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J. R. de la TORRE-BUENO

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J. R. de la TORRE-BUENO, *Editor*

GEORGE S. TULLOCH EWDIN W. TEALE

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NEW INDO-AUSTRALIAN LYCAENIDAE (LEPIDOPTERA).

BY ROBERT G. WIND, Berkeley, California, and
HARRY K. CLENCH, Cambridge, Massachusetts.

The following new species and subspecies have come to our attention during the course of research on the Lycaenidae of New Guinea. It seems advisable to publish them at this time, so that they might become more readily available.

The material is largely from two main sources: the extensive collections made by the senior author in Australia, New Guinea and many of the other East Indian islands over a period of two and a half years; and the large number of Lepidoptera (principally Rhopalocera) collected for the Museum of Comparative Zoölogy by Herbert Stevens, in the Morobe District of New Guinea. We wish to thank the authorities of the American Museum of Natural History, and particularly Mr. W. P. Comstock, for the loan of additional valuable material, as well as Prof. W. T. M. Forbes, of Cornell University, for making available to us that institution's specimens of this difficult group.

The genera covering the species presently under consideration are on a very insecure footing and will require considerable revision, not possible in the present paper. Those herein adopted constitute, in our opinion, the ones most widely accepted at present and those least likely to cause confusion.

Candalides erinus stevensi, new subspecies

UPPERSIDE:

Male. Both wings dark, dully shining purple. *Fore wing* with a narrow costal and a moderately broad, dark, marginal border, thickest at the apex. The *hind wing* also has a moderately thick black-brown border on costal, outer and inner margins, becoming faintly scalloped basally on the outer margin, near the anal angle. *Fringe* of fore wing basally brown, outwardly white; of hind wing, similar, but more prominently white.

Female. Both wings uniformly brown. *Fringe* as in the male.

UNDERSIDE:

Male. Both wings grayish white. *Fore wing* with a thin marginal line running from apex to inner margin. An interrupted submarginal line parallels this, frequently with the apical part obscure, and always with the lower (near inner margin) two segments moderately swollen. A post-discal line also runs parallel to these. It also is frequently obscure towards the apex. Between the two inner lines, and on the outer margin at the inner angle, the ground color is lightened to nearly pure white. *Hind wing* with the marginal line as in the fore wing, but slightly thickened at the veins. A marginal series of hazy spots, frequently fused, is inwardly and outwardly bordered by white. Basal to this row of spots is a row of faint, V-shaped dashes, apices basad, extremities joined. A convex post-discal row of similarly V-shaped dashes, more acute, and not joined, proceeds from costa to inner margin. Four basal spots, roughly parallel to the body line, are placed, one near the costa, one near the inner margin, and with the inner two alternately a bit out of line. At the end of the cell is an obscure dash, and just basal to that is a pair of dots, below which is another dot, and between this last and the lower one of the basal series is yet another.

Length of fore wing: Male, 11–12 mm.; female, 12 mm.

Holotype, male, Wau, Morobe District, New Guinea, April 4, 1932 (H. Stevens).

Allotype, female, same locality and collector, May 30, 1932.

Paratypes, three males, same locality and collector; two, April 19, 1932, and one, Oct. 2, 1932.

Holotype, allotype, and one paratype, No. 27629, in the Museum of Comparative Zoölogy. One paratype each in the authors' collections.

Remarks. Stevensi differs from typical *erinus* in the thickened marginal borders of the male above, and in the reduced intensity of the lower two dashes of the submarginal series on the fore wing below. In the typical race these form one of the outstanding characters of the under surface pattern.

It would seem that *stevensi* is quite local, as this seems to be the first record of the species for the island.

Candalides meeki kunupiensis, new subspecies

UPPERSIDE:

Male. Both wings pure white. Outer margin of fore wing as far as Cu_1 very broadly black-brown, extending basad on the costa about half way. From there it tapers to Cu_2 (where it is about one-third as thick), and sharply disappears just below that vein. Both wings obscurely shaded at the base with blackish scales, heaviest on the hind wing. *Fringe* of fore wing black-brown opposite the black-brown areas, white opposite the white areas; of hind wing white, with one or two dark scales at Cu_1, Cu_2, and 2A.

