931. *Trachymyrmex uncifer* Santschi, Rev. de Ent. 1: 281. New Synonymy.
1936. *Trachymyrmex annulatus* Santschi, Rev. de Ent. 6: 201. New Synonymy.
1940. *Trachymyrmex cornetzi* ssp. *gatun* Weber, Rev. de Ent. 11: 420. New Synonymy.
1945. *Trachymyrmex cornetzi* ssp. *brevispinosa* Weber, Rev. de Ent. 16: 55. New Synonymy.

¹ Supported by a grant from the National Science Foundation.

² Those of Forel in the Muséum d'Histoire Naturelle in Geneva, Switzerland, in charge of Dr. Ch. Ferrière; of Santschi in the Naturhistorisches Museum, Basel, Switzerland, in charge of Dr. Fred Keiser; and of Emery in the Museo Civico Di Storia Naturale, Genoa, Italy, in charge of Dr. Delfa Guiglia. Types in the U. S. National Museum have also recently been examined.

Three pins in the Forel collection are marked "Typus," one with three workers being labelled: "Tr. Cornetzi ♀ type, Forel, Sta. Martha, Colombie (Forel)." The thorax length of these including neck is 1.27–1.30 mm. A pin of three worker cotypes from the reserve collection given to me in an exchange with Dr. Ferrière has thorax lengths of 1.25–1.38 mm. The one type of the var. *naranjo* is somewhat spinier in places but is considered to be the same form.

The *annulatus* type in the Santschi collection is labelled: "Panama, San Francisco, Bierig, 8.vi.30." It has the usual brown frons spot of *cornetzi* but so concealed by the general dark color as to be difficult to see. The thorax length, excluding the neck, is 1.14 mm. or 1.2 mm. with neck. The *uncifer* type (labelled: "France Fld") in this collection is dirty and also very dark but faintly showing the same spot on the frons; the total extended length as mounted is 3.67 mm. including porrect mandibles and the thorax length with neck is 1.33 mm.

British Guiana and Surinam specimens (Weber, 1946, Rev. de Ent. 17: 145) belong to the typical form as do the Trinidad representatives described as the var. *bivittatus*, the Barro Colorado Island, Canal Zone ants described as *gatum* (although with a feeble post-occipital tubercle lacking in the six above Forel cotypes), and the Rio Porce (Lat. 6°40' N., Long. 75°10' W), Colombia ants called *brevispinosa* which are dark brown.

This species is much more common and variable in spinosity and color than formerly realized. The color is frequently pale ferruginous.

***Trachymyrmex cucumis* (Mann) comb. nov.**

1922. *Myrmicocrypta cucumis* Mann, Proc. U. S. Nat. Mus. 61: 45.

Two worker cotypes in the U. S. National Museum-Mann collection are typical small *Trachymyrmex* with the large post-petiole characteristic of the smallest species of the genus. This, from above, is as broad as long although being narrowed anteriorly it looks longer than broad. Compared with the holotype of *schomburgki*, the habitus is similar. The thorax length is

the same (0.9 mm.) and has similar spinosity except that the lateral pronotal spines of the latter are longer. When more specimens of both species are available *schomburgki* may be considered to be the same or a subspecies. The holotype of *carib* is bigger and coarser and *tucuché* is more sharply rugulose on the frons, the anterior lateral pronotal tubercles are coarser and the postpetiole is distinctly broader than long.

Trachymyrmex farinosus Emery

1894. *Atta* (*Trachymyrmex*) *farinosus* Emery, Bull. Soc. Ent. Ital. 26: 221.

1938. *Trachymyrmex trifurcatus* Weber, Rev. de Ent. 9: 199. New Synonymy.

The Emery collection has a single pin labelled: "124. Para; n. sp. Para, Schutz; *Atta farinosa* Em." which has doubtless the type. The thorax, including a short neck, is 1.77 mm. long. It agreed very well with a paratype of *trifurcatus* (King Frederick William IV Falls, Courantyne R., Surinam, 16.vii.36, N. A. Weber 577) and, despite minor differences, is conspecific. These two ants and the holotype of *trifurcatus* have a peculiar and massive lateral gastric swelling on each side that absorbs the usual gastric carina posteriorly. The *farinosa* hairs are fine and simple; some of the *trifurcatus* hairs are narrow-squamose but this is believed to be a variable character.

Trachymyrmex opulenta (Mann) comb. nov.

1922. *Sericomyrmex opulenta* Mann, Proc. U. S. Nat. Mus. 61: 48.

Six worker cotypes in the U. S. National Museum-Mann collection are typical *Trachymyrmex* with the same habitus as *wheeleri*, which was also described as a *Sericomyrmex* because of the unusually long and abundant silky pilosity. The well developed occipital tubercles, however, and the head in general are not those of *Sericomyrmex* as now considered (and as characterized by Mayr originally). The *opulenta* cotypes have shorter occipital tubercles and higher basal carinae on the epinotum anteriorly than *wheeleri* cotypes.

Trachymyrmex saussurei Forel

1884. *Atta tardigrada* st. *saussurei* Forel, Bull. Soc. Vaud. Sc. Nat. 20: 361.

The Forel collection now was found to have only *Sericomyrmex saussurei* Emery (and under *Sericomyrmex*), an entirely different ant, but the Santschi collection has one specimen under *Trachymyrmex* labelled: "A. acrom. Saussurei For. (Per-gande) ; Samlung Dr. F. Santschi Kairouan." It is in the space labelled *Trachymyrmex saussurei* Forel.

The extended length of the ant (a worker) is 4.30 mm., the thorax 1.90 mm. It is bigger and coarser than *septentrionalis* but with the same general arrangement of spines and head contours. The postpetiolar node from above is 0.4 mm. long \times 0.46 mm. wide. A pin of three workers from the duplicate Forel collection given to me by Dr. Ferrière in exchange appears to be type material. It bears the labels: "41; Mexiq. Orizaba; A. Saussurei, ♀ Forel; cn de Saussure." A pin of one worker given to me by W. M. Wheeler in the 1930's bears the label "Tepic, Mexico" and the label written by his secretary at the time "Cyphomyrmex (*Trachymyrmex*) *saussurei* Forel." The three workers may be type material. In the Biologia Centrali-Americana Tepic and Orizaba are the localities listed for the species.

This species may be close to the parental stock from which the far-ranging *septentrionalis* was derived and the ants may have spread along the northern Gulf of Mexico coast to and along the Atlantic coast. The resemblance between the two species is so close that one could still be considered a subspecies of the other. Since *septentrionalis* was described earlier, this would be the species name although perhaps inappropriate from the point of view of origin.

Trachymyrmex septentrionalis McCook

1880. *Atta septentrionalis* McCook, Proc. Acad. Nat. Sc. Philadelphia, pp. 359-363.

1907. *Atta* (*Trachymyrmex*) *septentrionalis* var. *obscurior* ✓
Wheeler, Bull. Amer. Mus. Nat. Hist., 23: 709. New
Synonymy.

1911. *A. (T.) septentrionalis* var. *vertebrata* Wheeler, Jour. N. Y. Ent. Soc. 19: 246.
1911. *A. (T.) septentrionalis obscurior* var. *irrorata* Wheeler, Jour. N. Y. Ent. Soc. 19: 247.
1911. *A. (T.) septentrionalis obscurior* var. *crystallina* Wheeler, Jour. N. Y. Ent. Soc. 19: 247.
1911. *A. (T.) septentrionalis obscurior* var. *seminole* Wheeler, ✓ Jour. N. Y. Ent. Soc. 19: 247. New Synonymy.
1950. *Trachymyrmex septentrionalis* Creighton, Bull. Mus. Comp. Zool. 104: 323.

In his original description, McCook called attention to the variability of the worker caste from 3 to 4 mm., referring to them as "workers major and minor." As Creighton has shown (and as Wheeler intimated for *irrorata* and *crystallina*), *vertebrata*, *irrorata* and *crystallina* are variants of no taxonomic significance and the present author believes that *obscurior* and *seminole* have the same value. Numerous colonies of New Jersey and Florida origins kept in the laboratory have shown the variation in size that McCook was the first to realize. Color varies greatly and appears of no consequence in this species. Biological studies of these two populations (Weber, 1956, Ecology 37: 150-161, 197-199) have proven their fundamental similarity.

The geographical range of this species, while considerable, is not unusual for a fungus-grower and the ecology appears quite uniform, with temperature the chief variant.

Trachymyrmex urichi Forel

1893. *Atta (Trachymyrmex) urichi* Forel, Ann. Soc. Ent. Belg. 37: 601.
1894. *Atta (Trachymyrmex) urichi* subsp. *fusca* Emery, Bull. Soc. Ent. Ital. 26: 222. New Synonymy.
1912. *Atta (Trachymyrmex) urichi* subsp. *marthae* Forel, Mem. Soc. Ent. Belg. 19: 183. New Synonymy.
1925. *Trachymyrmex urichi* subsp. *panamensis* Wheeler, Arkiv. För Zool. 17: 38. New Synonymy.
1938. *Trachymyrmex urichi* ssp. *radicis* Weber, Rev. de Ent. 9: 197. New Synonymy.

The Emery collection contains the two types of *fusca* mounted on one pin and carrying on the upper label: Coxipò; lx.900

(Matto Grosso). The upper ant has a thorax length of 1.77 mm., the lower ant 1.57 mm. They are no darker than some Panama and Colombian specimens and in other characters appear to be within the normal range of infraspecific variability.

The Forel collection contains a large series of the types of *marthae* and a pin of three workers was secured by exchange with Dr. Ferrière. It bears the label: Tr. Urichi Forel; ♂ r. Marthae Forel; Sta. Martha, Colombie (Forel). They are a dark brown but otherwise like *urichi*, which has been collected numerous times by the author in the type locality, Trinidad (see Rev. de Ent. 1945, 16: 44-54). The subspecies *panamensis* was based largely on color and these ants have since been found to be common on the Pacific slopes of Panama. While often of the color described by Wheeler, specimens from the same localities, but taken in March, 1957, during the height of an unusually severe dry season, were as dark as those named *marthae* by Forel. The subspecies *radicis* was based on small specimens, probably of a young colony. The species also occurs in Venezuela. Throughout its range it is an ant of the savannah or grass-woodland rather than of closed forests.

***Trachymyrmex wheeleri* (Weber) comb. nov.**

1937. *Sericomyrmex wheeleri* Weber, Rev. de Ent. 7: 396.

1937. *Sericomyrmex wheeleri* subsp. *pakeclai* Weber, Rev. de Ent. 7: 398. New Synonymy.

In pilosity and high mesonotal spines these ants resemble *Sericomyrmex*. However, the head is typical *Trachymyrmex*. They have the same habitus as *opulenta* but six cotypes in the U. S. National Museum have distinctly shorter occipital spines and higher basal carinae on the epinotum anteriorly. The type series of *pakeclai* consistently show lower and more rounded occipital spines, lower mesonotal spines and much more marked tubercles on the declivous surface of the mesonotum. These are believed now to fall within the normal infraspecific range of variability. Additional collecting and study may show *wheeleri* to be no more than a subspecies of *opulenta*.

Specimens taken by the author at Rio Porce (Lat. $6^{\circ}40'$ N., Long. $75^{\circ}10'$ W.), Colombia in 1938 are of this species. Males and females came to lights about 3-4 A.M., August 1 and a nest containing males was excavated July 21. The workers are dark brown. This species does not appear to have been taken in Colombia by Forel and is not his *gaigei*.

Trachymyrmex zeteki Weber

1940. *Trachymyrmex zeteki* Weber, Rev. Ent. 11: 422.

1940. *Trachymyrmex balboai* Weber, Rev. Ent. 11: 424. New Synonymy.

Additional collecting and study since 1938 in the type locality, Barro Colorado Island, Canal Zone, show that the differences noted in the two species cannot be sustained and that they are best considered to be the same species, *zeteki* having page priority. A colony kept for over two years in the laboratory shows a variation in worker morphology that was unknown in 1940. A conspicuous feature is the spatulate pilosity but this is of variable extent.

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All comments relating to the following should be marked with the Commissioner's File Number and sent to Francis Hemming, 28 Park Village East, Regent's Park, London N.W.1, England.

Calandra (**Calendra**) Clairville and Schellenberg, 1798, suppression of, in favor of *Sphenophorus* and *Sitophilus*, both of Schoenherr, 1838, respectively, in interests of universality of nomenclature; *abbreviatus* Fabricius, 1787 (*Curculio*) and *oryzae*, emendation to, of *oryzae* Linnaeus, 1783 (*Curculio*), validation of (Class Insecta, Order Coleoptera). File: Z.N.(S.)255. For details, see Bull. Zool. Nomencl., Volume 16, Part 1.

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THE NEOTROPICAL SPECIES OF THE 'SUBGENUS AESCHNA' SENSU SELYSII 1883 (Odonata)

By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeschna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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ENTOMOLOGICAL NEWS

MARCH 1958

Vol. LXIX

No. 3

CONTENTS

Kormondy— <i>Oligoclada umbricola</i>	57
Lipa—Fauna of nests of <i>Euproctis</i>	60
Dreisbach—New species of <i>Pompilinus</i>	61
Judd—Seasonal distribution of <i>Silvicola</i>	65
Papers by S. W. Frost	67
Notes and News in Entomology	
Budapest Museum	78
Proceedings of International Congress	78
Centennial News	79
Review—Annotated catalogue of African grasshoppers	80
Books Received	81

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ENTOMOLOGICAL NEWS

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MARCH, 1958

No. 3

The Plesiallotype Female of *Oligoclada umbricola* Borror, 1931

By EDWARD J. KORMONDY, Department of Zoology,
Oberlin College

In the preparation of type specimens of Odonata in the C. H. Kennedy Collection acquired by the University of Michigan Museum of Zoology, a female labelled "*Oligoclada umbricola* Borror, Allotype" by Kennedy, was found. The specimen, which Kennedy undoubtedly intended to describe, was in poor condition with the hind wings free, and the abdomen broken into several pieces. Two other females were found in the collection; one had been determined as *O. umbricola* by Borror; the other was in an envelope containing a male *umbricola*, not seen by Borror but presumably seen by Kennedy. The three females, along with eight males, were collected for Kennedy by William Clarke-MacIntyre; they are from Province de los Rios, Ecuador, and were collected March 4–April 12, 1938. These records extend the known range of the species southward from Colombia and Venezuela (Borror, 1931).

The female *umbricola* is distinguished, as is the male, by the structure of the occiput. This differs from the male only in the presence of two postero-medial brownish yellow elongate spots. Additional differences from the male are described below.

The plesiallotype, labelled "Ecuador: Province de los Rios, Playas, April 12, 1938, W. Clarke-MacIntyre," is deposited in the type collection of the University of Michigan Museum of Zoology.

The measurement of the plesiallotype are followed in parentheses, by those of Kennedy's "Allotype" (March 4, 1938), and the Borror determined specimen (March 4, 1938), respectively.

Abdomen: 16.4 mm. (16.0, 16.0); hind wing: 21.0 mm. (21.8, 21.4); stigma: 2.4 mm. (2.2, 2.4).

Venational Characters. Antenodals in front wing: $9\frac{1}{2}$ ($9\frac{1}{2}$, $9\frac{1}{2}$); postnodals in front wing: 9 (8, 9); antenodals in hind wing: 7 (7, 7); postnodals in hind wing: 8 (8, 9); triangle in front wing: free (free, crossed); cells bordering proximal side of bisector of anal loop: 9 (8, 7); cells bordering distal side of bisector of anal loop: 7 (7, 7); interpolated cells in distal half of anal loop: 2 (2, 2); rows of post loop cells in hind wing: 4 (4, 4).

Occiput, smooth, convex; posterior margin swollen, very slightly bilobed; dark brown, metallic except for two posterior-medial brownish yellow elongate spots. Vertex blue-black, metallic. Frons purple black, metallic. Postclypeus gray, anterior-lateral edges brown. Anteclypeus brownish-gray. Lower two-thirds of labrum black; upper third brownish yellow, broadening medially into a v-shaped encroachment on the black. Labium black; lateral lobes black medially, lateral $\frac{3}{4}$ yellowish white.

Thorax dark reddish brown; slightly pruinose. A large yellowish spot on mesepisternum approximately equidistant from humeral suture and mid-dorsal carina; a narrow yellowish stripe in front of the spiracle on mesepimeron; another, broader, above and slightly in front of spiracle on metepisternum, and almost contiguous with mesepimeron stripe; another, less distinct on upper part of metepimeron. Legs brownish black, moderately pruinose. Mesal side of prothoracic trochanter and proximal mesal third of femur yellowish white. Penultimate spine on externo-anterior angle of hind femur about $\frac{3}{4}$ as long as ultimate spine. Tooth on tarsal claw reduced to a small but definite notch located at about $\frac{2}{3}$ the length. Wings hyaline; pigmented area at base of hind wing very faint brownish yellow, slight but more diffuse than in male.

Abdomen reddish brown; sides of segments 4-7 increasingly black; 8-10 all black; appendages black; transverse carinae of segments 1-3 black; that of 4 brown dorsal. Vulvar lamina:

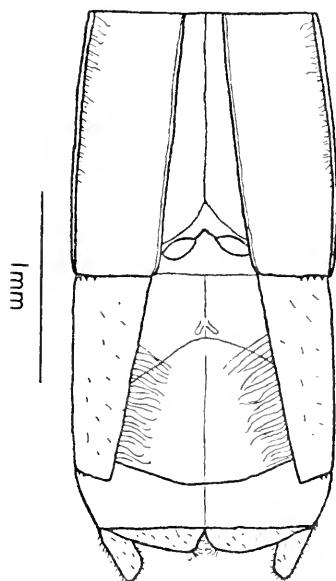


FIG. 1. Terminal abdominal segments of female *Oligoclada umbricola* Borror.

terminal $\frac{1}{6}$ of mid-ventral carina elevated, rounded; hind margin developed as two elongated oval thickenings between which is a v-shaped incision (fig. 1).

LITERATURE CITED

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Some Observations upon the Fauna of the Winter Nests of *Euproctis chrysorrhoea* (Lepidoptera)

By JERZY J. LIPA, Laboratory of Agricultural Entomology,
Institute of Plant Protection, Puławy, Poland

The caterpillars of *E. chrysorrhoea* construct nests in which they hibernate. I collected these nests during the winter and summer, and have also located nests in greenhouses. From the nests collected during the winter emerged the caterpillars of *E. chrysorrhoea*, and also larvae and adults of other species. However, from the nests collected during the summer (when the caterpillars had already left the nests) there emerged only the larvae and adults of other species.

Most interesting was the frequent occurrence of mixed winter nests in which there hibernated the caterpillars of both *E. chrysorrhoea* and *Aporia crataegi*.

During the winter the following species were observed in the nests:

LEPIDOPTERA: The caterpillars of *A. crataegi* and other species.

HEMIPTERA: Larvae of *Lecanium corni* and *Lecanium* sp.

ACARINA: *Tetranychus urticae* and other Tetranychidae.

HYMENOPTERA PARASITICA: *Eupteromalus micropterus*, *E. nidulans*, *Monodontomerus acrcus*, and other species.

ARANEIDA: *Araneus cucurbitinus*, *Philodromus* sp., *Clubiona* sp., *Theridium notatum*.

APTERYGOTA: Various species.

During the summer, I have observed the following:

HEMIPTERA: *Lygus pabulinus*, *Plesiocoris rugicollis*, *Kleidocerys resedae*, *Anthocoris nemorum*, *Arma custos*, and others.

COLEOPTERA: *Subcoccinella 24-punctata*, *Coccinella 7-punctata*, *C. bipunctata*, *Phalacrus fimentarius*, and others.

ACARINA: various species.

Discussion. The winter nests of *E. chrysorrhoea*, during both winter and summer, are the hiding places of the larvae and adults of other species. Some of these are predators or parasites, but since the majority are pests, the removal of the nests from trees is desirable.

Two New Species in the Genus *Pompilinus*
(Hymenoptera: Psammocharidae) with
Photomicrographs of the Genitalia and
Subgenital Plate of the Male

By R. R. DREISBACH, Midland, Michigan

Pompilinus clavipes n. sp.

Holotype male: Color completely black with the faintest very short, white line on the upper posterior orbits, and the tips of the mandibles reddish; only very scattered short hair over the front, vertex, and the clypeus, with longer hair on the upper posterior orbits, and under parts of the head; almost the whole body sericous, the front, clypeus, almost all the thorax, and the legs mostly covered with sericous hair; very shiny patch of a little longer hair on the posterior orbits; when seen from the side the front is visible above the eyes, the vertex is very slightly raised, and the nearer ocellus is completely visible; the clypeus is almost flat but slightly convex in middle; when seen from the front, a small rectangular plateau on the vertex carries the ocelli; the antennae are short and the joints are more than twice as long as wide with a silvery sheen when viewed in reflected light; the apical joint is blunt; the first and fourth joints are longer than the third; the ratio of the first four and last two joints are as 15:6:12:15:10:12; the pronotum rises in a smooth curve and is almost flat on top; the propodeum has a slight slope to the rear and the posterior and dorsal parts are connected by a smooth curve; propodeum is without hair but covered with appressed, beautiful silvery pubescence; the wings are brownish, hyaline, with the space beyond the cells considerably darker; the ratios of the joints of the posterior legs starting with the femur are as 83:81:63:27:22:15:20; the posterior tibia with its longest spur two thirds as long as its metatarsal joint; the distance between the lateral ocelli is equal to the distance from them to the eye; the interocular width at the vertex is slightly more than at the clypeus; the clypeus is one third times as long as its width; head 1.14 times as wide as long; the length of the head and thorax is 3.98 mm.; abdomen same length; fore

wings 5.96 mm.; rear wings 4.64 mm.; genitalia length 1.32 mm., width 0.66 mm.; subgenital plate 1.0 mm., width 0.33 mm.

Holotype male: 8/8/1952, R. R. Dreisbach, CONLON, Texas. (MCZ).

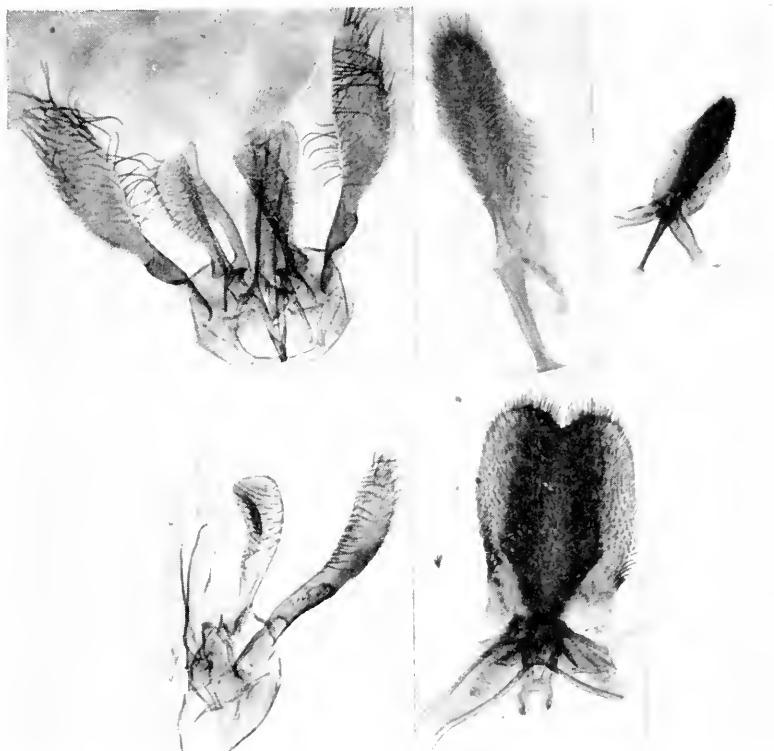
Genitalia of this species are very distinctive by virtue of the much broadened parameres, expanded very sharply about the basal third, and by the very long rather heavy hairs arising from the inner edge and the long slightly thinner hairs on outer edge; the subgenital plate is unique in shape, and is suddenly reduced about the apical third; heavily haired about this width to near the base and with semi-translucent sides on basal two-thirds.

Paratype males (13): Sand dunes Medora Kans., VII-7-53. H. E. Evans (8). USNM (1), MCZ (1), RRD (3).

***Pompilinus drakei* n. sp.**

Holotype male: Color black all over with just the faintest trace of a white streak on upper posterior orbits, and apices of the mandibles reddish; thinly placed hair on the vertex, under the head and a few very short hairs on the pronotum, practically none on the propodeum; when seen in facial aspect, the front just above the antennae is slightly raised sloping to the vertex, clypeus slightly arched in front of apex, slightly raised above the mouth; head slightly wider than long; antennae very slender with the third joint the same length as the first and slightly longer than the fourth, ratios of the first four antennal joints and the last two are as 18:7:17:15:11:15; the apical joint with the base slightly smaller than the apex of the 12th; the posterior ocelli are the same distance from the eyes as they are from each other; the interocular distance at the vertex about the same as at clypeus; clypeus one half as long as wide; the pronotum rises in a smooth curve ascending all along the rear, not flat on top, only very slightly angular on the posterior edge; propodeum almost horizontal on top but very slightly inclined with curve of the posterior surface very short; wings almost hyaline except considerably darker beyond the cells; third cubital cell very strongly petiolate; first intercubital vein meets the second cubital cell beyond the middle, the second intercubital vein meets

the third cubital cell at just about the middle; length of the second cubital cell on the radius only about half its length on the cubitus; second recurrent vein almost straight but sloping back-



Pompilinus clavipes n. sp.

Upper row. Left: genitalia of holotype. Middle: subgenital plate of holotype. Right: subgenital plate of paratype.

Pompilinus drakei n. sp.

Lower row. Left: genitalia of holotype. Right: subgenital plate of holotype.

wards rather strongly; abdomen widest at the apex of the second tergite and almost parallel to the apex; legs with a very few spines; ratios of the joints of the posterior legs starting with the

femur are as 95:92:60:28:22:13:20; posterior tibiae with longest spur three-fourths the length of its metatarsal joint; length of head and thorax 3.98 mm.; abdomen same length; fore wings 5.63 mm.; rear wings 4.64 mm.; length of genitalia 1.06 mm., width 0.53 mm., length of subgenital plate without stem at base 0.93 mm., width 0.53 mm.

Holotype male: Cranberry Lake, N. Y. 7/28/1917. C. J. Drake acc. 5136 (Am. Mus.)

The subgenital plate of this species is almost parallel-sided with a very strong emargination at the apex. This is the only species in the genus with an emarginate subgenital plate. Genitalia with the parameres slightly club-shaped and with a curved ridge on the surface about the basal fourth, basad of which are a few spines in spine pits; the volsellae bent inward about the middle and apicad of this a broadened flat surface; the parapenial lobes and aedeagus both have an indentation inside above the middle.

These two species will go in Evans' ¹ key as follows:

6. Subgenital plate more or less completely flat; apex evenly rounded as broad as rest of disc, in one case strongly emarginate; volsellae rounded apically6a
6. Subgenital plate of different form generally somewhat elevated medially, apex acute or subacute; volsellae not rounded apically7
- 6a. Subgenital plate strongly emarginate medially at apex; volsellae with a flat surface on inside and curved; volsellae with an indentation above middle on inside; parameres not so heavy and club-shaped; no upright hair on propodeum*drakei* n. sp.
- 6a. Subgenital plate not emarginate, rounded; volsellae without a flat surface not curved but straight on inside and volsellae without an indentation; parameres heavy, more club-shaped; propodeum hairy *tenebrosus* (Cress.)
11. Subgenital plate obtusely pointed, disc convex, median line not sharply elevated or, if somewhat so, the plate suddenly narrows about apical third; parameres very broad to apex11a
11. Subgenital plate with the median line distinctly elevated above rest of disc, the apex not tapered gradually to an obtuse angle; parameres not broad at apex12

¹ EVANS, H. E. 1951. Trans. Amer. Ent. Soc., LXXVI, p. 281.

- 11a. Parameres very heavy, club-shaped, widest about middle tapering to an obtuse point, very long hair (as long as width) on inside edge and almost as long hair on outside edge; subgenital plate suddenly reduced at apical third and slightly tapering from there to an obtuse tip
*clavipes* n. sp.
- 11a. Parameres rather flat and increasing in width from base to tip where they are the widest, no long hair on their inside edges nor on their outside edges, only short hair; subgenital plate gradually tapering to a very obtuse apex
*insolens* (Banks)

Studies of the Byron Bog in Southwestern Ontario.

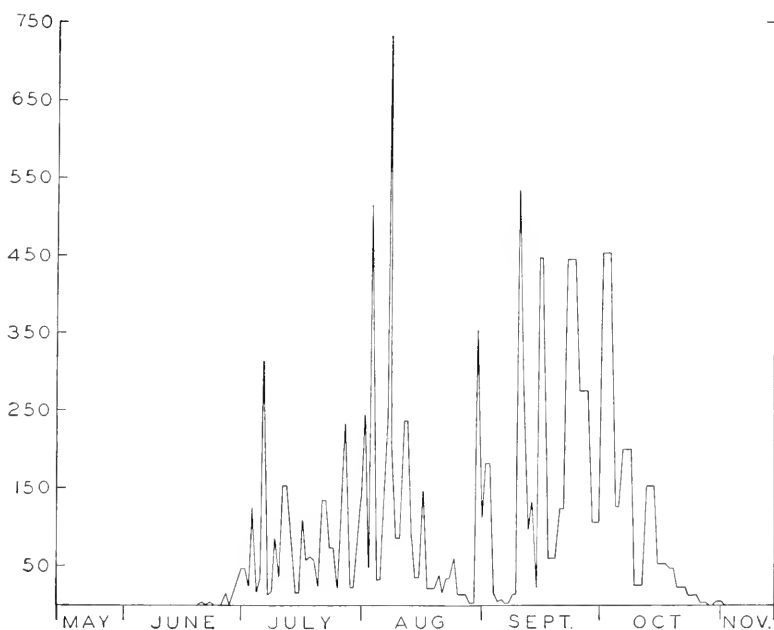
VI. Seasonal Distribution of the Wood Gnat, *Silvicola marginata* (Say) (Diptera: Silvicolidae)

By W. W. JUDD, Department of Zoology, University of Western Ontario, London, Ontario

In the description of the Byron Bog (Judd, 1957) it was pointed out that one method of collecting insects in the bog was the use of a baited trap. The position of the trap in the bog is shown by Judd (1957) and its mode of operation is also described (Judd, 1956). The trap was in operation during 1956 from May 15 to November 15 and over that period flies and other insects were removed from the trap each day and the numbers of the several species trapped were recorded. Among the insects so collected was the wood gnat, *Silvicola marginata* (Say). The insect was identified by Dr. A. Stone, Division of Insects, United States National Museum, who retained five specimens for the U.S.N.M. Other specimens are deposited in the collection of the Department of Zoology, University of Western Ontario.

The first gnat was trapped on June 21 and during the whole period of operation of the trap 14,855 gnats were trapped, the last being caught on November 1. Their seasonal distribution

is shown in fig. 1. The greatest number caught on one day, 731, appeared in the trap on August 9. Between July 1 and August 8 the daily catch was sorted according to sex and yielded 1,963 ♂♂ (51%) and 1,883 ♀♀ (49%).



Seasonal distribution of *Silvicola marginata* (Say)

Edwards (1923) points out that *Silvicola* (*Anisopus*) *marginata* (Say) is distinct from the European *punctatus*, for which several records of distribution in North America occur in the literature (e.g. Leonard, 1926). He based his decision on examination of specimens of *marginata* collected at Montreal, Quebec. The presence of the large population of *S. marginata* in the Byron Bog is in accord with the known habits of the gnats of this family as recorded by authors (e.g. Curran, 1923), for they occur near the edges of woods and in the vicinity of swamps and breed in wet or moist decaying organic matter.

ACKNOWLEDGMENT

This project was supported by funds from the Government of Ontario granted through the Ontario Research Foundation. The collections were made and the data assembled while the writer held a Summer Research Associateship from the National Research Council of Canada during 1956 and 1957.

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Papers by S. W. Frost

Pennsylvania State University, University Park, Pa.

1916

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1917

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1919

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Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Hymenoptera of the Budapest Museum

Dr. Erdős József of Tompa, Hungary, has written to me that the wing of the Hungarian National Museum in Budapest that contains the Hymenoptera collection has remained intact. The present curator of Hymenoptera is Némethné Bajári Erzsébet, a specialist in the families Ichneumonidae, Sphegidae and Mutilidae.—J. C. BRADLEY

Publication Announcement

The Proceedings of the Tenth International Congress of Entomology, held in Montreal, Canada, in August, 1956, are expected to be ready for distribution in late 1958. The price is \$75.00 postpaid for the set of four volumes. Since a limited number will be printed only orders received before May 1, 1958, can be guaranteed.

The Proceedings will contain nearly 700 scientific contributions, many accompanied by illustrations. The four volumes, comprising over 4200 pages, will constitute an indispensable work of reference for many years since most of the material is not being published elsewhere.

For further information write: Tenth International Congress of Entomology, Science Service Building, Ottawa, Canada.

Centennial News

The committee for planning the CENTENNIAL COMMEMORATION in 1959 of the founding of the American Entomological Society reports the following contributors during the past year to the special fund for this purpose:

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Dr. Harry G. Walker, Rome, Italy.
Dr. Joseph L. Williams, Philadelphia, Pa.

These 21 contributors are in addition to the 15 listed in the ENTOMOLOGICAL NEWS, December 1956 (p. 266) and the total is now about 24% of the present membership. The primary purpose of the fund is to present a special program marking the beginning of the second century for the Society, early in February or March 1959, and for publishing this as a greatly enlarged issue of the NEWS. Further contributions will be welcomed and will be acknowledged here. They should be sent to the American Entomological Society, 1900 Race Street, Philadelphia 3, Pa.

Review

ANNOTATED CATALOGUE OF AFRICAN GRASSHOPPERS. Compiled by H. B. Johnston, with a preface by B. P. Uvarov. xxii + 833 pp. Cambridge, England (Cambridge University Press, published for the Anti-Locust Research Centre). 1956. Price 5£, 5 shillings (in the United States \$18.50).

The preface of this timely and most important reference work, for both systematic and economic workers concerned with the acridoid fauna of Africa, was prepared by Dr. Uvarov, Director of the Anti-Locust Research Centre. His resumé of various aspects of locust problems in Africa should be read by all concerned with these matters in other areas. As there explained it was found essential for a sound approach to an understanding of African grasshopper problems to have a comprehensive systematic catalogue as a basis for work. The last world catalogue of the Acridoidea, published in 1910 by Kirby, was faulty in numerous respects; while the intervening years have seen an enormous increase in our knowledge of these insects, in Africa as elsewhere.

At the request of the Anti-Locust Research Centre, Dr. Johnston, who for years had been closely associated with locust problems in the Sudan and elsewhere, and whose knowledge of the fauna is comprehensive, devoted some years to the completion of the present catalogue, which brings together our knowledge of the systematics of African grasshoppers as of the end of the year 1953. All the families of the Acridoidea found in Africa, except the Tetrigidae, are included.

As the introduction states, "Nothing new in synonymy, taxonomy or distribution has been introduced, and though the arrangement of the material may present certain novel features, the work is in no sense a revision but merely a reference book." It would be a wonderful thing if those preparing similar catalogues could be persuaded to allow their presentations to rest solely on previously published analytic work, and to restrain tendencies to rearrange things without adequate presentation of reasons or demonstrable evidence. Unlike the treatment found

in numerous catalogues, the compiler has added a bibliography covering thirty-seven pages, which arrangement has materially reduced the bulk of the work by permitting the use of reduced reference citations. Aside from its immediate usefulness to one consulting the catalogue, this bibliography will be of the greatest value to present and future students of African grasshoppers.

The coverage of the catalogue embraces the continent of Africa and "the adjacent islands of the Atlantic and the Indian Ocean." The species whose distribution ranges extend beyond Africa required special treatment, and for these the more important non-African references and some of their synonymy are also included. In the case of the swarming locusts, on account of the great bulk of the economic and correlated literature bearing on them, it has been found possible to quote only the purely taxonomic and faunistic references for the five major African species of this category.

Since limitation of space has compelled the use of as concise an arrangement as possible consistent with clarity and ease of reference, full journal references are omitted from the systematic arrangement, but the papers can readily be located in the bibliography to which references are given by author, year and page. A system of symbols has been utilized to indicate the location of illustrations, misdeterminations, and preoccupied and substituted names. Genera have been arranged into subfamilies, tribes and groups according to usage as expressed in print up to the end of 1953. The compiler has noted "it is necessary to state here that no taxonomic or nomenclatorial value is attached to any names above the generic rank." In view of the fact that there are among some students of the African grasshopper fauna marked differences of opinion as to the worth, relative value and scope of numerous higher entities, Dr. Johnston is to be congratulated on this policy.

Immediately after the name of the genus, that of its type species is given, with an indication by a suitable term as to how, when, and by whom this was designated. The species in each genus are arranged alphabetically, subspecies are given under the nominate species with their treatment in general the same

as full species. References are arranged chronologically under species. Type localities are those "given by the original author with such supplementary information as may be given by a later reviser." The location of the type has been given wherever possible, "according to direct indication by the author, by inference from the original text, or from later references in literature," the owning institution being indicated by its abbreviated name, a listing of which is given in the introduction. Some few institutions cited in the body of the work, however, are not given in the introductory listing.

A very useful set of summarized annotations has been used to broaden the value of the catalogue as a reference work. These, given after each species, indicate which of the references cited presents a description, a figure, is in a key to species, or discusses the morphology, nymphal stages, ecology, bionomics, economic importance and distribution. Under the latter the references, which are individually numbered under each species, are grouped under North Africa, West Africa, East Africa, Central Africa, South Africa, Indian Ocean Islands, Atlantic Islands, and extra-African distribution.

To those who have prepared catalogues, even if only for personal use and not for publication, the amount of labor involved is well known and appreciated, and the meticulous way in which Dr. Johnston has brought together the exceedingly extensive and widely scattered information, which is summarized in this work, merits all possible praise. He, like all true bibliographers, has taken nothing second-hand, and citation errors of the past, which in some cases have been handed down through the years, have been corrected. The impersonal way in which the compiler has handled the literature gives to his work an exceptional character. The catalogue is fully indexed, and is as a whole a splendid piece of bookmaking. In its taxonomic, phylogenetic, and related aspects it is an excellent reference work, clearly a model for comprehensiveness, cohesiveness and ease of handling. To Dr. Johnston, to the Anti-Locust Research Centre, and to Dr. Uvarov, who inspired it, go the thanks of all who work to any degree with African acridoids. To the entomological fra-

ternity there has been given a model for similar works on other areas. Also we are promised supplements which will keep the general coverage of the subject relatively up to date.

JAMES A. G. REHN

Books Received

CAMRAS, S. and P. D. HURD. The Conopid flies of California. Bull. Calif. Insect Survey. Vol. 6, No. 2. Pp. 19-49. 4 figs., 25 maps. 1957. Price \$0.75.

ELDRIDGE, B. E. and M. T. JAMES. The typical muscid flies of California. Bull. Calif. Insect Survey. Vol. 6, No. 1. Pp. 1-17. 3 plates, 4 maps. 1957. Price \$0.50.

LANGSTON, R. L. A synopsis of hymenopterous parasites of Malacosoma in California. Univ. of Cal. Publications in Entomology. Vol. 14, No. 1. Pp. 1-50. Univ. of Cal. Press, Berkeley and Los Angeles, 1957. Price \$1.00.

ROSS, E. S. The Embioptera of California. Vol. 6, No. 3. Pp. 51-57. 7 figs. 1957. Price \$0.50.

SNODGRASS, R. E. A revised interpretation of the external reproductive organs of male insects. Smithsonian Miscellaneous Collection. Vol. 135, No. 6. 1957. Pp. 60, ill. Washington, D. C., 1957.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and **Stizini** (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Dominick J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

Melanotus (Elateridae). Revising Nearctic species; desire to see all available specimens. Will return at end of study. L. W. Quate, Department of Entomology, University of Nebraska, Lincoln, Nebr.

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By Philip P. Calvert

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ENTOMOLOGICAL NEWS

APRIL 1958

Vol. LXIX

No. 4

CONTENTS

Woolley and Baker—Key to the Oribatei	85
Crabill—Centipedes from Wisconsin	93
Hull—Some robber flies	99
Kempf—Synonymic notes on ants.....	108
Review—Studies on the comparative ethology of digger wasps of the genus <i>Bembix</i>	111

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ENTOMOLOGICAL NEWS

VOL. LXIX

APRIL, 1958

No. 4

A Key to the Superfamilies and Principal Families of the Oribatei (Sarcoptiformes: Acarina)

By TYLER A. WOOLLEY,¹ Department of Zoology, Colorado
State University, Fort Collins, Colorado, and EDWARD W.
BAKER, Entomology Research Division, Agr. Res.
Serv., U. S. D. A.

Although several keys to the oribatids are available, none is completely adequate. Cited in chronological order, these keys are in the publications of Sellnick (1928), Willmann (1931), and Baker and Wharton (1952). Grandjean (1953) and Dubinin (1954) wrote papers on classification and presented the oribatids at the family and superfamily level, but neither had a key. This paper is an attempt to direct and help organize the thinking of acarologists and students at the higher taxonomic levels, and to consolidate the differentiating characters of the common families in a simple key.

Some of the taxonomic designations indicated in this paper differ with respect to existing arrangements in the literature. The writers feel, however, that the simplified system included here will facilitate the identification of the oribatids to family and that minor differences in the systematic designations at this level will be resolved as the taxonomy of the whole group becomes clarified.

The following key to the higher categories and principal families of oribatid mites is a nature sequel to the paper *A PRELIMINARY ACCOUNT OF THE PHYLOGENY OF THE ORIBATEI*, presented by the senior author at the Tenth International Congress

¹ Research of the senior author supported by funds from the National Science Foundation.

of Entomology at Montreal, Canada, in the summer of 1956. Such a key was intended as a corporate part of that paper, which is in press, but could not be included in the publication because of limited space. The present key follows the systematic arrangement of this article in most instances, although one or two obvious alterations have been made.

The writers have included some generalized drawings for orientation purposes, but have illustrated specific points in the key by citing figures in the literature. Three sources of figures are indicated by the letters of the authors' names, viz., Baker and Wharton (1952), Sellnick (1928), and Willmann (1931). The figure numbers in these works are cited following the initial letter of the author's surname, e.g., Baker and Wharton, Fig. 372, is rendered B&W 372; Willmann, Fig. 27, becomes W 27; Sellnick, Figs. 37-40, is indicated as S 37-40.

In spite of certain exceptions, the key should provide the means to identify the more common oribatids to superfamily and family. In one or two cases a minor group, which may be considered a separate family by some other authors but which bears general resemblance to a larger family, is incorporated in the larger family. In other cases, families, although lacking specific key characters, are placed in a particular superfamily because of general resemblance. Indications of both of these situations are handled by footnotes.

A Key to the Superfamilies and Families of Oribatei

1. Usually sclerotized; body divided into propodosoma and hysterosoma dorsally, sometimes by a distinct suture; mouth parts not visible from above; setal pattern simple and not always obvious 2
 Soft-bodied; body usually undivided; setae distinct in transverse rows; mouth parts visible from above
 PALAEACAROIDEA Grandjean, 1953
 (B&W 313) **Palaeacaridae** Grandjean, 1932 ²
2. Prosoma and opisthosoma not movably hinged together (Fig. 1) 5

² The writers include in this single family designation the three groups indicated by Grandjean (1953), viz., Archeonothridae, Palaeacaridae, and Ctenacaridae.

Prosoma and opisthosoma movably hinged together, armadillo-like (Fig. 2)

PHTHIRACAROIDEA Grandjean, 1953 3

3. Genital and anal plates contiguous (Figs. 3-4) 4

Genital and anal plates separate (Fig. 5; B&W 373, 374; S 88; W 341, 342) **Mesoplophoridae** Jacot, 1923

4. With segmented opisthosoma (B&W 372) **Protoplophoridae** Jacot, 1923

With unsegmented opisthosoma (B&W 375; S 89-91; W 345, 346) **Phthiracaridae** Perty, 1841

5. Genital and anal plates not contiguous, or if approaching one another, without adgenital-anal plates (Fig. 5) 9

Genital and anal plates flatly contiguous and usually with narrow adgenital-anal plates

CAMISIOIDEA Dubinin, 1954 6

6. With pseudostigmatic organs 7

Without pseudostigmatic organs (a small bristle present) (B&W 327; S 36, 37; W 41, 44, 45, 50)

Malaconothridae Berlese, 1916

7. Insertions of legs I-II and III-IV usually separated by a transverse suture (prosoma and metapodosoma present); dorsum of hysterosoma cylindrical or rounded, never with longitudinal ridges 8

Insertions of legs I-IV contiguous, fused together (prosoma present); dorsum of hysterosoma usually flattened, sometimes with longitudinal ridges (B&W 328; S 40-44; W 55, 56, 61-63, 70, 71)

Camisiidae Sellnick, 1928

8. Dorsum of hysterosoma without transverse sutures; hysterosoma cylindrical, flatly arched (B&W 321, 322; W 16, 17) **Lohmanniidae** Grandjean, 1931

Dorsum of hysterosoma usually with one or more transverse sutures; hysterosoma rounded or sometimes highly arched (B&W 325, 326; S 45-49; W 19, 28-30) **Hypochthonidae** Berlese, 1910³

9. Without pteromorphs or shoulder patches 10

With pteromorphs, which may be reduced to small shoulder patches 24

10. Without a suture between genital and anal plates 13

With a complete or an incomplete transverse suture between genital and anal plates

NANHERMANNOIDEA, new superfamily 11

³ Including Enarthronota and Parhypochthoniidae of Grandjean (1953).

11. Suture separating genital and anal plates complete 12
 Suture between genital and anal plates incomplete, not
 meeting medially, crescentic (B&W 317, 318; S 34
 W 12-15) **Nanhermanniidae** Sellnick, 1924
12. Genital and anal plate each lies in its own ventral plate;
 plates separated by a transverse suture; pseudostig-
 matic organs clavate and setose (B&W 319)
 Epilohmanniidae Oudemans, 1923
 Genital and anal plates lie in the common ventral plate;
 plates separated by a U-shaped suture; pseudostig-
 matic organ a simple or feather bristle (B&W 316;
 S 52; W 10, 11) **Eulohmanniidae** Grandjean, 1931
13. Genital and anal plates separate 17
 Genital and anal plates approximate, but not surrounded
 by an adgenital-anal plate; anal plate usually longer
 than genital plate; hysterosoma globose
 HERMANNIELLOIDEA Dubinin, 1954 14
14. Dorsum reflected ventrally 15
 Dorsum not reflected ventrally; with indistinct transverse
 apodeme between genital and anal plates (B&W 347,
 348) **Plateremaeidae** Trägårdh, 1931
15. Without glandular tubes on lateral margins of body 16
 With tubes on margins of body (B&W 343, 344; S 58;
 W 175) **Hermanniellidae** Grandjean, 1934
16. Genital plates entire (B&W 329; S 35; W 76-78)
 Hermanniidae Sellnick, 1928
 Genital plates divided by a transverse suture (B&W 332,
 333; S 53; W 81-83) **Neoliodidae** Willmann, 1913
17. Usually rugose, flat, without characteristic ventral
 apodeme IV **CARABODOIDEA** Dubinin, 1954 18
 Usually smooth, rounded, with apodeme IV bisecting, or
 transecting at least anterior border of genital aperture
 (Fig. 5) **BELBIDOIDEA** Dubinin, 1954 20
18. With conspicuous pseudostigmatic organs; propodosoma
 separated from hysterosoma by suture 19
 Pseudostigmatic organs inconspicuous; propodosoma in-
 completely separated from hysterosoma (B&W 342;
 W 183) **Ameronothridae** Willmann, 1931
19. With lamellae; dorsum of body rounded (B&W 341;
 S 52-66; W 176, 179, 184-187, 194, 204)
 Carabodidae Willmann, 1931 ⁴
 Without lamellae; hysterosoma usually with raised mar-
 gins, highly reticulate and with a clear round area on

⁴ Includes Cepheidae of Grandjean (1953).

- anterior dorsal margin (B&W 334, 335; S 55-57; W 86-89) **Cymberemaeidae** Willmann, 1931
20. Chelicerae with opposed chelae 21
Chelicerae whiplike, serrate, without opposed chelae
(B&W 353; S 50; W 233) **Gustaviidae** Willmann, 1931 ⁵
21. Lamellae dorsal; legs not for jumping 22
Lamellae ridgelike, marginal; legs IV may be for jumping, with enlarged apodemes (B&W 351, 352; S 51; W 230-232) **Zetorchestidae** Michael, 1898 ^{5, 6}
22. Lamellae not prominent, or if so, not converging; propodosoma relatively large 23
Lamellae usually prominent, convergent; with a relatively small propodosoma (B&W 349, 350; S 71; W 207, 214) **Liacaridae** Willmann, 1931
23. Usually rounded, without well-developed lamellae; legs usually with drop-shaped segments (B&W 337, 338; S 72-79; W 96-99, 114, 121) **Belbidae** Willmann, 1931 ⁷
Usually elongate, with ridgelike lamellae; leg segments may have slight keel, segments usually not drop-shaped (Figs. 5, 6; B&W 339, 340; S 80-87; W 131, 147, 159, 160, 171-173) **Eremaeidae** Willmann, 1931 ⁷
24. Pteromorphs large or small, but without sutures separating them from hysterosoma 25
Pteromorphs with complete or incomplete suture separating them from hysterosoma
PELOPOIDEA, new superfamily 31
25. Pteromorphs with cusps pointed anteriorly; usually with broad lamellae
ORIBATELLOIDEA, new superfamily 26
Pteromorphs without cusps, are shoulder patches or other than above; lamellae large or reduced (Fig. 1B)
ORIBATULOIDEA, new superfamily 28

⁵ Although the basic superfamily character is the fourth coxal apodeme, which the Gustaviidae and Zetorchestidae do not possess, these families are placed here because of their general appearance.

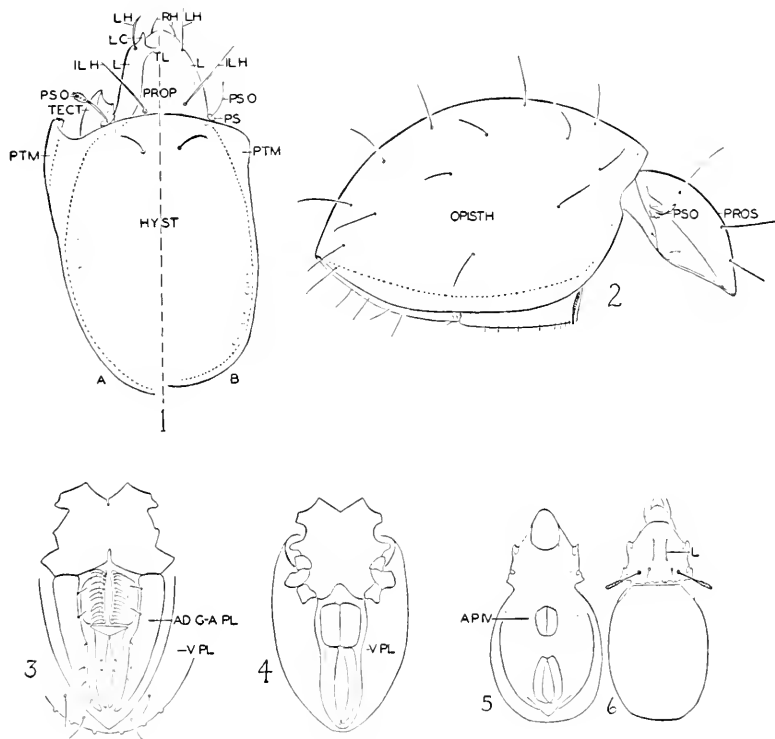
⁶ Grandjean (1954) raised the genus *Zetomotrichus* to family rank, Zetomotrichidae.

⁷ The Belbidae and Eremaeidae are frequently difficult to separate. Eremaeidae, as designated here, includes the family Oppidae Grandjean, 1953. These mites resemble most eremaeids, but are usually of extremely small size.

26. Pteromorphs projecting forward beyond anterior margin of hysterosoma or with long, anterior cusps (Fig. 1A) 27
 Pteromorphs not projecting forward and without long anterior cusps (Fig. 1B; B&W 360; S 10, 11; W 306, 310, 314) **Oribatellidae** Jacot, 1925
27. Entire pteromorph pointed, extending anteriorly at horizontal level (B&W 356; S 68; W 209) **Tenuialidae** Jacot, 1929
 Pteromorph with a narrow, anterior cusp, which may be decurved (B&W 363; S 7; W 315, 322, 323, 326) **Achipteriidae** van der Hammen, 1952
 (= Notaspididae Oudemans, 1900)
28. Propodosoma and hysterosoma broadly joined, propodosoma not partially covered by hysterosoma 29
 Hysterosoma expanded dorsally to cover basal portion of propodosoma and pseudostigmatic organs (B&W 355) **Oripodidae** Jacot, 1925
29. Lamellae small to normal; propodosoma much smaller than hysterosoma 30
 Lamellae large, almost covering propodosoma, sometimes scrolled and bizarre; propodosoma subequal to hysterosoma in length (B&W 362) **Microzetidae** Grandjean, 1936
30. Usually with six pairs of genital setae; lamellae with anterior cusps; pteromorphs decurved (B&W 359; S 12-26; W 251-260, 270, 272, 283) **Ceratozetidae** Jacot, 1925
 Usually with four pairs of genital setae; lamellae without anterior cusps; pteromorphs horizontal shoulder patches or reduced (B&W 357, 358; S 30-33; W 222-227, 234, 238) **Oribatulidae** Jacot, 1929

Explanation of terms

AD G-A PL..Adgenital-anal plate	PROSProsoma
AP IVApodemata IV	PSPseudostigmata
HYSTHysterosoma	PSOPseudostigmatic organ
ILHInterlamellar seta	PTMPteromorph
LLamella	RHRostral seta
LCLamellar cusp	TECTTectopodium
LHLamellar seta	TLTranslamella
OPISTHOpisthosoma	V PLVentral plate
PROPPropodosoma	



EXPLANATION OF FIGURES

FIG. 1. A schematic drawing of a pterogasterine oribatid from the dorsal aspect, showing two arrangements of pteromorphs and lamellae.

FIG. 2. A schematic drawing of a phthiracaroid mite from the lateral aspect, showing the armadillo-like arrangement of the body.

FIG. 3. The ventral aspect of a camisioid mite, showing the contiguous genital and anal plates with the adgenital-anal plates. (After Selnick, 1955.)

FIG. 4. The ventral aspect of a camisioid mite, showing genital and anal plates without adgenital-anal plates. (After Schweizer, 1956.)

FIG. 5. The ventral aspect of an eremaeid mite, showing apodeme IV. (After Forsslund, 1957.)

FIG. 6. The dorsal aspect of an eremaeid mite, showing the lamellae and other propodosomal features. (After Forsslund, 1957.)

31. Pteromorphs freely hinged and well developed; chelicerae normal; propodosoma not covered by hysterosoma 32
 Pteromorphs weakly developed; chelicerae usually attenuated; propodosoma partly covered by hysterosoma; interlamellar setae may be spatulate (B&W 365, 366; S 27, 28; W 327-340) **Pelopidae** Ewing, 1917
32. Pteromorphs large, extending anteriorly and posteriorly beyond attachment to hysterosoma 33
 Pteromorphs relatively small, triangular, not extending posteriorly or anteriorly, decurved (B&W 364) **Haplozetidae** Grandjean, 1936
33. With reduced lamellae which are usually marginal 34
 With broad lamellae, which cover propodosoma (B&W 371) **Epactozetidae** Grandjean, 1936
34. Pteromorphs rounded anteriorly; with 5 pairs of genital setae (B&W 357, 368; S 8, 9; W 293, 295, 296) **Galumnidae** Grandjean, 1936
 Pteromorphs pointed anteriorly; with 4 pairs of genital setae (B&W 369, 370) **Parakalummidae** Grandjean, 1936

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On a Collection of Centipedes from Wisconsin (Chilopoda)

By R. E. CRABILL, JR., Smithsonian Institution,
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The following records constitute one of the two known faunal reports on the significant and polyglot chilopod population of Wisconsin.¹ It has been made possible through the energy and generosity of Dr. and Mrs. Herbert W. Levi of the Museum of Comparative Zoology at Harvard. I should like to express my gratitude to them for the sizable collection of carefully preserved specimens of which most of the present localities are representative.

Though this report is admittedly fragmentary and introductory, in my estimation it still suggests at least that the state supports a rather versatile fauna, more versatile than the midwestern states' immediately to the south. This is apparent from the coexistence in Wisconsin of typical Austral and Transitional species, the latter evidently more prevalent than the former. For example we find such cold-adapted forms as *Escaryus urbi-cus*, *Lithobius forficatus*, and *Taiyubius harriclae* but also such Austral species as *Arenophilus bipuncticeps* and *Sozibius* sp., the advance of the latter no doubt being encouraged by the same edaphic and particularly climatic conditions that support the extension of the midwestern prairie into the extreme southeastern counties.

In the ensuing discussion collection stations are identified by a formula following each species name. A capital letter refers to a county, and the associated number to a locality within that county. The list of counties below is arranged as they occur from north to south: an asterisk indicates a Levi collection, the absence of one that the record is drawn, instead, from the literature.

¹ An earlier report is D. C. Matthews' unpublished doctorate thesis, "The Chilopoda of Wisconsin," The University of Wisconsin, Thesis, 1935.

A. ASHLAND: 1—Ashland. **B. MARINETTE:** 1—Marinette. **C. LANGLADE:** 1—Antigo. **D. BARRON:** 1—Haugen. **E. EAU CLAIRE:** 1—Eau Claire. **F. CLARKE:** 1—Neilsville, 12 miles southeast of. **G. BUFFALO:** 1—Fountain City, 10 miles east of. **H. JACKSON:** 1—Merrillan. **I. PORTAGE:** 1—Coddington, 3 miles east of. **J. WAUPACA:** 1—Waupaca. **K. LA CROSSE:** 1—La Crosse, 8 miles southeast of. **L. MONROE:** 1—Portland, 4 miles south of. **M. SHEBOYGAN:** 1—Cedar Creek. **N. COLUMBIA:** 1—Okee, 1 mile southwest of; 2—Prairie du Lac, 1 mile east of; 3—Columbus. **O. SAUK:** 1—Baxter's Hollow; 2—Devil's Lake State Park; 3—Eagle Bluffs, 5 miles southwest of Sauk City; 4—Parfrey's Glen; 5—Baraboo at Devil's Lake. **P. VERNON:** 1—Wildcat Mountain State Park. **Q. CRAWFORD:** 1—Wauzeka, 8 miles east of; 2—Wauzeka; 3—Hartwick Pines. **R. GRANT:** 1—Wyalusing State Park. **S. IOWA:** 1—Dodgeville, 7 miles northwest of; 2—Gibraltar Rock near Dodgeville; 3—Clyde, 3 miles southeast of. **T. DANE:** 1—Madison; 2—Cross Plains. **U. ROCK:** 1—Janesville; 2—Beloit. **V. WALMOUTH:** 1—Delavan.

GEOPHILOMORPHA

Schendyla nemorensis (C. L. Koch). [T-1*]. Two males, each with 41 pairs of legs, were captured in leaf litter. This tiny schendylid, which is quite common in western Europe, is now known to be widespread east of the Mississippi River where it prefers the colder, wetter winters of the more northern states. Both this and the next species show a remarkable tolerance to cold; I have found both in the vicinity of Ithaca, New York under snow-covered stones during brief February thaws.

Escaryus urbicus (Meinert). [O-1*]. A single male with 41 pairs of legs was found. To date this species has been recorded from a few localities in Massachusetts, New York, and montane Virginia, but west of the Appalachians it had been known only from Ohio and Minnesota. Such records, however fragmentary, suggest a distribution in the colder or mountainous parts of the northeastern North American continent.

Arenophilus bipuncticeps (H. C. Wood). [T-1*, U-1]. A male with 59 and a female with 67 pairs of legs were collected at Madison. The presence of what is probably our most widespread Austral geophilomorph in southern Wisconsin points to an extension of elements of the midwestern fauna northward into this region. In the extreme east it extends up the Atlantic seaboard through Long Island even as far as maritime Massachusetts, though its presence inland has never been demonstrated. Perhaps the shorter growing season and colder winters preclude its invading New York north of New York City and interior and upper New England. The peculiar tendency of this animal, when disturbed, often to retreat *backwards* at some speed has proved a good field character: I have detected this remarkable behavior in no other eastern North American geophilomorph.

Geophilus vittatus (Raf.) [*olim G. rubens* Say]. [C-1, J-1*, L-1*, O-2*-3*, P-1*, R-1*, S-1*, T-1*, V-1]. Numerous specimens were collected throughout the southern two-thirds of the state. More abundant and more widely-dispersed than any other centipede in Wisconsin, *vittatus* similarly is probably the most ubiquitous and commonly-encountered chilopod in North America east of the Rocky Mountains. It has been recorded from New England to Nebraska and Arizona, though in the extreme south it appears to prefer the higher, hence more temperate, elevations. Afield I have found it typically under tree bark, where the females may be found brooding their eggs and young in the spring and early summer, but it seems distinctly less common under stones and debris on the ground.

Strigamia chionophila H. C. Wood [*sensu lat.*]. [A-1, F-1*, K-1*, O-1*-2*-4*-5, P-1*, Q-2*, R-1*, S-1*-3*, T-1*]. Research nearing completion at the present time shows that at least three sibling species have been referred to the Wood name in the past; consequently to keep confusion at a minimum pending publication of these studies, I am assigning all of the Wisconsin specimens provisionally to *chionophila*. Members of at least two species of this complex were found to be quite prevalent in the state, each locality yielding a number of specimens from leaf litter.

Strigamia bothriopa H. C. Wood [*sensu stricto*]. [H-1*, O-1*-2*-3*, P-1*, Q-1*, R-1*, T-1*-2*]. Until recently² this striking crimson centipede was considered a junior synonym of *Linotaenia* (= *Strigamia*) *fulva* Sager, and since *bothriopa* is by far the commoner and more widespread of the two, existing statements of distribution are highly misleading. Wood's form, though present in parts of the south and midwest, is particularly abundant in the north and at higher elevations throughout its range. On the basis of Levi's collections, it appears to be almost as common as *Geophilus vittatus* (q.v.) in Wisconsin. Unlike this species, *bothriopa* seems to prefer living close to the ground. In New York State I have found it almost always under stones and debris, and quite often in leaf litter.

Taiyuna opita Chamberlin. [G-1*, N-1*, O-1*-4*, R-1*, S-3*, T-1*]. Heretofore this tiny chilophiline was known only from the type localities "Posers and Kimball's" [sic] in Michigan. Consequently it is of some interest to find it fairly widespread and evidently common in leaf litter in a neighboring north midwestern state. On the basis of our information to date, it is apparently absent to the south and east of Michigan, though additional records should be anticipated at least in Iowa and Minnesota and possibly in adjacent Canada. The known distribution of the genus is interesting, for apart from the midwestern *opita*, its species are common only to Arizona, California, and British Columbia. All of the Wisconsin specimens are females, each with 41 pairs of legs.

SCOLOPENDROMORPHA

Scolopocryptops rubiginosa L. Koch [*olim Otocryptops rubiginosus*]. [O-1*, R-1*]. Only two specimens were taken. The species is known from eastern Asia, from Alaska, and from most of the more northern midwestern states of this country (i.e., from Ohio through Nebraska and northern Missouri through Minnesota), thus suggesting a great arc from Asia across the Bering Straits and down into middle North America. So far as is known, it is absent west of Nebraska, in the south,

² Crabill: in Ent. News, 65(2): 40-46, (1954).

and in the states east of Ohio. It may be significant that the closely-related *sevspinosa* (Say) is extremely common in the latter areas east of the Rocky Mountains.

LITHOBIOMORPHA

Lamycetes fulvicornis (Meinert). [A-1, D-1, E-1, T-1*, U-2]. A single female was captured in Madison. This cosmopolitan hemicopid has been cited often for its striking ability to acclimate itself to a variety of environments. It has been recorded from most of the more northern United States east of the Rocky Mountains, from Europe where it is evidently widespread, and from such unlikely places as the Arctic Circle in Canada, and New Zealand. In the eastern United States it seems almost limited to sites in or near our cities and towns, which is in accord with the virtual certainty that it has been introduced repeatedly into this country from Europe and elsewhere. I have found this and other hemicopids quite commonly upon fairly moist, sandy soils, especially close to waterways in Transitional eastern North America.

Bothropolys multidentatus (Newport). [Q-3*]. The presence of but a single specimen of this extremely familiar and typically dendrophilous northeastern ethopolyine in the Wisconsin collection is not so odd when one recalls that the Levi material was taken largely from leaf litter. This handsome species is usually readily encountered throughout its range, which extends from Maine west to Missouri and south to higher elevations in the Gulf states.

Lithobius forficatus (Linne). [G-1*, J-1*, M-1*, T-1*; published accounts stress its abundance throughout the state]. Numerous collections, representing nearly all stages of both sexes, were made in the localities given above. A widespread European form, *forficatus* has undoubtedly been introduced into the United States repeatedly, probably since colonial times, so that today its presence in or near most areas of human traffic cannot be doubted. It is interesting that the species is rarely found at any great distance from places of human activity, even when such areas are known to be capable of supporting a dense

and varied lithobiid fauna. Consequently in our northern woods it is replaced by the dominant *Bothropolys multidentatus*, and, as Chamberlin pointed out long ago, in the south of the United States it is replaced by the several species of *Neolithobius* which, despite a superficial similarity of general habitus, are not very closely related to the European form.

Nadabius holzingeri (Bollman). [H-1*, N-1*-2*, O-1*-4*-5*, R-1*, S-1*-2*]. Each of these localities yielded a few specimens assignable to *holzingeri*. This form is clearly more closely allied to *iorwensis* than to anything else, the two differing in one or two rather unconvincing features. There is the good likelihood that future research will show *holzingeri* to be a variant of *iorwensis*. Bollman's species has been reported from southeastern Minnesota, from Wisconsin, and from Indiana.

Nadabius iorwensis (Meinert). [B-1, D-1, F-1*, G-1*, I-1*, O-3*, P-1*, R-1*, S-1*, T-1*, U-2]. Numerous specimens, representing both sexes and all stages of post-anamorphic development, were collected. The species, a hallmark of the mid-western lithobiid fauna, ranges from Idaho [?] east to Ohio and south to Tennessee. It seems completely replaced in the Appalachians by *aristeus* and *pullus*, and in New York and New England by *aristeus* alone.

Sozibius sp. [T-1*]. The poor condition of the single male does not permit further identification.

Taiyubius harriellae (Chamberlin). [T-1*]. The Levis collected one male at Madison. Originally described from Colorado, this distinctive form now has been reported from Nevada, from Wisconsin, from Ithaca, New York, and from eastern Massachusetts—a most remarkable distribution for a North American lithobiid. Perhaps the poverty of records is due to our failure to detect the presence of the species, which may be dependent upon narrowly restrictive environmental conditions. For instance, at Ithaca I have never failed to find specimens but only on non-sandy soil in a very cool, damp ravine through which Cascadilla Creek flows. Despite intensive searching, no other local site yielded a single specimen. On the basis of its

distribution it seems safe to predict its eventual discovery throughout the colder northeastern states.

Tidabius sp. [T-1*]. One specimen was captured, but its condition makes specific identification impossible. It is probably either *tivius*, which Chamberlin reported from Janesville, or *opiphilus*, known only from the type locality at Beloit.

SCUTIGEROMORPHIA

Scutigera colcoptata (Linne) [*olim Scutigera forceps* (Raf.)]. [N-3*, T-1*]. Ten specimens were collected. This common domiciliary species, which has been introduced from Europe, should be expected through the United States in, or occasionally near, human habitations.

Some Robber Flies (Diptera: Asilidae)

By FRANK M. HULL, University of Mississippi

This paper presents the descriptions of some miscellaneous species and genera of Asilids.

CHYMEDAX, new genus

Type of genus: *Chymedax delicatulus*, new species.

Minute, slender Asilids belonging to the Laphriinae. Characterized by the presence of only 4 posterior cells. Third antennal segment with a small microsegment at apex, more slender than the third segment, and above it, rising from the third segment there is a small, bristle-like spine. Related to *Despotiscus* Bezzi. Length 6.5 mm.

Head: The head is comparatively long and quite convex anteriorly; face visible in profile only below; proboscis quite small, short and cylindrical. Palpus reduced to a minute stub. Antenna slender and longer than the head; first segment twice as long as second; third segment, microsegment included, not quite twice the combined length of the first segments. At the apex the slender third segment bears a short, distinct microsegment.

and above it arising from the third segment, there is a bristle-like spine. From anterior aspect the face is about one-twelfth the head width with parallel sides. Face without pile; bristles restricted to 2 pairs, one above the other, which are long, slender, and attached at lowest part of face. Front wider than face, the vertex narrowed and slightly excavated; ocellarium low with vertical sides and without bristles or hairs,

Thorax: The thorax is short, with low mesonotum. Pile abundant, undifferentiated, subappressed, stiff but fine. There is 1 fine, slender, bristly hair on the notopleuron, 1 above wing, none on postalar callosity or scutellar margin. Prosternum undissociated; postmetacoxal area with strong arch of chitin.

Legs: Hind femur moderately elongate and a little swollen on the outer half but the lower margin is plane; ventrolateral margin with several long, slender, bristly hairs; posterior tibia with 2 quite long, conspicuous, attenuate bristles laterally; middle tibia with 2 long, slender, anterior bristles and 2 similar, stouter, ventral bristles. Claws slender; pulvilli short, broad, well developed.

Wings: The wings are villose throughout. Marginal cell is closed and stalked. Only 4 posterior cells are present, the third wanting. Anal cell is closed and stalked.

Abdomen: The abdomen is elongate and slender, the upper surface gently convex and shallowly punctulate. There are a few fine bristles present on the sides of the first and second segment only. Seven tergites present in male; seventh segment turned downward, enclosing the small terminalia, which appear rather similar to *Atomosia* Macquart.

Chymedax delicatulus, new species

Black, minute; abdomen punctate, with seven visible tergites. Length 5 mm. including antenna.

Male. *Head:* The head is quite black. There is a prominent patch of silvery pollen behind the ocelli, another occupying the middle two-thirds of the front and divided by a thin line and the whole face silvery white pollinose. There is no gibbosity, the face is a little sunken beneath the eyes and it bears

a vertical row on each side of 2 long, slender, reddish sepia, bristly hairs, together with a microscopically fine, shorter hair below. Proboscis quite short, but expanded at the base and brownish black in color. Antenna black with fine, black, bristly hairs on the first 2 segments. The minute second segment is bead-like and somewhat less than half as long as the first segment. Occiput without bristles and with only a few minute hairs below.

Thorax: The thorax is black, mesonotum with minute, appressed, fine, quite short, yellowish hairs, corners of the postcallus and a line in front of the scutellum light reddish brown. Scutellum black with wrinkled surface and no marginal bristles. Halteres translucent, smoky brownish. Stalk lighter in color.

Legs: The coxae and trochanters are pale clay yellow or brown, thinly dusted with silvery pollen. Femora are of the same color but shining and the hind pair distinctly dilated on the outer two-thirds but entirely on the upper half. The tarsi are entirely sepia brown to black, the tibiae likewise narrowly, diffusely yellowish at their bases. Hind femur with a conspicuous, erect, moderately long, ventromedial fringe of yellowish hairs. A similar fringe is on their tibia. They also have near the middle ventrolaterally 2 pale yellow, long, slender, bristly hairs. Hind tibia dorsolaterally with 2 still longer, blackish, slender, bristly hairs along the middle, the first and second hind tarsal segments with a similarly long element at the apex anteriorly. Middle femora and anterior femora with a few long, ventral, pale, bristly hairs. Middle tibia with 2 remarkably long, slender, yellowish bristly hairs situated anterodorsally near the middle. Anterior tibia with 2 or 3 less striking posteroventral elements and the first 2 anterodorsal segments with striking bristles both anteriorly and posteriorly at the apex and 1 postero-basally. Claws slender, sharp; the pulvilli well developed.

Wings: The wings are hyaline with only 4 posterior cells. Alulae absent.

Abdomen: The abdomen is comparatively long and slender, very slightly wider distally, the whole surface microgranulate, the tergites without lateral bristles except for very weak ele-

ments on the sides of the second. There are 6 segments visible from above, the well developed seventh is visible with a slight tilt of the abdomen and the terminalia appear to be male.

Type. Male. Guadalcanal, SOLOMON ISLANDS, January 25, 1945, collected by C. O. Berg. In the collection of the author, presented to him by Mr. Steyskal.

LYCOSIMYIA, new genus

Type of genus: *Lycosimyia carrerac*, new species.

Related to *Atomosia* Macquart, but with more narrow face, reduced mystax, smooth mesonotum, rather long proboscis and 4 pairs of very long, spike-like scutellar bristles. Length 10 mm.

Head: The head is quite short, plane with the eye above and evident below only because of the retreating eye margin. The proboscis extends a little beyond the face. The occiput is most prominent medially at some distance from the eye margin; it bears fine pile below, weak bristles in the middle and 9 pairs of stout, sharp, straight bristles above. Palpus moderately large, composed of 2 segments. First antennal segment nearly twice as long as the second, the third segment twice as long as the two basal segments combined. The third segment is slender and ends without microsegment and bears a dorsal incision and spine in the middle of the segment. The head from anterior aspect is not quite circular; the face is quite narrow and comprises about one-eighth the head width and is slightly more narrow on the middle; surface of face densely, finely appressed micropubescent; on the upper part on each side there are 3 long, slender, wiry black bristles, 2 other shorter bristles on the sides of subepistoma and 4 bristly, long hairs in the middle of the epistomal margin. Front small, with longitudinal submedial fossae; vertex narrowed, moderately excavated; the small, high ocellarium has vertical sides and a pair of long, moderately stout bristles.

Thorax: The thorax is short and moderately high; surface densely appressed setate with a dorsocentral row of fine, longer hairs anteriorly which are equally fine posteriorly. Lateral bristles are long and slender and consist of 1 notopleural, 1

supraalar, 2 on postalar callosity and the margin, of the polished, nearly bare, smooth, slightly convex scutellum bears 4 quite long, basally stout, spike-like, reddish bristles. Pronotum with only stiff hairs. Prosternum fused; postmetacoxal area with wide, complete band of chitin.

Legs: The hind femur is only slightly thickened distally; all legs with loose, scanty, fine, subappressed pile dorsally. Hind femur with 4 long, slender, ventrolateral bristles distributed along the middle and towards both base and apex it has 1 or 2 shorter, weak, bristly hairs; ventromedial surface with 3 strong, long elements. Hind tibia with more conspicuous bristles; it contains 3 long, lateral, 2 ventrolateral bristles in the middle and 4 equally long, distally curved, ventral bristles besides a medial fringe of pile. Claws slender, sharp, the pulvillus well developed.

Wings: The wings are hyaline, almost wholly villose. The marginal cell is closed with a long stalk; the anterior branch of the third vein ends barely above the wing apex; second posterior cell narrowed to half its maximal width; fourth posterior cell and anal cell closed with a short stalk. Alula narrow; ambient vein ends with the second posterior cell. Fourth posterior cell closed and ending slightly before the end of the discal cell.

Abdomen: The abdomen is a little wider than the mesonotum and rather long; it is everywhere punctulate with coarse, appressed setae and some rather long, fine, erect hairs along the lateral margin; sides of first tergite with a straight, vertical row of 6 microtuberculate, close-set, stout, pale bristles; lateral margin of second tergite with 4 or 5 slender bristles or bristly hairs at the middle; posterior margin of all segments before the actual apex with a fine fringe of appressed hairs. Female terminalia recessed and small.

***Lycosimyia carrerae*, new species**

Shining black; thorax non-punctate; scutellum with 4 stout, long, reddish spines.

Length 10 mm. including antenna.

Male. *Head*: The head is quite black, including the whole antenna. All bristles black except 4 weak, white bristles in the middle of the occiput. Upper bristles of occiput spinous and stout with 6 black pairs on the upper third which are straight and sharp and stout. Lower occiput with scanty, silvery pile, the whole surface silvery pollinose, the vertex is rather deeply excavated, the ocellarium small, narrow and high with vertical sides and a single pair of moderately long, stout, black bristles. The postvertex, the vertex proper, the whole of the front, except a medial, black line and the whole of the face is densely, silvery pollinose. The covering of the face is much finer than the usual pubescence and much denser. The ocular margins are accentuated. Sides of front with 3 tiny, black, bristly hairs. The large, silvery patch behind the vertex is conspicuously separated from the remaining silvery pollen of the occiput by a broad, dorsal, quadrate, black area, covered with dark brown pollen. Extreme base of third segment and apex of second light brown. Third antennal segment with incision and light, colored spine dorsally near the middle. Apex of this segment attenuate. Medial surface with a long scar. Upper face on each side with a vertical row of 4 short, fine, white hairs. Mystax composed of a vertical row on each side of 5 long, black, medium, stout, attenuate bristles, 2 of which are on the sides of the epistoma. Between these rows below are 4 much shorter, bristly hairs. Proboscis black with brownish tip and a brown spot at the top near the base. It is very little swollen below near the base, its pile brownish yellow but there are some long, brownish black hairs in a single row behind the proboscis. Palpus slender, elongate, black with a few slender, blackish hairs.

Thorax: The thorax is black, the mesonotum has orange brown, appressed, dense pile, slender black bristles laterally, 1 on the notopleuron, 1 supraalar, 2 on the shining, translucent, brownish orange postcallus. Scutellum polished black with the prescutellar band of reddish brown pollen, some of the same immediately over the wing and notopleuron. Scutellar margin with 4 remarkably stout, reddish, attenuate, long bristles. Meta-

notal callosity with a large patch of bristly pile. Posterior part of the humerus and a spot behind it, the propleuron and a wide, vertical middle band over the pleuron as well as the hypopleuron, the metapleuron with conspicuous, dense, silvery pollen. Elsewhere it is less conspicuous because much thinner. Mesopleuron posteriorly with a conspicuous, long, reddish bristle, pronotum with only fine, stiff, short hairs. Metapleuron with a double, vertical row of moderately stout, long, yellowish white bristles and some similar pile.

Legs: The legs are polished, dark sepia brown through most of the middle portion of all of the femora, leaving bases and apices obscurely yellowish brown. Middle and anterior tibia slender and similarly colored, the hind femur is slightly and gradually swollen distally on the upper half. The hind tibia is stout, and pale yellow except at the apex which is obscurely brownish. Pile is very scanty, and pale yellow and fine. There is a scattered fringe beneath the hind femur ventrally, a longer fringe of 7 elements ventromedially, 3 quite long ventral, slender bristles on the basal half and a row of 7 weaker, bristly hairs ventrolaterally, besides other elements laterally. Hind tibia with 3 very conspicuous, quite long, basally stout, reddish dorso-lateral bristles and 2 others in the middle ventrolaterally besides 4 ventrally and 4 long but much more slender dorsomedially. Ventral surface of middle femur with an anteroventral fringe of 15 long, bristly hairs and almost as many posteroventrally. Middle tibia with striking, very long, reddish bristles, 3 or 4 anterodorsally and the same number posteroventrally. Anterior femur with weaker, ventral hairs, its tibia with 2 long posteroventral, 3 or 4 quite long, ventral, 4 weaker, shorter, posterodorsal bristles and the same number of anterodorsal bristles. Claws slender, sharp, black, red at base. Pulvilli long and slender.

Wings: The wings are pale brownish hyaline, coarsely villose. The first posterior cell is slightly narrowed, the vein closing the fourth posterior cell enters the discal cell slightly before the end of that cell. Anterior crossvein enters the discal cell near the basal fifth. Ambient vein ends with the second posterior cell.

Abdomen: The abdomen is black, shining, with perhaps a very faint purplish luster, the surface densely punctulate except on the sixth tergite. Sides of first tergite with 6 quite stout, long, pale brassy bristles in 1 row. Other tergites with only weak, bristly hairs. The pile is yellowish and appressed, becoming black on the middle of the fifth and sixth tergites. Only 6 tergites visible from above, the seventh quite short, the abdomen is not strongly cupped at the apex.

Type. Male, Rio de Janeiro, District Federal, BRAZIL, October 1937. Servicofevre Amarela. In the collection of Departamento de Zoologia, Secretaria da Agricultura, São Paulo, Brazil. Named for Sr. Messias Carrera.

Diogmites unicolor, new species

A small species related to *Diogmites pritchardi*. The face is deep golden pollinose, the wings are uniformly dark, reddish, sepia brown. Length 16 mm.

Female. Head: The head is reddish brown. Face and the lower part of the front and the occiput densely, deep golden yellow pollinose. On the upper front and vertex the pollen is slightly darker. Sides of front with 4 minute, black, bristly hairs near the vertex and inside each upper eye corner 3 others. Ocellarium with 1 black and 1 reddish bristle, slender and extended forward and behind the ocellus a pair of minute, black bristles. Bristles of occiput begin at the bottom of the head, are light yellow in color, changing to stouter and more reddish elements above. On each side of the post vertex there are 2 stout, reddish bristles. Proboscis brownish black over the middle, reddish narrowly at the apex and on the basal half of the ventral portion. Palpus reddish brown with similarly colored bristles, including 1 black, dorsal bristle. Antenna reddish brown with black setae, the third segment very little longer than the first 2 segments combined.

Thorax: The thorax is brownish red, the pleuron is covered with golden yellow pollen, the metapleuron with fine, moderately long, slender, reddish bristles and a few additional hairs. Mesonotum opaque with brownish to reddish yellow pollen. There is a medial, dark red brown stripe slightly narrowing posteriorly,

which encloses a similar stripe of yellow pollen, the 2 halves of which change as the light changes. Mesonotum with scattered, short, stout, sharp setae. Humerus with 1 black or 1 red, short bristle. Remaining bristles stout and black. There are 2 notopleural bristles, 1 midnotopleural, 2 supraalar, 2 on the postcallus and 1 pair on the scutellum. There is only a single dorsocentral bristle a short distance in front of the scutellum. Pronotal bristles composed of 5 pairs of reddish elements, the middle ones more stout. Halteres reddish.

Legs: The legs are entirely light brownish red on the femora, brownish yellow on the tibia and first 2 tarsal segments, the remaining tarsal segments brownish red. Pile fine, minute, sharp and appressed and black, except for some fine, golden hairs along the posterior surface of the anterior and middle femora and the medial surface of the hind femur. Bristles black, none on hind femur, except a minute element laterally at the basal fourth and on middle femur a small bristle ventral at base, 1 laterally at basal third, 1 apically behind. On anterior femur only the lateral and posterior bristles present. On posterior tibia a dorsal pair at the base, a dorsolateral element before the middle, another at the outer fifth, matched by a dorsomedial bristle. Also there is a dorsomedial bristle beyond the middle and 3 ventrolateral bristles. Middle tibia with 2 short, basal anterodorsal and 2 much longer anterodorsal beyond. Also there are 4 short, posterodorsal, 2 small posteroventral, 1 small and 1 large ventral bristle. Bristles of anterior femur rather similar to the middle pair. Apex with protuberance and black, comparatively straight spine. Basitarsus with black denticles. Claws black, red at the extreme base. All pulvilli long.

Wings: The wings are uniformly tinged with dark reddish sepia; anal cell closed in the margin.

Abdomen: The abdomen is uniformly light reddish brown, the pile chiefly short, golden reddish and appressed and scanty even on the side margins. There are a few black, appressed setae on the posterior margins of all of the tergites. On the last 3 tergites these setae become nearly erect, a little more stout and constitute almost the whole pile of these tergites to the exclusion of yellow setae. Spines of acanthophorites red and

long. Rolled over lateral margins of the tergites are pale yellow pollinose in an oblique light. Dorsal portion of tergites more reddish golden pollinose in an oblique light.

Type. Female, San Pedro River, St. David, ARIZONA, August 3, 1954, collected by F. M. Hull. In the collection of the author.

Synonymic Note on Ants of the Genus *Paracryptocerus* Emery (Hymenoptera: Formicidae)

By WALTER W. KEMPF, O.F.M., São Paulo, Brazil

Frederick Smith, in 1867, described four new species of *Cryptocerus* (now: *Paracryptocerus*) from specimens in the collection of W. Wilson Saunders. Through the kindness of Mr. Ernest Taylor of the Hope Department of Entomology, Oxford University, I received on loan the types of the aforesaid species and was thus enabled to establish two cases of new synonymy and to confirm another case already proposed by Emery (1922, Gen. Ins. fasc. 174, p. 311).

Paracryptocerus conspersus (F. Smith)

1867. *Cryptocerus conspersus* F. Smith, Trans. Ent. Soc. London (3) 5: 523.
1894. *Cryptocerus targionii* Emery, Bull. Soc. Ent. Ital. 26: 205. New Synonymy.
1894. *Cryptocerus denticulatus* Emery, Bull. Soc. Ent. Ital. 26: 206.
1911. *Cryptocerus denticulatus* var. *variegata* Forel, Sitz.-ber. Bayer. Akad. Wiss., p. 262.

The holotype (unique) of *conspersus*, a worker from the Amazon, has all the distinguishing features of *denticulatus* which, as shown in a study to be published elsewhere, is nothing but the worker of *targionii*, based on a soldier. There are, however, a few trivial differences which deserve mentioning.

Measurements of holotype: Total length 3.9 mm.; max. length of head 1.00 mm.; max. width of head in front of the eyes 1.03 mm.; interocular width 1.00 mm.; Weber's length of thorax 0.97 mm.; max. width of thorax 0.78 mm.

Lower face of head finely punctate, lacking traces of longitudinal rugosities. Thorax rather narrow. Lateral border of pronotum (excluding the scapular corner) tridentate, the first two teeth acute, completely separate, the third tooth subrectangular. Lateral tooth of mesonotum acute. Lateral border of epinotum with 5 teeth: 1st short and subacute; 2nd stronger, acute; 3rd or supplementary fine and needle-like; 4th as 2nd; 5th at the bottom of the declivous face, rather blunt. Dorsal denticles on body of petiole obsolete. Dorsum of postpetiole not forming in profile a right angle, but only a moderate and continuous curvature, lacking posteriorly a median, faintly circumscribed, triangular area. First gastric tergite with a median, black, lozenge-shaped area, surrounded by a narrow, brown or ferruginous, stripe, cutting off the black antero-lateral lobes, the borders of which bear a narrow hyaline crest. For the rest, it is like the worker of *targionii*, including the row of sparse standing hair along the posterior border of the first gastric tergite.

The small size (from incipient colony?) of this individual seems to account for most of the previously mentioned differences, which do not allow for a specific distinction between *conspersus* and *targionii*. The type specimen of *conspersus* fits surprisingly well the description of Forel's variety *variegata*, founded upon specimens collected by Bates on the Amazon river. It is quite possible that the *conspersus* holotype was likewise taken by Bates, and even that both *conspersus* and *variegata* came from the same nest series. At any rate, the latter is a strict synonym of *conspersus*. The same applies to *targionii* (= *denticulatus*), unless the soldier of the *conspersus* "variety," still unknown, should prove the contrary.

As far as the systematic placement of the present species is concerned, it is obvious that Emery's proposal (1922, l.c.) is not any longer acceptable. Hence it must be transferred from

the *spinosus*-group in the subgenus *Paracryptocerus* s. str., to the *angustus*-group in the subgenus *Harnedia*, to which it doubtless belongs.

Paracryptocerus minutus (Fabricius)

1804. *Cryptocerus minutus* Fabricius, Syst. Piez., p. 420.

1867. *Cryptocerus exiguus* F. Smith, Trans. Ent. Soc. London (3) 5: 524. New Synonymy.

1951. *Paracryptocerus minutus* Kempf, Rev. de Ent. 22: 169.

The examination of the holotype specimen of *exiguus*, a worker from Mexico, revealed at once its identity with the common and widespread *minutus*. The present specimen has a slightly, yet insignificantly, broader head, a feature which I have observed in other *minutus* specimens from Mexico. There is not the slightest doubt concerning this synonymy.

Paracryptocerus scutulatus (F. Smith)

1867. *Cryptocerus scutulatus* F. Smith, Trans. Ent. Soc. London (3) 5: 524.

1867. *Cryptocerus angulosus* F. Smith, Trans. Ent. Soc. London (3) 5: 524.

1922. *Cryptocerus scutulatus* Emery, Gen. Ins. fasc. 174, p. 311.

1951. *Paracryptocerus scutulatus* Kempf, Stud. Ent. n. 1, p. 26.

This synonymy (*scutulatus* = soldier; *angulosus* = worker of the preceding species) has already been established by Emery from the original diagnoses. The examination of both holotypes involved confirms definitively this step.

Review

STUDIES ON THE COMPARATIVE ETHOLOGY OF DIGGER WASPS OF THE GENUS *BEMBIX*. By Howard E. Evans. Pp. 1-248, 52 figs. Comstock Publishing Associates, Ithaca, N. Y., 1957. Price, \$4.75.

Thirteen North American species are described and compared. First the behavioral patterns common to the genus are discussed; then each species is described in detail, with a great deal of original data in addition to information from the literature. On the basis of this material, the behavioral patterns are analyzed in order to provide a phylogenetic approach to the question of why a certain species, for example, behaves as it does. The patterns (of mating, nest-building, etc.) are, of course, innate, although learning also plays a part in such activities as orientation and hunting. In each species, not only is the nature of each activity studied, but the *sequence* of the chain of activities is analyzed and written as a formula, which represents the inherited neuro-motor pattern of the particular species. In addition to the behavior, the ecology of these wasps is analyzed and compared.

Reasoning just as a morphologist would, Professor Evans selects ten pairs of behavioral characters in the genus, and in each case decides which alternative represents the more primitive, and which the more specialized behavior. On this basis he is then able to outline roughly the evolutionary pattern in the genus. Interestingly, there is a correlation between the behavioral characters and ordinary structural characters, so that Evans is willing to predict the behavior of certain as yet unstudied species of *Bembix* merely from their structure.

This is an outstanding book, and is of fundamental significance because it treats of the evolution of behavior patterns, unequivocally, in the same manner as any neo-Darwinian would treat of the evolution of structural characters. It is so competently done, with the facts so clearly set forth and analyzed, that it should serve, incidentally, to exorcise finally the ghost of Lamarckianism that has continued to haunt discussions on the evolution of behavior in the Hymenoptera.—R. G. SCHMIEDER.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

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By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeshna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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Insects

ENTOMOLOGICAL NEWS

MAY 1958

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CONTENTS

Byers—Individual labels for specimens	113
Hood—Acanthothrips, palmi, a new thrips	117
Chamberlin—A new diplopod from Arizona	121
Gangwere—Grooming behavior in Orthoptera	123
Alexander—Western crane-flies, Part XVII	129
Thew—Dodds's types for two Callibaetis	137
Frost—Halysidota and pollenia	137
Retirement of Francis Hemming	139
Laboratory refresher courses	139

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Individual Identification Labels for Pinned Insect Specimens

By GEORGE W. BYERS¹

Several months ago, a friend and I were examining types of a certain family of Diptera in a university museum. Each type series was pinned to the right hand side of a label which bore the name of the species, while each pinned specimen carried a red label reading merely "holotype," "allotype," or "paratype." My friend removed one of the paratypes from the end of its row, examined it with his hand lens, and pinned it back into the tray, failing, however, to notice that he had placed it in the wrong row, thereby erroneously indicating it to be a paratype of quite another species. Fortunately this accident was immediately discovered and corrected. But how often do similar accidents occur, involving perhaps less important specimens, because of the lack of an identification label on each pinned insect specimen?

Collecting insects, somehow preserving them in the field, and in the laboratory pinning them and providing them with the essentials of collection data on labels all require little effort on the part of the entomologist, when time and expense are figured on a per-specimen basis. Identification, in contrast, usually involves a great amount of time and the expense of a library and other facilities appropriate to the problem at hand. Most collectors and curators, confronted with the task of species determination, are left no choice but to turn to qualified specialists for help. (This is quite apart from the fact that more often than not identifications by specialists are the only ones likely to

¹ Contribution no. 1009 from the Department of Entomology, University of Kansas, Lawrence, Kansas.

be correct.) Usually, for nearly any taxonomic category, a competent and willing taxonomist can be located; and in due time the specimens will be returned identified to the collector.

A museum specimen the identity of which has been determined by a qualified specialist has a much greater value than an unnamed specimen, but this value can easily be lost unless it is somehow permanently fixed. An identification label attached to the pin of only the first in a series of specimens seems to me to indicate an unwarranted faith in the infallibility of curators, technical assistants and all others who make use of collections in museums and other repositories; it is an invitation to confusion! After the taxonomist has arranged specimens in rows after an identification label (and some attach the determination to the *last* specimen in the series), there remain many opportunities for errors to creep in, as specimens are transferred to shipping boxes and later are unpacked and put into their permanent boxes or trays. Whenever the collection is used for whatever reason, there is a chance that a specimen removed from its place in the tray may accidentally be returned to another place. And a specimen merely placed alongside one bearing a determination label, even though it has been examined and identified by a competent authority, has no more status, in fact, than any number of other specimens later added to this group by other persons perhaps not at all qualified to make the identification concerned.

The logical solution to this problem is to attach an identification label to *every* specimen that has been identified. Such a label should indicate not only the genus and species (and subspecies, if any) but also the name of the person who made the identification and the date (year).

This would seem at first to be visionary, perhaps, but in fact it is quite an attainable goal. By a process of photo offset printing, the Snow Entomological Museum of the University of Kansas at the present time is able to have such labels made at a cost of about ten for one cent. The desired labels are typed on ordinary white bond paper, one $8\frac{1}{2} \times 11$ -inch sheet of which will usually provide space for about 50 kinds of labels. As a

measure of economy, four such sheets are photographed together at the desired reduction of dimension and are printed in any number on high quality, stiff paper. Since both date-locality labels and identification labels are made at the same time, it is not necessary to withhold printing until a large number of kinds of identification labels alone are accumulated. Most of the cost in the process described is for preparation of copy (by electric typewriter at the University of Kansas), but it should be pointed out that any clear black line or typing on white paper will be satisfactory copy for photo offset printing. Cost is therefore a minor consideration, and certainly a specimen worth the time and effort required for identification is worth a label noting this work!

One very practical problem is that of the responsibility for attaching identification labels. As matters now stand, it usually falls to the curator of a collection to so label the specimens that are returned to him from various specialists. This situation has one serious disadvantage, namely, that it is more often the case than not that there will be very small numbers of specimens of most species, requiring either that most of the identification labels for that species be discarded or that blank labels (showing only the name of the authority and the date) be printed and the species' name be added by hand. The first of these alternatives is unsatisfactory for reasons of economy, and the second introduces a further chance of error in transcription of the name. It therefore seems to me that the responsibility for attaching identification labels to each and every specimen identified should pass to the determining authority. He should have in his possession supplies of these inexpensive labels for all species in his particular taxonomic group, so that only the last two digits of the date would need to be filled in. Persons doing a great deal of identification work might have even the date completed on the printed label.