UNDERSIDE:

Male. Fore wing white; base and costa pale gray-brown. Outer margin very narrowly brown, basal to which is a row of tiny brown internervural dashes. Immediately basad of them is a very heavy band of black-brown (more brown than the corresponding band on the upper surface), running from the costa where it is thickest, to Cu_2. Cell closed by a narrow brown line. *Hind wing* white, with a filamentous, obsolescent marginal border, slightly swollen at the veins. Immediately basal to this is a marginal series of small brown dots, one to each interspace. A very irregular discal brown line crosses the wing, segmented as follows: one just outward of the midpoint on the costa, extending to M_1; one very irregular one in M_1–M_3, displaced marginally; one in M_3–Cu_1, placed slightly basad; one in Cu_1–Cu_2, still further basad; one in Cu_2–2A in line with the one in M_3–Cu_1. In the base is another, much shorter, transverse line, also disconnected, one segment on costa, one in cell, slightly outward, and one on inner margin, in line with the central one, but angled basad. Basal area shaded with pale brown, leaving white encirclements about the segments. On the inner margin, between the two bands, is a small brown spot. *Fringe* of fore wing brown, white at inner angle; of hind wing white, faintly brown at vein-ends.

Length of fore wing: Male 13.5–14 mm.

Holotype, male, Mt. Kunupi, Menoo Valley, Weyland Mts., Dutch New Guinea, 6000 ft., Nov.–Dec. 1920 (C., F., and J. Pratt), ex coll. E. I. Huntington, Acc. 34,909.

Paratype, male, same data as holotype.

Holotype and paratype in the American Museum of Natural History.

Remarks. This subspecies connects two hitherto geographically isolated forms that have long been regarded as distinct species, *i.e., Candalides meeki*[1] and *Candalides arfaki,*[2] from which we infer that these are merely extreme subspecies, with *kunupiensis* intermediate. The markings below are thinner and paler than in *arfaki,* but heavier than in *meeki.* Above, the black-brown on the outer margin of the fore wing stops just below Cu_2 as in *meeki,* and does not proceed to the inner margin as in *arfaki.* On the hind wing above the shading at the base does not extend to the anal angle as in *arfaki,* but is restricted to the base, agreeing with *meeki.*

Candalides m. meeki is restricted, so far as known, to eastern New Guinea. It was described from specimens taken on the Angabunga River (erroneously stated by Bethune-Baker to have come from Owgarra—see Jordan, *loc. cit.*). Jordan also records it from the Edie River (west side of the Herzog Mts.). In the Museum of Comparative Zoölogy are a number of examples from Mt. Misim (5–6000 ft.), not far from the latter locality.

C. meeki arfaki is apparently restricted to the Vogelkop. There is a series in the American Museum of Natural History from the Angi Lakes, Arfak Mts., Dutch New Guinea, and a specimen from Dohunsehik in the same region. They agree perfectly with Bethune-Baker's excellent figure.

Candalides grandissima morobea, new subspecies

UPPERSIDE:

Male. Both wings shining purplish, with a very thin dark border. Costa of fore wing very narrowly bordered with black. Costa of hind wing narrowly bordered with brown-black. The inner margin of the hind wing is white, shading into grayish towards the anal angle. *Fringe* of fore wing blackish white near the inner angle; that of the hind wing dark inwardly, white outwardly; dark at the veins.

UNDERSIDE:

Male. Both wings white. The costa and outer margin of the fore wing, and frequently the whole of the hind wing shaded with light ruddy brown. *Fore wing:* A submarginal series of angled spots runs from apex to Cu_2. A prominent, curved post-discal band of brown runs from a point three-quarters out

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[1] Bethune-Baker, 1906, Ann. Mag. Nat. Hist. (7), **17**, p. 101. Figured by Jordan, 1930, Proc. Ent. Soc. London **5**, p. 60, pl. 3, fig. 14.