It seems not unreasonable to think that the taxonomist would actually prefer to render this service, for then he would have some assurance that the order he had worked so hard to create would be maintained and that mixing of specimens after they

had left his hands would not result in confusion that could be attributed to him. Some taxonomists have argued with me that they are too busy to attend to the mere routine of attaching identification labels, but such a view would mean either that they consider the curator's time less valuable or that they do not believe in the desirability of fixing the identity of each specimen they have studied. (It might be suggested that surely one whose time is so valuable will have assistants!) Thus, if identification labels are to be attached at all, the logical time and place for this to be accomplished is at the time of species determination and in the laboratory where the identification is made.

Should a taxonomist be working alone, that is, not as a member of an institution, preparation of labels might be more expensive and less convenient. Such a taxonomist, however, might arrange to obtain labels from institutions for which he is making identifications.

Who would think of placing specimens in a permanent collection with a single date-locality label for each series of a species taken at one time and place? Who would attach collection data and identification to only one microscope slide of a series, with only a notation that all slides between that one and a certain other one should be regarded as having similar data? Surely the logic and desirability of the identification label for each specimen identified is inescapable.

Acanthothrips palmi, A New Thrips from Brazil. (Thysanoptera: Phlaeothripidae)

By J. DOUGLAS HOOD, Professor of Biology, Emeritus,
Cornell University

This species is named after Dr. Charles E. Palm, Director of Research and Director of the Experiment Station at the New York State College of Agriculture at Cornell University, my superior for many years. He has collected Thysanoptera on various occasions, both in the United States and in the American tropics, and has been instrumental in getting material resulting from investigations of banana thrips by the United Fruit Company. The types are in the author's collection.

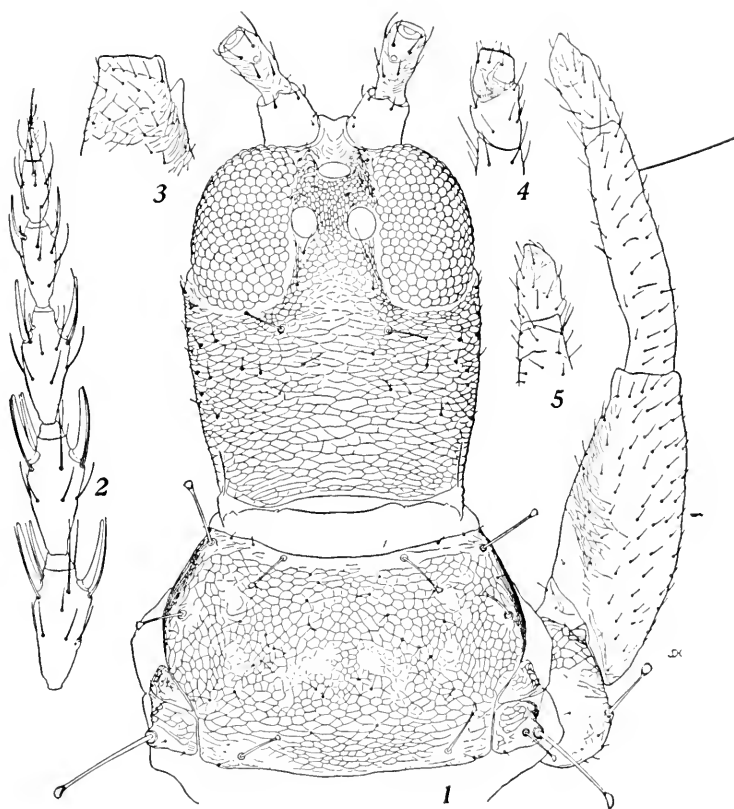
Acanthothrips palmi, sp. nov. (figs. 1-5)

Resembling *nodicornis*, only (among the dark blackish brown species with dark femora), in lacking a white vitta along the sides of the head and prothorax; but differing from that species principally in the presence of a white dash across mesonotum behind middle, the lack of white spots in the fore angles of segments III-VIII of the abdomen, the absence of prominent setigerous tubercles on the cheeks, and the darker, stouter, and much shorter intermediate antennal segments.

Female (macropterous).—Length about 2.8 mm. (fully distended, 3.6 mm.). Color blackish brown, without white markings in head and abdomen, but with a white dash across mesonotum behind middle (this dash is always visible as a pale area in the integument, but the white substance underlying it quickly disappears in preservative); legs blackish brown, with tibiae paler (especially at ends) and tarsi nearly yellow; fore wings lightly washed with brown in anal lobe, along costa to beyond last subbasal seta, in median pocket, and thence along posterior margin to tip; antennae blackish brown, darkest in segments I, II, VII, and VIII, segments III-V dappled with yellow along sides, III sometimes with extreme base of pedicel yellow, IV and V, and sometimes VI, yellow in basal third or more, VII often yellowish at base; internal pigmentation crimson.

Head (fig. 1) typical, its total length about 1.3 times its greatest width across cheeks, 1.4 times that across eyes, and 1.6 times the least width near base, broadest across cheeks at posterior margins of eyes; surface finely polygonally reticulate in ocellar area and along inner margins of eyes, nearly smooth in the deep groove in front of median ocellus, lightly cross-striate with widely-spaced anastomosing lines which form a subreticulation on dorsum and cheeks, the latter thus relatively smooth; cheeks without the usual outstanding tubercles, but with a few pale setae; postocular setae pale brownish, dilated and divided at tip, short ($48-51\ \mu$), about as far apart ($94-100\ \mu$) as their distance from sides of head, arising about $29\ \mu$ from eyes. *Eyes* typical, finely faceted, their dorsal length (in KOH-treated paratype) $155\ \mu$, greatest width 91, least interval (opposite median ocellus) 72, least interval shortly behind posterior ocelli 86. *Ocelli* of posterior pair slightly in advance of middle of eyes, the median ocellus directed forward and situated distinctly behind front margin of eyes. *Antennae* (fig. 2) thoroughly typical of the genus, but with the intermediate segments shorter and stouter than usual, segments III-V abruptly narrowed apically in the usual manner and thus urn-shaped, VIII conical and not narrowed at base, the large sense-cones disposed as follows on the inner (and outer) surfaces of the segments: III 1 (2), IV 1 (2), V 1 (1^{+1}), VI 1 (1^{+1}), VII 1 dorsal. *Mouth-cone* typical, extending fully to posterior margin of prosternum, its length beyond posterior dorsal margin of head $287-308\ \mu$.

Prothorax (fig. 1) along median line of pronotum somewhat less than 0.6 the length of head and (inclusive of coxae) more than 2.3 times as wide as long, its surface lightly reticulate throughout, but more closely and distinctly between the postero-marginal setae, the reticles often roughened; major setae all present, dilated and divided at tip, the epimerals pale, others sometimes brownish, antero-marginals $47\ \mu$ (54), antero-angulars 62 (67), midlaterals 60 (57), epimerals 113 (111), postero-marginals 65 (62), coxals 63 (63), in the two paratypes. *Mesonotum* smooth in the pale area crossing it behind



Acanthothrips palmi, sp. nov. (×141)

1. Head and prothorax, paratype; all sculpture and setae shown.
2. Segments III-VIII of left antennae, ♀, paratype.
3. Tip of left fore femur, ♀, holotype.
4. Right fore tarsus, inner surface, ♀, paratype.
5. Left fore tarsus, dorso-lateral aspect, ♀, paratype.

middle, subreticulate in remainder, the anterior part with the reticles faintly wrinkled and the faint separating lines with conspicuous raised dots; metanotum with well-developed raised pelta which extends to posterior margin and which is polygonally reticulate throughout, the reticles with faint wrinkles, the sep-

arating lines (except at base and narrowly along sides) with raised dots. *Legs* normal, except that the fore femoral tooth on inner surface near tip may sometimes be wanting (compare figs. 1 and 3); fore femora often more completely sculptured than in specimen used for fig. 1; fore tarsi (fig. 4) with a very small tooth which is pointed when seen in lateral aspect (compare figs. 1, 4, and 5). *Wings* normal, the fore pair somewhat narrowed at middle because of a prominent up-pocket; the usual four subbasal setae present, I (50μ) close to II and arising posterior to it, II $59-69\mu$, III $66-80$, IV $87-89$; posterior margin with $18-20$ accessory hairs.

Abdomen normal, broadest at about segment IV; median tergite of I sector-shaped, with rounded forward point and containing a darker and more heavily sclerotized capstan-shaped area whose posterior margin is narrowly prolonged to sides and thus curved forward, the surface of this median portion lightly polygonally reticulate and minutely longitudinally wrinkled, the more posterior reticles with a few backwardly-directed points; sculpture of rest of abdomen about as usual in the genus; sigmoid wing-retaining setae and the terminal ones dark brown, the others on segments I-IV pale, those on succeeding segments gradually more brownish at base, most of them dilated at tip; setae I and II on IX knobbed, III pointed, their lengths 163 , 180 , and 210μ , respectively.

Measurements of female (paratype), in mm., followed (in parentheses) by those of a second (KOH-treated) paratype: Length about 2.8 (2.7), distended, 3.6 (3.6); head, total length 0.365 (0.375), width across eyes 0.266 (0.267), greatest width across cheeks (just behind eyes) 0.280 (0.281), least width in front of basal collar 0.230 (0.234), width across basal collar 0.231 (0.235); prothorax, median length of pronotum 0.210 (0.210), width (inclusive of coxae) 0.487 (0.497); mesothorax, greatest width 0.463 (0.487); fore wings, length 1.29 ; abdomen, greatest width (at segment IV) 0.497 (0.479); tube (X, only), length 0.224 (0.217), width across basal collar 0.108 (0.110), greatest subbasal width 0.106 (0.108), least apical width 0.059 (0.059), length of terminal setae 0.378 (0.350).

Antennal

segments:	I	II	III	IV	V	VI	VII	VIII
Length (μ):	60	73	115	113	106	77	59	38
	(63)	(73)	(113)	(110)	(96)	(64)	(66)	(31)
Width (μ):	58	39	53	53	46	33	26-27	15

Total length of antenna, 0.641 (0.616) mm.

Male (macropterous).—Essentially like female in color and structure; tarsal tooth larger and arising at a right angle.

BRAZIL: Nova Teutonia, Santa Catarina, July, 1957 (1 ♀, holotype; 2 ♂♂, including allotype) and October, 1956 (2 ♀♀, paratypes), collected by Mr. Fritz Plaumann from dead branches.

It is interesting to note that two of the three females, even after one of the fore legs of each was remounted and studied in lateral aspect—one of them after treatment with KOH—show no evidence of a fore-femoral tooth. This tooth, heretofore quite generally looked upon as the most distinctive generic character, thus appears to be of no great importance. There are parallel cases of such variation in allied genera.

A New Lysiopetalid Diplopod from Arizona

By RALPH V. CHAMBERLIN

The milliped genus *Colactis* has been known from some six species occurring in Arizona, one from southern Utah, and one from Lower California. A specimen representing an additional species, here described, was taken by Vincent Roth in Yuma County, Arizona.

Colactis yuma new species

Body cylindrical, proportionately long, and composed in the type of 71 segments.

Eye patch subtrapeziform, the lower margin longer than the upper.

First three or four tergites narrower than those following. The first tergite with ten crests of which the two paramedian are parallel; the usual ten setae in a transverse series in front of the crests. Poriferous keels thickened about the large pore, dorsal line moderately convex, dorsocaudal corner angular, projecting a little above base. Of the other crests the major ones are high, with dorsal line nearly straight, highest at caudal end with the corner angular, the anterior rounded as usual. Transition to full number of crests at about segment 16. The last joint on the first three pairs of legs with a comb of hairs beneath, that joint on the following three pairs with velutinous pad beneath.

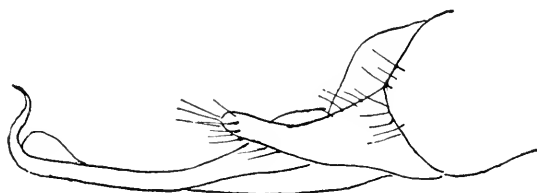


FIG. 1. *Colactis yuma* sp. n. Gonopod of male, lateral view.

The male gonopods differ from any heretofore described in having the apical portion of the solenomierit entirely smooth, being neither furcate nor spurred; also in the rounded outline of the terminal lamina, the margin of which presents neither angle nor tooth.

Length, 38–40 mm.

Locality.—ARIZONA: Yuma County, near Laguna Dam. One male taken March 3, 1957.

Aside from the distinctive features of the gonopods as figured, this species seems to differ superficially from all others known excepting *baboquivari*, in the strictly cylindrical form of the body. From that species it differs in gonopods, larger size, and greater number of body segments—71 as against 50–55.

Grooming Behavior in Orthoptera¹

By S. K. GANGWERE

Observations upon grooming behavior in the Orthoptera are but scantily represented in the literature. Only Allard (1929) has published upon this subject. His treatment is limited to the katydid *Orchelimum vulgare*, and it includes nothing on the action of the individual mouthparts during the cleaning process. The obvious need for a better understanding of grooming has prompted the following report, which is based upon numerous observations made over a period of five years.

METHODS OF STUDY

Observations carried out in the field, with and without the use of binocular field glasses, contributed to an understanding of some of the more general aspects of grooming behavior but were unsatisfactory in the study of movements of the mouthparts. Most of the following data, as a result, were taken in the laboratory. Two different methods were employed. First, Orthoptera were confined individually within small, rectangular glass chambers within which their activities were observed under a dissecting microscope. Second, motion picture photography was employed to analyze further the rapid and complex grooming of one species, the large cockroach *Byrsotria fumigata*. The 16 mm. camera used for this purpose was a Cine-Kodak Special II, fitted with a 63 mm. f2.7 lens and an 8 in. extension tube, and set at 64 frames per second. Illumination was provided by three Spencer microscope lamps fitted with heat filters to protect the cockroaches.

RESULTS

Unpublished work by the author shows that there are, from both a functional and structural point of view, two basic types of mouthparts in the Orthoptera. Since grooming in these insects

¹ Contribution No. 18 from the Department of Biology, Wayne State University, Detroit 2, Michigan.

is largely a function of the mouthparts, it is not surprising that there are also two grooming methods. The first method is used by cockroaches, camel crickets, katydids, crickets, etc.; these forms have swollen, lobular distagaleae adapted for wiping minute food particles and juices into the mouth (fig. 1). The second method is used by locusts or short-horned grasshoppers; these insects have flattened, plate-like distagaleae adapted as lateral lips but useless in feeding (fig. 2). The insects using the former grooming method are, in addition, generally characterized by comparatively long antennae and entire or non-emarginate labra; those using the latter by comparatively short antennae and emarginate labra.

Grooming by Method 1. During their periods of activity, the cockroach and other orthopterans having long antennae groom themselves frequently, sometimes as often as once or twice every ten minutes. In doing so, they follow closely the generalized pattern discussed below. Cleaning of the face is accomplished by the tarsi of either the right or left fore leg, depending upon the side to be cleaned. The underside of the tarsus is first pressed to the mouthparts, where the distagaleae and laciniae respectively wipe and scrape it, the activities of these pairs being synchronous. Whether or not the tarsus is wetted by saliva is difficult to say, but at least no moisture is evident upon its surface. The face is then wiped with a downward motion of the cleaned foot. As in grooming of appendages, the operation may be repeated several times on each side. Grooming of the wings, like that of the face, is carried out by the cleaned legs, in this case the hind ones.

In cleaning an antenna it is caught by the fore foot of the same side and pulled downward and inward toward the mouthparts, where it is held in a channel formed by the medial groove of the labium and by the crossed labial palpi. The apices of the maxillary palpi may touch the antenna to keep it oriented. Synchronously and rapidly the distagaleae wipe and the laciniae rasp the antennal surface. The incisor surfaces of the mandibles, which may be either together or apart, and the apical margin of the labrum may assist in cleaning as the antenna is

scraped against them. The antenna is pulled through by the antennal extensor muscles, perhaps aided by the ligula, which opens and closes, apparently carrying the antenna with it as it moves cephalad during closure. Each cleaning operation may last 30 seconds or more.

The palpi are cleaned in much the same manner as the antennae. A maxillary palpus is flexed caudad and thrust into a channel formed by the crossed labial palpi. The terminal one or two segments are then cleaned in the foregoing manner by the distagaleae and laciniae. The labial palpi, because of their position, must be flexed cephalad and are not confined within a palpus-enclosed channel when they are cleaned. In all other respects their grooming is like that of the maxillary palpi.

Nineteen species of non-acridoid Orthoptera were observed, but not all were seen to groom; therefore, the foregoing generalized account of grooming behavior is based upon numerous observations in the following fourteen species, all of them showing remarkable similarity in their grooming pattern:

Blattidae: cockroaches

Blattella germanica

Byrsotria fumigata

Parcoblatta pensylvanica

Tettigoniidae (cont.)

Neoconocephalus ensiger

Orchelimum gladiator

Orchelimum volantum

Scudderia f. furcata

Tettigoniidae: katydids

Amblycorypha oblongifolia

Amblycorypha rotundifolia

Conocephalus f. fasciatus

Conocephalus nigropleurum

Gryllidae: crickets

Acheta pennsylvanica

Nemobius f. fasciatus

Occanthus angustipennis

Grooming by Method 2. The short-horned grasshoppers groom themselves comparatively infrequently, and when grooming occurs it is done in such a manner that it is most difficult to observe, even in the laboratory; thus, it is not surprising that a few details of the cleaning operation are yet imperfectly understood. These insects groom their faces and wings much as do cockroaches; that is, by wiping the cleaned tarsus over the surface to be groomed. The flap-like distagaleae of these insects, however, are neither adapted nor used for cleaning; thus, when the tarsus is applied to the mouthparts it is rasped by the

laciniae, sometimes by the mandibles, and perhaps wetted by saliva.

The comparatively short antennae of these latter insects are not cleaned directly by the mouthparts but by the tarsi. The grasshopper reaches up with a newly cleaned fore tarsus and, using its tarsal claws to ensnare the antenna of that side, presses the apical portion of the antenna against the ground or other surface upon which the animal is resting; then, by pulling the head away from the tarsus, the insect draws the antenna from between the surface and the tarsal pads. The proximal part of the antenna cannot be groomed in this manner but must be rubbed by the cleaned fore tarsus of the same side of the body.

Twenty-three species of acridoids were observed in this study, but not all were seen to groom; therefore, the foregoing generalized account of grooming behavior is based upon observations in the following six species, all of them showing remarkable similarity in their grooming pattern:

Tetrigidae: grouse locusts	Acrididae (cont.)
<i>Tettigidea lateralis parvipennis</i>	<i>Chortophaga viridifasciata</i>
	<i>Encoptolophus s. sordidus</i>
Acrididae: grasshoppers	<i>Melanoplus confusus</i>
<i>Arphia sulphurea</i>	<i>Melanoplus f.-r. femur-rubrum</i>

SUMMARY AND DISCUSSION

Modern Orthoptera are known to have been derived from two major lines, the Protorthoptera and the Protoblattoidea

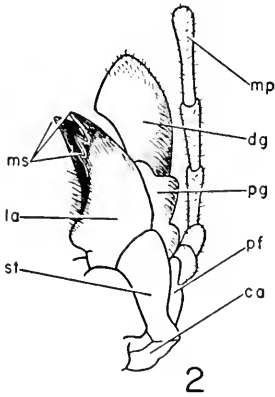
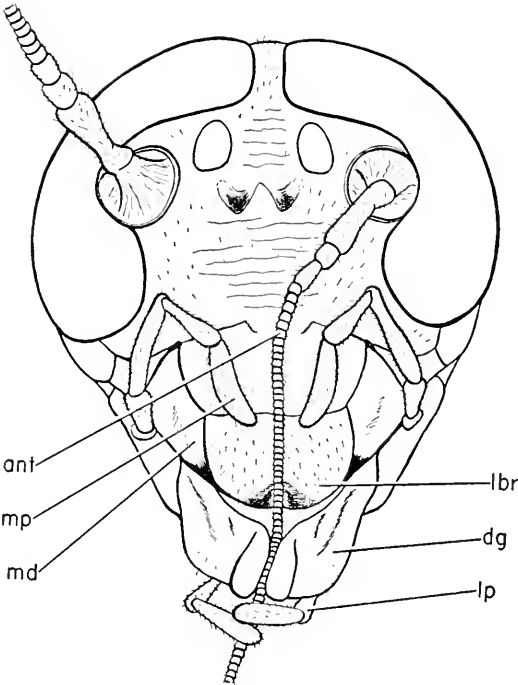
EXPLANATION OF FIGURES

FIG. 1. A view of the head of the cockroach *Blaberus craniifer*, showing the relationships of the mouthparts during antennal grooming (Method 1).

Ant—antenna	Lbr—labrum
Dg—distagalea	Md—mandible
Lp—labial palpus	Mp—maxillary palpus

FIG. 2. The left maxilla of a short-horned grasshopper, the slant-face *Syrbula admirabilis*.

Ca—cardo	Ms—maxadentes
Dg—distagalea	Pf—palpifer
La—lacinia	Pg—proxagalea
Mp—maxillary palpus	St—stipes



(Zeuner, 1939). Each of these has given rise to insects which utilize Grooming Method 1, but only the Acridoidea, a branch from the Protorthoptera, is composed of insects which utilize Method 2. In Method 1, used by such Orthoptera as cockroaches, camel crickets, katydids, and crickets, the cleaning of the appendages, including the antennae, is primarily through the rapid, synchronous movement of the distagaleae and laciniae. In Method 2, used by short-horned grasshoppers, the distagaleae are not used in cleaning, the laciniae and mandibles being used to complete the operation. In insects utilizing the latter method of grooming, antennal cleaning is accomplished by drawing the appendage from between the cleaned tarsal pads and the surface upon which the animal is resting. It is evident that there exists a close correlation between the insects' structure, both antennal and mouthpart, and their grooming behavior.

ACKNOWLEDGMENTS

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Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part XVII

By CHARLES P. ALEXANDER, Amherst, Massachusetts *

The preceding part under this general title was published in ENTOMOLOGICAL NEWS, 67: 210-216, 1956. The new species discussed herewith were collected by the writer in California, Colorado and Montana, representing part of the novelties discovered in the course of the comprehensive survey of Western North American Tipulidae. Types of the species are incorporated in the Alexander Collection of Crane-flies.

Limonia (*Dicranomyia*) *homichlophila* new species

Allied to *pudica*; size relatively small (wing about 6 mm.); general coloration of entire body pale yellow; wings subhyaline, stigma barely indicated; ovipositor with cerci very slender; male hypopygium with posterior border of tergite very feebly emarginate; ventromesal lobe of basistyle without an accessory lobule; ventral dististyle with the rostral prolongation relatively short, the subacute apex simple; rostral spines placed close together on small subequal basal tubercles.

♂. Length about 4.5-4.8 mm.; wing 5.3-6 mm.; antenna about 0.8-0.9 mm.

♀. Length about 6.5 mm.; wing 6 mm.

Rostrum yellow, light gray pruinose; palpi light brown. Antennae with scape and pedicel obscure yellow to brownish yellow, flagellum yellowish brown to brownish black; flagellar

* Contribution No. 1285 from the Department of Entomology, University of Massachusetts.

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segments short-oval to oval, slightly exceeding the verticils. Head obscure yellow, with a whitish bloom; anterior vertex relatively broad, about one and one-half times the diameter of the scape.

Thorax uniformly pale yellow, without pattern. Halteres yellow, knobs weakly darkened. Legs with the coxae and trochanters pale yellow; remainder of legs obscure yellow, terminal tarsal segments infuscated; claws with a single strong outer tooth and a few weak more basal denticles. Wings subhyaline, stigma barely indicated; veins brownish yellow to very light brown. Venation: Sc_1 ending approximately opposite the origin of Rs , in cases shortly beyond, Sc_2 slightly removed, about opposite this origin; free tip of Sc_2 and R_2 in transverse alignment; cell $1st\ M_2$ subrectangular, about equal in length to the distal section of vein M_3 ; $m-cu$ at or close to fork of M .

Abdomen obscure yellow to brownish yellow, sternites clearer. Ovipositor with the cerci very slender, gently upcurved, tips acute. Male hypopygium with the ninth tergite narrowly transverse, the posterior border very feebly emarginate, cephalic margin nearly straight; setae relatively few. Ninth sternite semi-oval, its setae long and conspicuous. Basistyle smaller in area than the ventral dististyle; ventromesal lobe simple, obtuse, without an accessory basal lobule. Dorsal dististyle gently curved, the apex suddenly narrowed into a spine, the base not dilated. Ventral dististyle with the rostral prolongation markedly shorter than in *pudica*, blackened, the tip subacute, simple; rostral spines relatively conspicuous, about equal in length to the rostrum beyond their insertion, placed close together on small subequal tubercles. Gonapophysis with the mesal-apical lobe a relatively slender blackened spine, its tip acute.

Habitat. CALIFORNIA. *Holotype*: ♂, Vernal Falls of the Merced River, Yosemite National Park, 5,000 feet, July 1, 1957 (C. P. Alexander). *Allotopotype*: ♀, pinned with the type. *Paratopotypes*: 8 ♂♀.

The most similar species is *Limonia* (*Dicranomyia*) *pudica* (Osten Sacken) which differs most evidently in the details of structure of the male hypopygium. The present fly was found

on the wet rocks and in the constant spray of Vernal Falls, near the base, and on the south side of the stream. Here it was associated with abundant specimens of *Elliptera clausa* Osten Sacken. It may be noted that this spot is the exact type locality for the *Elliptera*, where the species was found by Osten Sacken on June 11, 1876.* The habitat, in the eternal spray of the falls, has suggested the specific name of the present fly (to love mist).

***Pedicia (Pedicia) lewisiana* new species**

Allied to *parvicellula* and *subobtusa*; wing pattern pale brown, seam on vein *Cu* narrow, ending at *m-cu*; male hypopygium with the tergal lobes broadly obtuse at tips; basistyle with outer apical angle produced into a short stout spine.

♂. Length about 20–21 mm.; wing 19–20 mm.

Rostrum and head brownish gray, the latter clearer gray behind; palpi dark brown. Antennae relatively short, almost uniformly yellowish brown to light brown.

Pronotum obscure brownish yellow, narrowly dark brown on sides, the color continued onto the dorsopleural membrane to form an inconspicuous stripe. Mesonotal praescutum light gray, with four brown stripes, the intermediate pair separated by a narrow ground line that widens on posterior half; scutellum chiefly yellow; postnotum variegated brownish gray and obscure yellow. Pleura pale yellow, the sternopleurite slightly darker. Halteres with stem whitened, knob weakly darkened, the apex somewhat paler. Legs with the coxae light gray; trochanters yellow; femora brownish yellow, the tips gradually brownish black; tibiae yellow, tips more narrowly blackened; tarsi light brown, the outer ones dark brown. Wings with the brown pattern pale; seam on *Cu* narrow, ending at *m-cu*. Venation: *r-m* at fork of *Rs*, in alignment with R_{2+3} ; cell R_4 short-petiolate.

Abdomen with tergites dark brown, the lateral borders yellow;

* OSTEN SACKEN, C. R. Western Diptera. Bull. U. S. Geol. Survey, 3: 198; 1877. Record of my life work in Entomology, Part Third, pp. 215–218, 1904 (Heidelberg, Germany).

sternites dark brown, the lateral borders more broadly light gray, the posterior margins of the segments narrowly and abruptly yellow; hypopygium large, yellow. Male hypopygium with the tergal lobes narrowly separated, the tips broadly obtuse. Basistyle with outer apical angle produced into a short stout spine; no marked concentration of setae on face of style, as in *subobtusa*. Dististyle with the lower marginal spine from a strong basal tubercle; outer pegs or spines two or three in number, in a compact group.

Habitat. MONTANA. *Holotype*: ♂, Sacajawea Park, Lemhi Pass, 7,400 feet, June 26, 1956 (C. P. Alexander). *Paratopotypes*: 3♂♂.

Named in honor of Captain Meriwether Lewis (1774–1809), co-leader of America's most famous exploring expedition. The type locality of the present fly is at the highest source of the Missouri River at Lemhi Pass, about 100 feet below the small spring whence the river arises as a small branch of Pass Creek. At this point the river is scarcely more than a foot across, with small swampy areas on either bank, where the present flies and many other species of crane-flies occurred. Lewis and Clark remained at this locality for nearly two weeks in August 1805 while obtaining horses to enable them to continue westward to the Pacific. The note in Lewis's *Journal* under date of Monday, August 12th, 1805, reads: "At the distance of 4 miles further the road took us to the most distant fountain of the waters of the Mighty Missouri in surch of which we have spent so many toilsome days and wristless nights."—Original spelling retained.

In the structure of the male hypopygium, particularly the outer spine of the basistyle, the species is nearly intermediate between *Pedicia* (*Pedicia*) *parvicellula* Alexander on one hand and *P. (P.) subobtusa* Alexander on the other.

Paradelphomyia (Oxyrhiza) sierrensis new species

General coloration of thorax yellow; antennal flagellum dark brown; wings subhyaline, cell M_1 present; male hypopygium with the apex of basistyle produced into a subacute point, the

outer setae unmodified; outer dististyle narrowest before the slightly expanded apex; spines of the ventral fork very slender, pale.

♂. Length about 4–4.5 mm.; wing 4.8–5 mm.

♀. Length about 4.5 mm.; wing 5 mm.

Rostrum brownish yellow; palpi dark brown. Antennae 16-segmented, brownish black, scape paler; flagellar segments oval, the outer ones more elongate, with long verticils. Head brown.

Pronotum light brown, scutellum more yellowed. Mesonotal praescutum brownish yellow, in cases vaguely darker medially; posterior sclerites and pleura clear yellow, the surface nitidous. Halteres with stem pale, knob infuscated. Legs with the coxae and trochanters yellow; remainder of legs brownish yellow, the outer segments passing into brown. Wings subhyaline, prearcular and costal fields slightly more yellowed; veins brown. Sparse macrotrichia in outer ends of cells R_2 to M_4 , inclusive. Venation: Veins R_3 and R_4 gently divergent outwardly; cell M_1 present, from one-third to one-half its petiole; $m-cu$ beyond the fork of M .

Abdominal tergites brown, sternites obscure yellow, subterminal segments of male more darkened to form a ring; genitalia of both sexes yellow. Male hypopygium generally as in *pacifica*, differing in important details. Apex of basistyle produced into a subacute point, the outer setae elongate but slender. Outer dististyle narrowest at midlength or before the slightly expanded apex. Spines of the ventral fork very slender, pale.

Habitat. CALIFORNIA. *Holotype*: ♂, Swale Camp, Kings Canyon National Park, about one mile south of the General Grant Big Tree, 6,400 feet, July 19, 1957 (C. P. Alexander). *Allotopotype*: ♀. *Paratopotypes*: several ♂♀. *Paratype*: 1♀, Sotcher Lake, Reds Meadow, Mammoth Lakes District, 7,600 feet, July 29, 1957 (C. P. Alexander).

Paradelphomyia (Oxyrhiza) sierrensis is most nearly related to *P. (O.) pacifica* (Alexander) of northwestern North America, differing most evidently in the structure of the male hypopygium, as described. The eastern Nearctic *P. (O.) americana* (Alexander) is nearly intermediate between the two western species in these characters.

Ormosia (Rhypholophus) arapaho new species

General coloration of head and thorax gray; antennae black throughout; legs brownish black to black; male hypopygium with the gonapophysis appearing as a simple black subtriangular structure, without branches; arms of aedeagus short.

♂. Length about 5.3–5.5 mm.; wing 5–5.5 mm.; antenna about 1.1–1.2 mm.

♀. Length about 6–6.2 mm.; wing 6–6.5 mm.

Rostrum dark gray; palpi black. Antennae black; flagellar segments oval. Head gray.

Pronotum dark gray. Mesonotal praescutum gray, with four brownish stripes, the intermediate pair separated by a line that is slightly narrower than either stripe; lateral stripes paler brown; pseudosutural foveae and tuberculate pits black, conspicuous; posterior sclerites of notum gray, the scutal lobes slightly patterned with darker near the midline. Pleura lighter gray; dorsopleural membrane dusky. Halteres whitened. Legs with the coxae gray; trochanters brownish yellow; remainder of legs brownish black to black. Wings whitish subhyaline; vein *Cu* in cell *M* vaguely seamed with darker; stigma brown; veins brown. Venation: Sc_1 ending opposite R_2 , Sc_2 far removed; R_2 at fork of R_{2+3+4} ; cell 1st M_2 relatively small, the second section of vein M_{1+2} about one-half the outer section; $m-cu$ about one-half its length beyond the fork of *M*; vein 2nd *A* strongly sinuous on outer half. The female paratype has cell M_2 of one wing open by the atrophy of *m*.

Abdomen dark brown, gray pruinose; ninth segment of male and genital segment of female brightened. Ovipositor with cerci yellow, strongly upcurved to the acute tips. Male hypopygium with the tergite transverse, the sides rounded oval, with conspicuous setae, the broad central area without major vestiture but with a narrow transverse sclerotized bar. Outer dististyle rather broadly dilated outwardly, the margin blackened, outer apical angle more extended; inner style a flattened brownish yellow blade. Gonapophysis distinctive, appearing as a simple black subtriangular structure, narrowed outwardly to an acute point, without branches. Arms of the aedeagus relatively short, the tips gently upcurved.

Habitat. COLORADO (Rocky Mountain National Park). *Holotype*: Trail Ridge Road, 11,300 feet, July 30, 1955 (C. P. Alexander). *Allotopotype*: ♀, pinned with type. *Paratypes*: 1 ♂, 1 ♀, Beaver Creek at Milner Pass, 10,730 feet, July 19, 1955 (C. P. Alexander).

The types were collected at timberline among low shrubby willows, swept from the latter, *Caltha*, *Cardamine*, *Senecio triangularis*, and other herbs. The small streamlets flow through gravel beds among the willow thickets, dropping rapidly and flowing into the Cache la Poudre River far below. The paratypes were found along Beaver Creek, near the ultimate source of the Colorado (Grand) River, where they were swept from the vegetation. The itinerary covering this part of field collecting in Colorado has been outlined elsewhere.*

The most similar described species is *Ormosia* (*Rhypholophus*) *bifidaria* (Alexander). The present fly differs conspicuously in the structure of the male hypopygium, particularly the simple compact gonapophyses which are quite distinct from all previously described species of the subgenus.

Molophilus (Molophilus) oligacanthus new species

Belongs to the *gracilis* group, *pubipennis* subgroup; general coloration dark brown; antennae short in both sexes; legs dark brown to blackened; wings broad, macrotrichia of veins dark; male hypopygium with tip of apical lobe of basistyle subacute; both dististyles with relatively sparse armature, the outer style without spinules on basal half; phallosomic plate broadly obtuse at apex, the surface with delicate setulae.

♂. Length about 4.5–4.6 mm.; wing 5.2–5.7 mm.; antenna about 1.1–1.2 mm.

♀. Length about 5–5.2 mm.; wing 5.8–6 mm.

Rostrum brown; palpi dark brown. Antennae relatively short, brown to brownish black; flagellar segments long-oval, the basal ones with very long verticils. Head light brown.

* ALEXANDER, CHARLES P. Distribution of crane-flies in the state of Colorado. The American Philosophical Society Year Book 1955: 122–125; 1956.

Thorax varying from light to dark brown, the pleura more pruinose. Halteres yellow. Legs with the coxae and trochanters yellow; remainder of legs dark brown to blackish. Wings broad, subhyaline, the prearcular field more yellowed; veins pale brown, macrotrichia dark brown. Venation: R_2 lying distally to $r-m$; petiole of cell M_3 from one and one-half to two times $m-cu$; vein 2nd A sinuous, ending some distance beyond the level of $m-cu$.

Abdomen dark brown, hypopygium more yellowed. Male hypopygium much as in *spiculatus*, differing in details. Apical lobe of basistyle moderately slender, tip subacute, the setae not including the apex. Both dististyles with relatively sparse armature; outer style without spinules on basal half, on outer part these restricted to the upper edge and ventral margin; inner style longer, strongly curved beyond midlength, as in *spiculatus*; spines relatively large but scattered and few in number, especially on the outer or convex side. Phallosomic plate broadly obtuse at apex, surface with delicate setulae.

Habitat. CALIFORNIA. *Holotype*: ♂, somewhat teneral, Coldwater Creek above Lake Mary, Mammoth Lakes District, Sierra Nevada, 9,000 feet, July 6, 1957 (C. P. Alexander). *Allotopotype*: ♀, July 5, 1957. *Paratopotypes*: Several ♂♀, July 5-6, 1957.

The type series was taken in an extensive boggy area that included small cold sunken streamlets flowing into Coldwater Creek. The sparse tree cover included chiefly lodgepole pine and mountain hemlock; shrubs and herbs chiefly *Kalmia*, *Ledum* and *Phyllodoce*, with *Veratrum*, *Allium* and *Saxifraga*, growing amidst abundant short sedges and rushes and among dense mosses. Associated crane-flies included *Limonia* (*Limonia*) *venusta* (Bergroth), *Ornithodes brevirostris* Alexander, *Limnophila occidentis* Alexander, *Gonomyia* (*Gonomyia*) *bihamata* Alexander, *Erioptera* (*Mesocyphona*) *melanderiana* Alexander, *Erioptera* (*Psiloconopa*) *rainieria* Alexander, and many others.

The most similar species is *Molophilus* (*Molophilus*) *spiculatus* Alexander, which is most readily separated by the details of structure of the male hypopygium, particularly the armature of the dististyles.

Dodds's Types for Two Species of *Callibaetis* (Ephemeroptera)

By THOMAS B. THEW, Davenport Public Museum,
Davenport, Iowa

Two species of mayflies, *Callibaetis vitreus* and *Callibaetis fuscus*, were described by Dodds in 1923 (Trans. Amer. Ent. Soc. 49: 93-114) in the results of his studies on the fauna of Colorado. Unfortunately, not only were the original descriptions extremely terse, but also no designation of a type for one species was made. In the Biology of Mayflies (Ithaca, New York, 1935), Traver pointed out that *C. vitreus* Dodds was a primary homonym of *C. vitreus* Navas and so renamed the former species *C. doddsi*. She could not place either of Dodds's species correctly, however, for the necessary detailed descriptions were lacking. Through the kindness of Harold J. Grant, Jr., of the Academy of Natural Sciences of Philadelphia, the author has been allowed to examine Dodds's material of these two ephemerids. Consequently, I hereby designate the male (Acad. Nat. Sci. Phila. type no. 9026), of the syntypical series of one male, one female, and one nymph as the lectotype of *C. fuscus* Dodds. I have also examined the single type, a male (Acad. Nat. Sci. Phila. type no. 9027) of *C. vitreus* Dodds [= *C. doddsi* Traver]. A detailed description of each species will be given in a subsequent paper.

Halysidota tessellaris S & A and *Pollenia*

By S. W. FROST, Pennsylvania State University

In making counts of *Halysidota tessellaris* taken from light traps operated during the summer of 1957, the writer noticed that many had pollenia attached to the tarsi of the legs. The moths were first noticed at the light traps in numbers on June 30. At that time it was not suspected that specimens with pollenia would later be taken abundantly and it is possible that a few moths with pollenia escaped notice. By July 3 the prob-

lem became evident and thereafter counts were made daily until August 18.

Several interesting observations were made. There were no milkweed plants, the only group of plants bearing pollenia in our area, near the location of the light traps. The moths must have travelled a considerable distance to reach the traps. Numerous insects bearing pollenia have been observed by the writer and by others but as far as known there is no mention of *Halysidota tessellaris* visiting milkweed. The larvae are known to feed on maple and many other trees. Frequent examinations of milkweed during the summer failed to reveal the presence of these moths. They are strong fliers and are never trapped as is the case of some of the small moths. Milkweed pods were well formed by August 2. After that date moths, due to seasonal conditions, were scarce and none bearing pollenia were recovered. It is evident that males came to light more frequently than females and apparently males visit milkweed more often than females. It is also interesting to note that none of the other species of moths captured in light traps bore pollenia.

Pollenia on the legs of *Halysidota tessellaris*

Period	Males		Females	
	Total number	No. with pollenia	Total number	No. with pollenia
June 30-July 2	110	0	63	0
July 3-8	422	70	195	19
July 9-13	237	56	105	9
July 14-18	227	43	114	20
July 19-23	213	48	113	11
July 24-28	39	8	24	2
July 29-Aug. 2	25	3	13	1
Aug. 3-7	5	0	1	0
Aug. 8-13	2	0	1	0
Aug. 14-18	1	0	1	0
Totals	1281	228	630	62

Retirement of Francis Hemming

FRANCIS HEMMING, Honorary Secretary to the International Commission on Zoological Nomenclature since 1936, is retiring from office on account of ill-health, according to an announcement of the International Trust of Zoological Nomenclature. In consultation with Sir Gavin de Beer, Director of the British Museum (Nat. Hist.), and President of the coming 15th International Congress of Zoology, the Trust has arranged for R. V. Melville, a senior member of the paleontological staff of the Geological Survey, London, to be released by the Survey for one year, to take charge, beginning May 1, of the Office of the Commission, with the title: "Assistant Secretary to the Director of the Office of the International Commission on Zoological Nomenclature." Sir Gavin has also asked Mr. Melville to act as Recorder for the Section on Nomenclature of the International Congress of Zoology meeting next July.

In order that Mr. Melville may concentrate on urgent tasks relating to the coming Colloquium on Zoological Nomenclature, Mr. Hemming has consented to complete certain work already begun, including the printing of the Lists and the Indexes, and the Opinions on decisions already taken. One of the first duties of the new Secretary will be to find suitable accommodation for the Office, hitherto housed rent-free in Mr. Hemming's private residence.

Laboratory Training Class

A schedule of the Laboratory Refresher Training Courses that will be given by the Laboratory Branch of the Communicable Disease Center during the period Sept. 15, 1958 to Apr. 10, 1959, has been issued. Twenty-three courses, varying from 1 to 4 weeks in length are offered on laboratory diagnoses of various viral, bacterial, rickettsial, fungous, protozoan and other parasitic diseases of man and animals. For information and application forms write to: Laboratory Branch, Communicable Disease Center, U. S. Public Health Service, P. O. Box 185, Chamblee, Ga.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Dominick J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

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By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeshna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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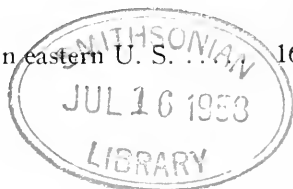
JUNE 1958

Vol. LXIX

No. 6

CONTENTS

Muesebeck—Three new aphid parasites	141
Increase in subscription rates for 1959	146
Evans—New males and sex associations in Pompilidae	147
Crabill—A new schendylid from eastern U. S.	153
Hubbard—New Mexican jungle and desert fleas	161
Krombein—Pison, a new adventive wasp in eastern U. S.	166



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No. 6

Three New Aphid Parasites from the Pacific Coast. (Hymenoptera: Braconidae, Aphidiinae)

By C. F. W. MUESEBECK, U. S. National Museum

Recently I received a large collection of nicely preserved Aphidiinae for identification from Dr. Evert I. Schlinger, of the Citrus Experiment Station, Riverside, California. The specimens had been reared from various aphid hosts and included three new species, two of them in long series. All three are described here.

Aphidius (Protaphidius) ponderosae, new species

In Smith's key (1944, Contrib. Zool. Ent., Ohio State Univ., No. 6, p. 37) this species runs to *californicus* Ashmead. It differs conspicuously from that species, however, in being much larger, and in having the mesoscutum delicately sculptured and the metacarpus nearly as long as the stigma. In *californicus* the mesoscutum is smooth and polished and the metacarpus is only half as long as the stigma.

Female.—Length about 3.5 mm. Head strongly transverse and noticeably wider than the thorax; face more than three times as broad as long from antennal foramina to base of clypeus, usually with a little weak and indefinite roughening below antennae; malar space one-third as long as eye; temples strongly receding from the eyes; antennae with 20 to 22, usually 20, segments; ocellular line about three times as long as diameter of an ocellus.

Mesoscutum very delicately coriaceous and subopaque; notaulices weak but usually distinct; scutellum smooth and pol-

ished; propodeum largely smooth but usually with a little weak, indefinite sculpture; a median longitudinal carina on dorsal face of propodeum, and from its caudal end a transverse carina extending each side to the spiracle; longitudinal carinae on posterior declivity of propodeum wanting, and the areola, therefore, incomplete; pleura smooth and polished. Stigma hardly twice as long as broad; metacarpus nearly as long as stigma; stub of second abscissa of radius not, or barely, longer than intercubitus.

Abdominal petiole weakly rugulose, except basally and just before apical margin where it is smooth; remainder of abdomen smooth.

Male.—Essentially like the female, but antennae with 21 to 23, usually 22, segments.

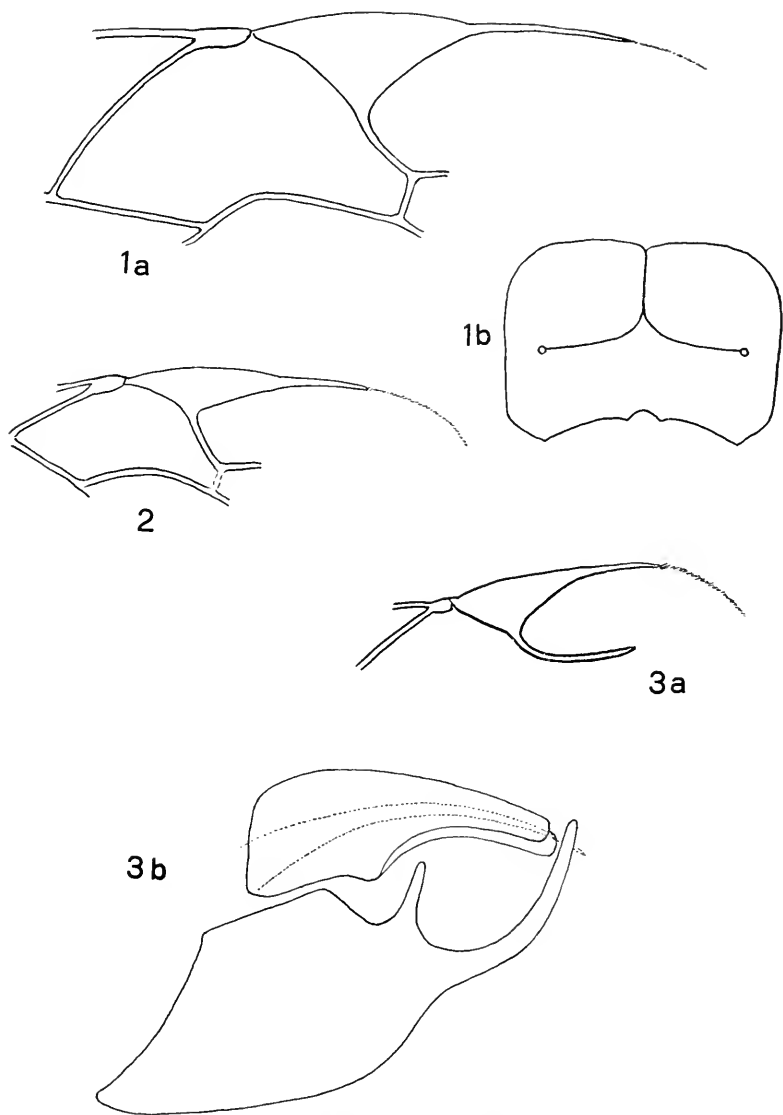
Type.—U. S. National Museum No. 64229.

Type-locality.—Cold Spring Camp, Allison Pass, Hozameen Mts., in E. C. Manning Provincial Park, New Westminster Sector, BRITISH COLUMBIA, elev. 4,450 ft.

Described from 21 females, including holotype, and 11 males reared from *Cinara* sp. on *Pinus ponderosa* by Evert I. Schlinger, June 4, 1957.

***Aphidius (Aphidius) alius*, new species**

This is apparently very similar to *confusus* Ashmead, where it will run in Smith's key (1944, Contrib. Zool. Ent., Ohio State Univ., No. 6, p. 51). Unfortunately, the holotype and only known specimen of *confusus* is headless, and a thoroughly satisfactory comparison is, therefore, impossible; but the present species differs from that incomplete type specimen in having all coxae yellow and the abdomen behind the petiole piceous to black; in the type of *confusus* the hind coxae are black and the abdomen is almost entirely testaceous. In addition, the new species has the metacarpus considerably shorter in relation to the length of the stigma than it is in *confusus*. From *nigriteleus* Smith, which it also closely resembles, it may be distinguished by its much shorter metacarpus, which is not longer than the



EXPLANATION OF FIGURES

1, *Aphidius* (*Protaphidius*) *ponderosae*, n. sp.: a, part of forewing; b, propodeum. 2, *Aphidius* (*A.*) *alius*, n. sp., part of forewing. 3, *Trioxyx* (*Acanthocaudus*) *schlingeri*, n. sp.: a, part of forewing; b, ovipositor sheath and last sternite.

first abscissa of radius, by its smoother abdominal petiole, by its black prothorax, and by the female antennae being blackish throughout.

Female.—Length about 2.3 mm. Head smooth and shiny; eyes large and prominent, converging below; malar space shorter than clypeus; temples somewhat convex but receding rather strongly; antennae with 15 or 16 segments (15 in two, 16 in three, of type series), all flagellar segments at least twice as long as broad.

Thorax smooth and polished; propodeum with a median longitudinal carina extending from base to middle and behind this a narrow, subpentagonal areola, costulae well developed; metacarpus and first abscissa of radius subequal; stub of second abscissa of radius slightly longer than intercubitus, which is very weak.

Abdomen smooth and shiny except for a little faint sculpture on basal half of petiole.

Black; clypeus yellow or brownish yellow; face sometimes more or less brownish; propodeum occasionally ferruginous; wings hyaline; all coxae and trochanters yellow, although the hind coxae may be a little darkened at bases; all femora, tibiae and tarsi usually a little infuscated.

Male.—Antennae 18-segmented in the two males of the type series. Otherwise like the female.

Type.—U. S. National Museum No. 64230.

Type-locality.—Riverside, CALIFORNIA.

Described from five females and two males reared April 16, 1957, from *Macrosiphum rosae* (L.) on *Rosa* sp. by Evert I. Schlinger.

***Trioxys (Acanthocaudus) schlingeri*, new species**

This is the third Nearctic species of the subgenus *Acanthocaudus*. It closely resembles *tissoti* Smith, but it lacks the distinct, median longitudinal carina on the basal half of propodeum which distinguishes that species; and the eyes are more definitely convergent below.

Female.—Length about 2.2 mm. Head smooth and polished; malar space about as long as median length of clypeus; face noticeably narrower at base of clypeus than at antennal foramina; temples convex, not receding from the eyes; antennae 12-segmented, the first flagellar segment slightly the longest, the apical segment usually a little the shortest, the remainder subequal.

Thorax smooth and polished except for a little vague sculpture on posterior declivity of propodeum; propodeal areola not distinctly defined.

Abdomen, including petiole, smooth and polished; the last three tergites each with a row of short, stout spines along the caudal margin; spiracles of petiole prominent, at or slightly behind middle; ovipositor sheath and posterior prongs as illustrated.

Head and thorax black; clypeus, pleura and propodeum often more or less brownish or piceous; antennae piceous to black; wings hyaline; legs piceous. Abdomen brownish yellow on petiole and apical segments; middle segments piceous.

Male.—Like the female in essential characters, except that the antennae are 13-segmented.

Type.—U. S. National Museum No. 64231.

Type-locality.—Skihist Camp, 5 miles east of Lytton, BRITISH COLUMBIA, elev. 580 ft.

Described from the female holotype and many paratypes of both sexes reared at the type locality June 2, 1957, from *Macrosiphum ambrosiae* (Thomas) by Evert I. Schlinger. I take pleasure in naming this species for Dr. Schlinger, who reared all three species described in this paper.

Increase in Subscription Rates for 1959

The cost of printing and distributing ENTOMOLOGICAL NEWS has been increasing greatly in recent years. Only the steady growth of our subscription list, and the additional income from the sale of runs of back volumes during these years has made it possible to keep the subscription rate at the same figure for the past six years. Now, however, some additional income will have to be secured.

Beginning January 1959 (Vol. 70) the subscription rate to libraries, laboratories, and institutions of every sort will be \$6.00 per annual volume (\$6.30 foreign, \$6.15 Canada).

Private subscriptions for personal, individual use will remain at the same rate as heretofore, i.e., at \$5.00 (\$5.30 foreign, \$5.15 Canada).

By this arrangement, there will be no decrease in individual subscriptions of the many amateur and professional entomologists who read the NEWS, and, it is hoped that many younger enthusiasts, especially students, will be encouraged to subscribe. By thus maintaining a large circulation, even if in part at a reduced rate, the costs will be more broadly spread to the ultimate benefit of institutional as well as individual subscribers.

Some Previously Undescribed Males and New Sex Associations in the Pompilinae (Hymenoptera: Pompilidae)

By HOWARD E. EVANS, Cornell University, Ithaca, N. Y.

Although the classification of the Nearctic Pompilidae has undergone many refinements in the past fifteen years, there remain a number of species known from only one sex. The purpose of the present paper is to describe the previously unknown males of *Pompilus perfasciatus* Evans and *Aporus bequaerti* (Banks) and to place in synonymy a species previously known from only the male sex, *Psorthaspis albocaudata* (Malloch). Knowledge of the male of *Aporus bequaerti* raises certain questions regarding generic limits in the Aporini; these are discussed at the end of the descriptive material.

Pompilus (*Perissopompilus*) *perfasciatus* Evans

Pompilus (*Perissopompilus*) *perfasciatus* Evans, 1951, Trans. Amer. Ent. Soc. 77: 225-226; Evans, 1953, Ann. Ent. Soc. Amer., 46: 531.

This species has been known from only two females, both from Riverside Co., Calif. On April 18, 1957, Dr. R. M. Bohart, of the University of California at Davis, took a series of three females and two males in dunes in Borrego Valley, San Diego Co., Calif. Interestingly enough, Dr. Bohart took four females and thirteen males of *P. (P.) phoenix* Evans, the only other known species of this subgenus, at the same time and place.

The male *perfasciatus* is readily separable from that of *phoenix* by virtue of the complete coalescence of the second and third transverse cubital veins, leaving only two submarginal cells; in addition, the apical fuscous band of the fore wing is smaller and the body pubescence much coarser. The terminalia agree in general pattern with those of *phoenix*, but there are some notable specific differences.

Description.—Length 3.5-4.5 mm.; fore wing 2.5-3.5 mm. Black; wings hyaline and with a whitish bloom, a brown band occupying the apical .2 of the fore wing; this band barely reaches

the tip of the marginal cell and posteriorly fades out before reaching the subdiscoidal vein. Entire body clothed with a coarse silvery pubescence, including the scape and the legs to the femora; pubescence especially prominent on the temples, posterior margin of pronotum, mesopleura, sides of the propodeum, and the hind coxae; pubescence on abdominal tergites directed backward except in broad apical bands, where it tends to diverge from the median line.

Head broad, the transfacial distance about 1.2 times the facial distance. Antennae relatively short, the first four segments in a ratio of about 10:4:4:5, segment three no longer than thick. Ocelli small, in a large triangle, the postocellar line greater than the ocello-ocular line as 8:5. Posterior margin of pronotum arcuate. Legs weakly spinose, the middle tibiae, however, with several fairly strong spines. Fore wing with the marginal cell slightly more than twice as broad as high, removed from the wing-tip by about 1.5 times its own length; second submarginal cell 1.5–1.7 times as broad as high; third submarginal cell absent; second submarginal cell receiving the second recurrent vein at or just basad of its outer apical corner.

Abdomen slender and with a strong tendency for the apical segments to telescope within the basal three segments. Sixth sternite with a broad, rectangular emargination which is flanked by a pair of thick, two-pronged spines; disc of this sternite with a pair of weak lateral carinae, but without the distinctly marked off median area of *phoenix*. Subgenital plate (fig. 2) shaped much as in *phoenix* but without the basal lateral expansions of that species. Genitalia (fig. 1) very similar to those of *phoenix* but differing as follows: parameres somewhat thicker and with a prominent squama about one-third the distance from the apex; parapenial lobes with a series of weak serrations along their inner margin; aedoeagus with the apex only weakly expanded.

***Psorthaspis planata* (Fox)**

Planiceps planatus Fox, 1892, Ent. News 3: 171. ♀.

Pedinaspis albocaudata Malloch, 1928, Proc. Ent. Soc. Wash. 30: 101. ♂. NEW SYNONYMY.

Malloch's *albocaudata* has remained in limbo since its description. Bradley (1944, Trans. Amer. Ent. Soc. 70: 152), on the advice of Banks, assigned the species to *Allocyphonyx*. I removed it to *Psorthaspis* (1954, Amer. Mus. Novitates no. 1662, p. 15), but was unable to place it properly because of the fact that the tips of all the tarsi are absent in the type and only known specimen.

The collections of the California Insect Survey contain a number of male specimens of *planata* from Borrego, San Diego Co., Calif., in which the apical abdominal tergites bear whitish pubescence. In some specimens the white is very limited, in others it covers all of the tergites beyond the third. This suggested to me that the type of *albocaudata* (from Higley, Ariz., U. S. Nat. Mus. no. 27432) might be merely a "white-tailed" *planata*. Re-examination of the type reveals that it is indeed *planata*, with the characteristic elevation of the ocellar triangle and other features of this species. The white pubescence begins on the posterior part of the third tergite, so it is somewhat more extensive than in any specimen from Borrego. *P. planata* is apparently rare in Arizona; I have seen a few females but no males other than this one. Whether all males from Borrego eastward are "white-tailed" and whether the name *albocaudata* should be retained in a subspecific sense remain to be determined.

Aporus (Aporus) bequaerti (Banks)

Planiceps bequaerti Banks, 1931, Bull. Brooklyn Ent. Soc. 26: 131. ♀.

Aporus (Aporus) bequaerti Bradley, 1944, Trans. Amer. Ent. Soc. 70: 95. ♀.

This species has been known from only a few females from eastern Mexico and southern Texas. For several years I have been aware of the occurrence of an unknown male *Aporus* in this area. On June 24, 1956, I collected three specimens of this unknown male on the flowers of *Avicennia nitida* near Port Isabel, Cameron Co., Texas, in close association with two female *bequaerti*. I think there can be little doubt that it represents the male of *bequaerti*.

These males run directly to *calcaratus* (Fox) in Bradley's key to the species of *Aporus* (1944, Trans. Amer. Ent. Soc. 70: 89). I have recently examined the type and only known specimen of *calcaratus* in the Academy of Natural Sciences of Philadelphia ("S. Fla., Robertson," type no. 4721). The two species are actually very different and may be separated as follows:

Second recurrent vein reaching the cubitus well apicad of the second transverse cubital vein; propodeum nearly flat in front, with a short, steep declivity behind; length 6.5–14 mm.
 *bequaerti* (Banks)

Second recurrent vein reaching the cubitus at the same point as the second transverse cubital vein (in the left wing of the type, apicad of it by half the width of the vein); slope of propodeum low and even; length 5.5 mm. *calcaratus* (Fox)

Description.—Length 6.5–14 mm.; fore wing 5.5–10.5 mm. Black, the tibial spurs white and the apical abdominal tergite with a white spot; body very extensively clothed with a fine silvery pubescence, more coarse and suberect on the posterior part of the propodeum; wings hyaline, the apical margin of the fore wing narrowly infuscated.

Clypeus slightly less than twice as broad as high, its apical margin weakly convex. Front relatively narrow, the middle interocular line .63 times the transfacial line. Ocelli in a broad triangle, postocellar line greater than ocello-ocular line as 7:5. First four antennal segments in a ratio of about 8:2:8:9, segment three slightly less than twice as long as thick. Pronotum long, its posterior margin arcuate but with a small median angulate notch. Propodeum rather long, its median line weakly impressed, its posterior declivity short and steep. Legs slender, the tibiae and tarsi with many small black spines; longer spur of hind tibia .62 times the length of the hind basitarsus. Wings with the transverse median and basal veins interstitial or nearly so; marginal cell acute apically, removed from the wing-tip by considerably less than its own length; second submarginal cell about twice as broad as high; second recurrent vein meeting the cubitus beyond the second transverse cubital vein by about half the length of the latter vein.

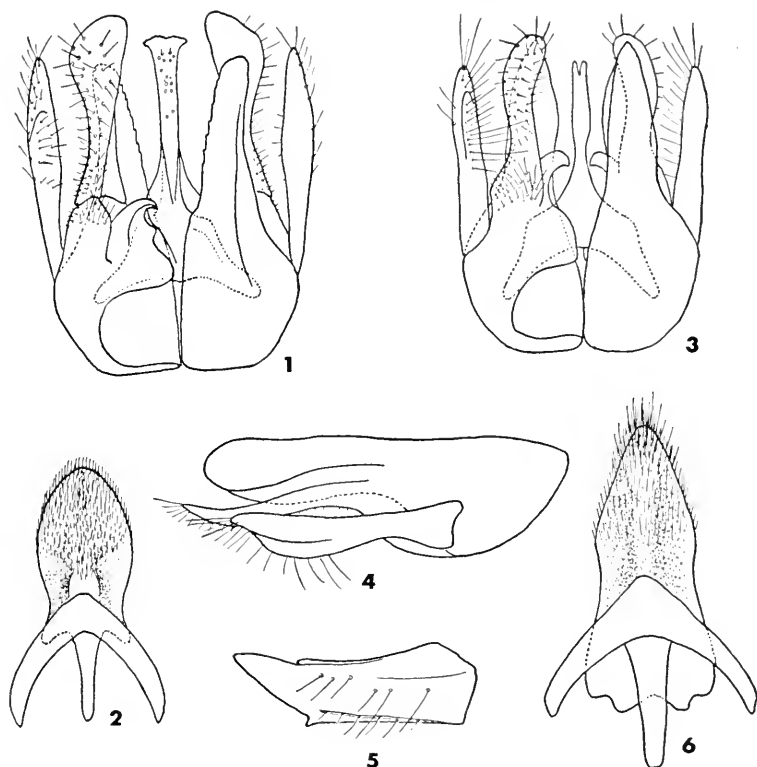


FIG. 1. *Pompilus* (*Perissopompilus*) *perfasciatus* Evans, male genitalia, ventral aspect on the left side, dorsal on the right. FIG. 2. Same species, subgenital plate. FIG. 3. *Aporus* (*Aporus*) *bequaerti* (Banks), male genitalia, ventral aspect on left side, dorsal on right. FIG. 4. Same species, male genitalia in lateral aspect. FIG. 5. Same species, mandible of female. FIG. 6. Same species, subgenital plate of male.

Abdomen with scattered erect setae on the apical segments ventrally. Emargination of sternite 6 deep, U-shaped. Subgenital plate (fig. 6) with a median longitudinal elevation, tapering to a subacute apex. Genitalia (figs. 3, 4) with the parameres short, obliquely truncate apically; volsellar digiti simple, with short hairs which are evenly distributed; aedocagus short and slender.

REMARKS ON GENERIC LIMITS IN THE APORINI

As I indicated above, the male *bequaerti* runs to *calcaratus* in Bradley's key to the species of *Aporus*. But the fact is that neither of these species will run to *Aporus* in his generic keys. Either these species do not belong in *Aporus* or some modification of our interpretation of this genus is necessary.

In the case of *calcaratus* (Fox), the venational features mentioned above would seem to place it in *Aspidaporus* Bradley, known only from Brazil. I have compared the type of *calcaratus* with a paratype of *Aspidaporus minusculus* Bradley. The two specimens are so similar they might almost be conspecific. However, since the male genitalia of *calcaratus* have never been studied and the female is unknown, no accurate generic assignment of this species can be made at this time. Presumably the female will be found to possess the unusual antennal fossae and the margined pronotal disc of *Aspidaporus*. If it does not, then additional characters for the separation of the males of these genera must be sought.

On the other hand, the male *bequaerti* (Banks) runs in Bradley's key to *Odontaporus* Bradley, since the parameres are straight and do not reach the apex of the parapenial lobes. (Actually the parameres are somewhat intermediate in form between *Aporus* and *Odontaporus*.) This fact has led me to re-examine the mandibles of the female *bequaerti*, and I find that they possess a tooth on the lower margin (fig. 5). Although this tooth is not as large as in the species which Bradley assigned to *Odontaporus*, it is nevertheless distinct in all of the specimens I have seen. As a matter of fact, some evidence of such a tooth is visible in freshly emerged specimens of *Aporus niger* (Cresson). Although Bradley supported his separation of *Aporus* and *Odontaporus* with color characters, he himself recognized certain exceptions to these color differences. In my opinion the species placed by Bradley in *Odontaporus* represent an early invasion of one or more stocks of *Aporus* (*s. str.*) into Central America and the Antilles, where these forms became isolated and specialized with respect to color, mandibular structure, and genitalia. As a subgenus, *Odontaporus* seems to me

considerably weaker than Bradley's subgenera *Notoplaniceps* and *Ncoplaniceps*. In my opinion *Odontaporus* Bradley, along with *Mcclanaporus* Ashmead, which is an earlier name for the same group, should be placed in the synonymy of *Aporus*, subgenus *Aporus*.

A New Schendylid from the Eastern United States, with Notes on Distribution and Morphology. (Chilopoda: Geophilomorpha: Schendylidae)

By RALPH E. CRABILL, JR., Smithsonian Institution,
Washington, D. C.

The chilopod fauna of the central and southern Appalachians, including parts of the adjacent Cumberland Plateau, seems to be comprised of several rather distinct components. Apart from recent artificial introductions and endemic elements of uncertain geographical affinity, two fairly heterogeneous factions stand out, groups having an affinity with eastern Asia and, or, northwestern America, and those with an affinity with the southwestern United States, and, or, lands to the south, principally Mexico.

The implication is that this area in the southeastern United States today shows the influence of earlier faunal movements, on the one hand, from the south, and on the other, from the American northwest, and ultimately from Asia.

Examples of the northwestern and Asian contribution are found in the following: *Strigamia*, *Arctogeophilus*, *Geophilus*, *Escaryus*, *Scolopocryptops* (except *gracilis*), *Zygethobius*, *Zygethopolys*, *Bothropolys*, and perhaps the majority of the Lithobiidae (*sens. str.*). A southern derivation is suspected for some of the species of: *Gosiphilus*, *Arenophilus*, *Nyctunguis*, *Scolopocryptops* (*gracilis*), *Scolopendra* (*viridis* and *polymorpha*), *Theatops*, *Cryptops*, all of the Gosibiidae and Watobiidae, a few Lithobiidae such as *Ncolithobius* and *Enarthrobium*, and some Henicopidae, notably *Lamyctes* and *Buethobius*. I do not mean to imply that a given group arose, was evolved, in either region—although some must have been—but merely that both regions

independently and probably at different times contributed to the existing centipede fauna of the lower Appalachians and adjacent areas.

To the southern component belongs the present new species, *Nyctunguis pholeter*, whose known congeners are especially characteristic of the North American southwest and Mexico. Apart from this rich fauna, two other species are known, one from the Leeward Islands, and another, rather aberrant form from Turkey.

The presence of *Nyctunguis* in the southern Appalachians suggests an ancient dispersal from the south, possibly from Mexico, and perhaps parallels the case of the himantariid *Gosiphilus euphorion* Crabill, whose closest relatives flourish on the Pacific coast south to Mexico. A third species linking the Cumberland Plateau with the far west is *Zygethopolys atrox* Crabill whose affinities, by contrast, are with the Pacific northwest, Alaska, and Asia.

On the basis of the original description, the Californian *Nyctunguis glendorus* Chamberlin seems most like *pholeter*. Possibly the most important distinctions between the two are: *glendorus*, median labral arc short, about $\frac{1}{3}$ of the labral width, *pholeter*, median arc wider, about $\frac{1}{2}$ the labral width; *glendorus*, dentate lamella in three blocks each with three teeth, *pholeter*, dentate lamella very vaguely divided into two blocks, with two and eight teeth respectively.

***Nyctunguis pholeter*, new species**

Type: ♀; Tennessee, DeKalb County, Cripps' Mill, Cripps' Mill Cave; December 27, 1956; Thomas C. Barr, leg. Deposited in the U. S. National Museum; Myriapoda Type Number 2453.

TOTAL LENGTH: 31 mm. ANTENNAE: Yellow, essentially concolorous with head. The right, normal, 3.5 mm long; proximal 4 articles notably less setose than those remaining. Left, abortive, consisting of 7 abnormally long articles. CEPHALIC PLATE: Yellow; 1.03 mm. long, greatest width 0.83 mm.

Anteriorly rounded, narrowing very slightly posteriorly, sides slightly bowed outward; posterior corners narrowly rounded; posterior margin straight, concealing the prebasal plate. Reticulation moderately strong; vestiture sparse; frontal suture absent. **CLYPEUS:** (fig. 1). Reticulation pronounced, the majority of the figures essentially pentagonal; clypeal area absent. Post-antennal setae 2; prelabral setae 2, minute (fig. 8); remaining setae disposed in two irregular, subparallel rows as shown. **LABRUM:** (fig. 8). Medial arc relatively wide, its tuberculate teeth (fig. 11, A) numbering 16, these directly meeting adjacent clypeus. Each lateral (i.e., side) piece weakly sclerotized, weakly reticulate antero-medially as shown (fig. 8, D); each indistinctly separated from clypeus proper by an extremely thin strip free of reticulation; lateral teeth numbering 6 and 7 (fig. 8, B), their apices sharply pointed and directed medially. **MANDIBLE:** (fig. 13). The dentate lamella very inconspicuously divided into two blocks (suppl. note 1), the lower of these with 2, the upper with 8 blunt teeth (fig. 13, B). **FIRST MAXILLAE:** (figs. 4, 7). Non-membranous portions prominently reticulate; coxosternum medially without a suture or weakened area, with a pair of long setae on each side of middle; each telopodite with a broad colorless and partially-concealed lappet (fig. 4, A) and each antero-lateral angle with a small, totally-concealed lappet (fig. 4, B) (see suppl. note 2). **SECOND MAXILLAE:** (fig. 7). Claw (fig. 3) rather broad, robust; its dorsal and ventral edges each with a row of delicate hyaline teeth or fimbriae, each of these drawn out into a long, thin point. Bridge-piece broad, strongly reticulate. **PREHENSORS:** (figs. 5, 6). Concolorous with prosternum and cephalic plate. When closed, slightly surpassing front margin of head. Sparsely setose, the articles totally without denticles. Claw (ungula) robust, rather short, its posterior edge not serrate or crenulate; poison gland and calyx as shown (figs. 5, 6) (suppl. note 3). **PROSTERNUM:** (fig. 2). Medial diastema conspicuous, margined on each side by a strong, sclerotized, deeply-pigmented ridge posterior to which is a small field of strong reticulation (fig. 2, A). Chitin-lines absent, but each lateral suture (i.e., coxopleural or pro-

sternopleural suture) margined for part of its length by a slight ridge or thickening (fig. 2, B).

STERNITES: (fig. 14). Weakly-defined, non-consolidated and reticulate paxilli (fig. 14, A) on sternites 2 or 3 through 14. Prominent medial, undivided pore-fields (fig. 14, C) on sternites 2 through 22. Very obscure, bilateral pore-fields (fig. 14, B), each consisting of a few scattered and minute pores, present on sternites 1 through the penultimate, there represented by 2 or 3 pores on each side. **LEGS:** 51 pairs. Each pretarsus with a pair of relatively prominent lateral non-articulated bristles (spines), these long, pointed, extremely thin (fig. 9) (suppl. note 4). **ULTIMATE PEDAL SEGMENT:** (fig. 10). Sternite broad, sides converging slightly toward truncate posterior edge. Coxopleural pores of the homogenous type (i.e., without inclusive canals and multiple discrete glands); each elongate, partly concealed by the sternite. Left leg (excluding coxopleuron) 1.27 mm. long, $1.3 \times$ the length of penultimate leg, each ultimate pretarsal claw strong, curved, deeply pigmented; setae long, sparse. Anal pores (of terminal segment) absent. **TERGITES:** First pedal and ultimate pedal yellow, those remaining yellowish-white; bisulcate; very sparsely clothed with rather long setae; ultimate pedal pretergite laterally undivided, fused with its pleurites. **PLEURAL REGION:** (fig. 12). Series 4 alpha and beta absent; series 5 absent (suppl. note 5).

SUPPLEMENTARY NOTES

1. **MANDIBLE.** The cleft in the dentate lamella is sufficiently obscure to be overlooked easily, and in fact it may even be an artifact, as may be its counterparts in a number of the cases noted in the literature. Though the question of whether or not a given schendylid dentate lamella is divided or not seems important, in my opinion (and at this time) the significance for systematics of the number and kind of divisions has yet to be demonstrated.

2. **1ST MAXILLARY LAPPETS.** Attems (in *Das Tierreich*, Lief. 52, p. 87, 1929) describes the known members of *Nyctun-*

guis as lacking 1st maxillary lappets, possibly because (1) he had never directly studied a specimen, or (2) they had never been ascribed to any species in the literature, or (3) perhaps because Verhoeff's figure of the maxillae of *N. dampfi* suggests them to be absent. In addition to *pholeter*, I have examined several Californian congeners and have found well-developed, though frequently concealed, lappets in all cases.

3. SENSILLA BASICONICA OF THE UNGULA. Microscopic examination of the claws of the prehensors and 1st maxillae discloses the presence of numerous minute canals extending through the exoskeleton and connecting the body surface with its interior. Having observed them in all of the chilopod orders, I was at a loss to imagine their function, unless they were glandular canals of some sort. However, S. L. Tuxen of Denmark seems indirectly to have explained their presence correctly. In the course of his study of similar canals in the chelicerae of a solpugid, he observed that each is capped by a minute hyaline cone and therefore suggested that they are sensory in nature and probably chemoreceptors. Subsequently I found the same hyaline cones in centipedes. These structures then are probably the modified counterparts of the sensilla basiconica of insects.

4. PRETARSAL ACCESSORY SPINES. I have found the same remarkably large pretarsal accessory spines in several Pacific coast members of the genus, though in these they are more prominent than in *pholeter*, being darker and heavier. I have observed such *conspicuous* accessory spines in no other Geophilomorpha, nor have I read of them in connection with any other species, with the possible exception of the Neogeophilidae. Their presence, especially in a schendylid, may actually be quite meaningful, since they may be homologous with the pretarsal accessory (articulated) *spurs* of the more primitive orders, e.g., Lithobiomorpha and Scolopendromorpha. If this is so, then they represent still another primitive feature testifying to the evolutionary conservatism of the Schendylidae within the Geophilomorpha.

5. THE PLEURAL REGION. The system of pleurite nomenclature used here is that of Broelemann. It is explained in

Faune de France, 25: 45, 1930; examples of its use may be found in Broelemann and Ribaut, *Nouv. Arch. Hist. Nat.*, Paris (5) 4: 53-183, 1912. In addition to one other work by a different author, their "Essai d'une Monographie des Schendylina" in my opinion still stands as one of the two most detailed, orderly, best illustrated, and in some ways most searching preliminary analysis ever accorded a group of centipedes during the hectic history of their study.

SLIDE PREPARATION WITH HOYER'S MOUNTANT

It has been my experience that treating the delicate mouth-parts in weak KOH or even in the gentler NaOH too often results in the distortion or partial (or complete) destruction of certain critical structures such as the labral teeth and fimbriae, parts of the maxillae, and the prehensorial ungula. This prob-

EXPLANATION OF FIGURES

1. Clypeus. Labrum schematic; all clypeal setae shown.
2. Prosternum. (Ventral, left half.) Anterior diastema with thickenings shown in inset. A, areas of prominent reticulation, weakly sclerotized. B, thickened edge of prosternal suture.
3. 2nd maxillary claw. (Left.)
4. 1st maxillae. (Left half.) A, lappet of telopodite. B, concealed lappet of coxosternum.
5. Left prehensor. (Ventral.) Poison canal and calyx outlined in dashes; larger setae shown.
6. Poison calyx of left prehensor.
7. 1st and 2nd maxillae. (Left half.) Prominent reticulation of bridge-piece shown in inset; larger setae included.
8. Labrum. A, medial arc. B, right lateral piece. C, typical strong, distinct reticulation of lower clypeus. D, weakly sclerotized, weakly reticulate upper portion of labrum. E, heavily sclerotized, non-reticulate corner of labrum; fulcrum shown in dashes.
9. Pretarsal claw of right first leg.
10. Ultimate pedal and succeeding segments. (Ventral.) Prominent setae of left half shown.
11. Representative labral teeth. A, from medial arc. B, from lateral piece.
12. Left eupleurium of 5th pedal segment. The more prominent setae shown. Tgt., tergite; Stn., sternite.
13. Mandible. A, row of simple hyaline teeth. B, dentate lamella of ten teeth, two broken.
14. Fifth sternite. A, paxillus of metasternite. B, weakly defined right lateral pore-field. C, prominent medial pore-field. The more prominent setae shown.

lem may usually be resolved through the use of Hoyer's mounting medium, a semi-permanent (though possibly permanent) mountant that is gaining an increasing following among zoologists.

It offers a number of desirable advantages apart from its ability to preserve and clear without distortion or destruction. Parts may be transferred to it directly from alcohol, water, or glycerine without preliminary treatment. It permeates the specimen rapidly and thoroughly, clearing it beautifully at the same time. It neither discolours with age nor crystallizes. It may be thinned with distilled water repeatedly.

As to procedure, one simply covers the object with the mountant in the usual manner on a microscope slide and then applies a plain or supported cover glass. *Gentle heating for one to two hours* is most desirable as it speeds clearing, insures uniform penetration without the formation of internal bubbles, and hastens hardening of the exposed mountant. To counteract the mountant's chief disadvantage, its tendency to shrink, after a day or so ring the preparation with fresh Hoyer's, and when this has set, ring it once or twice with some standard ringing mixture, such as murrayite.

As to permanency, slides of mites prepared with Hoyer's in this museum twenty years ago remain in perfectly acceptable condition today. The formula is as follows:

distilled water	50 ml.
gum arabic	30 grams
chloral hydrate	200 grams
glycerine	20 grams

The materials go into solution slowly, so that intermittent stirring over a period of several days is often necessary. Mix in the order given.

Mexican Jungle and Desert Fleas with Three new Descriptions

By C. ANDRESEN HUBBARD, Tigard 23, Oregon

I have before me at this time the results of two collections of fleas from Mexico. Dr. Murray Johnson, physician and surgeon, and well known west coast mammologist of Tacoma, Washington, collecting 35 miles north of Los Mochis on the border between Sinoloa and Sonora, Mexico on March 23, 1954, removed

Orchopeas s. firemani Hubbard, 4 males and 5 females off *Teanopus phenax* (woodrat), and on March 12-14, 1956 at Alamos, Sonora;

Echidnophaga gallinacea (Westwood), 4 males, 12 females off *Brassariscus astulus* (ringtail cat); off *Didelphis m. mesamericanus* (opossum), 61 males, 353 females;

Pulex simulans Baker, 10 males, 8 females off *Brassariscus austulus*; 31 males, 35 females off *Didelphis m. mesamericanus* and off *Citellus g. rupestris* (ground squirrel), 10 males, 12 females;

Ctenocephalides f. felis (Bouche), 1 male and 2 females off *Didelphis m. mesamericanus*.

It is to be noted in the above that for the first time in over 50 years the determination of *Pulex simulans* Baker has been used. Mr. Frans Smit of the British Museum, who studied the fleas involved, thinks he has found the characteristics upon which Baker made the original description in 1895. Practically all investigators to date have considered *P. simulans* a synonym of *P. irritans*. Smit is quite serious in his contention that *P. simulans* is a good species and has determined *Pulex* from central California for the writer as *P. simulans*.

The second collection before me was made by Mr. C. Hayden formerly of Riverdale, California but whose present whereabouts is unknown to the writer. During December of 1955 and January and February of 1956 Mr. Hayden was collecting about Mexico City. Six areas were visited, 14 different hosts ex-

amined, and the 24 vials of fleas collected represented 16 species and subspecies, 3 of which are considered new and described herewith as such. Upon the arrival of the materials the writer examined same without clearing and noticed the bulk of the fleas were of the genera *Kohlsia*, *Jellisonia*, *Plcochatia* and *Polygenis*. These genera being unfamiliar to the writer, the entire collection was forwarded to the British Museum for consideration. The results, now indexed, are as follows:

Pulex irritans L. off *Urocyon cinereoargenteus* (fox), 2 males, Pueblo Nuevo, Chiapas, Feb. 6, 1956.

Ctenocephalides canis (Curtis) off *Urocyon cinereoargenteus*, 3 pairs, Pueblo Nuevo, Chiapas, Feb. 6, 1956.

Ctenodaphalides f. felis (Bouche) off *Nasua narica* (koati), 4 males, 8 females, San Luis Potosi, Dec. 19, 1955; off *Sylvilagus floridanus* (cottontail), 2 females, Desierto de los Leones, Mexico City, Jan. 8, 1956.

Kohlsia cora Traub out of mouse nest, 7 males, 12 females, Pueblo Nuevo, Chiapas, Feb. 11, 1956.

Kohlsia whartoni T. and J. off *Peromyscus boylii* (deer mouse), 2 pairs, Pueblo Nuevo, Chiapas, Feb. 6, 1956; off *Neotoma mexicana* (woodrat), 1 male, Pueblo Nuevo, Chiapas, Feb. 9, 1956.

Kohlsia linni new species

There are before the writer at this time the *holotype* male, off *Peromyscus boylii* (deer mouse) (type host), Feb. 9, 1956; the *allotype* female and 2 male and 3 female *paratypes* off *Neotoma mexicana* (wood rat), Feb. 9, 1956; all taken at Pueblo Nuevo, Chiapas.

The new species differs from others of the genus in the shape and armature of the

Modified Segments: Male. Finger F, for the lack of better words to describe its shape, might be said to be bulbous or boxing glove like. The anterior border is slightly concave, and the complete apical border rounds nicely from its meeting with the anterior border to its junction with the process. On this face are three major bristles situated about equidistant along the

upper three fourths of the border. A small bristle is located at the most apical point. The finger does not quite reach the apex of the process. The process P is squarish at its apical angle, the posterior face being almost perpendicular. The bristle at the lower corner of P is giant and very long, extending well beyond those on F. Sternite IX with lower apical angle squarish, the apical face bearing 4 short stout bristles, then with upper apical rounded and thumblike, and armed with 3 short, almost spiniforms.

Female. Sternite VII with 2 lobes, the valley between larger or smaller, depending on variation, the upper lobe a small triangular protruberance, usually extending beyond the lower lobe which may be anywhere from rounded to block-like and squarish.

This flea bears the name of Dr. Otto Linn, Dean Emeritus of Faculty, Pacific Bible College, Portland, Oregon, under whom the writer has now been teaching for ten years.

Pleochaetis schmidtii Traub off *Neotoma mexicana* (woodrat), 1 pair, 1956, Pueblo Nuevo, Chiapas, Feb. 9, 1956.

Pleochaetis mathesoni Traub off *Neotoma mexicana*, 1 male, Pueblo Nuevo, Chiapas, Feb. 9, 1956.

Jellisonia ironsi Eads off *Baiomys musculus* (pigmy mouse), 1 female, Comitan, near Rio Grihalva, Chiapas, Feb. 15, 1956.

Jellisonia grayi new species

There are before the writer at this time, all from El Salto, San Luis Potosi, the *holotype* male, off *Peromyscus boylii* (deer mouse) (type host), Dec. 15, 1955, the *allotype* female and 2 male and 1 female *paratypes* with same data, and 1 male *paratype* off *Peromyscus boylii*, Dec. 18, 1955; and off *Sigmodon hispidus* (cotton rat), 1 male *paratype*, Dec. 18, 1955.

The new species differs from others in the genus in the shape and armature of the

Modified Segments: Male. The finger F might be called triangular, the posterior face made undulant by the insertion of the 5 major bristles. The heel is well defined, and at this ventral apical angle there is inserted a very large bristle. Along the posterior border, about equally spaced, are 4 other promi-

ment bristles which, due to their deep insertions, make the posterior border look undulant. Process P is somewhat hook shaped, the hook facing anteriorly.

Female. Sternite VII consists of a squarish lobe below, then a deep valley, then a second lobe, pointed, triangular, and as long as the first.

This flea bears the name of Dr. Albert Gray, President Emeritus of Pacific Bible College, Portland, Oregon.

***Foxella ignota chapmani* new subspecies**

There is before the writer at this time only the *holotype* male which was taken off a cotton rat (*Sigmodon hispidus*) at El Salto, San Luis Potosi, on December 15, 1955. Although the holotype was taken off a cotton rat, it seems likely that this was accidental for *Foxella* usually have pocket gophers for their normal hosts. The new subspecies differs from others in the series mainly in the proportions of the VIIIth sternite in the male. Due to the fact that this is short in the new subspecies it seems likely that it is close to *Foxella ignota franciscana*.

Modified Segments: Male. Finger F long, slender and finger like; armed along its posterior border with the usual equally spaced 3 major bristles. Process P, the characteristic long, slender, high process, armed at the apex by a few minute bristles. VIIIth sternite characteristic, the apex with the usual long, undulant bristle and above it a wide area, squarish, the area of which is greater than any *Foxella ignota* so far described.

The female is unknown to the writer.

This flea bears the name of Dr. Milo Chapman, President of Pacific Bible College, Portland, Oregon.

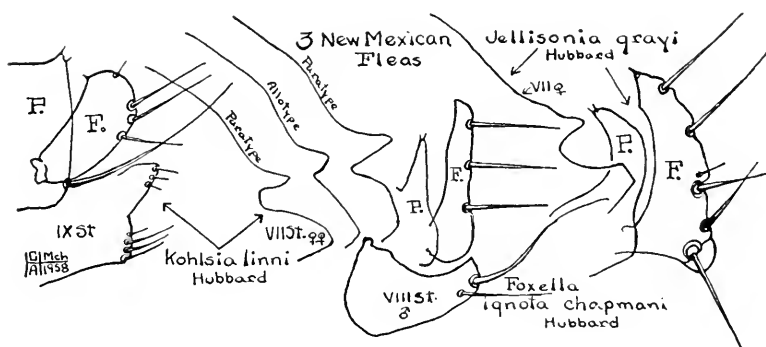
Orchopeas howardi bolivari Barrera off *Urocyon cinereoargenteus* (fox), 1 female, Pueblo Nuevo, Chiapas, Feb. 6, 1956; off *Sciurus aureogaster* (squirrel), 3 males, 1 female, Pueblo Nuevo, Chiapas, Feb. 5, 1956.

Opisodasys robustus mexicanus Dampf off *Sciurus nelsoni* (squirrel), 2 males, 12 females, Desierto de los Leones, Mexico City, Jan. 1, 1956.

Polygenis vazquezi Vargas off *Peromyscus boylii* (deer mouse), 1 male, 8 miles south of Vera Cruz, Oaxaca, Jan. 23, 1956; off *Liomys pictus* (pocket mouse), 3 males, 2 females, 2 miles west of Tapanatepec, Oaxaca, Jan. 29, 1956; off *Didelphis marsupialis* (opossum), 1 pair, Comitán, near Rio Grihalva, Chiapas, Feb. 15, 1956.

Rhopalopsyllus caciús saevus J. and R. off *Homo sapiens* (man), 1 female, Comitán, near Rio Grihalva, Chiapas, Feb. 12, 1956.

Rhopalopsyllus australis australis Rothschild off *Procyon lotor* (raccoon), 1 female, Desierto de los Leones, Mexico City, Jan. 8, 1956; off *Didelphis marsupialis* (opossum), 1 male, 2 females, Desierto de los Leones, Mexico City, Jan. 8, 1956.



Note: Since the writer no longer possesses a collection of fleas, his collection for the most part having been transferred to the Rothschild collection by gift, all materials mentioned above are returned to the Rothschild collection, and any information wished concerning them should be addressed to Mr. Frans Smit, Custodian of the Rothschild Collection of Siphonaptera, Zoological Museum, Tring, Herts., England.

The 3 new descriptions herewith bring to 60 the number of world fleas described by the writer, 50 from the continental

United States, 6 from Iraq and 4 from Mexico, and clear his desk once again of siphonapteran materials.

The writer has asked Mr. Smit to send to the United States National Museum and the Academy of Natural Sciences of Philadelphia paratypes where they are available.

Pison (Paraceramius) koreense (Rad.), A New Adventive Wasp in Eastern United States (Hymenoptera, Sphecidae)

By KARL V. KROMBEIN, Entomology Research Division,
Agr. Res. Serv., U. S. D. A.

For several years I have puzzled over the specific identity of a short series of *Pison* (5.5–6.5 mm. long), reared by A. D. Cushman, July 19, 1954, from some fragile clay cells. He found this aggregation of cells inside a discarded photographic tank stored under an old Army barracks. This building had been transported to McLean, Virginia, from Georgia after the war. More recently J. T. Medler sent a single specimen reared in 1957 from a similar cell found at Palisades Park, Illinois. At first I supposed that the wasp was *Pison laeve* Smith, described from Georgia, but I. H. H. Yarrow at the British Museum advised me that Smith's species belongs to a different subgenus. Subsequent study of the collection in the U. S. National Museum indicated that this unknown species was more closely allied to those occurring in eastern Asia and the Orient than it was to any of the South American species. Suspecting by now that it might be *koreense* (Rad.), I borrowed a Japanese specimen of that species from K. Yasumatsu, and was able to confirm this tentative determination.

P. koreense is native to Korea, China and Japan, and is now established at two localities in the United States. Presumably it was introduced here since the war, possibly on military material returned to this country (Palisades Park is near the Ordnance Depot at Savannah, Ill.). Probably it can be expected

to turn up at additional localities as it extends its range or as additional successful introductions are discovered.

The reniform eyes covered with dense short hair and two submarginal cells will distinguish *korencse* from any of our native sphecoid wasps. It stores spiders in delicate clay cells about 8 mm. long and 4 mm. in diameter. The cells found by A. D. Cushman were constructed side by side in a diagonal row. The cocoon is opaque, rather brittle, cylindrical with rounded ends, and about 7 mm. long and 2.5 mm. in diameter.

Radoszkowski (1887) included only *korencse* in his new genus *Paracceramius*. I do not accept Turner's synonymy (Proc. Zool. Soc. London, p. 617, 1916) of *Paracceramius* Rad. under *Pison* subgenus *Pisonoides* Sm. In the latter group the eyes are bare, the second recurrent vein is received well within the second submarginal cell (interstitial with the first transverse cubital vein in *Paracceramius*), and the mesopleuron is not margined posteriorly by an oblique row of small foveolae. The other identified species before me belonging to the subgenus *Paracceramius* are the Philippine *Pison brozeni* (Ashm.) and *P. differens* Turner from Java (type locality is Assam). Two unidentified Neotropical species also belong in *Paracceramius*, though probably in a separate species group because they have three submarginal cells.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

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By Philip P. Calvert

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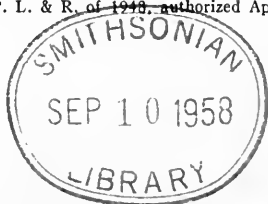
No. 7

CONTENTS

Sabrosky—New species and notes on N. A. Diptera	169
Burks—Eurytoma important in control of weeds	177
Knull—A new species of Conosphaeron from Arizona	185
Hull—Some species of the genus Bathypogon	187
Moure—On the bee genus Cyphomelissa	191
Hall—Change of name in the Bombyliid Anastoechus	195
XIth International Congress of Entomology	195

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New Species and Notes on North American Acalyptrate Diptera

By CURTIS W. SABROSKY, Entomology Research Division,
Agricultural Research Service, U. S. Department
of Agriculture

Miscellaneous notes and descriptions in various families of North American acalyptrate Diptera are presented here for public record, to clarify misidentifications and synonymy.

ANTHOMYZIDAE: *Cyamops* Melander

The genus was reviewed by Sturtevant (1954, Proc. U. S. Nat. Mus. 103: 557-559), who referred it to the Anthomyzidae, described one new species, and noted the considerable color variation in *C. nebulosa* Melander. I take this occasion to note sexual dimorphism in color, and to describe a new species with entirely clear wings, undoubtedly confused in the past as a pale-winged variant of *nebulosa*. Sturtevant's key is modified slightly to include the new species.

Key to the Nearctic species of Cyamops

1. Fore tibia and tarsus chiefly black; one pair of scutellar bristles.....*C. imitata* Sturt.
Fore tibia and tarsus yellow, distal segment of latter infuscated; two pairs of scutellar bristles.....2
2. Wing typically heavily browned on disk and a narrow apical margin, in palest examples with only faint traces of brown along the veins and midway in marginal cell; second vein distinctly sinuate, suddenly narrowing the marginal cell about midway, where discal infuscation begins; halter knob whitish yellow.....*C. nebulosa* Mel.

(169)

Wing membrane entirely clear; second vein almost straight, or weakly convex anteriorly considering its entire length, the marginal cell steadily narrowed from base to apex; halter knob predominantly brown to black in females, yellowish in males. *C. halterata* n. sp.

Cyamops nebulosa Melander

Cyamops nebulosa Melander, 1913, Jour. New York Ent. Soc. 21: 292 (Mass.).

The fortunate collecting of a good series of 33 specimens (18 males, 15 females) at Cranberry Glades, Pocahontas County, W. Va., July 16, 1955, gave opportunity to check sexual dimorphism. In addition to the broader face mentioned by Sturtevant, the females have the entire face and cheek black, palpi brown to black, and antennae infuscated on dorsal half. In the males, the face, anterior half of cheek, and palpus are bright yellow, and the antenna is predominantly so, only narrowly infuscated along the dorsal margin.

Typically the pleuron in both sexes is pollinose, although thinly so and hence shining. In a few specimens, the greater part of the mesopleuron is bare and polished, a character that is often of specific importance. However, I can find no other differences, and for the present at least I regard this as a variation. Three specimens of the 33 noted above, and five from scattered localities, are so marked.

Cyamops halterata, n. sp.

As described for *C. nebulosa* Melander, but differing in the characters noted in the key, and in having the palpi yellowish in both sexes, the central area of the front more deeply velvet black, and the orbital area flanking each antenna narrower and more conspicuously silvery than in *nebulosa*, and without a row of orbital hairs on its surface.

Holotype ♀, Washburn County, Wis., July 6, 1951 (R. H. Jones). Type No. 64220 in the U. S. National Museum. *Allotype*, same locality, Aug. 25, 1951 (Jones). Paratypes:

♂, 2♀♀, Washburn Co., Wis., July 25, 1950, July 10, 1953 (♀) (Jones) [Jones Colln.]; ♀, Wexford Co., Mich., July 17, 1948 (R. R. Dreisbach) [USNM]; ♀, Woods Hole, Mass., June 28, 1950 (A. H. Sturtevant) [USNM]; 3♀♀, Woods Hole, Mass., July 21, 1954 (M. R. Wheeler) and ♀, same locality, Aug. 29, 1950 (Sturtevant) [Wheeler Colln.].

Available material seems to indicate that the new species is more northern than *nebulosa*, but the series is obviously too limited to do more than suggest this as a tentative hypothesis.

MILICHIIDAE: *Stomosis* Melander

This genus was proposed in 1913 for *Desmometopa luteola* Coquillett from Arizona, and that species was subsequently identified from the wide range of Michigan, Indiana, Virginia, Texas, and Costa Rica. Recently the study of additional material and review of former identifications revealed that two species have been confused under the name *luteola*, and that the true *luteola* is a synonym of *innominata* (Will.).