[2] Bethune-Baker, 1909, Ann. Mag. Nat. Hist. (8), **4**, p. 184, pl. 7, fig. 4.

on the costa to Cu_2 just basal to the submarginal line. A thin line crosses the end of the cell. On the costa, basal to the post-discal line, are two brown spots, the inner one placed slightly basad of the center of the costa, the other midway between it and the costal end of the post-discal line. *Hind wing.* A submarginal line of very faint angled dashes follows the margin completely. These dashes are very faint, on close inspection apparently consisting merely of concentrated brown irroration. Marginal to the anal few dashes are several small spots, one to each interspace. The one between Cu_2 and 2A is duplex. A very tortuous post-discal line runs from two-thirds out on the costa down towards the anal angle in a shallow curve. Towards the inner margin this line merges basally with a spattering of brown that appears to be without any definite pattern. Near the base, parallel to the body, runs a series of four or five brown spots, frequently quite indistinct. Between the spot nearest the costa and the costal end of the post-discal band, is a brown bar, parallel to the latter. Immediately below this in the cell is another elongate spot. As was mentioned above, the whole of the under surface of the hind wing is frequently overlaid with pale brownish. When any white ground is present it lies between the post-discal line and the submarginal line, near the costa. The general appearance of the underside of the hind wing of this species is quite reminiscent of the North American *Lycaenopsis pseudargiolus* form *lucia* Kirby, although on a more elaborate scale.

Length of fore wing: Male 14.5–17.5 mm.

Holotype, male, Wau, Morobe District, New Guinea, April 18, 1932 (H. Stevens).

Paratypes, one male, same locality and collector, March 15, 1932; nine males, Mt. Misim, Morobe District, New Guinea (6400 ft.), dated respectively as follows: Feb. 17, March 5, 10, 25, 26, April 8, 1932; two, April 13, 1933; one, no date.

Holotype male, and eight male paratypes, No. 27630, in the Museum of Comparative Zoölogy. One paratype each in the authors' collections.

Remarks. Differs from typical *grandissima*[3] only in minor points. The marginal line of the hind wing below is fainter, and the brown discal scaling there is heavier, and the costa is shaded with brown. The post-discal band is slightly variable in length. Concepts of typical *grandissima* are based on Bethune-Baker's description and illustration (*loc. cit.*).

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[3] Bethune-Baker, 1908, P.Z.S. **1908**, p. 121, Pl. 8, fig. 15.

An additional five males of this subspecies, from the same general region as the types, and collected by the same person, are in the collection of the senior author. They were not made a part of the type series as they were not examined by both authors.

Philiris diana papuanus, new subspecies

UPPERSIDE:

Male. Both wings moderately lustrous violet. *Fore wing* with costa and outer margin narrowly black. *Hind wing* with costa light gray, outer margin narrowly black, slightly thicker towards the anal angle. Outer margin somewhat scalloped concavely near the anal angle. Inner margin gray, lighter, almost white near the base. *Fringe* of fore wing black basally, white outwardly; of hind wing similar, but at the anal veins (Cu_1, Cu_2, 2A, and to a lesser extent M_3) solidly black and tufted.

UNDERSIDE:

Male. Both wings uniform, slightly pearly white. *Fore wing* with a grayish brown patch on inner margin near base, usually covered by the costa of the hind wing. *Fringe* of both wings white, blackish at the ends of veins M_3, Cu_1, Cu_2, and 2A.

Length of fore wing: male 14 mm.

Holotype, male, Wau, Morobe District, New Guinea, June 2, 1932 (H. Stevens), No. 27625, in the Museum of Comparative Zoölogy.

Remarks. This race differs from typical *diana*[4] in the absence of a discal white patch on the upperside of the fore wing. Otherwise it appears very similar. Typical *diana* has not been examined by the authors, and the association of *papuanus* with that species is based solely on the figures and descriptions of *diana* in the two works referred to above. In view of the close interresemblance of many of the species of *Philiris* there is more than a possibility that *papuanus* may be a species in its own right. It seems likely, however, that our present arrangement is correct.