The genus will thus contain the following five known species: *innominata* (Will.), *rufula* (Frey) from Brazil, the new Nearctic species, and two species from Victoria, Australia, *flavoscutellata* Mall. and *vittata* Mall.

Key to the North American species of *Stomosis*

1. Epaulet black; legs yellow, the knees of mid and hind femora narrowly but distinctly black; conspicuous black stripe along upper margin of sternopleuron, enclosing base of sternopleural bristle (Arizona, St. Vincent, Honduras, Costa Rica, Panama) *S. innominata* (Will.)
- Epaulet yellow; legs entirely yellow; upper margin of sternopleuron weakly and narrowly browned, the infuscation not enclosing base of sternopleural bristle (eastern United States) *S. flava*, n. sp.

Stomosis innominata (Williston), n. comb.

Agromyza innominata Williston, 1896, Trans. Ent. Soc. London 1896: 443, pl. 14, fig. 158 (St. Vincent).

- Desmometopa luteola* Coquillett, 1902, Jour. New York Ent. Soc. 10: 188 (Williams, Ariz.). NEW SYNONYMY.
Stomosis luteola (Coq.) Melander, 1913, Jour. New York Ent. Soc. 21: 242.

The correct family position of *innominata* and its possible synonymy with *Stomosis luteola* (Coq.) were first suggested by H. Oldroyd of the British Museum (Nat. Hist.) in correspondence with Kenneth Frick regarding the identity of Williston's *Agromyza*. Subsequently, Oldroyd kindly compared Costa Rican specimens of *luteola* with the type of *innominata* and found them to be the same. I have no material for clarifying the identity of the other Neotropical species, *S. rufula* (Frey), described from southern Brazil, but it is many years junior to Williston's name and thus does not affect the recognition of the latter.

In addition to the holotype of *luteola*, I have before me 34 specimens of both sexes from the following localities: ARIZONA: Sedona, Oak Creek Canyon, June 29, 1953 (W. W. Wirth). HONDURAS: La Ceiba, June 14, 1920 (F. J. Dyer). COSTA RICA: 22, Higuito, San Mateo (Pablo Schild). PANAMA: Arraijan, Oct. 7, 1952 (F. S. Blanton): Tocumen, Panama Province, Jan. 6, 1953 (Blanton); Piña, Jan. 31, 1954 (Blanton); 7, Almirante, Bocas del Toro, Jan. 1953 (Blanton) [all USNM].

I do not know the correct assignment of the Texas record of "*luteola*" cited by Melander (1913). The other records of *luteola* from eastern United States cited by Sabrosky (1953, Ent. News 64: 39) actually refer to *S. flava*, new species.

***Stomosis flava*, n. sp.**

Stomosis luteola (Coq.) Wirth, 1952, Proc. Ent. Soc. Wash. 54: 240 (Va.) [Misident.].

Stomosis luteola (Coq.) Sabrosky, 1953, Ent. News 64: 39 (Eastern U. S.) [Misident.].

Very close to *S. luteola*, and agreeing with the detailed description for *Stomosis* published by Melander (1913), but char-

acterized as noted in the above key. The species is yellowish to testaceous except for the black hairs, bristles, arista, ocellar tubercle at least in part, central area of occiput, and proboscis at the geniculation; upper margin of sternopleuron narrowly and weakly browned.

Holotype ♂, Lafayette, IND., Aug. 21, 1916 (J. M. Aldrich). Type No. 64221, U. S. National Museum. *Allotype*, same locality and collector, August 7. Paratypes: ALABAMA: ♀, Auburn, 1952 (H. Cunningham). FLORIDA: ♀, Osceola National Forest, Columbia Co., Apr. 19, 1954 (H. V. Weems, Jr.). GEORGIA: ♂ (?), Savannah, Sept. 1, 1954, in privy trap (J. W. Kilpatrick). INDIANA: 2♂♂, Lafayette, Aug. 19, 24, 1916 (Aldrich). MICHIGAN: ♀, E. Lansing, July 31, 1941 (Bruce Wilson) [Sabrosky Colln.]; Monroe, July 4, 1940 (G. Steyskal); Detroit, June 16, 1940 (Steyskal); Grosse Isle, Wayne Co., July 5, 1948 (Steyskal). TENNESSEE: ♀, Maynardville, reared from puparia collected in cavity in beech tree, June-Aug., 1955 (W. E. Snow) (4 coll. 7-14, emerged 7-18; 3 coll. 8-16, emerged 8-24; 2 coll. 6-14, emerged 7-1 and 7-29). VIRGINIA: ♂, ♀, Alexandria, June 14, 1951, on flowers (W. W. Wirth); ♂, ♀, Holmes Run, Falls Church, April 15, 16, 1951, reared from tree crotch debris (Wirth). [Colln. USNM, except as noted.]

Genitalia of *innominata* and *flava* were compared, and showed only slight differences, which might or might not prove reliable in a long series of specimens.

The Maynardville, Tenn., series was reared from puparia found in a cavity near the base of a beech tree in a heavily shaded ravine. The cavity contained slightly moist woody material, and now and then a leaf or two. These rearings and that by Wirth at Fall Church suggest that this hitherto rather rare species should be looked for in tree hole debris.

PIOPHILIDAE

For the North American fauna, attention is called to a new synonym, and the record is clarified on a second Arctic species.

Piophila (Allopiophila) arctica Holmgren

- Piophila arctica* Holmgren, 1883, Ent. Tidskr. 4: 177 (Vaigach I., northern Russia, opposite Novaya Zemlya).
P. aterrima Becker, 1897, Ann. Mus. Zool. St. Petersburg. 1897: 402 (Novaya Zemlya). (Synonymy by Hennig, 1943, in Lindner's *Fliegen Palaeark. Region*, Lfg. 151, Fam. 40, p. 37, from comparison of types).
P. aterrima Becker; Malloch, 1934, Mem. Carnegie Mus. 12 (pt. 2, sect. 4): 22 (Southampton I., Hudson Bay, and Herschell, N.W.T., Canada).
? *Allopiophila* sp. near *A. aterrima* (Becker); Weber, 1949, Ent. News 60: 126; Weber, 1950, Trans. Amer. Ent. Soc. 76: 200 (Point Barrow, Alaska) (det. Sabrosky).
Piophila (Allopiophila) arctica Holmgren; Weber, 1954, Proc. Ent. Soc. Wash. 56: 89 (Point Barrow, Alaska; det. Sabrosky, correction of preceding).

I have examined the type series in the Naturhistoriska Riksmuseum in Stockholm, and compared Alaskan specimens with it. The species is probably circumpolar, but relatively seldom recorded. I have seen numerous specimens from Point Barrow, Alaska, collected June 22–Aug. 5, 1952 (Paul D. Hurd), July 8–30, 1953 (Hurd), and July 9, 1953 (R. I. Sailer), in addition to those collected earlier by N. A. Weber (see refs.). One example is at hand from Mould Bay, Prince Patrick I., Canada, July 28, 1949 (C. O. Handley) [USNM].

Piophila (Allopiophila) fulviceps Holmgren

- Piophila fulviceps* Holmgren, 1883, Ent. Tidskr. 4: 177 (Khabarov Bay, northern Russia, opposite Novaya Zemlya).
P. fulviceps Holmgren; Sack, 1923, Rept. Norweg. Exped. Nov. Zemlya, no. 15: 10 (Novaya Zemlya).
Piophila borealis Malloch, 1919, Rept. Canad. Arctic Exped. 1913–18, vol. 3 (pt. C): 84C (Camden Bay, Alaska).
NEW SYNONYMY.

I have compared a Point Barrow specimen with the type of *fulviceps* in the Museum at Stockholm. In Alaska, the species is apparently less common than *arctica*, judging from the available material. I have seen a few specimens from Point Barrow,

Alaska, collected by Hurd and Sailer, and a lone specimen from Churchill, Manitoba, June 20, 1930 (O. Bryant) (det. Malloch as *P. borealis*).

Neither *fulviceps* nor *arctica* was included in Melander's review of the family in 1924 (Psyche 31: 78-86), and Malloch's publication of *borealis* in 1919 was overlooked. Fortunately, this has not resulted in any synonymy of Melander's species. The two species are easily distinguished by color, in addition to a number of other characters. *P. arctica* has an entirely black head and body whereas *fulviceps* has the front, outside of the upper orbits and ocellar triangle, and variably, the humeri, sides of mesonotum narrowly, and scutellum bright orange to reddish.

SPHAEROCERIDAE (BORBORIDAE)

Leptocera (Coproica) acutangula (Zett.)

Limosina acutangula Zetterstedt, 1847, Diptera Scandinaviae 6: 499.

In 1948, I recorded this species from southern Georgia (Proc. Ent. Soc. Wash. 50: 85), apparently the first published record for North America. Subsequently A. R. Brooks, then at Ottawa, Canada, wrote me that he had seen a male of the species from Winnipeg, Manitoba, July 1942. Other specimens have since come to my attention from Grant and East Lansing, Mich. and Benton Co., Tenn. Recently several specimens were received from Irving Blake, collected in sweeping over alpine tundra at 13,100 ft. on Mt. Lincoln, Colo., Aug. 24, 1957. It now appears likely, especially from the last record, that the species is a normally Holarctic species long overlooked in North America.

Males have a peculiarly distinctive wing, with the discal cell apically acute and a fringe of about a dozen long hairs on the margin of the wing about at the end of the fifth vein, but females could easily have been confused with other species of the subgenus *Coproica* (*Coprophila* of Duda and Spuler). The females may be separated from other known North American species of this subgenus by the combination of second costal sector

(between veins one and two) longer than the third, and the third and fourth veins not divergent but subparallel.

Leptocera (*Limosina*) ochripes (Meigen)

Borborus ochripes Meigen, 1830, Syst. Besch. 6: 209.

This species has not hitherto been recorded from North America, as far as I am aware. Three specimens have turned up in material received for determination: East Lansing, Mich., May 20 and July 15, 1955; Midland Co., Mich., July 15, 1952 (R. R. Dreisbach) [USNM Colln.]. The specimens have been compared with European material determined by O. W. Richards.

The bright yellow front, face and cheeks are a striking characteristic in this predominantly dark and drab genus. The two other North American species of the subgenus *Limosina* Macquart (*Scotophilella* Duda) which have a yellow head can be separated from *ochripes* as follows:

Key to the North American species of Leptocera

1. Third section of costa (between tips of second and third veins) subequal to or barely shorter than second section; occiput predominantly blackish on upper half; all femora and tibiae yellow except for the infuscated distal half of fore tibia.....*L. ochripes* (Mg.)
 Third section of costa obviously longer than second, almost twice or more than twice its length; head entirely yellow; legs not as above, the femora and tibiae with some dark markings.....2
2. Antenna yellow; legs yellow, the fore tibia and apex of fore femur black (Costa Rica).....*L. xanthocephala* Spuler
 Antenna dark brown; legs yellow with mid and hind femora black (N. J.)*L. palliceps* (Johnson)

Three Species of *Eurytoma* Important in Biological Control of Weeds (Hymenoptera, Eurytomidae)

By B. D. BURKS, Entomology Research Division,
Agr. Res. Serv., U. S. D. A.

This paper includes the descriptions of three species of the chalcidoid genus *Eurytoma* which are of actual or potential importance in projects for the biological control of noxious plants. The first species is a previously undescribed phytophagous one which develops in the seeds of the black sage (*Cordia macrostachya*). It has been introduced from the West Indian island of Trinidad into the Indian Ocean island of Mauritius to aid in the control of this weed. The second species, *Eurytoma cressoni* Howard, is thought to be a parasite of the first; it is redescribed from fresh material. The third species is a previously undescribed parasitic one which attacks the larva of a weevil, *Microlarinus* sp., which feeds commonly in the stems of the puncture vine (*Tribulus terrestris*) in South India. This weevil may prove to be useful in the control of this weed in the United States, but in India its effectiveness is considerably reduced by the attacks of the *Eurytoma*.

i

Eurytoma attiva, new species

Eurytoma sp., Williams, 1951, Mauritius Dept. Agr. Ann. Rpt. 1949, no. 25, p. 64.

This species agrees with *howardi* Dalla Torre (= *mayri* Howard not Ashmead) in having weak facial striae which converge on the mouth opening; in having a longitudinal fold crossing the lateral part of the pronotum; in having the prepectus smooth with the posterodorsal angle tonguelike; in having the propodeum almost vertical, with a broad, median, shallow concavity; in that the petiole of the female is so short as scarcely to be visible; and in having the fourth gastral tergite almost or quite as long as the preceding three tergites combined. The females of these two species differ in that the head in anterior aspect is

more square in *attiva* than in *howardi*; the antennal scape and midfemora are partly dark brown to black in *attiva*, although these structures are entirely yellow to tan in *howardi*; and the propodeal concavity is laterally shagreened in *attiva*, but it is rugulose in *howardi*. The males of *attiva* and *howardi* differ in that the antennal scape in *attiva* is clavate toward the apex, but it is not in *howardi*; the abdominal petiole is longer than the hind coxa in *attiva*, but it is slightly shorter than the hind coxa in *howardi*.

Female.—Length 2.5–3.0 mm. Black; antennal scape tan with more or less extensive dark brown to black shading apically; pedicel tan beneath and black above, flagellum dark brown; mandibles, trochanters, bases and apices of femora, tibiae, and tarsi, tan; wings hyaline, venation tan or yellow; ventral base of gaster red-brown; tips of ovipositor sheaths yellow. Pubescence relatively inconspicuous, silvery; one or two pairs of obscure setae on each of basal three gastral tergites, fourth tergite with three pairs, fifth with one and a partial second irregular row of setae extending completely across tergite near its posterior margin, exposed surfaces of sixth and seventh tergites covered with long, slender setae.

Frons in anterior aspect appearing to be almost square, indistinct striae converging on mouth; antennae inserted slightly below center of frons, apex of scape reaching level of vertex; funicle segments becoming progressively slightly broader and shorter toward apex, so that fifth segment is $1\frac{1}{5}$ times as wide and $\frac{2}{3}$ as long as first; club as long as fourth and fifth funicle segments combined; scrobe cavity with margins acarinate; a faint and irregular carina encircling the compound eye; malar furrow present and complete; postocellar line twice as long as ocellular.

Umbilicate punctures of thoracic notum deep, distinct, interstices strongly shagreened; pronotum with disc of lateral sector with a longitudinal fold; prepectus smooth and shining dorsally, sculptured ventrally, its posterodorsal angle tonguelike; tegula brown, smooth and shining; anterior face of fore coxa excavated and flattened on apical two-thirds of its length; mesosternum

not prolonged anteriorly between bases of fore coxae; forewing with marginal and postmarginal veins equal in length, stigmal vein $\frac{5}{6}$ as long as marginal, submarginal 5 times as long as marginal; hind coxa with deep femoral concavity at apex, surface within this concavity smooth, rest of exposed surface of coxa with irregular, alveolate sculpture, this sculpture more minute on mesal surface than on outer surface.

Propodeum vertical, with a broad, very shallow concavity on meson, this concavity with a median, vertical band of semi-transverse, strong rugae, area of concavity lateral to median band shagreened; propodeal spiracles oval; petiole short, much wider than long, and roughly sculptured; gaster $1\frac{1}{4}$ times as long as thorax, first tergite entirely smooth and shining, second to fifth tergites smooth dorsally; very faintly and minutely sculptured laterally near anterior margins; fourth tergite the longest, being almost or quite as long as first 3 tergites combined; sixth tergite, when seen in lateral aspect, forming a 50° angle with longitudinal axis of gaster.

Male.—Length 2.0–3.0 mm. Antennal scape clavate toward apex; funicle composed of 5 pedunculate segments, first slightly longer and thicker than any one of more distal segments; club two-segmented; petiole longer than hind coxa, ventral apex of petiole smooth, rest of its exposed surface with close, alveolate sculpture; propodeum lacking the broad, shallow concavity of the female, a median, longitudinal groove present with areas lateral to it slightly produced and with rugose, irregular, alveolate sculpture; gaster compressed, $\frac{7}{8}$ as long as thorax, third gastral tergite the longest.

Type locality.—St. Augustine, Trinidad, B. W. I.

Types.—U. S. N. M. No. 64233.

Described from 35♀ and 30♂ specimens as follows: Holotype ♀, allotype ♂, and 13♀ and 10♂ paratypes, St. Augustine, Trinidad, April 1945, reared from inflorescence of *Cordia* sp., R. Donald (specimens received through E. C. McCallan); 1♀ and 1♂ paratypes, St. Augustine, Trinidad, Sept. 1946; 1♀ paratype, Nariva, Trinidad, Nov. 1946, from *Cordia macrostachya* flowers, F. J. Simmonds; 7♀ and 8♂ paratypes, Mauritius, 1949,

reared from seeds of *Cordia macrostachya* from Trinidad, J. R. Williams; 12♀ and 10♂ paratypes, Mauritius, 1950, from seeds of Trinidad *Cordia*, J. R. Williams. Fifteen ♀ and 15♂ paratypes are deposited in the British Museum (Natural History) collection; the rest of the type material is in the U. S. National Museum collection.

ii

The following species is thought to be a parasite of *Eurytoma attiva*, although it is possible that in part of its larval development its feeding is phytophagous rather than parasitic. As Noble (1940, Roy. Ent. Soc. London Trans. 90: 33) has shown, in some other species of *Eurytoma* the larvae spend part of their lives as parasites, passing the rest as plant feeders. *E. cressoni* was first segregated in material reared from *Cordia* seeds in the Island of Trinidad. Later it was found to have been introduced into the Island of Mauritius in *Cordia* seeds sent there from Trinidad. It was originally determined as an unknown species of *Eurytoma* by A. B. Gahan, formerly of the U. S. Department of Agriculture. Subsequently G. J. Kerrich, of the Commonwealth Institute of Entomology, London, was able to identify it as *Eurytoma cressoni* Howard by comparing specimens with the female type of that species in the British Museum (Natural History) collection. Mr. Kerrich has very kindly checked my redescription against this type.

***Eurytoma cressoni* Howard**

Eurytoma cressoni Howard, 1897, Linn. Soc. London, Zool. Jour. 26: 138; Dalla Torre, 1898, Cat. Hym., v. 5, p. 336; Ashmead, 1900, Ent. Soc. London Trans., p. 338; Schmiedeknecht, 1909, Gen. Ins., fasc. 97, p. 141.

Female.—Length 1.5–2.5 mm. Black; mandibles, antennae, fore and mid legs, hind legs except coxae, tegulae, venter of gaster, and apices of ovipositor sheaths, yellow to tan, but this light color somewhat variable—pedicel sometimes shaded with black dorsally, a faint yellow or tan spot usually on face ventral

to each antennal socket, hind coxae may be partly or almost entirely yellow or tan, and light color may extend from venter onto lateral areas of fourth and fifth gastral tergites or, sometimes, extend over entire surface of fourth gastral tergite; wings hyaline with venation yellow to tan. Pubescence fine, silvery; dense on metepisternum and sixth and seventh gastral tergites.

Antennae inserted slightly below center of frons, apices of scapes reaching level of anterior ocellus; antennal funicle segments equal in width, and gradually decreasing in length, the first somewhat longer than the fifth; club as long as first and second funicle segments combined; scrobe cavity with lateral and dorsal margins obscurely carinate; face with numerous, strong striae converging on mouth opening; compound eye not encircled by a carina; malar furrow complete; postocellar line $2\frac{1}{2}$ times as long as ocellular.

Umbilicate punctures of thoracic notum deep, regular, and closely set, interstices very narrow, shagreened; anterior face of fore coxa flattened and slightly excavated from base to apex; mesosternum not produced anteriorly between fore coxae; prepectus smooth dorsally, sculptured ventrally, its posterodorsal angle bluntly rounded; tegula smooth, shining; forewing with marginal vein twice as long as stigmal and $1\frac{1}{3}$ times as long as postmarginal, submarginal vein $3\frac{1}{2}$ times as long as marginal; hind coxa with a shallow femoral cavity at apex, surface within this concavity slightly sculptured, almost smooth, rest of exposed surface of coxa with uniform alveolate sculpture.

Propodeum vertical, median area of propodeum with a shallow and broad concavity, surface of this concavity shagreened and irregularly rugulose, lacking a median, longitudinal band of rugose sculpture; petiole so short as scarcely to be visible in undissected specimens; gaster slightly compressed, varying from $1\frac{1}{3}$ to $1\frac{1}{2}$ times as long as thorax; fourth gastral tergite as long as basal 3 tergites combined; first gastral tergite smooth, second and third smooth on dorsomedian line and at posterior margins, otherwise with minute, closely set, irregularly alveolate sculpture; fourth tergite completely sculptured except for a pair of lateral sub-basal smooth spots; fifth tergite more minutely sculp-

tured than fourth; apex of abdomen acuminate, ovipositor and seventh gastral tergite directed obliquely dorsad, ovipositor sheaths slightly exerted.

Male.—Length, 1.5–2.0 mm. Color as in female except that light color is less extensive on hind coxae and gaster, and hind tibiae are usually mostly black; antennal scape broadened in basal $\frac{2}{3}$, constricted apically; funicle with 4 pedunculated segments; club three-segmented; propodeum with median concavity deeper and narrower than in female; petiole as long as or slightly longer than hind coxa; gaster not compressed, $\frac{5}{6}$ as long as thorax; third gastral tergite the longest.

Type locality.—Balthazar, Grenada, B. W. I.

Lectotype.—Female, in the British Museum (Natural History).

This species was originally described from a female and male cotypes. The male cannot now be found either in the British Museum (Natural History) or the U. S. National Museum collections, so it is presumed to be lost. The female specimen is hereby designated as the lectotype, and Mr. Kerrich has so labeled it.

Eurytoma cressoni is redescribed from specimens from St. Augustine, Toco, and Nariva, Trinidad and from Mauritius, reared either from the seeds or from the inflorescence of *Cordia macrostachya*. These specimens are divided between the British Museum (Natural History) and the U. S. National Museum collections.

iii

The name of the following species has long since gotten into the literature, but no description of it has ever been found. Girault's manuscript types of it have been in the U. S. National Museum collection since 1916. T. V. Ramakrishna Ayyar in 1920, in discussing parasites of *Alcidodes bubo* (F.) in South India, said of it: "Two parasites, *Metastenomomyia juliani* Gir., and *Eurytoma pigra* Gir., have been noted on the grub; but not to any great extent." On an accompanying plate he figures a "Chalcidid parasite" of *Alcidodes bubo*, without naming it fur-

ther. The specimen figured is clearly a pteromalid (probably *Metastenomyia*), so that this publication could not be taken to have validated the name *Eurytoma pigra*.

Eurytoma pigra, new species

Eurytoma pigra Girault MS, Ramakrishna Ayyar, 1920, Rpt. Proc. Third Ent. Meeting Pusa, 1919, v. 1, p. 321; Mani, 1938, Cat. Ind. Ins., pt. 23, p. 71; Pruthi and Mani, 1940, Imperial Council Agr. Res., India, Misc. Bul. 30, p. 8; Thompson, 1943, Imperial Par. Serv., Cat. Par. and Pred. Ins. Pests, sect. 1, pt. 1, p. 9.

Eurytoma sp., Ramakrishna Ayyar, 1925, *Spolia Zeylonica* 13: 244.

This species may be distinguished from other oriental species of *Eurytoma* as follows: It differs from *poloni* Girault in lacking a pair of sublateral, longitudinal carinae on the first gastral tergite; it lacks the conspicuously long and stout setae which are borne on the posterior margin of the hind tibia in *scitibia* Gahan; the female abdominal petiole is short, not as long as or longer than the hind coxa, as in *brunneipectus* Crawford; the face has striae converging on the mouth opening, not with unmodified umbilicate punctation as in *albotibialis* Ashmead, although both *pigra* and *albotibialis* have low carinae on the frons running parallel with and close to the anterior margins of the compound eyes; in *hindupurensis* Gahan the mesosternum is prolonged anteriorly as an acute projection between the anterior coxae, although this projection is truncate apically in *pigra*. Other oriental species, such as *systoloides* Crawford and *manilensis* Ashmead, have convergent facial striae, but they lack the low carinae bordering the compound eyes. The anterior coxa has a distinct toothlike projection near the middle of the outer ventral margin in *nesiotes* Crawford, but this projection is wanting in *pigra*. In both *pigra* and *nesiotes* the propodeum has a very broad, shallowly concave median depression.

Female.—Length 2.5–3.0 mm. Black; antennae, trochanters, bases of fore and mid femora, all but bases and apices of mid tibiae, and sometimes base of gaster, dark brown; apices of all

femora, bases and apices of mid and hind tibiae, and mid and hind tarsi, yellow; front tibiae and tarsi tan; wings hyaline with venation yellow. Pubescence of head, body, and appendages short, silvery; gastral tergites 1-3 bare, fourth tergite with a few setae laterally, tergites 5-7 densely setose.

Antennae inserted in center of frons, apices of scapes reaching level of anterior ocellus; funicle segments all subequal in length and width, fifth segment only very slightly shorter and broader than first, club as long as funicle segments 4 and 5 combined; scrobe cavity carinately margined laterally and dorsally; face with strong striae converging on mouth opening; weak but distinct carinae encircling compound eyes, these carinae bordering the frons laterally; malar furrow obsolete; postocellar line 3 times as long as ocellocular.

Umbilicate punctures on thoracic notum shallow, interstices narrow, somewhat irregular, lightly shagreened; prepectus smooth, shining, its posterodorsal angle blunt; anterior face of fore coxa excavated from base to apex; mesosternum produced forward between bases of anterior coxae, its apex truncate, and a short, median, longitudinal carina present; tegulae black, lightly sculptured, almost smooth; forewing with marginal and stigmal veins equal in length, postmarginal $1\frac{1}{3}$ times as long as marginal, submarginal 4 times as long as postmarginal; hind coxae with minute, alveolar sculpture extending completely over exposed surfaces, a deep, concave femoral groove present at apex.

Propodeum almost vertical, lying at an angle of 80° with longitudinal axis of thorax; median area of propodeum broadly and shallowly concave; surface of concavity shagreened and with a median longitudinal band of confused, semi-transverse rugulae, these varying in intensity in different specimens; propodeal spiracles elongate-ovate; petiole extremely short, but discernible; gaster varying from $1\frac{1}{10}$ to $1\frac{1}{6}$ times as long as thorax, first gastral tergite smooth, tergites 2-4 minutely and closely pitted laterally and anteriorly on dorsum; fourth tergite the longest, being twice as long on dorso-meson as third tergite and as long as first and second combined; gaster acuminate at apex, dorsal

surface of sixth tergite, when seen in lateral aspect, forming a 55° angle with longitudinal axis of gaster.

Male.—Length 2.5 mm. Antennal funicle composed of 5 pedunculate segments, first segment slightly longer than any of those following; club two-segmented; femoral groove at apex of hind coxa more shallow than in female; petiole longer than hind coxa, apex of petiole smooth, rest of its surface with minute, alveolar sculpture; gaster compressed and as long as thorax, third gastral tergite the longest, fourth tergite extremely short.

Type locality.—New Delhi, INDIA.

Types.—U. S. N. M. No. 64167.

Described from 11♀ and 1♂ specimens as follows: Holotype ♀, allotype ♂, and 10♀ paratypes, reared at New Delhi, India, July 5, 1957, from *Microlarinus* sp. larvae boring in the stems of puncture vine, *Tribulus terrestris*, G. W. Angalet. Additional specimens, not included in the type series, parasitized larvae of the weevil, *Alcidodes bubo* (F.) in *Sesbania*, Coimbatore, India, Aug. 7–24, 1916, Ramakrishna Ayyar. The latter specimens, all more or less broken, are Girault's manuscript types. Two ♀ paratypes are deposited in the British Museum (Natural History) collection; the other specimens are in the U. S. National Museum collection.

A New Species of *Conosphaeron* Linsley from Arizona (Coleoptera: Cerambycidae)

By JOSEF N. KNULL, Department of Zoology and Entomology,
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This interesting specimen appears to belong to genus *Conosphaeron* Linsley (1935).

Conosphaeron pullum n. sp.

Female: Dark brown throughout, shining on both surfaces.

Head coarsely densely punctured, sparsely clothed with long hairs; eyes coarsely granulated; antennae extending beyond

apex of elytra when laid over top, third and following segments flattened, carinate, ciliate to ninth segment, three to seven inclusive spinose at tip, scape stout, coarsely punctured. Ratio of lengths of segments 1 to 10, 4:1:6:4.4:4.8:4.4:4.6:4.2:3.7:3.2, last segment missing.

Pronotum slightly longer than wide, widest back of middle, apex and base about same width; sides rounded with obtuse tubercle back of middle which gives it an angled appearance; surface convex with an elongate smooth area in middle and an oblique one each side near base; a transverse lateral depression each side at base; irregularly, densely, coarsely punctured; sparsely clothed with long ciliate hairs. Scutellum densely clothed with short recumbent pubescence.

Elytra at base wider than widest part of pronotum, widest near base; sides converging toward apex, broadly rounded near apex, apex emarginately truncate; surface densely coarsely punctured, punctures diminishing in size toward apices; densely clothed with long recumbent pubescence, sparsely intermixed with long ciliate hairs.

Beneath abdomen sparsely, finely punctate, pubescence sparse, long; prosternum transversely rugose; femora coarsely punctured toward apices; all tibiae carinate.

Length 12.6 mm.; width 2.9 mm. *Holotype* ♀ collected at light five miles north of Nogales, ARIZONA, July 30, 1957, by D. J. and J. N. Knull, in collection of author.

This species appears to be close to *Conosphaeron piceum* Lins. (1935).

The elytra are considerably wider than pronotum; the long ciliate hairs of elytra are shorter toward apices instead of longer as in *piceum*.

I am indebted to G. B. Vogt for comparing it with specimens in the U. S. National Museum.

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Some Species of the Genus *Bathypogon* Loew

By FRANK M. HULL, University, Mississippi

Flies of small or medium size which belong to the subfamily Dasypogoninae and are characteristic of the Chilean and Australian regions. A number of undescribed species have recently been found in collections and several are described in this paper.

Bathypogon ichthyurus, new species

A small species with wholly black color, except some red on the terminalia and the very dark reddish brown humerus. Further characterized by the 4 pairs of scutellar bristles and the curious, fish-tailed process curving down to the apex of the superior forceps. Length 12 mm.

Male. *Head*: The head is black in ground color, the vertex and front are wider than usual, the occipital pollen grey, the pollen of front and vertex quite thin, somewhat brownish across the upper front and vertex and yellowish grey on the lower half of the front, except for a narrow border along the eye margin, which is longer, denser and brownish yellow. Face a little wider, more produced and protuberant, the elevation occupying the lower two-thirds; the pubescence is greyish white with a yellow cast and the eye margins laterally have thick yellow pubescence continued from the front but not extending on the lower face or cheeks. Bristles of face unusually numerous but not very stout. Palpus and proboscis black. All pile and bristles of the head pale brownish yellow, except those of the ocellarium and the short bristles on the upper occiput, which are light brown. Antenna black, except the base of third segment and apex of the second segment, which are sepia brown. Third segment slender, only slightly dilated, the style a little longer than usual.

Thorax: The thorax is everywhere quite black, except on the humerus, which is quite dark reddish brown. Pollen over the mesonotum, including the lateral margin before the suture, dark brown with a distinct reddish cast, but behind the suture some-

what greyish yellow. Though badly preserved, there are evidences of 2 submedial, black stripes separated by 3 narrow vittae of pale brownish yellow pollen, which might possibly be described as greyish yellow. The complement of thoracic bristles consists of 1 posthumeral, 2 notopleural, 1 supraalar, 2 postalar and 4 pairs of strong scutellar bristles. Metapleural bristles not strongly differentiated. The pollen on the black pleuron is reddish to yellowish brown and appears to be rather thin over much of the pleuron.

Legs: The legs are black, except the dorsal surface of the anterior and middle tibiae, which is quite dark reddish brown and a little lighter on the basal half. Tarsi brownish black. All pile and bristles of legs pale brownish yellow. Claws rather slender, brown on the basal third.

Wings: The wings are nearly hyaline with dark brown veins. The lower end vein of the discal cell makes a strong angle with the lower end vein of the fourth posterior cell. There is a minute stump of a vein a short distance from the base of the anterior branch of the third vein.

Abdomen: The abdomen is black with only the terminalia dark reddish to reddish brown. Pollen of abdomen distinctly grey on the dorsal portion of the tergites, where it forms a large posterior triangle, which in some lights appears to be divided medially. The lateral pollen on the first 4 tergites is more or less dark reddish brown, lighter in color on the remaining tergites. The superior forceps are drawn down into an extended, sharply pointed, fish-tail process on each side, thus each half has 2 points with a deep concavity between. The process of the outer point is longer than the medial point. The hypandrium has a prominent, thin, rounded, scoop-like processes.

Type. Male, L. Callabonna, collected by A. Zietz. No date given. Type in the South Australian Museum.

***Bathypogon nigrotibiatus*, new species**

A moderately large species characterized by the general black ground color, the black femora and tibiae; the femora have only narrow, dark reddish brown stripes posteriorly. The thoracic

bristles are pale brown, the scutellar and facial bristles quite pale brownish yellow. Antenna black. A species with very distinct terminalia. The lower apex of the superior forceps has a curious, strong but slender, curved, pointed process; the hypandrium has stout, curved and excavated protuberances. Length 20 mm.

Male. Head: The ground color of the head is entirely black, the pollen quite pale greyish yellow, the pubescence of the same color. The stout bristles of the face are extremely pale brownish yellow. First 2 antennal segments are totally black; third missing. Palpus black, but pollinose and not shining, its pile and the lower occipital pile brownish white. Postvertical bristles quite pale.

Thorax: The thorax everywhere is black in ground color, the pollen dark brown widely over the middle and pale brownish yellow laterally. The extreme posterior corner of the humerus laterally has a tiny reddish brown spot. The stripes are very poorly differentiated from either anterior or dorsal view. Along the medial margin of the humerus the pollen is a little lighter and more nearly golden brown. The thoracic complement of bristles, all of them light brown, consist of 1 posthumeral, 2 notopleural, 1 supraalar, 2 scutellar pairs and 3 postdorsocentral elements. The pleural pollen is similar to that on the sides of the mesonotum.

Legs: The legs are everywhere black, except for an indistinct, posterodorsal, reddish brown stripe on the anterior and middle femora. Pile and bristles are pale brownish yellow. Claws stout, slightly more blunt than usual and more than the basal third is light brown.

Wings: The wings are nearly hyaline and dilutely tinged with pale brown, veins dark brown and at the extreme base light reddish brown. The lower end vein of the discal cell and the end vein of the first posterior cell are quite aligned.

Abdomen: The abdomen is blackish sepia in color, the lateral margins with dense, bright, golden brown pollen and the dorsal portion with thin, dark brown pollen. Pile and bristles pale. On the outer third the posterior margins of tergites 2 to 4 are

contrastingly colored, and to some extent this is true of the fifth tergite. These margins are pale brownish yellow with similar pollen. The terminalia are entirely blackish, except for the slender, ventroapical process on the superior forceps, which is red and the hypandrium which is a pale mahogany red ventromedially and again on its apical and lateral half. The ventral process from the hypandrium is darker. This process is quite characteristic and takes the form of a stout, curved, ventral, apically truncate and laterally excavated protuberance.

Type. Male, Cairns District, collected by F. P. Dodd. No date given. Type in South Australian Museum.

***Bathypogon microdonturus*, new species**

A small, light reddish species with dark brown thorax. The head is black in ground color and all bristles are light yellowish brown. The hypandrium has only very small, short teeth. Length 13 mm.

Male. Head: The pollen of occiput and front and the pubescence of the face light brownish yellow or ochre colored. The bristles are similar, except those of the face, which are more yellowish. Antenna absent.

Thorax: The thorax is quite dark brown in ground color, including the humerus. Only the coxae are more reddish. The pollen of the mesonotum is a dark, golden brown, but anteriorly between the humeri it is a lighter and faintly reddish golden brown. Humeral, lateral, marginal and the whole pleural pollen is thick, pale, brownish to golden yellow. The thoracic complement of bristles consists of 1 posthumeral, 2 notopleural, 1 supraalar which may be lacking, 2 postalar, 2 scutellar pairs, 4 postdorsocentral and 4 weakly differentiated, metapleural bristles, besides the usual complement of stiff, long, metapleural hairs.

Legs: The femora are moderately stout and are light reddish brown to orange brown with the anterior surface of the anterior and middle pairs and the posterior surface of the hind pair dark sepia brown. The tibiae are light reddish brown with the anterior surface and lateral surface of the hind pair obscurely

darker. All tarsi light brownish red. Claws sharp, slender, with the basal third quite red. Pile and bristles of legs quite pale brown.

Wings: The wings are nearly hyaline and dilutely tinged with pale brown. Veins reddish brown, the apical fourth is darker and villose; the lower end vein of the discal cell makes quite a strong angle with the end vein of the fourth posterior cell, this being one of the strongest angles that we have seen.

Abdomen: The abdomen is reddish brown, darker on the dorsal portion and lighter along the lateral margins, the pollen rather uniformly pale reddish to yellowish brown. Terminalia chiefly reddish brown, rather dark except narrowly along the medial border of the superior forceps. Hypandrium with short, lappet-like processes.

Type. Male, Owicandana, North Flinders Range, collected by Hale and Tindale. Type in the South Australian Museum.

On the Bee Genus *Cyphomelissa* (Hymen., Apoidea)

By J. S. MOURE, C.M.F.,¹ Department of Entomology, University of Kansas, Lawrence, Kansas, and Seção de Zoologia, Universidade do Paraná, Curitiba, Brasil

The genus *Cyphomelissa* Schrottky (1902) contains large robust, parasitic bees found in South America. The conspicuous differences between this genus and similar ones are indicated by Moure (1946, Notas sobre as mamangabas, Boletim Agrícola, 4: 21-50). The following account contains descriptions of two new forms and a key to known species.

¹ I wish to thank the Rockefeller Foundation (New York), the National Science Foundation (Washington) and the Campanha de Aperfeiçoamento de Pessoal de Nível Superior (Rio de Janeiro) for aid that made this study possible. Also, I wish to thank Dr. Carlos Alberto Campos Seabra of Rio de Janeiro for the stimulus and generosity which he is giving to studies of Brazilian bees, and Dr. Charles D. Michener of the University of Kansas for help in preparation of this paper.

***Cyphomelissa magnifica* n. sp.**

Female: Black, basal half of mandibles and legs in part fuscous chestnut; flagellum with the second and following segments slightly cinereous beneath. Tegulae black, wings dark fuscous with glassy iridescence; veins black.

Entirely clothed with velvety pubescence: black, with some bluish tints in certain lights on head, mesepisterna, metepisterna, posterior two-thirds of tegula, legs, propodeum, a narrow marginal fascia on first tergite, almost whole second, and basal fasciae on third and following tergites, and ventral side; bright yellow on posterior edge of vertex, pronotum and pronotal lobes, mesoscutum, scutellum and metanotum, anterior third of tegula, a patch on mesepisterna around pronotal lobes, basal three fourths of first tergite, and marginal bands on the following ones, on the second almost vestigial and on the third slightly interrupted in middle.

Punctures dense, very fine on clypeus with some larger scattered ones; on mesepisterna coarser with larger ones very sparse.

Head a little broader than long (584:520²). Eye longer than lower interorbital distance, and this longer than upper one (392:248:300). Labrum more than twice as broad as long, shallowly emarginate; mandibles slightly bidentate. Clypeus as long as half distance between clypeus and anterior ocellus, broadly and shallowly emarginate on apical border; interalveolar distance almost double alveolorbital distance (76:40); frontal carina a very sharp line; interocellar distance longer than transverse diameter of anterior ocellus, and longer than ocellorbital distance (64:40:48), but shorter than ocelloccipital distance (90). Scape short and bulky (140 × 60), pedicel very short (20); proportions of first four flagellar segments as 54:54:60:60 and diameter of the fourth 50. Scutellum strongly bituberculate, axillae very weakly produced; a strong smooth carina on mesepisternum in front of median coxal cavity, and another forming scrobal suture. Spur of intermediate tibia very strong, strongly bifurcate at apex, the anterior ramus armed with four or five

² These lengths are in hundredths of millimeters, measured by eyepiece micrometer.

small teeth or spines. Second submarginal cell the largest, third subtriangular, petiolate with first and second *r-m* anastomosed together a little before meeting marginal cell. Pygidial plate oboval, the border slightly raised, the disc rough with some irregular punctures.

Approximate length 19.6 mm., anterior wing, including tegula, 17.5 mm.; widths of head and abdomen 5.84 and 8.3 mm.

Male: Very similar to female, with some yellow pubescence on the clypeus. Mandibles yellow on apical third, inner tooth a little stronger than in the female.

Head broader than long (584:500); eye longer than interorbital distances, the upper one shorter than lower (392:220:288). Labrum more than twice as broad as long, shallowly emarginate; malar area linear. Clypeus weakly protuberant as in female, a little longer than half clypeocellar distance (128:232). Interocellar distance longer than ocellorbital, but shorter than ocellocipital (56:34:90 and transverse diameter of median ocellus 42). Inter-alveolar distance almost twice alveolar (68:36); frontal carina raised in a sharp angle. Scape short (140 × 54), pedicel very short (14), proportional length of first four flagellar segments as 58:54:54:54, and diameter of the fourth 47. Thorax and legs as in female. Last tergite ending in two strong and very acute teeth; fourth sternite broadly emarginate, tomentous, with a dense fringe of hairs curved at their tips; fifth sternite also emarginate and with a moderate fimbria of straight hairs; sixth largely truncate and with a sparse median tuft.

Approximate length 20.3 mm.; anterior wing, including tegula, 17.6 mm.; widths of head and abdomen 5.84 mm. and 8.80 mm.

Habitat: Manaos, Amazonas, BRASIL, July, 1935, G. V. Vredenburg.

Types: *Holotype* female (17.B.1177), *allotype* male and one paratype in the British Museum (Natural History); one paratype in my collection.

Very closely related to *Cyphomelissa superba* (Ducke), but differing by having yellow fasciae on the metasomal tergites (2-5, female; 2-6, male). It is very probable that these forms are but subspecies of *C. diabolica* (Fries, 1900).

Cyphomelissa commata n. sp.

Male: Black, entirely clothed with black velvety pubescence with some bluish gloss, and with a yellow fringe on the occipital border, and some yellow hairs mixed with black ones on clypeus, parocular areas and on pronotum.

Except as indicated above, this form agrees with *C. magnifica*.

Approximate length 20.2 mm.; anterior wing, including tegula, 16.5 mm.; head and abdominal widths 5.1 mm. and 8.00 mm.

Habitat: Itatiaia (700 meters), Rio de Janeiro, BRASIL, J. F. Zikán, March 22, 1937 (holotype), and Nova Friburgo, Rio de Janeiro, February, 1937.

Types: *Holotype* in Zikán's collection in the Instituto Osvaldo Cruz, Rio de Janeiro; one paratype in my collection.

Probably this form also is only a subspecies of *C. diabolica*.

The following key separates these four forms of *Cyphomelissa*:

1. Dorsum of thorax and first metasomal tergite covered with bright yellow pubescence.....2
 Dorsum of thorax and of the first metasomal tergite clothed with black pubescence.....3
2. Metasomal tergites 2-5, female, or 2-6, male, with bright-yellow marginal fasciae, on second vestigial. (Middle Amazon region).....*C. magnifica* Moure
 Metasomal tergites 2-5 female, or 2-6 male, covered with black pubescence with some bluish gloss in certain lights. (Lower Amazon region).....*C. superba* (Ducke)
3. Posterior edge of vertex with a band of bright-yellow hairs. (Northern Serra-do-Mar region).....*C. commata* Moure
 Posterior edge of vertex black pubescent like rest of body. (Southern Brasil and Paraguay)....*C. diabolica* (Fries)

A Change of Name in the Bombyliid Genus *Anastoechus* (Diptera).

By JACK C. HALL, University of California, Riverside, California

In ENTOMOLOGICAL NEWS, 67(8): 199, 1956, I proposed the name *Anastoechus deserticola* for a new species. Since that time I have received word from Dr. A. J. Hesse of the South African Museum, Capetown, South Africa, that the name had been used by him in 1938, Ann. S. African Mus., 34: 347, for a South African species of *Anastoechus*. His species was named *deserticolus*. Since the names are of the same formation and since his name has priority I propose the name **Anastoechus hessei** for my *A. deserticola*, in honor of Dr. Hesse.

XIth International Congress of Entomology

The XIth International Congress of Entomology will be held in Vienna from August 17th to August 25th, 1960. Prof. Dr. Karl E. Schedl is the President, and Dr. Max Beier is the General Secretary. All persons who are interested and who have not yet received a circular letter, are asked herewith to please write a postcard to the Secretary's office as soon as possible: Burgring 7, Vienna 1. Further information will be sent to them immediately.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and **Stizini** (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Dominick J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

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THE NEOTROPICAL SPECIES OF THE 'SUBGENUS AESCHNA' SENSU SELYSII 1883 (Odonata)

By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeshna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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OCTOBER 1958

Vol. LXIX

No. 8

CONTENTS

Evans—Nesting behavior of <i>Larropsis distincta</i>	197
Hungerford and Matsuda— <i>Teratobates</i> a synonym	200
Scott—New records for <i>Proisotoma frisoni</i>	202
Parfin—Bionomics of Mantispidae	203
Dreisbach—Three new species of <i>Haploneurion</i>	207
Alexander—Undescribed western crane-flies XVIII	215
Frost—Ecological insect survey of Pennsylvania	222

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Observations on the Nesting Behavior of *Larropsis distincta* (Smith) (Hymenoptera, Sphecidae)

By HOWARD E. EVANS, Cornell University, Ithaca, N. Y.

Very little has been recorded on the nesting behavior of digger wasps of the genus *Larropsis*. Williams (1913, Kansas Univ. Sci. Bull., 8: 192) found *L. divisa* (Patton) preying upon cave crickets (*Ceuthophilus*) in Kansas. Williams found two nests of this species, one in the bottom of a crack in the earth, the other inside a hole "the size of that made by a mouse." He was unable to dig either nest successfully, but believed that the nest was fairly deep and of several cells. Williams noted that wasps of this genus occur frequently about holes dug by mammals; he believed that they seek cave crickets in these places.

During the summer of 1957, I found an unusually large population of *Larropsis distincta* (Smith) inhabiting a gravel pit near Six-mile Creek, Ithaca, N. Y. On every sunny day many females could be seen hunting prey, and on several occasions females were seen carrying prey to their nests. Nine nests were eventually marked and dug out. The first observations were made on August 26, the last on September 18. All the Ithaca specimens in the Cornell collections were taken between August 9 and September 18. It seems certain that this species has but a single generation a year in the Northeast.

Hunting is done among stones, dried leaves, and low vegetation. The wasps walk along the ground in a circuitous path, entering depressions and accumulations of debris. Any crickets which are flushed are pursued rapidly, but I did not observe capture and stinging. Some of the crickets flushed may be unacceptable to the wasps, as all of the numerous crickets which

I took from wasps or from nests were adult female *Nemobius fasciatus* (DeGeer) [det. A. B. Gurney]. There are also two specimens in the Cornell collection taken at Ithaca by P. P. Babiý with females of this same species of cricket.

After being stung, the crickets are carried to the nest over the ground, the wasp seizing the base of the antennae with its mandibles and proceeding forward, straddling the cricket's body, which is dorsum-up. Occasionally the wasp may make a short flying hop or carry the cricket up a plant 10–20 cm. and then fly off heavily with it. The latter behavior occurs most commonly near the nest, and may enable the wasp to obtain a better view of the vicinity of the nest. In the area of study, all nests were situated in relatively bare places in the gravel pit, and it was a common sight to see wasps proceeding over the ground with their prey in a more or less straight line from the litter and low vegetation of surrounding areas into the nesting area. Once in the nesting area, they would circle about and eventually disappear rather suddenly into a hole in the ground.

Without exception, the wasps in this aggregation made their nests from the bottoms of pre-existing depressions in the ground. These depressions were often beneath sticks or dried leaves and in most cases appeared to represent caved-in parts of the burrows of the hairy-tailed mole, *Parascalops breweri* (Bachman). The burrows of the wasps, emanating as they did from the bottoms of these depressions and associated mole tunnels, were exceedingly difficult to trace, and only five of the nine nests marked were dug out with any degree of success. Apparently the wasps take advantage of various natural cavities among the clods and pebbles and do not do very much digging themselves. The cells found varied in depth from 10 to 20 cm., with the majority between 12 and 15 cm. In any one nest the cells tended to radiate out from a common point. Of the five nests dug out successfully, one contained only one cell, one contained two, one three, one seven, and one nine. Doubtless the nests with only a few cells would have eventually contained more. In fact, it is probable that once a wasp has found a suitable hole in the soil it continues to construct cells from the same cavity for as long as it lives.

The cells are rough-walled and somewhat irregular, generally measuring about 1.5 cm. in length. The usual number of crickets per cell is two, but I found a few cells with three and a few with apparently only one cricket. As mentioned above, all crickets were adult female *Nemobius fasciatus*. The egg is laid on the first cricket placed in the cell. It is about 2 mm. long and is placed transversely between the front and middle coxae, with one end pressed against one of the front coxal cavities. The egg hatches in two days and the larva begins to feed through the coxal cavity. As it grows, the larva bends itself around the prothorax of the cricket, like a collar, as it continues to feed through the venter of the thorax. In about three days it consumes the first cricket and then proceeds to consume the remaining one or two crickets more rapidly, finishing the entire contents of the cell about five days after hatching. I have described the full-grown larva elsewhere (1958, Trans. Amer. Ent. Soc. 84: 119-120).

The crickets are paralyzed rather lightly, and until consumed by the wasp larva they often show spontaneous movements of legs and antennae, but are unable to walk about in a co-ordinated manner. The contents of several cells appeared to have been destroyed by mold.

Of 23 cells dug out, no less than 13 contained the maggots of miltogrammine flies. The number of maggots per cell varied from one to six, with the usual number three or four. Without exception the wasp larva failed to develop in these cells. On more than one occasion an intact egg on its cricket was removed from a cell for rearing only to have it destroyed by minute, first-instar maggots within a day or two. Apparently these maggots are deposited beneath the wings or in some other concealed place; later they move onto the egg and destroy it, then consume the crickets and form their puparia in or near the cell.

None of the flies was actually observed larvipositing in the field. The maggots taken from various cells were placed in rearing tins, overwintered outdoors, and brought into the laboratory in March 1958. Emergence of flies was obtained from all five nests. Of 25 flies reared, 14 were *Metopia argyrocephala* (Meigen) and 11 were *Scotainia trilineata* (Wulp) [det.

W. L. Downes, Jr.]. In one case both species emerged from the same nest (no. 1494; 7 *Metopia* and 1 *Scenotainia*). However, three cells of this nest had been infested, and I placed all three cells in the same rearing tin. Thus I cannot say whether or not the two species of miltogrammines infested the same cell.

The rather local distribution of wasps of the genus *Larropsis* may be a result of the fact that they require coarse soil containing various natural cavities. It may be that they are attracted to animal burrows more for purposes of nesting than for finding crickets, as Williams suggested. I would judge these wasps to be among the most primitive of Sphecidae in their nesting behavior. At least the practice of using pre-existing cavities in the soil, the light paralysis of the prey, and the manner of carrying the prey over the ground with the mandibles are all usually regarded as primitive traits. A great many more Sphecidae must be studied in detail before one can confidently generalize regarding the evolution of behavioral characters.

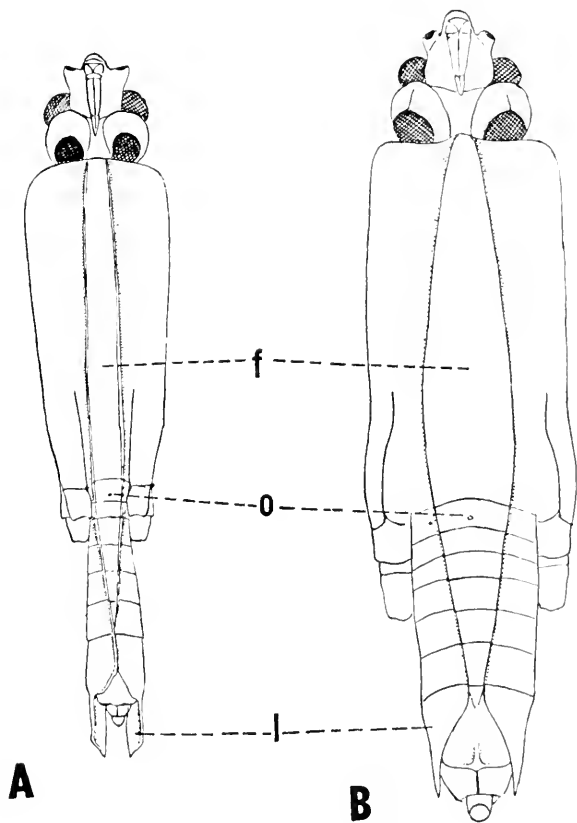
Teratobates Esaki, a Synonym of Heterobates Bianchi (Gerridae, Heteroptera)¹

By HERBERT B. HUNGERFORD and RYUICHI MATSUDA,
Department of Entomology, University of Kansas

In 1896 V. Bianchi described *Heterobates* for his *H. dohrandti* (Ann. Mus. Zool. Acad. Sci. St. Petersburg, 74). We have in our University of Kansas Collections three males and two females of this species kindly sent by Dr. A. N. Kiritschenko many years ago. In our study of the genera and higher categories of the Gerridae we were able to borrow from Dr. W. E. China of the British Museum paratype specimens of *Teratobates bilobatus* Esaki. Dr. Esaki described this species in 1927 (Eos,

¹ Contribution No. 1,018 from the Department of Entomology, University of Kansas. This report is a by-product of a project conducted with the aid of a grant from the National Science Foundation.

Rev. Esp. Ent., 3(3) : 264). These two species are strikingly similar in appearance and we are impressed by the remarkable modification of the thoracic and abdominal venters of the females in both the species (figs. 1 and 2). They are plainly different species but must be congeneric.



The ventral view of (A) *Teratobates bilobatus* Esaki, and (B) *Heterobates dohrandti* Biauchi. o. = Omphalium, f. = longitudinal fold of the thoracic and abdominal venters, l. = lateral lobe of the seventh abdominal segment.

New Locality Records for *Proisotoma frisoni*, (Collembola, Isotominae)

By HAROLD GEORGE SCOTT, Communicable Disease Center,
Public Health Service, U. S. Department of Health,
Education, and Welfare, Atlanta, Georgia

Proisotoma frisoni Folsom can be distinguished from other members of the genus by means of the following diagnostic characteristics: white, eyes absent; postantennal organ elliptical; antenna longer than head; Abd V and VI not fused; ratio of Abd III to IV as 5:6; unguis without teeth; hind unguiculus two-thirds as long as hind unguis, one-half as long on other legs; one tenent hair; furcula present, extending to posterior part of Abd II; length 1.1 mm.

This species was described by Justus Watson Folsom (1937) from Cahokia, Illinois. Since then no records of the species have been published. Two additional records are noted as follows:

1. Taken by C. Clayton Hoff from Berlese funnel sample of mixed aspen-fir litter, 9,700 feet, along Canjilon Road, at divide west of Vallecitos, Rio Arriba County, NEW MEXICO, 13 Aug. 1953 (included in a dissertation presented to the University of New Mexico in partial fulfillment of the requirements for the Degree of Doctor of Philosophy, aided by National Science Foundation Grant G-112).

2. Taken by Jerrold M. Michael from around potted *Ficus elastica* in a private home, Decatur, DeKalb County, GEORGIA, 21 March 1958. The infestation was eliminated by dusting the plants with 2% chlordane. Since overwatering of potted plants is often a key factor in the development of household infestations of Collembola, it was recommended that, henceforth, the plants be watered only after the soil appeared dry.

REFERENCE

FOLSOM, J. W. 1937. Bull. U. S. Natl. Mus., 168: 55.

Notes on the Bionomics of the Mantispidae (Neuroptera: Planipennia)

By SOPHY PARFIN, United States National Museum,
Washington, D. C.

Because information on the hypermetamorphic Mantispidae is scarce, it is believed that the following three notes on their bionomics will be of interest. All of the specimens, on which these observations are based, are in the collection of the United States National Museum.

I am grateful to the late J. C. Bridwell (Lignum, Virginia) and G. B. Vogt (Entomology Research Division, U. S. Department of Agriculture) for making certain mantispid specimens available for study; to W. J. Gertsch (American Museum Natural History) for the identification of a spider egg-sac; to J. F. Gates Clarke (Smithsonian Institution) for helpful suggestions in the preparation of the manuscript; to R. E. Crabill (same institution) for providing the approved names of the spiders; to K. V. Krombein (Entomology Research Division, U. S. Department of Agriculture) for supplying the current names of the vespid wasps; and to C. W. Sabrosky and W. W. Wirth (same Division) for the determination of the sarcophagid.

MANTISPID HOSTS

Three cocoons of the green mantispid, *Mantispa viridis* Walker (tentatively determined until a revision of the Mantispidae is completed; in the genus *Mantispilla*, according to Enderlein's key, 1910, pp. 341-349), in two similar spider egg-sacs, were collected by the late J. C. Bridwell in "late 1951," at Lignum, Virginia, on the underside of a plank buried in grass. The adults emerged "early in 1952," according to Mr. Bridwell. One of the egg-sac halves, containing one cocoon, was sent to Dr. W. J. Gertsch, who kindly identified it as the sac of a spider, *Agelenopsis* sp., prob. *pennsylvanica* Koch, a familiar grass spider in the area. The cocoons, which are approximately 9 mm. long and 7 mm. wide, are composed of a dense, thick, white outer portion (about 1 mm. thick), and a much thinner

and considerably more loosely woven, pale yellow inner lining. The two light gray spider egg-sacs are each about 1.8 cm. in diameter. It was interesting to note that two mantispid larvae were able to complete their development in one spider egg-sac, without one destroying the other.

Host records for the hypermetamorphic Mantispidae are scarce in the literature, and can be summarized as follows:

Host	Mantispid	Reference
Spider egg-sacs and spiders		
<i>Agelena naevia</i> Walckenaer	<i>Mantispa fuscicornis</i> Banks as <i>fuscicornis</i>	Kaston, 1938, p. 147
<i>Arcotosa littoralis</i> (Hentz) = <i>A. cinerea</i> (Fabricius)	1st stage mantispid larvae	Hungerford, 1939, p. 265
<i>Clubiona</i> sp.	<i>Mantispa</i> sp.	Rogenhofer, in Brauer, 1869, p. 833
<i>Cupiennis sallei</i> (Keyserling)	<i>Mantispa viridis</i> Walker?	Milliron, 1940, p. 358
<i>Drassodes hypocrita</i> (Simon)	<i>Mantispa styriaca</i> Poda	Poujade, 1898, p. 347
<i>Drassid</i>	<i>Mantispa styriaca</i> Poda	Main, 1931, p. 26
<i>Lycosa</i> sp.	<i>Mantispa styriaca</i> Poda	Rogenhofer, 1862, p. 583
<i>Lycosa inquilina</i> Koch = <i>Tarentula barbipes</i>	<i>Mantispa styriaca</i> Poda	Brauer, 1869, p. 833
<i>Philaeus militaris</i> (Hentz)	<i>Mantispa interrupta</i> Say	Smith, 1934, p. 124
<i>Thomisus</i> sp.	<i>Mantispa</i> sp.	Brauer, 1869, p. 834
Vespid wasp nests		
<i>Polybia occidentalis scutellaris</i> (White)	<i>Symphrasis varia</i> (Walker)	White, 1841, p. 322; Walker, 1853, p. 212; Smith, 1863, p. 501; Westwood, 1867, p. 506; Hagen, 1877, p. 210; Brauer, 1887, p. 213
<i>Polybia rejecta</i> (Fabricius)? (honey "bereitenden" wasp)	<i>Symphrasis varia</i> (Walker) <i>Mantispa</i> sp.	Brauer, 1887, p. 213 Rogenhofer, 1862, p. 585
Noctuid moth pupae		
<i>Xylomyges curialis</i> Grote	<i>Plega signata</i> (Hagen)	Woghun, 1935, p. 119

Brauer (1869, pp. 833-834) observed that the larvae of the Palearctic *Mantispa styriaca* Poda did not appear to like the lenticular green egg-sacs of *Lycosa fluxiatilis* Blackwall, but (*loc. cit.*, p. 836) stated that the white, spherical egg-sacs of the following spiders are suitable for rearing the mantispids: *Lycosa inquilina* Koch = *Tarentula barbipes* (Sundevall), *Arcotosa allodroma* Koch = *A. cinerea* (Fabricius) and *Dolomedes* Latreille.

LONGEVITY IN THE MANTISPIDAE

A female of *Mantispa viridis* was kept alive by the writer for a period of eighty-one days, dying on December 17. It was collected in flight just before dusk by Mr. G. B. Vogt as it was about to alight on a hop hornbeam tree near a rock outcrop located at an angle between Difficult Run, Virginia, and the Potomac River on September 28, 1955. No insects other than a small roach nymph, which was rejected, were offered to the mantispid, but bits of fruit such as peach, plum, grapes and cucumber were placed near the top of the small jar (2½ oz.) in which the specimen was confined. It was not seen to feed on the fruit, although it appeared attracted, even reaching for the fruit with its forelegs. Water was splashed on it daily, and grass and chickweed kept in the jar. It was frequently seen to pass its forelegs and tarsi through its mouth. The day before death, it fell into about ¼" water, which had accumulated in the jar from the daily splashings, and after it was rescued, it became inactive and died the next day. Upon dissection, a moderate amount of fat was found next to the body wall of the abdomen, but eggs were not apparent.

The above longevity record for an adult mantispid in captivity is greater than that of Hungerford (1936, p. 70), who was able to keep a female of *M. interrupta* Say alive sixty-seven days, from July 19 to September 24, by giving it "a few drops of water each day and a housefly or other insect for food." Milliron (1940, p. 359) fed a mantispid (from Central America?), which was tentatively determined as *viridis*, ten to fifteen drosophilid flies between October 30th and November 7th, when the mantispid died. Thus it is seen that *M. viridis* may overwinter as an adult in its natural habitat. Smith (1934, p. 124) suggested that *M. interrupta* and *M. sayi* may overwinter as adults because some were taken in October in Kansas. Viets (1941, pp. 70-71) reared an adult of *M. interrupta* from an egg. The parent was collected in the summer in Michigan and the adult offspring emerged two months and five days after the egg was laid. This might indicate hibernation by the adult. Brauer (1869, p. 833), however, after approximately sixteen

years of research, found that the Palaearctic *styriaca* Poda overwintered as a larva and did not seek a spider egg-sac until spring. Main (1931, p. 26) made similar observations on *styriaca*.

SARCOPHAGID INVADER OF A MANTISPA

A sarcophagid larva (Diptera, Sarcophagidae), approximately 3 mm. long, identified by W. W. Wirth and C. W. Sabrosky, was found by the writer in the abdomen of a male of *M. interrupta* from Victoria, Texas, when it was dissected. It is not known whether the mantispid was alive or dead when the sarcophagid entered.

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Three New Species of Haploneurion Kohl (Hymenoptera: Psammocharidae) from Chile

By R. R. DREISBACH, Midland, Michigan

Townes, in his paper ¹ on the Nearctic wasps of the Subfamilies Pepsinae and Cerapalinae, places the species of this Genus and those of the Genus *Sphictostethus* Kohl in the Genus *Priocnemis* Schiødte. The writer cannot agree with this. Both of these Genera have outstanding characters which are distinctly different from those in *Priocnemis*. These differences are even greater than is usual between genera. The following key for the females (no males are known for the Genus *Haploneurion*) will show these differences.

1. Fore wings with two cubital cells; second recurrent vein meets second cubital cell from about apical fifth to slightly apical of the second intercubital vein; second intercubital vein strongly bowed outward on anterior third, the second cubital

¹ Townes, H. 1957. U. S. Nat. Mus. Bulletin 209.

cell as long on cubitus as on marginal vein; third discoidal cell five-sided; no lobe in rear wings; marginal cell extends beyond second cubital cell by about 0.4 of its length; wings covered with setae; submedian cell in rear wing very narrow and short, reaches only 0.3 of the distance from base of wings to transverse vein; in the fore wings the transverse vein apicad of the basal vein by two to three times the length of the transverse vein; the wings very small, but probably functional, barely reaching apex of first tergite; no teeth whatever on posterior tibiae; eyes do not reach the vertex; pronotum almost as long as mesonotum or longer; scutellum prominent, almost three-fourths as long as mesonotum, postscutellum very short, metapostnotum very long, as long as scutellum and in genotype longer than mesonotum, with many very fine transverse ridges; propodeum smooth and rounded, swollen just at the slope; a large sharp tooth on claws, almost parallel to the apical ray.....*Haploneurion* Kohl

1. Fore wings with *three* cubital cells; second recurrent vein meeting the third cubital cell about the *basal* third; third discoidal cell four sided; an anal lobe to rear wings; teeth present on posterior tibiae, very strong or weak; pronotum not as long as mesonotum or if so thorax constricted behind the pronotum; metapostnotum not so long or if almost so thorax constricted and wings with three cubital cells; eyes reach the vertex or if not then three cubital cells and thorax constricted.....2
2. Thorax constricted just back of pronotum, pronotal shoulders *much enlarged*; a very large mesopleural tooth just at the rise above the middle coxae; propodeum with dorsal surface flat, very long, parallel-sided, posterior slope almost at right angles to the dorsal surface; eyes do not reach the vertex; wings small, hardly reaching to basal third of abdomen, but functional, the transverse vein in fore wings apicad of basal vein by *almost twice* its length; teeth on posterior tibiae small; tibiae hairy between teeth.....*Sphictostethus* Kohl
2. Thorax not constricted, pronotal shoulders *not* enlarged; *no* mesopleural tooth, not even a swelling; propodeum slope without a differentiation between dorsal and posterior parts, not parallel-sided; very short, not rough; eyes reach vertex; wings normal or in one case very small *not* functional, the transverse vein in fore wings apicad of the basal vein by *much less* than twice its length; posterior tibiae generally strongly toothed, not strongly hairy between the teeth, or sometimes slightly so.....*Priocnemis* Schiødte

Haploneurion chilensis, n. sp.

Holotype female: The sides of the thorax behind the pronotum to the apex of propodeum, the mesosternum, the first tergite (except a narrow apical edge and a large spot back of base, reddish), the extreme apex of second tergite, and a little more than basal one-half of third tergite, black; the rest of body, including all the legs, a reddish yellow; first five joints of antennae same reddish color as body, the apical seven joints darker, dull ferrugineous; ratio of lengths of first four and last two joints are as 50:20:50:50:40:35; third joint of antennae almost five times as long as wide; inner orbits parallel, very slightly convergent at apex; eyes almost reach the vertex, the latter in a smooth curve above the eyes; ocelli small, of equal size, in a very small triangle; lines connecting the inside of the fore ocellus with the inside of each lateral, form an acute angle with each other; lateral ocelli 0.8 as far apart as their diameter, and about 3. as far from eyes as each other; when seen from side there is a prominent depression between base of antennae and base of clypeus; clypeus very slightly convex and from the rise above the groove is almost flat to apex, but sloping a little; posterior orbits rather wide, and vertex and front just back of antennae visible above the eyes; interocular distance at the widest part is 0.60 of trans-facial distance; clypeus slightly more than twice as wide as long; length of second and third antennal joint is 0.8 the distance between the eyes at vertex; width of head not quite 1.1 as long as length; the lateral ocelli in front of a line connecting the top of eyes; lateral ocelli three times as far from eyes as each other; pronotum in a low curve from neck and widest just above fore coxae; ratio of length of pronotum, mesonotum, scutellum, postscutellum, metapostnotum, and propodeum are as 25:40:25:10:30:150; the metapostnotum transversely striate; basal one-third of propodeum almost flat and in one plane, from there in a smooth low curve to apex, swollen on sides at and widest about the middle; abdomen widest at apex of second tergite, more shining than rest of body, last two segments with numerous, upright, golden hairs, directed apically; a medium, impressed, transverse groove on second sternite; wings very

short, reaching to apex of first tergite, hyaline, whitish colorous; only two cubital cells; the second recurrent vein meeting second cubital cell about its apical 0.15, second intercubital vein bowed outward in its anterior third; second cubital cell almost as long on marginal as on cubital vein; third discoidal five-sided, its outer vein perpendicular to the third discoidal cell, the latter not extending beyond the cell; second discoidal cell very narrow; in fore wings the transverse vein apical of the basal vein by two times the length of transverse vein; legs practically free of spines, no trace of teeth on posterior tibiae; ratio lengths of joints of posterior legs starting with femora are as 190:190:140:70:50:30:35 (without claw); a very large tooth on claws just beyond center with broad base and sharp point, almost parallel with the apical ray, much heavier than the apical ray; a fairly large arolia between claws; length head and thorax 4.3 mm.; abdomen 4.5 mm.; fore wing 4.2 mm.; rear wing 3.2 mm.

Holotype female: CHILE, Thorey, 1867 (MCZ).

Paratype female: Corral, Chile, T. Barbour (RRD).

Haploneurion bullocki, n. sp.

Holotype female: The neck, sides of the pronotum, the sides of rest of thorax, all of the metapostnotum, almost all of the posterior slope of the propodeum, the base, sides and posterior half of first tergite, the anterior sides of second tergite (the apical half darkish with some yellowish), the basal three-fourths of the third and a semicircular basal spot on fourth tergite, black; the rest of body, including the legs, bright reddish yellow, except the eyes and ocellar triangle are black; the mouth parts and last ten joints of antennae are also blackish; when seen from the front the vertex rises in a smooth curve, and extends above eyes about width of eyes; the ocelli small, less than their diameter apart, and the laterals about 10 times as far from eyes as each other; the lines touching insides of rear and fore ocelli forming a very acute angle; diameter of ocelli 0.8; distance between the posterior ocelli 0.3; distance between the fore ocellus and the laterals 0.8; distance between the eyes and lateral ocelli 30

(these lengths on same scale as rest of dimensions); a groove from fore ocellus to between antennae, the anterior orbits almost parallel; when seen from the side the front completely raised above eyes, the highest point just at base of antennae, as high as one-half width of eye; antennae long and slender, the lengths of first four and apical two joints are as 50:20:70:60:40:40; fourth, fifth, and sixth joints of antennae slightly excavated at base underneath; clypeus arched and with a hairless rim; cly-

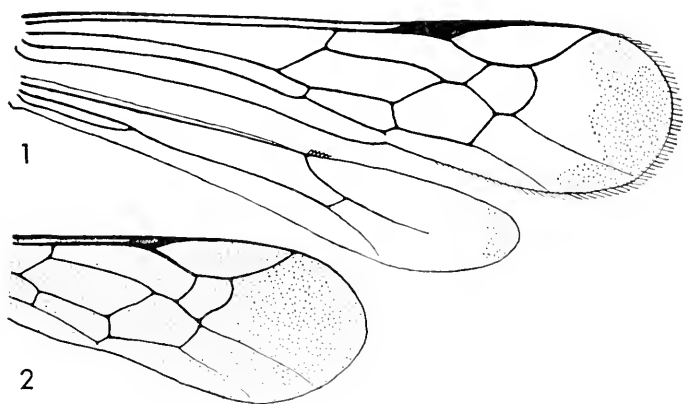


Fig. 1. *Haploncurion bullocki* n. sp. fore and rear wings.

Fig. 2. *Haploncurion minus* Kohl fore wing.

peus two and one-half times as wide as long; interocular length is equal to 0.6 transfacial distance; interocular distance at vertex equal to 0.9 interocular distance at antennae; the distance between eyes at vertex as long as length of second and third antennal joints; head as wide as long; front and clypeus with golden prostrate pubescence; pronotum rising rather sharply from neck; lengths of thoracic segments are: pronotum 50; mesonotum 50; and scutellum postscutellum 10; metapostnotum 20; propodeum 130; the metapostnotum is finely, closely, transversely striated; pronotum bulging just above the fore coxa and the propodeum bulging (widest) just posterior to the slope; body

golden prostrate-pubescent pretty well all over, but more strongly so on apical third of second tergite, and even more so on most of third tergite; ratio of joints of posterior leg beginning with femora: 245:250:160:80:60:30:45 (without claw); a broad based rather sharp tooth on apical three-fourths of claw, parallel to apical ray; second recurrent vein meets second cubital cell at apical fifth; second recurrent vein bowed outward on anterior third; the length of second cubital cell on cubitus equal to its length on medius between first intercubital and second intercubital veins; third discoidal cell five-sided; median vein does not extend beyond third discoidal cell nor does the subdiscoidal vein extend beyond this cell; basal vein in fore wings basad of transverse by three times the length of transverse vein; the marginal cell extends beyond second cubital cell by 0.4 of its length; wings covered with setae; no anal lobe on rear wing; in rear wings submedian cell very small only 0.3 of distance from base of wing to transverse median; anal cell very narrow; tip of fore wings beyond marginal cell blackish, rear wing concolorous; length of fore wing 4.1 mm., rear wing 3.3 mm. (the fore wing reaches to about apex of first tergite); length of head and thorax 6.2 mm., length thorax 3.3 mm., length abdomen 4.0 mm.

Holotype female: Nahuelbuta, Angol, CHILE. 11-4-57 R. Acuna (MCZ).

Haploneurion nitidus, n. sp.

Holotype female: The sides and ventral surface of the thorax behind the pronotum to the apex of thorax, the basal three-fourths or more of first tergite and the basal three-fourths of third tergite, black; the rest of body, including all legs and all of antennae, a reddish yellow; ratio of lengths of first four and last two joints of antennae are as: 50:20:70:65:40:45; eyes slightly convergent, interocular distance at clypeus 90 compared to 110 at vertex; interocular distance at widest part of head is 0.6 of transfacial; head as long as broad; clypeus slightly more than twice as wide as long; ocelli separated from each other by

their diameter and the lateral ocelli three times as far from eyes as each other; the distance between the eyes at vertex is equal to length of second and third antennal joints; ratio of lengths of pronotum, mesonotum, scutellum, postscutellum, metapostnotum are as 60:50:30:10:25:120; propodeum about like *chilensis*; abdomen shining without the prostrate golden pubescence of *chilensis*; the second recurrent vein meeting the second cubital cell at about its apical third; second cubital cell two-thirds as long on marginal vein as on cubital vein; in fore wings the transverse vein is apicad of basal vein by two times length of transverse vein; ratio of lengths of joints of posterior legs are as: 260:270:190:90:70:40:50 (without claw); length head and thorax 6.6 mm., abdomen partly broken, fore wing 3.7 mm., rear wing 3.5 mm.

Holotype female: CHILE, E. C. Reed (U.S.N.M.).

Paratype female: Pucon, Chile, P. Herbst (MCZ).

Key to Genus Haploneurion Kohl—Females

1. Head, antennae, and legs (beyond trochanter) are yellow; thorax and abdomen black; wings black; second recurrent vein meeting the second cubital cell just apicad of the second intercubital vein, almost interstitial but definitely apicad. *minus* Kohl
1. Head, antennae, and legs (including coxae) all yellow, thorax and abdomen mostly yellowish, wings yellowish hyaline. 2
2. Brilliant, glistening, golden patches of pubescence on outside of fore coxae, sides of pronotum, dorsal surface of propodeum, central apex of first tergite, spots on sides and apices of tergites two and three, on sides of propodeum just above second and third pair of coxae, and the clypeus and sides of face; wings completely yellowish; metapostnotum very long, one-half length of propodeum; mesopleura, propodeum and ventral part of thorax black; second recurrent vein meets the second cubital cell much beyond middle of cell but not as far out as apical fifth. *apogonum* Kohl
2. The brilliant, glistening, golden patches of pubescence of *apogonum* not present; metapostnotum not nearly as long as in preceding species. 3
3. Ocelli less than their diameter apart and the lateral ones *ten times* as far from eyes as each other; third antennal joint

- longer than the first or fourth; distance between the eyes at vertex equal to the length of second and third antennal joints; basal vein in fore wings basad of transverse vein by three times length of latter; second recurrent vein meets second cubital cell at apical fifth; second and third tergites with prostrate golden pubescence. *bullocki* n. sp.
3. Ocelli about their distance apart and the lateral ones about *three times* as far from eyes as each other; if prostrate pubescence on second and third tergites it is thin, not strongly golden and not very noticeable. 4
4. Third tergite shining, no pubescence; second recurrent vein meeting second cubital cell at apical third; second cubital cell about two-thirds as long on marginal vein as on cubital vein; basal vein in fore wings is basad of transverse by two times length of latter. *nitidus*, n. sp.
4. Third tergite not shining, but pubescent; second recurrent vein meeting second cubital cell at apical 0.15; second cubital cell about as long on radius as on cubitus; basal vein in fore wings basad of transverse vein by twice length of latter.
- *chilensis*, n. sp.
- These species are all from Chile. This new species is named in honor of Dr. D. S. Bullock, a missionary in Chile, who has sent a great many new species of insects to the museums of the United States.

I wish to thank Mr. Steyskal of Detroit for his kindness in making the drawing of the wings.

Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part XVIII

By CHARLES P. ALEXANDER, Amherst, Massachusetts *

The preceding article under this general title was published in ENTOMOLOGICAL NEWS, 69: 129-136, 1958. Most of the species discussed at this time were collected by the writer, the types being preserved in the Alexander Collection; one interesting crane-fly from Arizona was taken by the late J. August Kusche and is in the collection of the California Academy of Sciences.

Limonia (Limonia) kuschei new species

Belongs to the *eiseni* group; mesonotal praescutum dark chestnut brown with a broad obscure yellow central stripe; pleura dark chestnut brown; wings tinged with brown, patterned with darker, *Sc* long; male hypopygium with the posterior border of the tergite emarginate; gonapophysis with mesal-apical lobe broad, its apex obliquely truncated; aedeagus broad, apex conspicuously bilobed.

♂. Length about 6.5 mm.; wing 7.5 mm.; antenna about 1.3 mm.

Rostrum and palpi black. Antennae black, apex of pedicel paler; flagellar segments passing from oval to elongate, each with one very long verticil. Anterior vertex narrow, light silvery; posterior part of head dark brown.

Cervical region brownish black. Pronotum yellow above, dark brown on sides; pretergites and dorsopleural membrane yellow. Mesonotal praescutum dark chestnut brown with a broad obscure yellow central stripe that represents the confluent median and very reduced lateral areas; scutal lobes chestnut

* Contribution No. 1291 from the Entomological Laboratory, University of Massachusetts.

I wish to express my deepest thanks and appreciation to the authorities of the American Philosophical Society and the National Science Foundation for financial assistance in conducting field studies on Western North American Tipulidae in 1955 and 1956.

brown, narrowly bordered by dark brown, median area gray pruinose; scutellum brownish black; mediotergite brownish black with a gray central area that does not reach the posterior border. Pleura dark chestnut brown. Halteres with stem dusky, knob dark brown. Legs with the coxae and trochanters obscure yellow; femora obscure brownish yellow, tips darker brown, extreme genua vaguely whitened; tibiae and tarsi light brown, outer tarsal segments brownish black; claws long and slender, with a single very long spine before midlength. Wings tinged with brown, patterned with darker brown, including areas at origin of *Rs*, fork of *Sc*, cord and outer end of cell 1st *M*₂; distal ends of outer radial cells darkened; vague subhyaline areas before and beyond origin of *Rs* and beyond the subcircular brown stigma; veins brown. Venation: *Sc* long, *Sc*₁ ending about opposite two-thirds the length of *Rs*, *Sc*₂ near its tip; *Rs* square at origin; *m-cu* shortly before fork of *M*.

Abdomen dark brown, outer dististyle of male hypopygium pale. Male hypopygium with the tergite transverse; posterior border emarginate, forming two broadly rounded lobes, each with about fifteen long setae. Basistyle with the ventromesal lobe short and stout. Dorsal dististyle straight, apex suddenly decurved to a point, surface glabrous. Ventral dististyle small, its total area about two-thirds that of the basistyle; rostral blade very large, spines widely separated, accessory tubercle at base of the prolongation with the usual pair of very long setae. Gonapophysis with the mesal-apical lobe stout, blackened, apex obliquely truncated to appear slightly bilobed. Aedeagus broad, apex conspicuously bilobed.

Habitat. ARIZONA. *Holotype:* ♂, Rustler Park, Chiricahua Mountains, Cochise County, 8,000–9,000 feet, July 28, 1927 (J. A. Kusche).

The species is named for the collector, Mr. J. August Kusche, who collected numerous Tipulidae in California, Arizona and in the Pacific Islands. The most similar Nearctic species is *Limonia* (*Limonia*) *rara* (Osten Sacken) which agrees well in the general appearance and venation, differing conspicuously in the structure of the male hypopygium.

***Limonia (Limonia) indigena loloensis* new subspecies**

♂. Length about 9.5 mm.; wing 9 mm.

Antennae with the first flagellar segment yellow, succeeding two or three indistinctly bicolored, the incisures pale, outer segments more uniformly darkened. Thorax light yellow; pronotum broadly blackened medially; intermediate praescutal black stripes very narrowly separated by a ground line, lateral stripes very pale to subobsolete; scutal lobes with solid brownish black centers; scutellum dark brown, narrowly yellow on central part; mediotergite dark brown. Pleura and pleurotergite yellow, the brown transverse girdle on anterior mesepisternum pale brown, inconspicuous. Legs yellow; femora with a narrow brown terminal ring; remainder of legs brownish yellow, terminal tarsal segments brownish black. Wings much as in the typical subspecies but with the dark pattern even more reduced, including the stigma and the darkened washes in the cubital and anal cells. Abdominal tergites chiefly obscure yellow, the sides broadly dark brown, the dark pattern expanded behind; sternites clear yellow, the extreme lateral borders darkened, especially on the cephalic portions. Male hypopygium with the dististyle much stouter than in typical *indigena*, the length about twice the greatest width; apex produced into a single spine, with a more obtuse denticle on lower margin back from the tip. Tergite with the median notch very shallow or lacking.

Habitat. IDAHO. *Holotype:* ♂, Powell Ranger Station, along Lochsa River, Lolo National Forest, Idaho County, June 24, 1956 (Alexander).

The general coloration of the body and wings in the present fly is much more as in the eastern Nearctic *Limonia (Limonia) indigena* (Osten Sacken) than in the Rocky Mountain race *L. (L.) indigena jacksoni* (Alexander). It may be noted that the aedeagus of the latter is conspicuously setuliferous whereas it is glabrous in typical *indigena*. The condition in the present fly cannot be stated due to the condition of mounting of the hypopygium of the unique type. It seems probable that all three forms here discussed will eventually be found to represent distinct species.

***Limnophila (Phylidorea) nevadensis* new species**

Allied to *snoqualmiensis*; mesonotum almost uniformly fulvous or fulvous yellow, pleura light yellow; femora of all legs yellow with a very narrow pale brown subterminal ring; wings tinged with very pale yellow, stigma dark brown; abdomen brownish yellow, segments seven and eight black to form a conspicuous ring, hypopygium light yellow; male hypopygium with the tergal lobes paired; filaments of aedeagus long and slender; basal gonapophysis a slender blade, its tip subacute.

♂. Length about 9.5–10 mm.; wing 9.5–10 mm.; antenna about 1.9–2.1 mm.

Rostrum dark brown; palpi black. Antennae with scape black, pedicel light yellow; basal flagellar segments obscure yellow, the outer ones darker; verticils conspicuous. Head light gray.

Pronotum slightly infuscated above, yellowed on sides. Mesonotal praescutum and scutum almost uniformly fulvous or fulvous yellow, in cases somewhat darker medially but otherwise unpatterned; scutellum more testaceous; postnotum very vaguely pruinose; in fully colored specimens, including the holotype, a capillary pale brown central vitta on mediotergite and, in cases, involving virtually the whole mesonotum. Pleura and pleurotergite light yellow. Halteres with stem pale yellow, knob weakly darkened. Legs with the coxae and trochanters light yellow; femora yellow, with a very narrow pale brown subterminal ring, subequal in extent to the pale tip; tibiae obscure yellow; tarsi gradually darkened, the outer segments dark brown. Wings tinged with very pale yellow, the prearcular and costal fields more evidently so; stigma dark brown, conspicuous; veins dark brown. Venation: R_s relatively short, about twice R_{2+3+4} , more or less angulated near origin; veins R_3 and R_4 divergent, cell R_3 at margin from about one-third more to nearly twice as extensive as cell R_2 ; cell M_1 longer than its petiole; *m-cu* at or shortly before midlength of cell $1st\ M_2$.

Abdomen brownish yellow, segments seven and eight black, forming a conspicuous ring; hypopygium light yellow, base of

ninth sternite darkened. Male hypopygium with the tergal lobes small, paired. Filaments of aedeagus long and slender, much longer than in *brevifilosa*. Basal gonapophysis a narrow slender blade, shorter and stouter than in *snoqualmiensis*, the tip subacute.

Habitat. NEVADA. *Holotype*: ♂, East side of Lake Tahoe, Ormsby County, 6,800 feet, July 3, 1953 (Alexander). *Paratopotypes*: 4 ♂♂; *paratypes*: Spooners Summit, Douglas County, July 3, 1953 (Alexander). The type was taken along a small stream flowing into Lake Tahoe, described in detail in my field notes as Station No. 2.

The most similar described species is *Limnophila* (*Phylidorea*) *snoqualmiensis* Alexander, of the Pacific Northwest, which differs especially in the pattern of the legs and wings and in slight differences in the structure of the male hypopygium. The types of *snoqualmiensis* have the darkened pattern of the fore legs very extensive but other specimens that appear to be conspecific have it more restricted.

Molophilus (Molophilus) arapahoensis new species

Belongs to the *gracilis* group, *pubipennis* subgroup; size large (wing of male 6 mm.); general coloration of mesonotum dark brownish gray, scutellum testaceous yellow; antennae short, flagellum black; legs brownish black, only the femoral bases restrictedly obscure yellow; wings weakly suffused, macrotrichia of veins long and conspicuous, dark brown; male hypopygium with the apical lobe of the basistyle relatively long and slender; outer dististyle broad, with microscopic spinulae over the entire surface; phallosomic plate broad, outer half narrowed, apex subacute.

♂. Length about 6 mm.; wing 6 mm.; antenna about 1.4 mm.

Rostrum and palpi black. Antennae short; scape brown, flagellum black; flagellar segments long-oval to subcylindrical, verticils of the more basal segments very long. Head dark gray.

Pronotum brownish gray; scutellum and pretergites restrictedly light yellow. Mesonotal praescutum and scutum dark

brownish gray, without clearly defined pattern; pseudosutural foveae pale brown; scutellum obscure testaceous yellow, postnotum brown. Pleura brown. Halteres obscure yellow. Legs with the coxae and trochanters brownish yellow, the posterior pair clear yellow; remainder of legs brownish black, only the femoral bases restrictedly obscure yellow. Wings subhyaline to weakly suffused, prearcular field slightly more yellowed; veins brownish yellow, macrotrichia long and conspicuous, dark brown. Venation: Vein R_2 lying beyond level of $r-m$; petiole of cell M_3 about twice $m-cu$; vein 2nd A strongly sinuous on outer half, ending distinctly beyond the level of $m-cu$.

Abdomen dark brown, the hypopygium only slightly brighter. Male hypopygium with the apical lobe of the basistyle relatively long and slender, subequal in length to the outer dististyle, tip narrowly obtuse; ventral lobe with about 30 spicules. Outer dististyle broad and flattened, the apex bent laterad into a spine; entire surface of style with microscopic spinulae, those near the base smaller; inner style longer, strongly bent at near midlength, terminating in an acute point, with relatively few spines, including a single outer one before the tip and a scattered series of four or more spines along the lower edge, the outer ones smaller. Phallosomic plate broad basally, the outer half strongly narrowed, apex subacute; disk of plate with microscopic setulae, the margins glabrous.

Habitat. COLORADO. *Holotype:* ♂, Milner Pass, Rocky Mountain National Park, Grand County, 10,730 feet, July 19, 1955 (Alexander).

Although evidently allied to other western Nearctic species, as *Molophilus* (*Molophilus*) *kulshanicus* Alexander and *M.* (*M.*) *spiculatus* Alexander, the present fly appears to be quite distinct in the diagnostic characters above listed, especially the structure of the male hypopygium, particularly the outer dististyle and phallosome. All members of the *pubipennis* subgroup of the genus are unusually difficult to determine and exact relationships still are insufficiently known.

Molophilus (Molophilus) dirhaphis new species

Belongs to the *gracilis* group, *nitidus* subgroup; general coloration of body, legs and antennae black; knobs of halteres light yellow; wings strongly darkened; *m-cu* long, very oblique, slightly angulated; male hypopygium with the tergal furcula very shallowly notched; basistyle with the dorsal spine very long and slender; mesal spines two, long and slender; inner dististyle relatively short and stout.

♂. Length about 5.5–6 mm.; wing 5–5.6 mm.; antenna about 1.2–1.3 mm.

Rostrum and palpi black. Antennae black throughout, relatively short; segments oval, shorter than the verticils. Head black.

Thorax entirely black, subnitidous to nitidous. Halteres with stem dusky, knobs light yellow. Legs black throughout. Wings strongly darkened; veins dark brown. Venation: R_{2+3} long, R_2 and basal section of R_5 nearly in transverse alignment or the former more distal in position; petiole of cell M_3 short, less than the very oblique to slightly angulated *m-cu*; vein *2nd A* long, ending about opposite the fork of M_{3+4} .

Abdomen black throughout. Male hypopygium of the type of *nitidus*, differing from all previously described species in structure. Notch of the tergal furcula very shallow, gently emarginate to subtruncate. Basistyle with the dorsal spine very long and slender, extended distad to beyond the level of the apices of the dististyles; mesal spines two, very long and slender. Inner or simple dististyle much shorter and stouter than in *nitidus*.

Habitat. CALIFORNIA. *Holotype*: ♂, Castle Crags State Park, Shasta County, 2,000 feet, July 7, 1953 (Alexander). *Paratopotypes*: 2 ♂♂ on a single pin, July 8, 1953.

Molophilus (Molophilus) dirhaphis is quite distinct from the five other regional members of the *nitidus* subgroup. It is most similar to *M. (M.) nitidus* Coquillett in the elongate mesal spines of the basistyle. In *nitidus* the tergal fork is deep and conspicuous and there is a single mesal spine.

The Ecological Insect Survey of Pennsylvania

By S. W. FROST, The Pennsylvania State University

Having retired from the Pennsylvania State University as of October 1, 1957, the writer feels that it is his duty to summarize the results of Project 1077 of the Agricultural Experiment Station known as, The Ecological Insect Survey of Pennsylvania. He hopes this project will continue and bring forth greater results. An extensive report, now in preparation, will give the origin and purpose of this project, describe Pennsylvania as an ideal ecological unit for such studies, and will list all publications dealing chiefly with Pennsylvania insects. This will constitute part one of the survey.

A large part of the survey is based on the insects which have been assembled by the writer during the past thirty-nine years when he was associated with the Pennsylvania State University. The accumulation of this material has been chiefly a one-man job, without a curator or preparator, and as a side line along with teaching, research and other duties.

Numerous small collections of insects have been purchased or received as gifts. The Bureau of Plant Industry, Harrisburg, donated duplicate Lepidoptera from the Charles S. Anderson collection. Mr. C. A. Thomas turned over his collection of Coleoptera. The Reading Museum donated duplicate Lepidoptera, chiefly exotic material. We have acquired other groups of insects, the J. O. Pepper collection of Homoptera and Hemiptera, the W. W. Long collection of Lepidoptera, chiefly from Western Pennsylvania, and the J. M. Geddes collection, chiefly Sphingidae.

The insect collection comprises approximately 10,000 correctly identified species and between 40 and 50 thousand specimens. It is housed in 47 steel cabinets and 546 U. S. National Museum insect drawers, using the tray system.

This collection is not large but represents a good beginning. It is especially strong in the following groups of which the number of Pennsylvania species and outstanding authorities who have worked on them are indicated. Collembola 27 Ken-

neth Christiansen, Orthoptera 150 V. R. Haber, Neuroptera, Hemerobiidae 10 F. M. Carpenter, Ephemera 85 Isaac Aurelio, Odonata 103 George H. Beatty, Thysanoptera 22 Louis Stannard, Homoptera, Psocidae 18 Kathryn Somerman, Aphidae 300, Cicadellidae 196 and Hemiptera 290 J. O. Pepper, Coleoptera 782 J. N. Knull, W. W. Boyle, W. W. Sanderson, Henry Dietrich and F. Werner, Mecoptera 21 J. O. P. Brown, Trichoptera 111 Cornelius Betten, Lepidoptera 193 Wm. T. M. Forbes and J. G. Franclemont, Diptera 615 S. W. Bromley, E. T. Cresson, F. C. Harmston, Maurice T. James, L. L. Pechuman, R. B. Priddy, G. W. Sabrosky and Alan Stone, Hymenoptera 272 W. G. Bodenstein, William Brown, H. E. Evans, T. B. Mitchell, Louis Stannard and Grade Sandhouse. These figures do not represent the total number of insects in the collection. For example, there are 1,323 species of Coleoptera and 934 species of Lepidoptera from Pennsylvania.

Records of every correctly identified Pennsylvania species are entered on special $8\frac{1}{2} \times 11$ sheets. These records include date of collection, locality, collector, authority for determination, number of specimens in the collection and other important ecological information. In addition similar records of species in other outstanding collections of the state have been added to the files. There are more than 15,000 records of Pennsylvania insects.

The Insect Survey of Pennsylvania has led to numerous publications. Most of these are brief reports of a preliminary nature. Two comprehensive manuscripts have been completed, "The Odonata of Pennsylvania" and "The Tabanidae of Pennsylvania." Both summarize the species in all the collections of the State. Many new records are added and much ecological data is given. These are the first reports ever to be prepared on any of the larger groups of insects of Pennsylvania. In addition to the above manuscripts, a description of the Insect Survey of Pennsylvania, as mentioned previously, is in preparation. These contributions will be published as parts I, II and III of the Ecological Survey of Pennsylvania.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

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By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeschna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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ENTOMOLOGICAL NEWS

NOVEMBER 1958

Vol. LXIX

No. 9

CONTENTS

Hungerford and Matsuda—A new genus for <i>Gerris euphrosyne</i> .	225
Blickle—Eye color of <i>Diachlorus ferrugatus</i>	230
Kannowski—Swarming of the ant <i>Stenamma brevicorne</i>	231
Reinhard—New American Tachinidae	233
Weber—Synonymies and types of <i>Apterostigma</i>	243

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A New Genus for *Gerris euphrosyne* Kirkaldy, (Heteroptera, Gerridae)¹

By HERBERT B. HUNGERFORD and RYUICHI MATSUDA,
Department of Entomology, University of Kansas,
Lawrence, Kansas

Kirkaldy described *Gerris euphrosyne* from Victoria, Alexandria, Australia, and said that the specimens were in the Montandon and Kirkaldy collections. We find in the Kirkaldy collection at the University of Kansas a winged female labeled "*Gerris euphrosyne* type" by Kirkaldy. It also carries the label "Victoria, Alexandria, F. L. Billingham." Carrying this second label we find also a winged male, nine wingless males and four wingless females in the type series, and in the Torre Bueno collection a winged female, and a wingless male and female with the same label. While Kirkaldy wrote that *Gerris euphrosyne* "belongs to typical subgenus" we find that it belongs more closely to the *Tenagogonus-Limnometra* complex than to *Gerris*. Its color pattern is like that of *Tenagogonus-Limnometra* complex and has the pronotum with a median longitudinal black stripe. The metathoracic spiracle is not apically approximated to the pronotum as in *Gerris*, but at some distance away as in *Tenagogonus-Limnometra* complex. Its mesosternum is about four times as long as metasternum, whereas in no species of *Gerris* (except for *Eurygerris*) is the mesosternum more than three times as long as metasternum. It has more characters in common with *Tenagogonus* Stål than with *Limnometra* Mayr but differs from all of them in having the third segment of the

¹ Contribution No. 1,016 from the Department of Entomology, University of Kansas. This report is a by-product of a project conducted with the aid of a grant from the National Science Foundation.

beak shorter and stouter and not reaching onto mesosternum; the second, third and fourth segments of antennae being all short, each one less than two-thirds the length of the first segment, whereas in the *Tenagogonus-Limnometra* complex one or more of these may be as long as or often longer than the first and never all of them shorter than two-thirds of the first segment.