P. diana, as represented by the *papuanus* holotype at any rate, is a magnificent insect, even for this group. It is about the largest species in the genus, and from above might easily be mistaken for a species of *Miletus*.

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[4] Waterhouse and Lyell, 1914, The Butterflies of Australia, p. 76, figs. 183, 220, 271. See also, Waterhouse, 1932, What Butterfly is That? p. 138, pl. 20, figs. 4, 4a.

Philiris ariadne, n. sp.

Eyes ringed with white. *Frons* brown, flanked by the white eye-margining. Behind the bases of the antennae is a nearly straight whitish line, and between them are two lines of whitish scales, tending to converge. *Collar* above of dense brown hair, sprinkled sparsely with some bluish. Below, the collar is pure white as characteristic in this genus. *Antennae* black-and-white annulate; club blackish brown above, fulvous below. *Thorax* above dull blue-black, fringed with scattered light hairs, anally more densely fringed with bluish hair; below with long dense pure white hair. *Abdomen* above brown, below narrowly white. *Wing-shape:* (fore wing)—costa normal; outer margin rather strongly (for this genus—excepting the *aurelia* group) rounded; (hind wing)—costa, inner margin normal; outer margin nearly evenly rounded.

UPPERSIDE:

Male. Both wings moderately lustrous violet. *Fore wing* with a very narrow filamentous black border on both outer and costal margins (that of the latter somewhat thicker), the former rather thickened at the apex. *Hind wing* with costa gray-brown. A narrow border of black, thickening almost imperceptibly towards the anal angle, margins the wing. Inner margin colored as the costa, but with a whitish patch near the base. *Fringe* of fore wing outwardly white, basally blackish; of hind wing, similar, but solidly black brown on the veins from M_3 to 2A; the white is also more prominent.

UNDERSIDE:

Male. Both wings uniformly pearly white. *Fringe* of fore wing white, touched lightly with dark at the ends of some veins (hardly noticeable); of the hind wing similar, but prominently black on the anal veins (M_3 to 2A).

Length of fore wing: male 13.5 mm.

Holotype, male, Wau, Morobe District, New Guinea, May 6, 1932 (H. Stevens), No. 27626, in the Museum of Comparative Zoölogy.

Remarks. This species is very similar in general appearance to *diana papuanus,* and occurs in the same general locality. The similarity between the two is so great that at first they were taken to be the same. They agree quite closely in size, color, and reduced marginal bordering, but differ in several rather important, though not at first obvious points. The marginal black of the fore wing is thickened slightly at the apex in *ariadne,* but not at all in *papuanus.* In fact, the whole costal and outer marginal border of the fore wing is thicker. On the hind wing this border is not thickened anally as much as it is in *papuanus,* and the whole border is thinner (just the converse to that obtaining on the fore wing). In *papuanus* the outer margin of the fore wing is only very shallowly convex, while in *ariadne* this margin is prominently so; and in the hind wing the outer margin in *papuanus* is straight or slightly concave from M_1 to Cu_1, and from M_3 to 2A is concavely scalloped between the veins, while in *ariadne* this border is entirely convex, with scarcely a trace of scalloping. Below, the white appears to be slightly more pearly in *ariadne.*

Philiris azula, n. sp.

Eyes ringed with white. *Frons* brown with a central white line directed downward from between the bases of the antennae to mingle with a white area at the base of the eyes. *Collar* above with long profuse hair of mixed white and bluish. Just back of the eyes is a short bar of white scales, tapering towards either side. On the sides the color changes from dorsally black-brown with scattered white scales and hairs to ventrally white with a few brown scales. *Antennae* black-and-white annulate; club black, tipped with bright fulvous. *Thorax* above black, with a moderate amount of long hair, directed back, lying along the sides. Below covered heavily with long white hair. *Abdomen* above black, overlaid with blue, chiefly near the base; below white; sides with thin bluish lines extending partially upwards along the sutures. *Legs* white, femora with two lengthwise black lines; tibiae and tarsi annulated with black.