Since we have considered it expedient and useful to retain *Tenagogonus* Stål and *Limnometra* Mayr as separate genera (Hungerford and Matsuda, Univ. Kansas Sci. Bull. 39) it is necessary to propose a new genus for *Gerris euphrosyne* Kirkaldy which belongs to this complex for the reasons given above.

TENAGOGERRIS gen. nov.

Type species of the genus: *Tenagogerris euphrosyne* (Kirkaldy)

Gerrids closely related to *Tenagogonus*. Third segment of beak short and stout, not or barely reaching anterior margin of mesosternum. Second, third and fourth antennal segments short, each one less than two thirds the length of first segment. First front tarsal segment shorter than second. Hind coxa of male covering basal three ventral abdominal segments. Metasternum of male longer than first two ventral abdominal segments.

Male abdomen: Shorter than mesosternum. Last ventral abdominal segment without either connexival spine or with processes, longer than preceding segment. Seventh, eight and ninth segments together longer than or equal to four preceding segments together ventrally. Paramere vestigial.

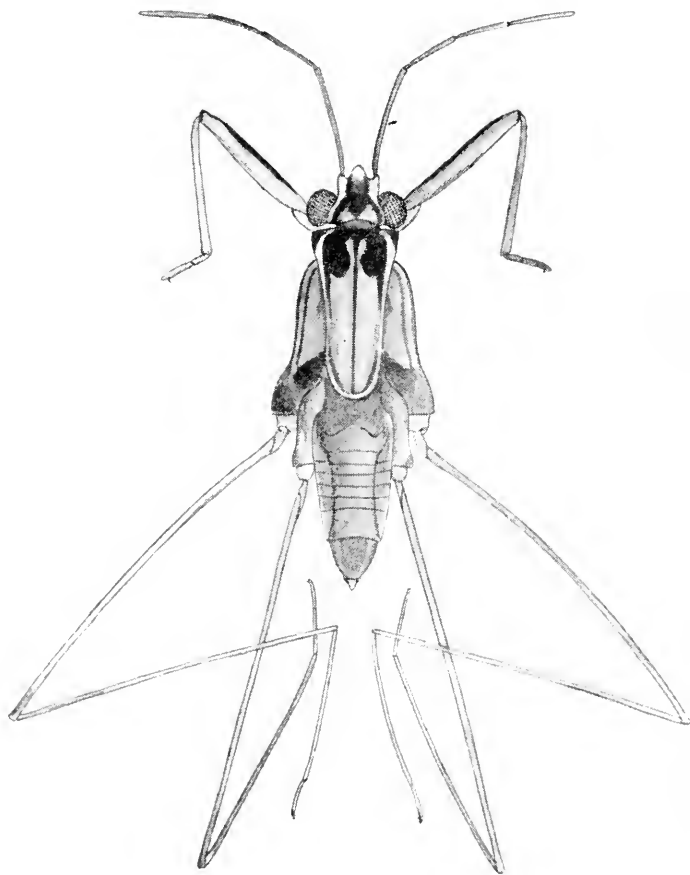
Redescription of **Tenagogerris euphrosyne** (Kirkaldy)

(Figures 1 and 2)

1902, *Gerris euphrosyne* Kirkaldy, G. W. Entomologist, 35: 138.
1925, *Gerris euphrysone* Hale, H. M. Arkiv för Zoologi 17A (20): 11 (typographical error, adds to distribution of type locality which was Alexandria, Northern Territory, six places in Queensland).

1933, *Gerris euphrosyne* Lundblad, O. Archiv für Hydrobiologie, Suppl. Bd. 12, Tropische Binnengewässer, 370.

1934, *Gerris euphrysone* Hungerford, H. B. Bulletin, Brooklyn Entomological Society, 29: 70 (typographical error).



Dorsal view of a wingless male of *Tenagogerris euphrosyne* (Kirkaldy).

Size: Winged female type: Length 9.11 mm.; width across head 1.64 mm.; width across humeri 2.14 mm.; width across mesoacetabula 3.23 mm. Winged male: Length 7.8 mm.; width

across head 1.55 mm.; width across humeri 1.85 mm.; width across mesoacetabula 2.9 mm. Wingless female: Length 9.53 mm.; width across head 1.76 mm.; width across humeri 1.51 mm.; width across mesoacetabula 3.53 mm. Wingless male: Length 6.55 mm.; width across head 1.47 mm.; width across humeri 1.22 mm.; width across mesoacetabula 2.69 mm.

Color: From Kirkaldy, "Head and pronotum ferrugineous; a broad central longitudinal stripe and a sublateral stripe on vertex, a narrow median longitudinal stripe and a sublateral stripe (greatly widened inwardly on anterior lobe) on pronotum, blackish, lateral margins of pronotum pale yellowish. Elytra ferrugineous fumate, nervures blackish. Femora pale fulvous, black at apex, longitudinally banded with same color; tibiae and tarsi blackish. Sterna black, a sublateral undulate stripe yellowish. Venter fawn colour, spotted laterally with black, covered (except laterally) with silver-grey pubescence. Above covered with golden yellow pubescence."

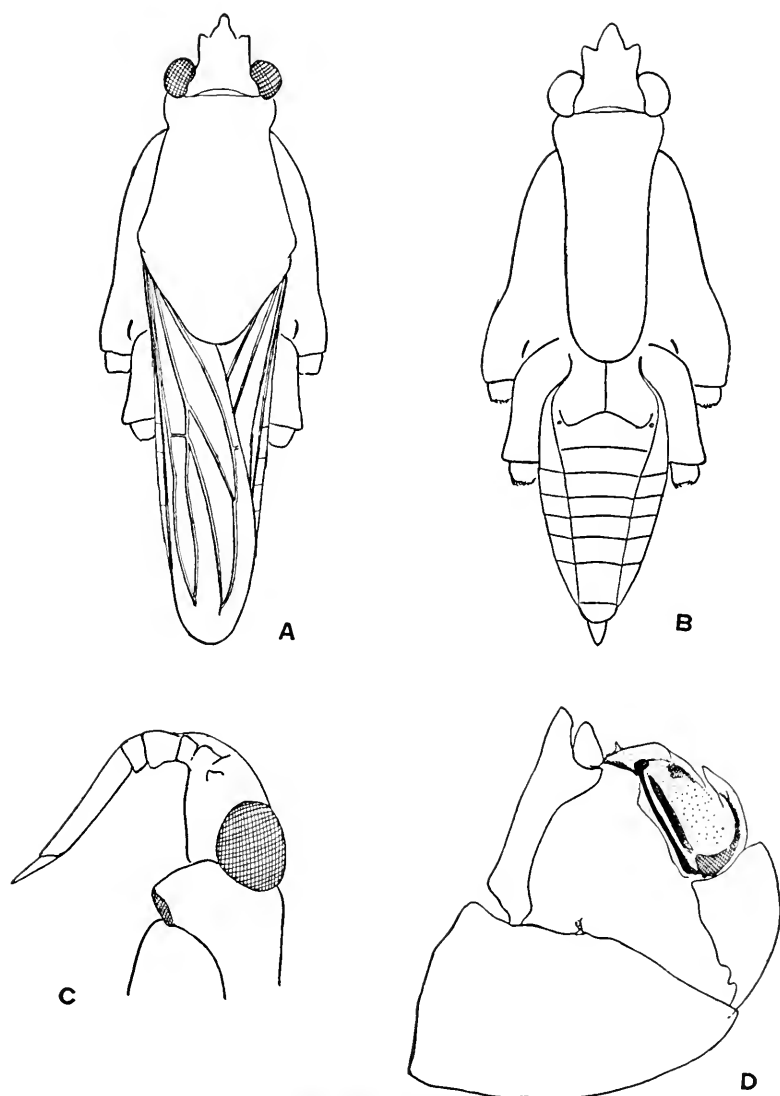
Structural characteristics: Relative lengths of antennal segments of a male: First: second: third: fourth:: 80: 44: 40: 50; of a female:: 114: 63: 55: 58.

TABLE 1. Relative Lengths of Leg Segments of a Male

	Femur	Tibia	1st tarsal segment	2nd tarsal segment	Total of tarsal segment
Front leg	115	110	15	25	40
Middle leg	310	290	120	26	146
Hind leg	295	192	38	20	58

Front femur rather stout, nearly twice the diameter of middle femur. First tarsal segment of front leg shorter than second. Pronotum in winged form with humeri prominent, caudal margin short and broadly rounded; in wingless form caudal margin also broadly rounded and short. Male without connexival spine; pygophore simply rounded on apical margin; paramere vestigial. Female with end connexivum slightly produced.

Location of types. In the Kirkaldy collection at the University of Kansas.



Tenagogerris euphrosyne (Kirkaldy)

- A. Dorsal view of a winged female.
- B. Dorsal view of a wingless female.
- C. Lateral view of the head.
- D. Lateral view of the male genital segment.

Eye Color of Male *Diachlorus ferrugatus* (Fabr.) (Diptera, Tabanidae)

By R. L. BLICKLE^{1,2}

Six male specimens of *Diachlorus ferrugatus* (Fabr.) were obtained from the following locations. Five from light trap material, Leesburg, Florida, May 7, 10, 21, and 24, 1957; one was taken inside the Entomological Research Laboratory, Vero Beach, Florida, June 10, 1957, W. Wood, collector.

The Vero Beach specimen was kept alive for twenty-four hours in order to ascertain the true eye color. The Leesburg specimens still retained the eye color when they were sorted out of the light trap material two weeks after they had been trapped. The color pattern is shown in fig. 1.

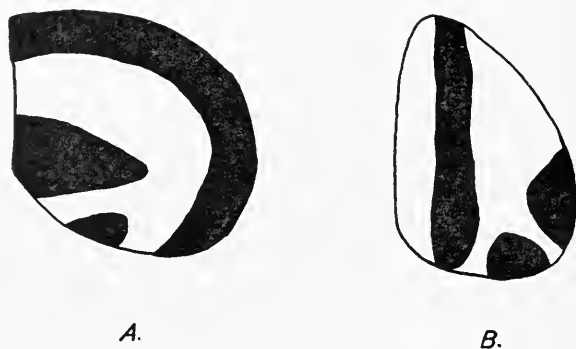


FIG. 1. Eye color of male *D. ferrugatus* (Fabr.). A. Anterior view. B. Lateral view. Shaded areas are dark reddish brown; light areas are a bright green.

The male of *D. ferrugatus* (Fabr.) was first described by Shewell (1947).³ Since the specimen on which his description was based had been dead for sometime and he was not able to restore the color pattern, it seems advisable to figure the color pattern as seen in fresh specimens.

¹ New Hampshire Agricultural Experiment Station.

² Contribution No. 58, Entomological Research Center, Florida State Board of Health.

³ SHEWELL, G. E. 1947. The male of *Diachlorus ferrugatus* (Fabr.) (Diptera, Tabanidae). Can. Ent., 79 (2) : 52.

Swarming of the Ant *Stenamma brevicorne* (Mayr)

By PAUL B. KANNOWSKI, Department of Biology,
University of North Dakota

The alates of most species of ants take part in nuptial flights during which they disperse from the vicinity of the nest. Usually the alates appear to fly long distances—at least out of sight of the viewer. In such cases we can only speculate on when, where, and how mating takes place, and by what means the sexes are attracted to each other. Sometimes the alates, after leaving the nests, will form swarms in which pairing and copulation take place. Ant swarms have been observed rather infrequently, probably because they are often formed at some distance from the nests.

On the afternoon of May 2, 1955, I observed swarming of *Stenamma brevicorne* (Mayr) alates near "Blanchard's Pond" on the outskirts of Ann Arbor, Michigan. The pond, about an acre in size, occupied a shallow depression surrounded by a field which had not been cultivated in the last five years. Around the periphery of the pond were isolated clumps of shrubs and small trees, of which willows (*Salix* spp.) and hawthorns (*Crataegus* spp.) were the most numerous. About 150 yards to the northeast of the pond was a large oak-hickory woodland ("Eber White Woods").

I discovered the swarms about 2:45 p.m. It was a cloudy and moderately warm day (about 70° F.) with very little wind. The swarms had formed at the tops of 8 to 12 foot high hawthorns and willows at the edge of the pond. The hawthorns were in bloom. When I first sighted the swarms from a distance, I assumed that they were composed of bees attracted to the pollen of the flowers. Closer examination revealed that they were alate ants. The alates were not in contact with the trees, but always remained slightly above the tree tops. About a dozen such swarms were found at the tops of these trees. Usually, there was only one swarm per tree top, but several large trees had two swarms each.

Each swarm was composed of 15 to 50 males. These swarms

were observed for an hour and a half, but no females were seen. At 4:15 p.m. it was necessary for me to leave the area, and the observations were terminated. No new swarms were seen to form during the time of observation. Each swarm hovered in approximately the same position during this time. The size varied from swarm to swarm, but each occupied an area that was roughly cuboidal in shape and measured from one to two feet on a side. Movement of an entire swarm seemed restricted to a distance of about one foot in any direction. Within each swarm the males were in continual motion without moving in any set direction.

Stenamma brevicorne colonies seldom comprise more than 200–300 individuals. Probably not more than a few dozen alates are produced each season in a single colony. Thus, the large number of males in these swarms—a total of at least 250—indicates that they came from a number of colonies. I attempted to find the sources of these alates without success. I had previously found this species nesting only in wooded areas in southeastern Michigan. However, parts of the field near the pond were cursorily examined for *Stenamma* nests, but none was found. I next examined a small area in Eber White Woods where I had previously collected *S. brevicorne*. Again I found no evidence of the species. Nevertheless, I believe that these alates most likely came from colonies in Eber White Woods and/or in other nearby woods.

The occurrence of exclusively male swarms is significant. Perhaps they developed because only males took part in flights on this day. The first flights of the season of some species of ants are mostly, if not exclusively, male ones. Possibly this is also true of *S. brevicorne*. On the other hand, both sexes may have taken part in the flights with the males forming the swarms first and the females being attracted later in the day.¹ If the latter hypothesis has any validity, it is necessary to account for the activities of the females from the time of flight until the time they join the swarms.

¹ The only female of *S. brevicorne* that I have taken in flight was collected over a lawn at the Edwin S. George Reserve, Livingston County, Michigan, about 6:15 p.m. on May 30, 1956.

The swarms were observed in an environment quite distinct from that in which nests of this species were located in this region. Evidently the primary attraction for these alates was the top of a tree, not the major environment. Perhaps swarms form at the tops of trees in any local environment. They would, however, be most noticeable where the trees were small and scattered. Additional swarms may form over the trees in the woodlands, but, because of the height of the trees and the dense foliage, they would be difficult to observe. If the alates were attracted to the tree-tops as prominences, the fact that the trees surrounding the pond were isolated may be important. In a more or less open environment any tree-top would likely be a conspicuous promontory. In a woods probably only those individual trees which towered above the general canopy level would attract the alates.

New American Tachinidae (Diptera)¹

By H. J. REINHARD, College Station, Texas

The new species characterized herein were encountered in material received for study from several different sources which are all cited below.

***Phyllophilopsis evanida*, n. sp.**

A small long-legged species differing from the genotype, *P. nitens* (Coq.), most obviously by the presence of a fascicle of recurved spines on the female mid coxae.

Female.—Shining black, thorax thinly pruinose, last three abdominal segments silvery on narrow basal margin. Legs reddish yellow, weakly bristled, elongated. Head silvery pollinose, frontalia subequal parafrontal width, vertex 0.11 of head width; inner verticals decussate, outer equally large and divaricate; ocellars small; two proclinate orbitals and five or six

¹ Contribution No. 2,952, Department of Entomology, Texas Agricultural Experiment Station.

frontals in a single row; narrow parafacial and facialia bare; vibrissae on oral margin; antenna subequal length of face, black, third segment about four times second; arista thickened near base thence slender and short-haired to tip; cheek about one-seventh eye length; eye bare; palpus red, proboscis short. Acrostichals minute before and behind suture; sternopleurals three, lowermost small and sometimes lacking; scutellum with two lateral and one hairlike apical pair. Abdomen bearing a marginal row of bristles on last three segments, no median discals. Wing rather long, hyaline with a yellow tinge; first posterior cell open at wing tip; third vein with one setule near base; calypters glassy white. Genitalia terminating in a short sclerotized piercer-like organ.

Male.—Legs very slender and greatly elongated; fore claws and pulvilli longer than last tarsal segment. Front strongly narrowed above lunule thence subparallel to triangle, frontalia sublinear to completely pinched out above; vertex 0.25 of head width; inner verticals and ocellars hairlike, frontals erect and larger, including ten or more closely set bristles in a single row. Abdomen slender, subequal to length of hind femur, reddish basally. Genitalia wholly retracted within tip of abdomen; forceps fused, tapered to a fine tip.

Length, 3.5–5 mm.

Holotype female and *allotype* male, Shenandoah River, Clark Co., VIRGINIA, September 3, 1923 (J. M. Aldrich) in the U. S. National Museum. *Paratypes*: 5 males and 1 female same data as type; 1 female, Wenonah, N. J., September 5, 1910; 2 females, Chain Bridge, Va., June 30, 1923 (J. M. Aldrich) and Difficult Run, Va., July 7, 1915 (R. C. Shannon); 1 female, Plummerville Island, Md., August 27, 1927 (J. R. Malloch); 1 female ex larva *Endomychus biguttatus* Say, Snowhill, Md., May 19, 1941 (W. H. Anderson); and 1 male, Beltsville, Md., September 3, 1916 (W. L. McAtee), all in the U. S. National Museum. In my collection, 2 females, Babylon, L. I., N. Y., June 19, 1936 (Blanton & Borders); 1 female, Ringwood, N. Y., June 13, 1922 (L. S. West); 1 female, Chester, Mass., August 8, 1911 (C. W. Johnson).

Hemyda decumata, n. sp.

Similar to *H. aurata* R-D, differing mainly as follows:

Male.—Head pollen golden, cheek and occiput gray; antenna black, arista contrasting pale red; thorax black, scutellum reddish beyond middle; sternopleura, humeri, and transverse suture densely golden pollinose, besides two broad prescutal vittae of similar pollen which taper rearward and fade out before suture; legs except tibiae and ventral margin of femora black; wing yellow to smoky brown on costal margin becoming paler or grayish hyaline on posterior half; abdomen elongate and slender, second segment translucent yellow except median line and on narrow hind margin; third segment feebly shining black with narrow basal margin and extreme posterior edge above pale yellow; segment four black with yellow pollen sprinkled thinly over most of upper surface, the following one concolorous but more distinctly shiny above; genitalia as in *aurata*.

Female.—Similar to male except for sexual differences.

Length, 10–12.5 mm.

Holotype male and *allotype* female, Rio Blanco, V. C. Mex., November 13, 1957 (R. & K. Dreisbach). *Paratypes*: 4 males and 2 females, same data as type.

Clairvillia curialis, n. sp.

A shiny black species allied to *C. nitoris* (Coq.), but with decisive differences in the male genitalia.

Male.—Head gray to silvery pollinose; parafrontal rather thickly clothed with fine erect hairs and strongly narrowed above mid front; latter at vertex 0.19 of head width increasing to 0.44 of same at antennal base; frontal bristles longish but rather weak, one or two below base of antenna; ocellars weak, reclinate; inner verticals decussate at tip, nearly as long as vibrissae, which are well above oral margin; facialia broad and flattened, with a few small hairs on lower extremity; antenna jet black, third segment about one-half longer than second; arista bare, little thickened on basal fourth or less, proximal segments short; bare parafacial a trifle narrowed downward;

cheek about one-fifth eye length; proboscis short, palpus black, slender, subequal to haustellum length; eye bare, reaching to vibrissal level; back of head convex below, clothed with intermixed black and pale hairs.

Thorax and scutellum black, surface showing a bluish white sheen in most views. Chaetotaxy: acrostichal 0, 1 (hairlike); dorsocentral 2, 3; intraalar 2; supraalar 3; presutural 1 (outer); notopleural 2; humeral 2-3; pteropleural 1 (small); sternopleural 3; scutellum with 3 lateral (hindmost weak) and 1 decussate apical, no differentiated discals. Legs shiny black; hind tibia with some erect but rather short villous hairs and a row of uneven bristles on outer posterior side; claws and pulvilli elongate. Wing subhyaline slightly yellowish on costal margin; first posterior cell open well before wing tip; third vein with one setule near base; oblique hind cross vein barely its length from rounded cubitulus; costal spine small; calypters large, opaque white with inner rim of hind lobe black.

Abdomen black, last three segments pruinose above in favorable view, hairs on entire upper surface rather sparse, long and erect; one pair of erect median marginal bristles on second segment and a marginal row on the two following ones, no differentiated discals; first genital segment shining black, fused with last abdominal segment, not prominent in profile and directed anteroventrally; second segment subglobose, less shining, hind surface with a uniform vestiture of short black hairs; forceps polished and slender beyond base; latter bearing a pair of short square-tipped hairy appendages on hind side, with a dense cluster of long recurved brown hairs at posterior extremity of the narrowed or free part of the forceps.

Female.—Similar to male, but head bristling stronger, two pairs verticals and proclinate orbitals; vertex 0.26 of head width; frontalia wider than parafrontal; claws and pulvilli short; abdomen elongate, dorsal vestiture appressed; anal cerci strongly bowed inward and forcepslike; fourth segment much shorter than preceding, smooth and polished on basal half above.

Length, 6 mm.

Holotype male and *allotype* female, Cuernavaca, Mex., September 28, 1957 and October 29, 1957 (R. & K. Dreisbach).

Paratype, 1 female, Tepotzlan, Morelos, Mex., September 26, 1957 (R. & K. Dreisbach).

***Paralispidea aperta*, n. sp.**

Similar to *P. unispinosa* (Coq.), but the antennae wholly black and distinctly larger; eyes bare; palpi infuscated; abdomen with discals, etc.

Male.—Front at vertex about two-fifths head width; head gray pollinose on dark background; verticals two pairs; frontals in a single row with two bristles below antennal base; one reclinate and two proclinate fronto orbitals; ocellars proclinate; frontalia reddish, narrower than one parafrontal; antenna as long as face, broad third segment five or more times length of second; black arista micro-pubescent, evenly tapered to slender tip; vibrissae slightly below oral margin; facialia bearing a few hairs on lower extremity; narrow parafacial with a row (sometimes irregular) of short coarse hairs extending from near lower frontal to cheek groove; labella slender, nearly half as long as short haustellum; cheek about two-fifths eye length.

Thorax black, notum dusted with gray pollen, four dark vittae before suture but hardly visible behind, black scutellum subpolished; three post dorsocentrals and two or three sternopleurals; scutellum with three good-sized lateral bristles, discals and apicals not developed. Legs black; mid tibiae with one median anterolateral bristle; claws and pulvilli short. Wing hyaline with a light tawny tinge on costal half or more; first posterior cell nearly closed at wing tip; cubitulus broadly rounded, without stump or fold; hind cross vein about midway between latter and small cross vein; third vein with one good-sized setule near base; costal spine well developed; calypters semitransparent yellowish white.

Abdomen shiny black, narrow basal margin of segments two to four silvery pollinose; discals smallish on intermediate segments and situated far before middle on each, the median marginal pair on segments two and three also set well forward and appearing as discals; one pair of median marginals on first segment, a complete discal row before middle and a submarginal row of smaller bristles on anal segment; genital black, small and

retracted in repose; forceps fused, very short tapering to an acute tip slightly bowed forward; accessory process much wider in profile and blunt-tipped; penis slender, jointed and bowed forward near middle, basal segment compressed and reddish, the distal one shining black and depressed, terminating in a minute membranous tip.

Female.—Quite similar to male.

Length, 5–6 mm.

Holotype male and *allotype* female, Waquoit, MASS., September 21, 1910 (Owen Bryant) in the U. S. National Museum. *Paratypes*: 2 males same data as type; 4 males and 1 female, Riverhead, L. I., July 4, 1952, October 9, 1953, Orient, October 19, 1952 and Greenport, L. I., August 14, 1952, all collected by Roy Latham and in the U. S. National Museum. In my collection, 1 pair, Selden, L. I., N. Y., September 9, 1934 (Blanton & Borders) and 2 males, Amherst, Ohio, July, 1933 (H. J. Reinhard).

***Nephoteropsis erotema*, n. sp.**

Quite similar to *N. johnsoni* (Coq.) in most essential details but readily distinguished on wing color and abdominal pollen patterns, among other characters as listed below.

Female only.—Front wide, at vertex 0.4 of head width; head pollen gray with a brassy tinge on parafrontalia; latter narrower than frontalia; antenna black third segment widening uniformly to broad apex and about three times longer than second; arista micro-pubescent, second segment fully three-fourths third; bare parafacialia much narrowed near mid face level and widening slightly above and below; cheek about one-third eye length; palpus short, spatulate. Thorax with heavy brassy gray pollen on mesonotum, no vittae; three post dorsocentral bristles, pre-scutellars differentiated, three sternopleurals but the lowermost weak. Legs black; apical segment of fore tarsus not noticeably widened and about equal to length of preceding one; claws and pulvilli small. Wing yellowish basally, but distinctly infuscated from tip of subcostal to apex of second longitudinal vein including apical fourth of subcostal, entire marginal and ante-

rior border of submarginal cell, thence subhyaline to hind margin; costal spine distinct but not very long. Abdomen shining black to violaceous above, with silvery pollen confined to narrow lateral basal margin of intermediate segments; anal segment with an arcuate row of discals but no distinct marginals, a complete row of erect marginals on third segment; genitalia retracted within anal orifice.

Length, 4 mm.

Holotype: Orient, L. I., NEW YORK, July 9, 1952 (Roy Latham). *Paratype*: 1 female, Falls Church, Va., September 5, 1915 (C. T. Greene). The type series is in the U. S. National Museum.

***Aplomya doloma*, n. sp.**

Differs from *A. trichiosomae*, to which it traces in Sellers' key (Proc. U. S. N. M., 93: 72-75), in having the last three abdominal segments more extensively pollinose above; third antennal segment barely one-half longer than second; third vein with a single setule near base, etc.

Male.—Head pollen subsilvery, parafrontal blackish above middle and slightly narrower than frontalia; vertex 0.24 of head width; inner verticals erect, ocellars proclinate, four or five frontal bristles below antennal base; bare parafacial well narrowed below; facialia with bristles and bristly hairs on lower fourth or less; vibrissae on oral margin; antenna black, third segment wider than parafacial; arista micro-pubescent, moderately thickened near base thence tapering and very slender to tip; eye thickly pilose, reaching to vibrissal level or slightly below; cheek about one-ninth eye length; haustellum short, thick, labella large; palpus red, thickened apically and beset with numerous black hairs.

Thorax black lightly dusted with pale pollen and feebly shining, dorsal vittae poorly defined, four in front and five behind suture; scutellum sometimes tinged with red apically; three post dorsocentral and three sternopleural bristles. Legs black, long but not very slender, mid tibia with three anterodorsal bristles, hind tibia not ciliate; claws and pulvilli subequal to

combined length of last two tarsal segments. Wing gray hyaline; hind cross vein in plane of apical and about two-thirds its length from cubitulus; latter normally without stump or fold; costal spine vestigial; calypters opaque white.

Abdomen shining black, last three segments with gray pollen above extending thinly to hind margin of each in favorable light, hairs on entire upper surface long and erect; normally one pair of median marginals on first and two on second segment, a marginal row on third and fourth besides irregularly spaced discs on last and usually one weaker pair on each intermediate segment; genital forceps rather long and thin in profile on apical half, prongs separated but contiguous to tip; accessory process thin and bladelike, considerably shorter than forceps and bearing a vestiture of minute spinose hairs on outer side; fifth sternite with a deep U-shaped median excision, lobes sparsely clothed with fine longish black hairs.

Female.—Vertex 0.29 of head width; outer verticals well developed; two stout proclinate orbitals; abdominal hairs erect but shorter and coarser than in male; claws and pulvilli shorter than last tarsal segment.

Length, 10–11 mm.

Holotype male and *allotype* female, Cranberry Gls., W. VA., August 10, 1952 (F. W. Meade), in the U. S. National Museum. *Paratypes*: 1 pair Glacier National Park, July 27, 1947 and 3 males, Teton Pass, Wyoming, August 2, 1947, all collected by F. A. Cowan and M. R. Wheeler.

***Hypertophomma subita*, n. sp.**

A small compactly built black fly allied to *H. opaca* Tns., from which it is at once distinguished in having jet black palpi.

Female.—Face and front equibroad from vibrissae to vertex, latter 0.32 of head width; eye uncommonly large extending from upper to near lower head margin, leaving cheek linear in profile and posterior orbit also nearly obliterated; parafrontal gray pollinose, narrowed upward and subshiny black before vertex; frontalia deep velvety brown, fully four times parafrontal width; two pairs verticals and proclinate orbitals; frontal row extend-

ing two bristles below antennal base; ocellars proclinate; para-facial gray pollinose, narrowed and pinched out at lower extremity; facialia vertical, bearing three bristly hairs next to vibrissae, which are on oral margin; antenna black, third segment three times second; arista black, thickened on proximal third; proboscis short, palpus practically bare and distinctly spatulate.

Thorax and scutellum shining black with a whitish bloom apparent over most of upper surface in favorable light; three post dorsocentral bristles, two sternopleurals, scutellum with three lateral, one decussate hairlike apical and one poorly differentiated discal pair. Legs black, claws and pulvilli minute; mid tibia with one weak anterolateral bristle, hind tibia subpectinate. Wing gray hyaline, veins brown, third with two or three setulae near base; first posterior cell narrowly open shortly before wing tip; hind cross vein midway, cubitulus broadly rounded; costal spine not developed; calypters translucent tawny.

Abdomen ovate about as broad as long, shining black with basal margin of last three segments lightly dusted with whitish pollen; one pair of median marginals on first three segments and a marginal row on last, no discs. Male unknown.

Length, 3.5 mm.

Holotype, Huajitlan, Morelos, MEX., September 27, 1957 (R. & K. Dreisbach).

***Thelairodoria floscula*, n. sp.**

Similar to *T. thrix* Tns. (genotype), but the head and mesonotal pollen wholly silvery gray; two or three frontals below antennal base; facialia ciliated on about lower fourth, etc.

Male.—Front at vertex 0.22 of head width, equibroad on upper third, thence evenly divergent into facial angle; frontalia deep brownish, narrower than parafrontal; two strong reclinate preverticals and one (inner) vertical, ocellars a bit weaker and proclinate; antennae black, third segment about five times second; arista micro-pubescent, very slender beyond slightly thickened proximal fifth; facialia subvertical, with bristly hairs on lower third or less; vibrissae large, on oral margin; bare para-

facialia equal to facialia inverted; eye pilose, extending almost to vibrissal level; cheek barely one-seventh eye length; proboscis short, palpus red, beset with short black hairs on thickened apical half; back of head rather densely pale-haired below.

Thorax and scutellum black dusted with gray pollen leaving four black notal vittae, inner pair narrow, the outer ones broader but widely interrupted at suture. Chaetotaxy: acrostichal 3, 3; dorsocentral 3, 3; intraalar 3; supraalar 3; presutural 1 (outer); humeral 2-3; sternopleural 2; pteropleural 1 (small); scutellum with 3 strong lateral, 1 weak decussate apical and 1 poorly differentiated discal pair. Legs black, normal in length; hind tibia subpectinate and one stoutish median bristle on outer front side of mid tibia; claws and pulvilli longer than last tarsal segment. Wing subhyaline, reaching beyond apex of abdomen; first posterior cell narrowly open a little before wing tip; hind cross vein slightly over its length from broadly rounded cubitus; third vein setulose almost to small cross vein; costal spine vestigial; calypters opaque white.

Abdomen conical, shining black, intermediate segments dusted with gray pollen which extends thinly to or beyond middle of each in favorable angle; one pair of median marginals on segments one and two and a marginal row on three and four; genitalia black, wholly retracted within tip of abdomen; fused forceps rather strongly tapered on basal half thence polished and beaklike to apex; accessory process quite slender from base to tip and a trifle shorter than forceps, setose on outer side.

Female.—Vertex 0.24 of head width; outer verticals not developed; two pairs of proclinate and reclinate orbitals but uppermost much smaller; third antennal segment four times second; fourth abdominal segment more pointed than male, with discal bristles on apical half above; claws and pulvilli small, fore tarsi moderately wide and flattened.

Length, 6-7 mm.

Holotype male and *allotype* female, Gainesville, FLA., July. 29-Aug. 3, 1955, at light, in U. S. National Museum. *Paratypes*: 3 males same data as type except dated Sept. 9-23, Oct. 6-14, and Nov. 6-14, 1955 and 1 female, Atlanta, Ga., Jun. 19, 1949 (P. W. Fattig) all in the U. S. National Museum.

Synonymies and Types of *Apterostigma* (Hym: Formicidae)

By NEAL A. WEBER, Swarthmore College,
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The genus *Apterostigma* Mayr is confined to the mainland of Tropical America and most of the species are found in rain forest. The ants depend for food entirely on a basidiomycete fungus that they culture like other members of the tribe Attini. Many of the described forms are still recorded only from the original collections and normal infraspecific variation has been largely unknown. Recent examinations of types in European and American museums¹ and biological studies have for the first time made possible the following synonymies. Hitherto the geographical distribution of the species has appeared limited but the present synonymies reveal a widespread distribution of some like the situation in other attine genera which have recently been re-studied.² Little on the habits of the species has been published except for the 1893 studies of Möller and those of myself. Fortunately the changes in names involve only those of the latter. As in other attine genera, color, size, sculpturing and pilosity are bound to vary within members of one colony.

Apterostigma auriculatum Wheeler

1925. *Apterostigma auriculatum* Wheeler, Arkiv f. Zool. 17A: 49-50.

1925. *Apterostigma auriculatum* var. *demerarae* Wheeler, Arkiv f. Zool. 17A: 51. New Synonymy.

1940. *Apterostigma immobile* Weber, Rev. de Ent. 11: 418-419. New Synonymy.

1945. *Apterostigma wasmanni*, Weber, Rev. de Ent. 16: 36-39.

Wheeler described *auriculatum* from Trinidad and the variety *demerarae* from British Guiana. The differences appear insignificant in the light of later studies. The cotypes of *wasmanni*

¹ Supported by a grant from the National Science Foundation. The museums are cited in the publications below and, in addition, types in the Museum of Comparative Zoology, Harvard, have recently been examined.

² Weber, N. A. 1958. Ent. News 69: 7-13, 49-55; Proc. Ent. Soc. Washington (in press).

secured in 1957 show this to be an unrelated species. The species *immobile* was described from the Panama Canal Zone and was noted at the time as close to *wasmanni* and *auriculatum* but separated by a median unpaired tooth in the meso-epinotal impression, posterior to the pair of lobes here. While this is a distinctive character in the specimens mounted then for study, not every specimen in the colony shows this and several South American specimens show it feebly. The ants are otherwise unusually and deeply punctate but are probably best considered, as in other attines, members of a variable and wide-ranging species.

Colonies have since been taken on Barro Colorado Island, Canal Zone, and the fungus cultured.

***Apterostigma auriculatum* subsp. *icta* Weber**

1937. *Apterostigma wasmanni* subsp. *icta*, Weber, Rev. de Ent. 7: 393.

1945. *Apterostigma wasmanni icta* Weber, Rev. de Ent. 16: 39.

The exact status of this form, known only from a Trinidad dealate female, must await more comparative material. It differs particularly from Trinidad females of *auriculatum* in lacking the strongly marginate gaster, darker color (possibly unimportant) and less sharply depressed incipient frontal scrobes.

***Apterostigma auriculatum* subsp. *petiolatum* Weber**

1938. *Apterostigma wasmanni* ssp. *petiolatum* Weber, Rev. de Ent. 9: 175-176.

Cotypes are paler and with higher thoracic ridges than Trinidad or British Guiana *auriculatum*. When more material is produced, *petiolatum* may not be sustained.

***Apterostigma billi* Weber**

1938. *Apterostigma billi* Weber, Rev. de Ent. 9: 165-166.

This species is close to *auriculatum* and *petiolatum* above, rather than to *wasmanni*. It has the broad, coarsely sculptured

head with transverse anterior clypeal margin of *auriculatum* but the frontal lobes are distinctly more irregularly convex. The petiole is clearly longer and lower. The thoracic ridges and gastric carinae are comparable.

Apterostigma bolivianum Weber

1938. *Apterostigma bolivianum* Weber, Rev. de Ent. 9: 181–182.

This species is close to *auriculatum*, *petiolatum* and *billi* but lacks well defined meso-epinotal lobes and is generally less rugose. All may prove to be one variable species complex when more material is available.

Apterostigma calverti Wheeler

1911. *Apterostigma calverti* Wheeler, Psyche 18: 206–207.

Two pins of cotypes were borrowed from the American Museum of Natural History. One, of three workers, bore the label “Juan Viñas, Costa Rica, in Bromeliads, Calvert” and the other, of three alate females, bore the label “Banana River district, Costa Rica, Early xi, 1909. Calvert.” In the original description Wheeler refers to 12 workers, one dealated and five winged females taken by Dr. P. P. Calvert during October and November 1909 as the material seen by him. All were taken between overlapping leaves of bromeliads 12–15 feet above the ground in their fungus gardens.

Cotype workers of *dubium* (= *dentigerum*) differ particularly in having longer necks, more irregularly angulate frontal lobes and sharply carinate gastric margins. The female *dubium* has a longer neck, more rounded frontal lobes and more marginate gaster. Workers of *collare* have similar frontal lobes but still longer necks and gastric carinae. Cotypes of all castes of *branneri* (= *robustum*) are close but have longer necks and smoother pleurae of the prothorax.

***Apterostigma collar* Emery**

1896. *Apterostigma collar* Emery, Bull. Soc. Ent. Ital. 28: 67-68.

The Emery collection has the holotype dealate female with a single, much-folded label: "Coleccion De Anastasio Alfaro, *Apterostigma collar* Em., Costa Rica, Suerre, Nov. 1895." The thorax length is 1.77 mm., the petiole from above 0.25 mm. wide, the postpetiole from above 0.48 mm. long by 0.51 mm. and there are no gastric carinae. The ant is glued by the side, making head measurements difficult.

The reference to typical *collare* females and workers (Weber 1938, Rev. de Ent. 9: 169) from Hamburg Farm, Sta. Clara Pr., Costa Rica was based upon comparisons with Emery's original description. One of these workers when compared with the female type shows no important differences.

***Apterostigma dentigerum* Wheeler**

1925. *Apterostigma dentigerum* Wheeler, Arkiv f. Zool. 17A: 51-54.
1938. *Apterostigma collar* ssp. *dubium* Weber, Rev. de Ent. 9: 168-169. New Synonymy.
1938. *Apterostigma collar* ssp. *angulatum* Weber, Rev. de Ent. 9: 169-170. New Synonymy.
1941. *Apterostigma dubium* Weber, Rev. de Ent. 12: 110.
1941. *Apterostigma angulatum* Weber, Rev. de Ent. 12: 111-113.

The types ("numerous workers, a single female and two males") were taken "from a small flattened fungus garden under a large stone in the jungle at Zent, Costa Rica, Dec. 1911." The worker was figured as *angulatum* (Rev. de Ent. 9: 163, fig. 4, : 171, fig. 12 and as *dubium* (*loc. cit.*, figs. 6, 14, 19) by the author from Panama Canal Zone specimens. The descriptions allude to the angulate frontal lobes as the outstanding worker character. There are now six pins in the Museum of Comparative Zoology labelled cotypes (No. 23238) that total 14 workers, one female and three males and were taken December 8, 1911, by W. M. Wheeler. The female has the same thorax length as

a Barro Colorado Island, Canal Zone specimen and males from the latter locality are also similar.

The *dubium* description alluded to the marked similarity of the worker of this and *angulatum*, while the female of *dubium* had the rounded frontal lobes characteristic of most other species. The holotype of *dubium* is not conspecific with a cotype female of *calverti* nor with a syntype of *collare*. Whether or not this represents a case of dimorphism in the female caste of *denticgerum* or of an adoption of the female of one by workers of the other (in which case mixed colonies should be found) cannot now be determined.

Apterostigma ierense Weber

1937. *Apterostigma ierense* Weber, Rev. de Ent. 7: 387-388.

1937. *Apterostigma fitzgeraldi* Weber, Rev. de Ent. 7: 393-394. New Synonymy.

This small and striking species and the closely related *gibbum* differ markedly from others known in having a separately raised mesonotum and in having a tubercle or carina (vestigial in *gibbum*) at either side of the smooth meso-epinotal impression. The holotype of *fitzgeraldi* differs distinctly from *ierense* cotypes in darker color, in having reduced meso-epinotal tubercles and in sculpture, but additional collecting in Trinidad, the type locality for both, will probably show that these differences are infra-specific. *A. gibbum* of Bolivia is larger and with the gibbosity of the prothoracic pleurae more prominent.

Apterostigma luederwaldti Santschi

1923. *Apterostigma luederwaldti* Santschi, Ann. Soc. Ent. Belg. 63: 66-67.

The Santschi collection contains two pins of types (No. xxi.v.d. 3383) labelled: "Brésil, São Paulo, Luederwaldt." The thorax of a worker was 1.32 mm. long. It is close to *manni* but compared with *manni* cotypes the latter has a more convex dorsal surface of the epinotum, lacks the distinct though small tubercle on the declivous surface of the mesonotum and is a smaller ant.

Luederwaldti has large, angular frontal lobes; these are smaller and convex in *manni*.

***Apterostigma mayri* Forel**

1893. *Apterostigma mayri* Forel, Ann. Soc. Ent. Belg. 37: 604.
1912. *Apterostigma Mayri* var. *discrepans* Forel, Mem. Soc. Ent. Belg. 19: 190. New Synonymy.
1922. *Apterostigma abdita* Mann, Proc. U. S. Nat. Mus. 61 (Art. 13): 50-51. New Synonymy.
1937. *Apterostigma mayri* var. *pallidum* Weber, Rev. de Ent. 7: 388-389. New Synonymy.
1938. *Apterostigma mayri* ssp. *zip* Weber, Rev. de Ent. 9: 166-168. New Synonymy.

The Forel collection has four pins marked "Typus." One with two workers has the label "A. Mayri Forel ♂ Trinidad (Urich) 47." These were compared with my Nariva Swamp, Trinidad (No. 140.1) workers and found to be identical as were my British Guiana (No. 326) and Barro Colorado Island, Canal Zone (No. 3437) workers. The color differences of the female and worker of *pallidum* are no longer considered significant and the characters of *zip* are believed to fall within the infraspecific range. The variety *discrepans* was compared by Forel with *pilosum* and *mayri*; its description makes it unclear how best to treat it but there is no evidence to retain it as a form of *mayri*. Cotypes of *abdita* show characters identical with *mayri*, including the terminal antennal segment.

Specimens taken by the author at Rio Porce (Lat. 6°40' N., Long. 75°10' W., 3,300 feet) and above Medellín at 5,700 feet, Colombia in 1938 are of *mayri*.

***Apterostigma pilosum* Mayr**

1864. *Apterostigma pilosum* Mayr, Novara Riese, Zool. Thiel, Formicid. 2: 113.

Of the six pins in the Emery collection under this species, the first bore only the label "Apterost. pilosum Bras M" and appears to mean "Brasil, Mayr." It may well be a cotype worker received from Mayr. The second pin was not of the same species and is from Matto Grosso (Germain). Mayr described the spe-

cies from Rio de Janeiro, Brazil, although in 1887 he listed the worker and female from St. Catharina, Brazil. Forel listed the female and male in 1912 from Rio de Janeiro (Göldi).

The above possible worker cotype is a typical member of the genus with a long neck, small and evenly convex frontal lobes, no meso-epinotal tubercles and no gastric carinae. The post-petiolar node from above was 0.35 mm. long \times 0.45 mm. wide and the thorax length was 1.62 mm. It differed distinctly when compared with types of *amiae* (= *robustum*), *bolivianum*, *dorotheae*, *gibbum*, *ierense*, *immobile* (= *auriculatum*), *manni* and *tramitis*.

***Apterostigma tramitis* Weber**

1940. *Apterostigma tramitis* Weber, Rev. de Ent. 11: 417–418.

As noted in the original description, this species is close to *mayri*, differing in the shorter and stouter terminal antennal segment. This, in cotypes of *tramitis*, is 0.35–0.36 mm. \times 0.17 mm. while in Trinidad *mayri* it is 0.40 \times 0.16 mm. It is temporarily retained as a separate species although it may fall as a synonym.

***Apterostigma dorotheae* Weber**

1937. *Apterostigma dorotheae* Weber, Rev. de Ent. 7: 389–390.

As noted in the original description, this species is close to *mayri* but differs particularly in coarser sculpturing. The carinae of the mesonotum are well defined and in most cotypes are produced as lobes.

***Apterostigma robustum* Emery**

1896. *Apterostigma robustum* Emery, Bull. Soc. Ent. Ital. 28: 66–67.

1916. *Apterostigma branneri* Mann, Bull. Mus. Comp. Zool. Harvard 60: 456–457. New Synonymy.

1925. *Apterostigma jubatum* Wheeler, Arkiv f. Zool. 17A: 47–49. New Synonymy.

1937. *Apterostigma amiae* Weber, Rev. de Ent. 7: 391–392. New Synonymy.

1938. *Apterostigma robustum* ssp. *constrictum* Weber, Rev. de Ent. 9: 173-175. New Synonymy.
1938. *Apterostigma robustum* ssp. *tic* Weber, Rev. de Ent. 9: 170. New Synonymy.

The holotype in the Emery collection is a worker with the labels: "Jiménez" and "*robustum* n. sp." The thorax is 2.08 mm. long, the postpetiolar node 0.54 mm. long by 0.63 mm. wide, the neck is broad and there are no gastric carinae. The differences with the subspecies *tic* of Costa Rica, based on Emery's description, do not exist and the two forms are the same when directly compared. Types of the other listed synonyms show minor infraspecific differences.

The gynetype female of *jubatum* from British Guiana in the Museum of Comparative Zoology was compared with females of *constrictum* from Bolivia and is conspecific. The feeble gastric marginations or carinae appear to be variable in development as are the anterior pronotal lateral gibbosities and neck dimensions. The neck is best developed in the *branneri* cotypes and the worker pair of anterior pronotal lobes the least separated.

The types of *branneri* were taken in Brazil (a colony each at Abuna and Madeira-Mamoré R.R. Camp 39) and were likened to *calverti* of Costa Rica. The British Guiana cotypes of *amiae* are slightly smaller, less rugose on the thorax and somewhat intermediate but clearly conspecific with *branneri* when compared with Abuna cotypes of the U.S.N.M. The *amiae* may have come from a younger colony. The *branneri*, compared with *calverti* cotypes, show the two species indeed to be closely related and separated most distinctly by the larger frontal lobes in worker and female castes of *branneri* (and *robustum*). *Jubatum* was compared originally only with *branneri*.

It is clear that *robustum* is a widespread species that has been redescribed under different names because the holotype and only known specimen has not been used directly for comparisons.

Apterostigma urichi Forel

1893. *Apterostigma urichi* Forel, Ann. Soc. Ent. Belg. 37: 603.
1937. *Apterostigma urichi* var. *nitidum* Weber, Rev. de Ent. 7: 392. New Synonymy.

1937. *Apterostigma urichi* var. *guianense* Weber, Rev. de Ent. 7: 393. New Synonymy.

The Trinidad and British Guiana distribution and habits of this species have been described (Weber, 1945, Rev. de Ent. 16: 29-34 and 1946, *loc. cit.*, 17: 138-140). Since 1937, additional collecting and study have shown that *nitidum* and *guianense* are probably infraspecific variants of doubtful taxonomic value. This species has seldom been collected but must have a wider distribution.

***Apterostigma wasmanni* Forel**

1892. *Apterostigma wasmanni* Forel, Mitt. Schweiz. Ent. Ges. 8: 345.

There were four pins in the Forel collection marked "typus." One, with three workers, bore the labels "A. Wasmanii Forel, ♂, Blumenau, Möller 39a." Another with two workers was labelled "A. Wasmanii Forel, ♀, Möller F, Blumenau, Sur Brésil." A pin of two workers was secured in an exchange with Dr. Ferrière. It bears the labels "Cotypus" and "A. Wasmanii Forel, ♂, Blumenau, Möller 39a." The Emery collection has two pins of ants under *wasmanni*, one a worker from Rio Grande (Ihering), the other being a male with the single pencilled label: "Wasmannia, Blumenau." Forel's original descriptions were drawn from workers and males of Blumenau, Santa Catharina, South Brazil.

The cotypes of the author have total extended lengths of 4.1 and thorax lengths of 1.59 mm. and include the following characters: clypeus produced as a broadly convex apron covering the mandibular bases, frontal lobes angulate, neck short and broad, thorax with a longitudinal median pair of carinae of irregular form which disappear in the meso-epinotal region and are feebly developed on the epinotum. Lateral to the carinae on the mesonotum is an angular tubercle on either side; the petiolar node is angulate above and the sides of the gaster are carinate. A closely related species is *A. manni* Weber, which has the frontal lobes less angulate and the body in general less rugulose; the types are distinctly smaller.

EXCHANGES

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By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna*, *Coryphaeschna*, and *Castoraeschna*, *Aeshna* in its turn being subdivided into the subgenera *Aeschna*, *Hesperaeschna*, *Rhionaeschna*, *Schizuraeschna*, *Marmaraeschna* and *Neureclipta*. These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna*, 1 species of *Schizuraeschna*, 1 species of *Neureclipta* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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DECEMBER 1958

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No. 10

CONTENTS

Swartzendruber—Permeability of sensory hairs	253
Hungerford and Matsuda—Another generic entity of Gerridae ..	258
Svihla—The nymph of Tanypteryx hageni	261
Hungerford, Leidy Medalist	266
American Entomological Society Centennial	267
Indexes and title page to Volume LXIX	269

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No. 10

The Permeability of Certain of the Sensory Hairs on the Antennae of Lacewings (Neuroptera: Chrysopidae)

By DONALD C. SWARTZENDRUBER, Department of Zoology,
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INTRODUCTION

Slifer (1954) reported that the largest of the basiconic sensilla which are present on the antennae of grasshoppers are permeable at the distal tip to aqueous solutions of dyes, such as acid fuchsin, both in the living condition and in preserved material. Trichoid sensilla and two smaller types of basiconic sensilla as well as coeloconic sensilla present on the antennae were found, at that time, to be unaffected by the dye. Later, coeloconic sensilla were found by Slifer (1955) also to be permeable at the distal tip to a dye solution. In 1956, Slifer reported that two smaller types of basiconic sensilla were permeable to dyes, though not at the distal end of the sense organ, but at or near the base of the peg. The evidence presented indicates either (1) that the waxy or lipid layer of the cuticle which imparts the property of impermeability must be missing from the tips of the largest basiconic sensilla and from a small area near the base of the smaller pegs, or (2) that the entire cuticle must be missing in these areas in the grasshopper. Slifer (1954, p. 127) states that: "Whether insects other than grasshoppers also possess basiconic pegs which are permeable to water and dyes is not known with certainty at present. A few adults belonging to other orders (Collembola, Thysanura, Dermaptera, Isoptera, Neuroptera, Coleoptera, Hymenoptera and

(253)

Diptera) were tested with interesting but inconclusive results." It is the purpose of this paper to show that in the living lacewing the distal end of certain of the sensory hairs present on the antenna is permeable to aqueous solutions of a dye.

The sense organs which are present on the antenna of the lacewing, *Chrysopa perla* Linnaeus, were described by Hauser (1880) as tactile bristles (*Tastborsten*) and pegs (*Zäpfchen*). Ruland (1888) described curved or arched pegs (*knieförmig gebogenen Zäpfchen*) which are present on the antenna of the same species. Röhler (1906) briefly reviewed the literature concerning neuropteran antennal sense organs and stated that in 1894 Nagel found the curved or arched pegs only at the distal end of each subsegment of the flagellum and noted nearby the presence of fine or fragile (*äusserst zarte*) hairs.

MATERIALS AND METHODS

Three species of adult lacewings—*Chrysopa oculata* Say, *Chrysopa plorabunda* Fitch, and *Chrysopa nigricornis* Burmeister¹—were used in this study. Males and females were caught in the field and tested in the laboratory. Also, individuals of *C. plorabunda* and *C. oculata* were reared in the laboratory and tested just after emergence from the pupal cases in order to eliminate the possibility that the cuticle of the sense organs had been damaged in any way, and so made permeable to the dye. Directions for raising chrysopids are given by Smith (1937).

The method used to demonstrate the permeability of certain of the sensory hairs is that of Slifer (1954). Essentially it consists in bringing the living antennae into contact with a dye in aqueous solution for periods ranging from 15 minutes to 12 hours, dehydrating and clearing the antennae very rapidly, and mounting the antennae whole in resin. All experiments were performed at room temperature. Whole individuals which had been immersed in the stain as long as an hour showed complete recovery after removal, indicating that the tests are valid, as stated, for living material.

¹ The author wishes to thank Dr. W. E. Bickley, University of Maryland, who kindly made the species identification.

RESULTS

Chrysopid antennae are long and thread-like and, in the species examined, ranged in length from 8 to 14 mm. The number of flagellar subsegments is large and an individual may have as many as a hundred. A camera-lucida drawing of a typical subsegment of *Chrysopa plorabunda* (fig. 1) shows the arrange-

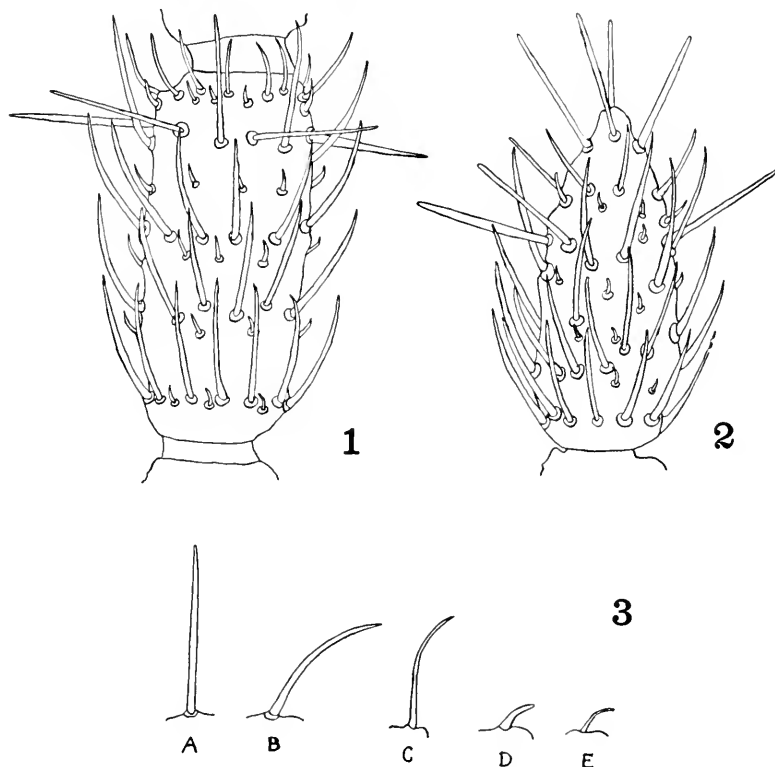


FIG. 1. A typical subsegment of *C. plorabunda* antenna showing the several types of sense hairs present. Long permeable hairs are in transverse row near the anterior end of subsegment. $\times 350$.

FIG. 2. Terminal flagellar subsegment of *C. plorabunda* showing sensory hairs and the two transverse rows of long permeable hairs near anterior end. $\times 350$.

FIG. 3. The five types of hairs found on lacewing antennae. A is permeable hair. The other types are apparently unaffected by the dye. $\times 350$.

ment of the several types of sense organs present on it. Those of *C. oculata* and *C. nigricornis* are very similar. No differences between the antennae of males and females were noticed, either in the number of sense organs present, or in their distribution.

Sensory hairs on the antennae which have been found to be permeable at their distal tips to aqueous solutions of dyes are slender structures, 50 to 60 microns long, and are found only near the distal end of each flagellar subsegment. They are about 2.5 to 3 microns in diameter. A row of six hairs encircles each subsegment. They are spaced evenly around the surface of the subsegment. The hairs project outward from the surface in a plane nearly perpendicular to the long axis of the antenna. They are semi-transparent and their walls appear to be thin. Figure 3, a, shows a typical hair which is of the type described. When the antennae of living adult lacewings are brought in contact with an aqueous solution of acid fuchsin, treated and mounted on slides as described above, and then examined under a microscope, the tips of these hairs will be found to have retained some of the red stain. Only the distal end of the hair is colored, indicating that the dye has entered the structure at the tip. The remainder of the sense organ and the antennal surface are unaffected by the dye, except in instances where obvious damage to the cuticle has occurred. Other types of sense organs which are present on the antennae and in which, as yet, no permeable areas have been found are shown in fig. 3, *b*, *c*, *d*, and *e*.

The degree of penetration of the dye into the hair is affected by the time that the antenna is allowed to remain in contact with the dye solution. The stain enters the hair rapidly at first and then more slowly as evidenced by the fact that antennae immersed in the dye for varying periods of time up to two hours show the permeable hairs to be stained about the same amount. Periods of exposure over two hours show that the dye has diffused slowly down into the hair from the tip but usually not more than two or three microns after exposure for 12 hours. Adults tested shortly after emergence in the laboratory showed the same results as did the insects caught in the field. This

indicates that the penetration of the dye is not due to a damaged or abraded cuticle.

The terminal flagellar subsegment of an antenna of *C. plorabunda* is shown in fig. 2. The most notable difference between this subsegment and the typical subsegment in fig. 1 is the number of permeable hairs at the tip of the former. As in many insects, the tip of the flagellum in this species is more specialized than are the other antennal subsegments. The hairs at the tip of the terminal subsegment stain very readily in the dye solution. These hairs are of the same general size and structure as the permeable hairs described above. The tip of the flagellum usually contains at least six of these hairs in addition to the regular circle of six which is found in its normal location on the subsegment.

DISCUSSION

The experimental evidence presented by Slifer (1955) for the long, permeable basiconic sensilla of the grasshopper suggests that they may serve as receptors for the common chemical sense and this may be true for the permeable hairs on the lacewing. These sensilla are permeable only at the distal end to solutions of a dye and so resemble the permeable hairs described on the grasshopper. The permeable hairs on the lacewing are located favorably for the reception of tactile stimuli and long, slender, movable hairs of this type are commonly believed to be tactile in function. It is possible that these hairs may have a dual function, i.e., they may respond both to touch and to chemicals as Dethier (1955) suggests for certain of the sense organs on the labellum of *Phormia*.

SUMMARY

1. A description of the antennal subsegments and of the sense organs on the antennae is given for *Chrysopa oculata* Say, *Chrysopa plorabunda* Fitch, and *Chrysopa nigricornis* Burmeister.

2. Certain of the sensory hairs on the antennae are permeable at their distal tips to aqueous solutions of acid fuchsin in the living condition.

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Another New Generic Entity of the Gerridae (Heteroptera)¹

By HERBERT B. HUNGERFORD and RYUICHI MATSUDA,
Department of Entomology, University of Kansas,
Lawrence, Kansas

We have in the Francis Huntington Snow Museum of the University of Kansas three apterous specimens of a gerrid, two males and one female, that came from Sretensk, Siberia, and were determined as *Gerris brachynotus* Horváth by Dr. A. N. Kiritschenko. *Gerris brachynotus* was described from Gabritza, Eastern Siberia.

At the present time we are unable to examine the type and cannot therefore verify the determination. However, we are convinced these three specimens are not congeneric with *Gerris* and should be described as a new genus.

¹ Contribution No. 1,017 from the Department of Entomology, University of Kansas. This study is a by-product of a project aided by a grant from the National Science Foundation.

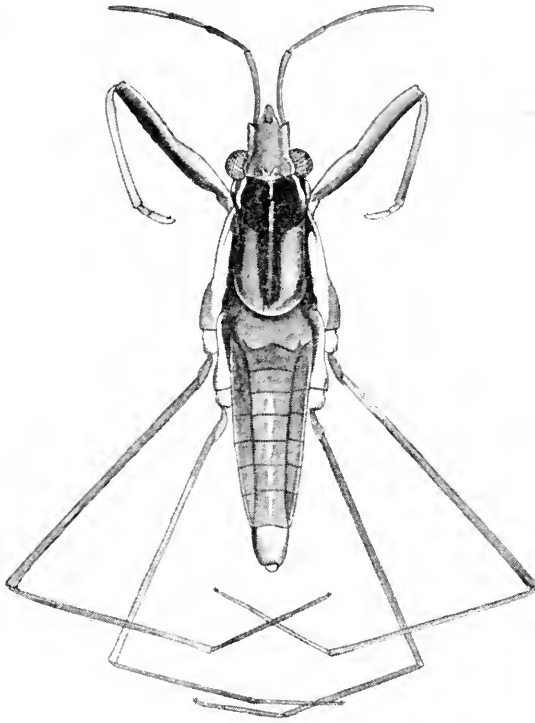


FIG. 1. Dorsal view of a wingless male of *Gerriselloides brachynotus* (Horváth)

GERRISELLOIDES nov. gen.

(Figures 1 and 2)

Type species of the genus: *Gerriselloides brachynotus* (Horváth)

Spindle shaped gerrids. Antennae and beak short. Third segment of beak barely reaching mesosternum. Pronotum short but covering mesonotum. Median longitudinal sulcus of metasternum absent. Mesosternum relatively short; compared to metasternum only about twice as long. Metasternum long, with omphalium and omphalial groove reaching metaacetabula. Rela-

tive length of hind tibia to tarsus shorter than in any species of *Gerris*. Middle and hind legs relatively stout.

There are other gerrids that have a short pronotum, as in *Eurygerris*, but it does not reach the posterior margin of the

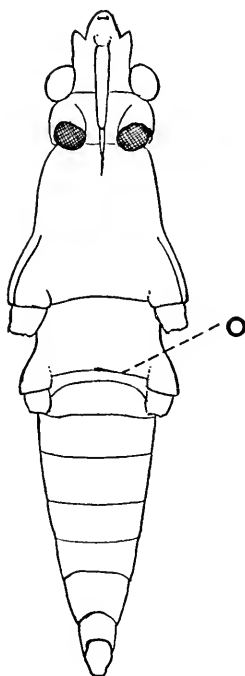


FIG. 2. Ventral view of a male of *Gerriselloides brachynotus*. (Horváth). O is the omphalial groove.

mesonotum in those species. The short mesosternum is a striking character. In no species of *Gerris* is the mesosternum less than two and a quarter times as long as the metasternum. The omphalial groove is also a generic character in the Gerridae, either all species of a genus have it as in *Cylindrostethus*, *Potamobates* and *Brachymetra* etc., or they all lack it.

The Nymph of *Tanypteryx hageni* Selys (Odonata)

By ARTHUR SVIHILA, Department of Zoology, University of Washington, Seattle 5, Washington

For the past four years a search has been made in the Mount Hood region of Oregon for the nymph of this rare dragon-fly, the only representative of the archaic Petaluridae in western North America. During these four years numerous adults of both sexes were observed and collected in that area but the nymph eluded discovery.

On July 8, 1958, an exuvia of this dragon-fly was found attached to the base of the sedge, *Carex ablata*, at Tipsoo Lake (5,200 feet) in Mount Rainier National Park, Washington. Further search in the vicinity revealed the habitat as well as the presence of numerous nymphs in various stages of development.

The habitat of the nymph of this dragon-fly is very restricted and specialized, for extensive search covering an area of several square miles failed to reveal additional sites. Notes on the habitat, ecological environment and life history will be reported upon in another paper.

A total of 7 exuviae, 4 ♂♂ and 3 ♀♀, as well as several nymphs (to be reared in the laboratory) have been collected from this site. Many others were left in situ for further observation.

On August 6, 1958, the Mount Hood region was revisited and at Still Creek Forest Camp (4,200 feet), Mt. Hood, Oregon, the nymphs were also found.

DESCRIPTION OF EXUVIAE AND NYMPHS

The body is subcylindrical, hairy and so encrusted with muddy substances that the coloration is obscured.

The measurements are based upon 7 exuviae, 4 ♂♂ and 3 ♀♀. The descriptions are also based on these exuviae as well as on live nymphs.

Total length: 26–31 mm., average 27.5 mm. Head: almost twice as broad as long, width at eyes 6.7–7.5 mm., average 7.03 mm.; length 3.5–4.25 mm., average 3.84 mm. Eyes: large and well forward; a transverse line touching anterior edge of eyes passes through first segment of antennae to the superior part of the frons. Frons: a truncated triangle meeting dorsally the roughly circular vertex which has two laterally located tufts of long hair. Occiput has a small tuft of long hair just behind each eye. Another tuft is located at the posterior lateral edges. Antennae: short, total length 2.5 mm., depressed and slightly incurved, six segmented, relative segment length 2–3–4–2–3–3; scape short and robust; pedicel almost globular (this is especially so in the live nymphs); flagellum slender; all segments with long hairs. Labium: large; lateral and median lobes fitting together to form a shovel; hinge of labial mask reaching base of mesothoracic legs. Mentum: almost as long as wide, 5×5.25 mm.; width at base of lateral lobes 5.25 mm., at hinge 3.5 mm.; ventral mid-line a shallow groove; dorsal surface sparsely spined; numerous long hairs at margin of base of median lobe. Median lobe: bare, extending slightly forward, with approximately 15 strong denticulations on each side, those nearest the median cleft largest and projecting forward; medial cleft, narrow but conspicuous. Lateral lobes: hollow, truncate, inner and apical margins minutely denticulate; a short strong spine located dorsally along edge of lobe at base of moveable spine; moveable spine moderately slender, 1.5 mm. long and tapering gradually.

Abdomen: spindle-shaped, length 15–20 mm., average 17.4 mm., widest at segments 5–6, tapering posteriorly; posterior edges of segments fringed with short hairs. No dorsal hooks but commencing on segment 5 and extending to segment 9 are four pairs of conspicuous submedian hair tufts. The two tufts on each side are close together with the outer one larger than the inner but widely separated from the pair on the opposite side. In young nymphs of 23 mm. length these four tufts of hair are found on the first four segments as well. Possibly as the wing sheaths grow and develop they rub off those on the first four

segments. In some of the exuviae the outermost tuft is sometimes present on the fourth segment. Abdominal margins fringed with long hairs; no lateral spines present, instead, the posterior lateral regions of the segments are rounded. Ventral surface of segments 2-9 with a pair of submedian parallel grooves which separate each segment into a smooth central more convex area and a narrower lateral rougher flat portion. On segment 9 this groove flares outward. All surfaces are hairy.

Wing sheaths laid parallel; hind wings extending posteriorly to segment 4; front wings to segment 3. Legs: robust, femora length of pro-meso- and metathoracic legs, 3.5-4 and 6 mm. respectively. All legs fringed with hairs; those on the dorsal ridge of the femora and tibiae longer. Tibiae end in 4 hairy stout spines. Tarsal formula 3-3-3. Third tarsal segment almost twice as long as first two and terminating in two sharp recurved claws.

Caudal appendages prominent. Shape of adult male inferiors foreshadowed in the larval middle dorsal appendage as a broad flat wing with three irregular conical projections, the two lateral projections being the largest. Numerous hairs are located between the two lateral projections and almost conceal the shorter median conical projection. On the sternum of the 9th segment are two short longitudinal elevated projections, the posterior parts of which are covered with hairs. In between these projections is a smaller black oval disc with the genital opening in the middle. These structures develop into the two medianly located flaps or valvules in the adult male. The forerunners of the male copulatory apparatus are present as black and brown patches on the posterior part of the 2nd segment and the anterior part of the 3rd sternum. In the female the ovipositor is visible on the sternum of segment 9. The sternum of segment 10 and the dorsal appendages of both the male and female are covered with long hairs.

COMPARISONS AND REMARKS

The nymph of *Tanypteryx hageni* is the smallest of all of the known nymphs of the Petaluridae.

<i>Tanypteryx hageni</i>	26-31 average 27.5 mm.
<i>Tanypteryx pryeri</i>	30-38
<i>Tachopteryx thoreyi</i>	38
<i>Uropetala carovei chiltoni</i>	40-50 average 44 mm.
<i>Phenes raptor</i>	48
<i>Petalura gigantea</i>	55

The nymphs of *Tanypteryx hageni* and *T. pryeri* are similar in having 6 segmented antennae, a short spine at the base of the large moveable spine on the lateral lobes of the labium, the median lobe projecting forward slightly and being of the same general shape.

The nymph of *Tanypteryx hageni* differs from that of *T. pryeri* in being smaller; having no abdominal spines; the hinge of the mentum extending back to the base of the mesothoracic legs rather than only to the prothoracic legs; the labial mask almost as long as it is wide rather than wider than long; the hind wing buds extending down only to the 4th abdominal segment rather than down to the 5th; and the pedicel of the antennae more globular in shape than it apparently is in *T. pryeri*.

The nymph of *Tachopteryx thoreyi* which is the eastern United States member of the Petaluridae differs from that of *Tanypteryx hageni* by having 7 segments in the antennae, no spine at the base of the moveable spine and the hair tufts on the abdomen located on tubercles.

Except for the marked difference in size of the two, the nymph of *T. hageni* is quite similar to the nymph of *Uropetala carovei chiltoni* of New Zealand in many characters, such as the 6 segmented antennae, rounded lateral edges of the abdominal segments, spine at the base of the moveable spine of the labium, labial mask as long as wide and the mentum extending down posteriorly to the base of the mesothoracic legs. *Uropetala carovei chiltoni* is less hairy than *T. hageni*.

The nymphs of *T. hageni* and *Phenes raptor* of Chile are similar in having 4 tufts of hair on each abdominal segment, but differ from each other in that the tufts are not located on tubercles in *T. hageni* as they are in *Phenes raptor*.

The six known petalurid nymphs may be separated by the following characters:

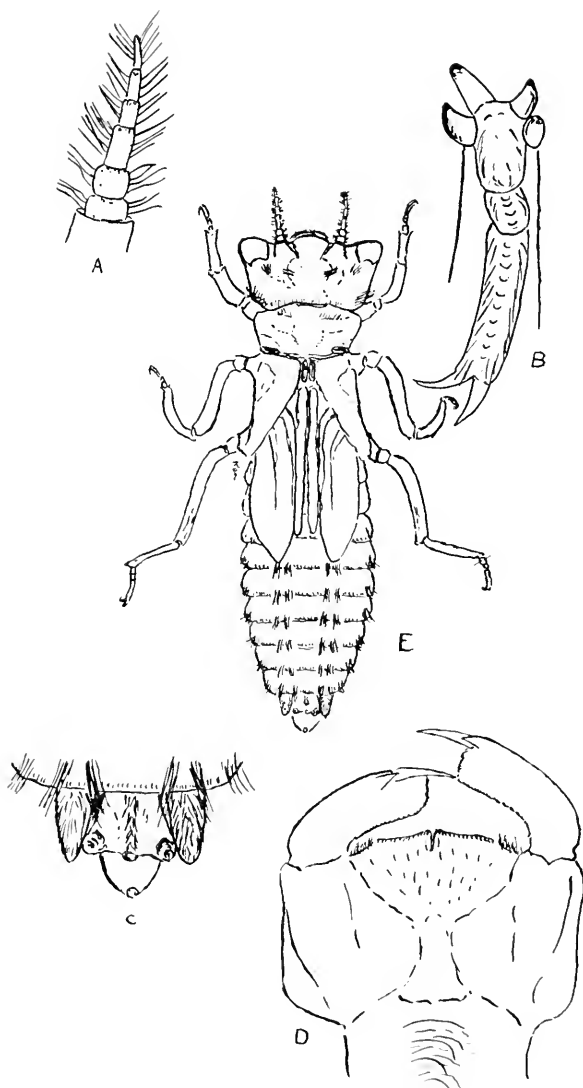


FIG. A. Right antenna, dorsal view
 FIG. B. Tibial spurs and tarsus
 FIG. C. Caudal appendages of male, dorsal view
 FIG. D. Labium, dorsal view
 FIG. E. Nymph drawn from exuvia

- I. Lateral lobes of labium truncate, apical and inner borders denticulate.
 - A. Median lobe triangular, projecting forward.....*Uropetala carovei*
 - B. Median lobe not triangular, straight.
 - 1. Hairy tubercles on abdomen.
 - a. 7-segmented antennae, no short spine at base of moveable spine, 2 hair tufts on abdominal segments.....*Tachopteryx thoreyi*
 - b. 6-segmented antennae, short spine at base of moveable spine, 4 hair tufts on abdominal segments.....*Phenes raptor*
 - 2. No hairy tubercles on abdomen.
 - a. Lateral spines on abdomen present, 2 hair tufts on abdominal segments.....*Tanypteryx pryeri*
 - b. Lateral spines on abdomen absent, 4 hair tufts on abdominal segments....*Tanypteryx hageni*
- II. Lateral lobes of labium concave, inner borders curved, median lobe triangular.....*Petalura gigantea*

American Entomological Society Centennial

Early in 1958 a Committee was appointed by President H. W. Allen to investigate ways and means of properly celebrating the Society's 100th anniversary, which occurs in March 1, 1959. The plans of this Committee, as approved by the Council, provide for a variety of activities. Several well known entomologists have been invited to contribute papers for a Centennial Number of our "Transactions." In this same number will appear a brief history of the Society from 1909 to the present, a report on its library, and a review of its extensive collections. The planning committee has already secured funds sufficient to meet costs of this number.

A Celebration is planned for March 26, 1959, at the headquarters of the Society in the Academy of Natural Sciences of Philadelphia. At this time it is hoped that a brief program of afternoon events will be presented and that visitors will have the opportunity of inspecting the Society's collections and library. Members, their guests and other visitors are urged to

attend the Society's headquarters when in Philadelphia during the Centennial Year.

Hungerford Leidy Medalist

Dr. HERBERT B. HUNGERFORD, Corresponding Member of the American Entomological Society, was the recent recipient of the Leidy Medal given by the Academy of Natural Sciences of Philadelphia. The medal, with an honorarium, is awarded every three years under the terms of the Joseph Leidy Memorial, which was created in 1923. It is given "as a reward for the best publication, exploration and discovery of research in the natural sciences in such particular branches thereof as may be designated."

The Committee which chose Dr. Hungerford was composed of the following members: Dr. Reed C. Rollins, Harvard; Dr. W. Frank Blair, University of Texas; Dr. Philip A. Munz, Rancho Santa Ana Botanic Garden; Prof. Evelyn Hutchison, Yale; Dr. H. Radclyffe Roberts, Academy of Natural Sciences of Philadelphia.

Dr. and Mrs. Hungerford traveled to Philadelphia to receive the award, which was presented by the Academy's President at a ceremony on October 23, 1958.

The Society extends its heartiest congratulations to Dr. Hungerford for this recognition of his masterful work in the systematics of the aquatic Hemiptera.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to \$1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleigh, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspay, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

Phasmidae of nearctic area desired alive. Purchase or trade, drawing on large stock of major orders, worldwide. Dominick J. Pirone, Dept. Entomology, Cornell University, Ithaca, N. Y.

INDEX TO VOLUME LXIX

(* Indicates new genera, names, etc.)

ALEXANDER, C. P. Undescribed species of crane-flies from the western United States and Canada (Dipt. Tipulidae)	
Part XVII	129
Idem. Part XVIII	215
ARNAUD, P. H. <i>Cressonomyia</i> new name for <i>Plagiopsis</i> Cresson preoccupied (Diptera: Ephydridae)	24
BLICKLE, R. L. Eye color of male <i>Dichlorus ferrugatus</i> (Fabr.) (Diptera, Tabanidae)	230
BROWN, W. L., JR. (See under Wilson, E. O.)	
BURKS, B. D. Three species of <i>Eurytoma</i> important in biological control of weeds (Hymenoptera, Eurytomidae)	177
BYERS, G. W. Individual identification labels for pinned insect specimens	113
CHAMBERLIN, R. V. A new Lysiopetalid diplopod from Arizona	121
Some records of chilopods from Florida	13
CLARKE, J. F. G. A new genus and two new species of Microlepidoptera from Japan	1
CRABILL, R. E., JR. A new Schendylid from the eastern United States, with notes on distribution and morphology. (Chilopoda: Geophilomorpha: Schendylidae)	153
CRABILL, R. E., JR. On a collection of centipedes from Wisconsin (Chilopoda)	93
Report of <i>Geophilus proximus</i> in North America, with a key to its eastern North American congeners (Chilopoda: Geophilomorpha: Geophilidae)	15
DREISBACH, R. R. Three new species of <i>Haploneurion</i> Kohl (Hymenoptera: Psammocharidae) from Chile	207
Two new species in the genus <i>Pomphilius</i> (Hymenoptera: Psammocharidae) with photomicrographs of the genitalia and subgenital plate of the male	61

EHRlich, P. R. Lepidoptera collected in the tundra-taiga ecotone at Kotzebue, Alaska	17
ELBEL, R. E. (See under Emerson, K. C.)	
EMERSON, K. C. Designation of a lectotype of <i>Goniodes minor</i> Piaget (Philopteridae: Mallophaga)	6
EMERSON, K. C. and R. E. ELBEL. A new species and subgenus of <i>Kurodaia</i> (Mallophaga)	29
EVANS, H. E. Observations on the nesting behavior of <i>Larropsis distincta</i> (Smith) (Hymenoptera, Sphecidae) ..	197
Some previously undescribed males and new sex associations in the Pompilinae (Hymenoptera: Pompilidae) ..	147
FROST, S. W. <i>Halysidota tessellaris</i> S & A and pollenia ..	137
Papers by S. W. Frost	67
The ecological insect survey of Pennsylvania	222
GANGWERE, S. K. Grooming behavior in Orthoptera	123
HALL, J. C. A change of name in the Bombyliid genus <i>Anastoechus</i> (Diptera)	195
HOOD, J. D. <i>Acanthothrips palmi</i> , a new thrips from Brazil (Thysanoptera: Phlaeothripidae)	117
HUBBARD, C. A. Mexican jungle and desert fleas with three new descriptions	161
HULL, F. M. Some robber flies (Diptera: Asilidae)	99
Some species of the genus <i>Bathypogon</i> Loew	187
HUNGERFORD, H. B. and R. MATSUDA. A new genus for <i>Gerris euphrosync</i> Kirkaldy (Heteroptera, Gerridae) ..	225
Another new generic entity of the Gerridae (Heteroptera)	258
<i>Terobates</i> Esaki, a synonym of <i>Heterobates</i> Bianchi (Gerridae, Heteroptera)	200
JUDD, W. W. Gall flies (Itonididae) and parasitic Hymenoptera reared from rosette galls of willow	39
Studies of the Byron Bog in southwestern Ontario. VI. Seasonal distribution of the wood gnat, <i>Silvicola marginata</i> (Say) (Diptera: Silvicolidae)	65

KANNOVSKI, P. B. Swarming of the ant <i>Stenammina brevicorne</i> (Mayr)	231
KEMPE, W. W. Synonymic note on ants of the genus <i>Paracryptocerus</i> Emery (Hymenoptera: Formicidae) ..	108
KNOLL, J. N. A new species of <i>Conophaeron</i> Linsley from Arizona (Coleoptera: Cerambycidae)	185
KORMONDY, E. J. The plesiallotype female of <i>Oligoclada umbricola</i> Borror, 1931	57
KROMBEIN, K. V. <i>Pison</i> (<i>Paraceramius</i>) <i>koreense</i> (Rad.), a new adventive wasp in eastern United States (Hymenoptera, Sphecidae)	166
LAUCK, D. R. and W. G. WHEATCROFT. Notes on a new habitat for <i>Nerthra</i> (Gelastocoridae-Hemiptera)	20
LIPA, J. J. Some observations upon the fauna of the winter nests of <i>Euproctis chrysorrhoea</i> (Lepidoptera)	60
MATSUDA, R. (See under Hungerford, H. B.)	
MEDLER, J. T. Parasitism of bees in trap-nests by <i>Leucospis affinis</i> Say (Hymenoptera: Leucospidae)	21
MOURE, J. S. On the bee genus <i>Cyphomelissa</i>	191
On the genus <i>Arhysosage</i> Brèthes from Argentina (Hym., Apoidea, Panurginae)	43
MUESEBECK, C. F. W. Three new aphid parasites from the Pacific coast (Hymenoptera: Braconidae, Aphidinae)	141
PARFIN, S. Notes on the bionomics of the Mantispidae (Neuroptera: Planipennia)	203
REHN, J. A. G. Review: Annotated catalogue of African grasshoppers	80
REINHARD, H. J. New American Tachinidae	233
SABROSKY, C. W. New species and note on North American acalyptrate Diptera	169
SCHMIEDER, R. G. Review: Studies on the comparative ethology of digger wasps of the genus <i>Bembix</i>	111
Velia's clock	26

SVIHLA, A. The nymph of <i>Tanypteryx hageni</i> Selys (Odonata)	261
SWARTZENDRUBER, D. C. The permeability of certain of the sensory hairs on the antennae of lacewings (Neuroptera: Chrysopidae)	253
THEW, T. B. Dodds's types of two species of <i>Callibaetis</i> (Ephemeroptera)	137
WEBER, N. A. Nomenclatural changes in <i>Trachymyrmex</i> (Hym.: Formicidae, Attini)	49
Nomenclatural notes on <i>Proatta</i> and <i>Atta</i> (Hym.: Formicidae)	7
Synonymies and types of <i>Apterostigma</i> (Hym. Formicidae)	243
WHEATCROFT, W. G. (See under Lauck, D. R.)	
WILLIAMS, J. L. Notes on the 17-year locust on Cape Cod in 1957	25
WILSON, E. O. and W. L. BROWN, JR. The worker caste of the parasitic ant <i>Monomorium metoecus</i> Brown and Wilson, with notes on behavior	33
WOOLLEY, T. A. A key to the superfamilies and principal families of the Oribatei (Sarcoptiformes: Acarina)	85

GENERAL SUBJECTS

American Entomological Society Centennial	79, 267
Bembix, comparative ethology of	111
Bibliography of S. W. Frost ..	67
Biological control	177
Budapest, Hymenoptera in Museum	78
Centennial News	79, 267
Grooming behavior in Orthoptera	123
Hemming, F., retirement of ..	139
International Congress	195
Labels for specimens, individual	113
Laboratory training class	139
Leidy Medal to Hungerford ..	266
Nomenclature, Colloquium on. Notice on	55
International Commission on	139
Orientation behavior in Velia.	26
Pennsylvania insect survey ...	222
Pollenia on Halysidota	137
Subscription rate, increase of .	146
Sensory hairs, permeability of	253
Swarming of ants	231
Tenth International Congress .	195
Velia's clock	26

PERSONALS

de Beer, G.	139
Hemming, F.	139
Hungerford, H. B.	266
Melville, R. V.	139

REVIEWS

Books received	83
Evans, H. E. Studies on the comparative ethology of digger wasps of the genus Bembix	111

Uvarov, B. P. Annotated catalogue of African grasshoppers	80
---	----

GEOGRAPHICAL DISTRIBUTION

Alaska: Lep.	17
Argentina: Hym.	46, 48
Arizona: Col. 186, Diplop. 122; Dipt.	108, 217
Australia: Dipt.	188, 190, 191
Brazil: Dipt. 106; Hym. 193, 194; Thysan.	121
British Columbia: Hym. .	142, 145
California: Dipt. 130, 133, 136, 221; Hym.	144
Chile: Hym.	210, 212, 213
Colorado: Dipt.	135, 220
Florida: Chilop. 13; Dipt. ...	242
Idaho: Dipt.	217
India: Hym.	185
Indiana: Dipt.	173
Japan: Lep.	1
Kansas: Hym.	62
Massachusetts: Dipt.	238
Mexico: Dipt. 235, 236, 241; Siphon.	161
Montana: Dipt.	132
Nevada: Dipt.	219
New York: Hym.	64
Solomon Is.: Dipt.	102
Thailand: Malloph.	31
Trinidad: Hym.	179
Virginia: Dipt.	234
West Virginia: Dipt.	240
Wisconsin: Chilop. 93; Dipt. .	170
Mexico: Dipt.	235, 236, 241

COLEOPTERA

Calandra (Calendra)	55
<i>pullum</i> ,* <i>Conosphaeron</i>	185

DIPTERA

<i>acutangula</i> , <i>Leptocera</i>	175
<i>aperta</i> ,* <i>Paralispidia</i>	237

<i>arapaho</i> ,* <i>Ormosia</i>	134	<i>trilineata</i> , <i>Senotainca</i>	199
<i>arapahocensis</i> ,* <i>Molophilus</i>	219	<i>unicolor</i> ,* <i>Diognites</i>	106
<i>arctica</i> , <i>Piophilila</i>	174		
<i>argyrocephala</i> , <i>Mctopia</i>	199	HEMIPTERA	
<i>carrerae</i> ,* <i>Lycosimyia</i> *	103	<i>brachynotus</i> , <i>Gerrisseloides</i> * .	259
<i>Chymedax</i> *	99	<i>euphrosync</i> , <i>Gerris</i>	225
<i>Cressonomyia</i> *	24	<i>Gerrisseloides</i> *	259
<i>curialis</i> ,* <i>Clairvillia</i>	235	<i>Heterobates</i>	200
<i>Cyamops</i> , key to genus	169	<i>manni</i> , <i>Nerthra</i>	20
<i>decumata</i> ,* <i>Hemyda</i>	235	<i>Nerthra</i> , habitat of	20
<i>delicatulus</i> ,* <i>Chymedax</i> *	100	<i>Velia</i> , behavior and internal clock of	26
<i>deserticola</i> , <i>Anastoechus</i>	195	<i>Tenagogeris</i> *	226
<i>dirhaphis</i> ,* <i>Molophilus</i>	221	<i>Terobates</i>	200
<i>doloma</i> ,* <i>Aplomya</i>	239		
<i>erotema</i> ,* <i>Nephroteropsis</i>	238	HOMOPTERA	
<i>evanida</i> ,* <i>Philophilopsis</i>	233	<i>septendecim</i> , <i>Tibicen</i>	25
<i>ferrugatus</i> , <i>Dichlorus</i>	230		
<i>flava</i> ,* <i>Stomosis</i>	172	HYMENOPTERA	
<i>floscula</i> ,* <i>Thelairdoria</i>	241	<i>affinis</i> , <i>Leucospis</i>	21
<i>fulviceps</i> , <i>Piophilila</i>	174	<i>alius</i> ,* <i>Aphidius</i>	142
<i>halterata</i> ,* <i>Cyamops</i>	170	<i>Amblymerus</i> (<i>salicis</i> (Grt.)?)	40
<i>hessci</i> ,* <i>Anastoechus</i> , new name	195	<i>Ants</i> , swarming of	231
<i>homichlophila</i> ,* <i>Limonia</i>	129	<i>Aporini</i> , generic limits of	152
<i>ichthyurus</i> ,* <i>Bathypogon</i>	187	<i>Arhysosage</i>	43
<i>indigena loloensis</i> ,* <i>Limonia</i> ..	217	<i>Atritomellus</i>	42
<i>innominata</i> , <i>Stomosis</i> , n.comb.	171	<i>Atta</i>	8
<i>Itonididae</i> from willow galls ..	39	<i>attiva</i> ,* <i>Eurytoma</i>	177
<i>kuschci</i> ,* <i>Limonia</i>	215	<i>auriculatum</i> , <i>Apterostigma</i> ...	243
<i>Leptocera</i> , key to species	176	<i>auriculatum icta</i> , <i>Apterostigma</i>	
<i>levisiana</i> ,* <i>Pedicia</i>	131	<i>auriculatum petiolatum</i> , <i>Ap-</i>	
<i>Lycosimyia</i> *	102	<i>terostigma</i>	244
<i>marginata</i> , <i>Silvicola</i>	65	<i>Bembix</i> , book on	111
<i>microdonturus</i> ,* <i>Bathypogon</i> ..	191	<i>bequaerti</i> , <i>Aporus</i>	149
<i>nebulosa</i> , <i>Cyamops</i>	170	<i>billi</i> , <i>Apterostigma</i>	244
<i>nevadensis</i> ,* <i>Limnophila</i>	218	<i>bolicianum</i> , <i>Apterostigma</i>	245
<i>nigrotibiatus</i> ,* <i>Bathypogon</i>	188	<i>brevicorne</i> , <i>Stenamma</i>	231
<i>nitidifrons</i> , <i>Plagiops</i>	24	<i>bullocki</i> ,* <i>Haploneurion</i>	210
<i>ochripes</i> , <i>Leptocera</i>	176	<i>butteli</i> , <i>Proatta</i>	7
<i>oligacanthus</i> ,* <i>Molophilus</i>	135	<i>calverti</i> , <i>Apterostigma</i>	245
<i>Rhabdophaga</i> (<i>rhodoides</i> Walsh?)	39	<i>cephalotes isthmicola</i> , <i>Atta</i> ...	9
<i>Sarcophagidae</i> , in Mantispid ..	206	<i>cephalotes lutea</i> , <i>Atta</i>	10
<i>sierrensis</i> ,* <i>Paradelphomyia</i> ..	132	<i>cephalotes opaca</i> , <i>Atta</i>	10
<i>Stomosis</i> , key to species	171	<i>cephalotes polita</i> , <i>Atta</i>	11
<i>subita</i> ,* <i>Hypertrophomma</i>	240		

<i>chalybii</i> , <i>Melittobia</i>	21
<i>chilensis</i> ,* <i>Haploneurion</i>	209
<i>clavipes</i> ,* <i>Pompilinus</i>	61
<i>collare</i> , <i>Apterostigma</i>	246
<i>columbica</i> , <i>Atta</i>	11
<i>columbica tonsipes</i> , <i>Atta</i>	12
<i>commata</i> ,* <i>Cyphomelissa</i>	194
<i>conspersus</i> , <i>Paracryptocerus</i> ..	108
<i>cornetzi</i> , <i>Trachymyrmex</i>	49
<i>cressoni</i> , <i>Eurytoma</i>	180
<i>cucumis</i> ,* <i>Trachymyrmex</i>	50
<i>Cyphomelissa</i> , key to	194
<i>dentigerum</i> , <i>Apterostigma</i>	246
<i>distincta</i> , <i>Larropsis</i>	197
<i>drakei</i> ,* <i>Pompilinus</i>	62
<i>farinosus</i> , <i>Trachymyrmex</i>	51
<i>flava</i> ,* <i>Arhysosage</i>	45
<i>germana</i> ,* <i>Arhysosage</i>	47
<i>Haploneurion</i> , key to	207
Hymenoptera from willow galls ..	40
Hymenoptera of Budapest Museum	78
<i>ierense</i> , <i>Apterostigma</i>	247
<i>incermis</i> , <i>Megachile</i>	23
<i>korcense</i> , <i>Pison</i> , in the U. S. ..	166
<i>Larropsis</i> , nesting habits	197
<i>luederwaldti</i> , <i>Apterostigma</i>	247
<i>magnifica</i> ,* <i>Cyphomelissa</i>	192
<i>mayri</i> , <i>Apterostigma</i>	248
<i>metecocus</i> , <i>Monomorium</i>	33
<i>minutus</i> , <i>Paracryptocerus</i>	110
Nesting behavior of <i>Larropsis</i> ..	197
<i>nitidus</i> ,* <i>Haploneurion</i>	212
<i>ochracca</i> , <i>Arhysosage</i>	44
<i>opulenta</i> ,* <i>Trachymyrmex</i>	51
<i>Paracryptocerus</i> , synonymies in ..	108
<i>Platygaster</i>	42
<i>perfasciatus</i> , <i>Pompilus</i>	147
<i>pigra</i> ,* <i>Eurytoma</i>	183
<i>pilosum</i> , <i>Apterostigma</i>	248
<i>ponderosae</i> ,* <i>Aphidius</i>	141
<i>producta</i> , <i>Hoplitis</i>	23
<i>relativa</i> , <i>Megachile</i> , parasites ..	21
of	21
<i>robustum</i> , <i>Apterostigma</i>	249

<i>saussurei</i> , <i>Trachymyrmex</i>	52
<i>schlingeri</i> ,* <i>Trioxyxys</i>	144
<i>scululatus</i> , <i>Paracryptocerus</i> ..	110
<i>septentrionalis</i> , <i>Trachymyrmex</i> ..	52
<i>Stelis</i>	23
<i>Tetrostichus</i>	40
<i>Torymus</i> sp.	40
<i>tramitis</i> , <i>Apterostigma</i>	249
<i>urichi</i> , <i>Apterostigma</i>	250
<i>urichi</i> , <i>Trachymyrmex</i>	53
Vespidae, Mantispid parasites ..	204
of	204
<i>weasmanni</i> , <i>Apterostigma</i>	251
<i>wheeleri</i> ,* <i>Trachymyrmex</i>	54
<i>zeteki</i> , <i>Trachymyrmex</i>	55

LEPIDOPTERA

Alaska, Lepidoptera from	17
Noctuidae, Mantispid parasites ..	204
of	204
<i>Paralida</i> *	1
<i>sapindivora</i> ,* <i>Chclaria</i>	4
<i>tessellaris</i> , <i>Halysidota</i>	137
<i>triannulata</i> ,* <i>Paralida</i>	1

ODONATA

<i>hageni</i> , <i>Tanypteryx</i> , nymph of ..	261
<i>umbricola</i> , <i>Oligoclada</i>	57

ORTHOPTERA

Acridoidea, Review of book ..	80
<i>fasciatus</i> , <i>Nemobius</i>	199
Grooming behavior	123

SMALLER ORDERS

<i>boonsongi</i> , <i>Kurodaia</i> (<i>Falco-</i> <i>menopon</i> *) (Mallophaga) ..	30
<i>Chrysopa</i> , sensory hairs, permeability of	254
<i>Falco-menopon</i> * (Mallophaga) ..	30
<i>fuscicornis</i> , <i>Mantispa</i> (Neurop- tera)	204

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