UPPERSIDE:

Male. Both wings slightly purplish blue, only slightly iridescent. *Fore wing* with costa narrowly black. Apex more broadly so, outer margin from Cu_1 very thinly so. Veins for a short distance inward obscurely black-pencilled. *Hind wing* with costa pale gray. Outer margin very narrowly black, thickening slightly towards the anal angle. Inner margin from 2A gray, darker near the vein, and near the base, lighter on the edge. *Fringe* of fore wing black basally, white outwardly; that of hind wing similar.

UNDERSIDE:

Male. Both wings uniform, slightly pearly white. *Fore wing* with a gray-brown spot at the base on the inner margin, usually obscured by the costa of the hind wing. *Hind wing* with a black spot about 1 mm. in from the center of the inner margin. *Fringe* white, black at the vein-ends; only faintly so on the fore wing and upper part of the hind wing.

Length of fore wing: male 13 mm.

Holotype, male, Wau, Morobe District, New Guinea, Oct. 15, 1932 (H. Stevens), No. 27627, in the Museum of Comparative Zoölogy.

Remarks. In wing shape and size *azula* is very close to *fulgens* (*septentrionalis*), but may be told from that species instantly by the narrower black on the fore wing, and the fact that the ground color of fore and hind wings above are identical, rather than different, as in *fulgens.* The pale, lustreless blue of the upper surfaces, the narrow black borders, the pale line on the frons, and the relatively large amount of blue on the upper surface of the abdomen all combine to make *azula* a very distinct species.

Philiris fulgens bicolorata, new subspecies

UPPERSIDE:

Male. *Fore wing* dully shining dark purple. Costa and outer margin narrowly black; veins outwardly obscurely black-pencilled. *Hind wing* bright shining coerulean blue, very faintly violet in some lights. Costa pale brown. Outer margin narrowly black, extending basad on the veins for short distances. Inner margin white, becoming brown on the outer third. *Fringe* outwardly white on both wings, obscurely dark at the vein-ends.

UNDERSIDE:

Male. Both wings pure white. A minute spot on the inner margin of the hind wing, one third out from the base. *Fringe* of both wings white, black-tipped on Cu_1–Cu_2 and 2A of hind wing.

Length of fore wing: male 13.5 mm.

Holotype, male, Dobo, Aru Islands, June 3, 1939 (R. G. Wind), in the collection of the senior author.

Remarks. This is a very interesting subspecies, apparently forming a link between the subspecies *septentrionalis*[5] of New Guinea and *Kurandae* has heretofore been considered a good species, but is quite obviously only Australia's representative of *fulgens.*
between the two. The apical black is broader than in *septentrionalis* (where it only covers the outer half of the cell-end-to-apex area), but not so broad as in *kurandae* (in which the whole cell-end-to-apex area is black). The hind wing is the bright blue of *kurandae*

[5] Joicey and Talbot, 1916, Trans. Ent. Soc. London, **1916**, p. 76.
kurandae[6] of Australia. It is, in fact, almost exactly intermediate
[6] Waterhouse, 1902, Proc. Linn. Soc. N. S. W. **27**, p. 651.

and not the violet of *septentrionalis.* The marginal black of the hind wing is narrow as in the New Guinea race.

Typical *fulgens*[7] was described from Amboina. No specimens have been seen. From the description and figure it would seem to be rather like *kurandae,* but with the violet hind wing of *septentrionalis.*

Philiris intensa birou, new subspecies

UPPERSIDE:

Male. Both wings bright, iridescent, and slightly purplish blue. *Fore wing* with a narrow costal and a broader marginal black border, the latter thickening toward the apex, where it occupies the outer third of the cell-end-to-apex area. *Hind wing* with costa and inner margin moderately broadly brown-black, and outer margin less broadly black. *Fringe* of both wings white, black at the ends of the veins.

Female. Both wings brown. *Fore wing* with a large pale bluish area that occupies the lower half of the cell to the inner margin, and out about three-quarters of the way on the latter. The outer extremity of this blue area extends from the above-mentioned point on the inner margin straight up to Cu_1, where it curves over and meets the upper limit at the origin of M_2. Near the apical end of this bluish area, between the bases of M_3 and Cu_2, is an obscure whitish patch. *Hind wing* with costa faintly lighter. Cell entirely bluish, which extends beyond the end half way to the outer margin, below into the basal thirds of the Cu_1–Cu_2 and Cu_2–2A interspaces, and above, faintly into the base of the Rs–M_1 interspace. *Fringe* as in the male.

UNDERSIDE:

Male. Pure white on both wings. A small black spot occupies the center of the inner margin of the hind wing, about 1 mm. in from the edge. *Fringe* white, black at the ends of the veins.

Female. Similar to the male.

Length of fore wing: male; large 13 mm., average 12.8, small 12. Female; large 14 mm., average 13.3, small 13.

Holotype, male, Wau, Morobe District, New Guinea, Aug. 8, 1932 (H. Stevens).

Allotype, female, same locality and collector, Feb. 13, 1932.

[7] Smith and Kirby, 1897, Rhop. Exot. Orient. Lyc. X, p. 8, figs. 14, 15.

Paratypes, 6 males and 2 females, same locality and collector; 1 female each Feb. 13, 19, 1932; one male each, March 10, 16, 25, April 15, Aug. 8, Oct. 15, 1932; two males, Bialowat, Morobe District, New Guinea (H. Stevens) resp. Aug. 6, 13, 1932.

Holotype, allotype, and 6 male paratypes, No. 27623, in the Museum of Comparative Zoölogy. One male and one female paratype in each of the authors' collections.

Remarks. Birou differs from typical *intensa* in the reduction in size of the marginal bordering of both wings. In typical *intensa* the apical part of this bordering on the fore wing extends back half-way to the cell-end, while in *birou* it extends back but one-third. The marginal black on the hind wing is about half as thick as that of typical *intensa.* Also, there is no pencilling of the outer extremities of the veins, such as that found on the typical subspecies. In the female, the bluish appears to be more extensive on the hind wing.

The typical insect was described from the Aru Islands. Specimens in the collection of the senior author from Samarai and Milne Bay, eastern New Guinea, agree well with Aru specimens in the same collection and in the collection of the Museum of Comparative Zoölogy. From Fak-Fak (Kapaur), Dutch New Guinea, is a series of some few specimens that apparently belong to an intermediate race. It was not deemed worthy of description, in the absence of a greater and more convincing number of specimens. From Inanwatin, Dutch New Guinea, is a very large male, whose length of fore wing is 15 mm. It otherwise corresponds with the Fak-Fak specimens. In the Carnegie Museum is a male of *intensa* (*s.l.*) from Hollandia, Dutch New Guinea, that apparently represents an extreme development along the *birou* line, the black bordering being even narrower than in *birou.* Because of this difference, and the fact that it hails from a locality quite far removed from the type locality of *birou,* it was not made part of the type series.

The name *birou,* Malay for *bright blue,* seems to be particularly applicable to *intensa* and its subspecies.

Philiris innotatus[8] evinculis, new subspecies

is a good species, quite distinct from Amboinese *ilias* Felder (Sitzungsber. kais. Akad. Wiss. (Vienna) **40**, 1860, p. 454), with which it has previously been associated.

UPPERSIDE:

Male. Both wings blue-lilac. *Fore wing* with costa narrowly black-brown, and outer margin with a border of similar

[8] *Philiris innotatus* Miskin (Ent. Mo. Mag. **11**, Dec. 1874, p. 165)

color, thickest at the apex, where it covers the outer half of the distance from cell-end to apex. This border extends briefly basad on the veins. *Hind wing* with a gray costal and inner marginal border, and a black-brown outer marginal border, also extending briefly basad on the veins. *Fringe* of both wings white, basally black-brown and also at the vein-ends near the anal angle of the hind wing.

Female. Both wings black-brown. *Fore wing* with a large sky blue patch covering the whole cell, save for the upper cell-end, and the whole region below to the inner margin, where it occupies the inner four-fifths of the wing. Veins M_3, Cu_1 and Cu_2 in this blue area are white. *Hind wing* with a central dull blue patch leaving the veins and a dash across the cell-end brown. *Fringe* as in the male.

Underside:

Male. Both wings sublustrous white. *Fringe* white, basally black near the anal angle of the hind wing, and at the vein-ends there.

Female. Similar.

Length of fore wing (last two paratypes only): male 11 mm.; female 12.5 mm.

Holotype, male, Redlynch, North Queensland, Australia, August 14, 1938 (R. G. Wind).

Allotype, female, same locality and collector as holotype, September 17, 1938.

Paratypes, same locality and collector as holotype: two males, October 1, 3, 1938, resp.; one female, August 14, 1938.

Holotype, allotype, and one male paratype in the Cornell University collection. One male, one female paratype in the collection of the senior author.

Remarks. Differs from a number of topotypical (Brisbane) specimens in the collection of the Museum of Comparative Zoölogy as follows: In the male, the ground color above is paler, less violet, and the outer marginal border is narrower (one-half instead of two-thirds the distance from cell-end to apex). In the female the blue is more extensive on both wings above.

Philiris moira putih, new subspecies

Upperside:

Male. Both wings bright shining violet-blue. *Fore wing* with a costal and outer marginal border, the former about 1 mm. thick, the latter about 5 mm. at the apex, narrowing down to a minimum of 1.5 mm. This dark bordering extends basad a short distance on each vein. *Hind wing* with a costal, outer and inner marginal border, the first and last somewhat paler and slightly thicker (maximum 1.5 mm.), the second slightly less than 1 mm. This bordering also extends briefly basad on each vein. *Fringe* brown, whitish outwardly between the veins.

Female. Both wings uniformly brown. *Fore wing* with the basal third each of M_3, Cu_1 and Cu_2 and the lower DC between them white. Between the whitened portions of these veins are scattered pale blue scales, and below in the Cu_2–2A interspace are some darker scales.

UNDERSIDE:

Male. Both wings pure, very slightly lustrous (save on inner margin of fore wing) white. Below the cell of the fore wing, near the base, is a brown patch, usually hidden by the costa of the hind wing. On the hind wing is a spot on the inner margin, just basad of the center of that margin. *Fringe* of fore wing white, dark at the vein-ends and towards the apex; of hind wing black, whitish outwardly between the veins.

Female. Similar to the male.

Length of fore wing: male 11.5 mm.; female 11.5 mm.

Holotype, male, Pt. Moresby, British New Guinea, April 26, 1939 (R. G. Wind).

Allotype, female, same data.

Paratypes, three males, same locality and collector as holotype, April 18, 22, May 5, 1939 resp.

Holotype and allotype in the Cornell University collection. One paratype, No. 27624, in the collection of the Museum of Comparative Zoölogy, and one paratype each in the authors' collections.

Remarks. This may well be a good species. It differs from *moira* in being much smaller (less than 1 inch in expanse, while *moira* attains to nearly 1¼ inches). The black border on the fore wing of the male is thicker, and the blue above on the female is reduced considerably. *Putih* has a black spot on the inner margin of the hind wing below, which is absent from the illustration (with which these comparisons were made) given by Smith and Kirby of *moira*.[9]

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[9] Rhop. Exot. 3, Lycaenidae (Oriental) Plate XVIII Holochila IV, Jan. 1899, p. 14, figs. 9, 10, 11.

Putih is the Malay word for *white*.

Philiris mayri, n. sp.

Eyes[10] ringed with white. *Frons* brown, narrowing towards the base of the eyes. *Collar* above with long brown hair, becoming shorter and white on the sides. *Antennae* black, annulated with white; club black, tipped obscurely with dull, dark fulvous. *Thorax* above black with long, back-directed hair on the front, sides, and just before the abdomen; below covered with long projecting white hair. *Abdomen* black-brown above, narrowly cream-white below; on each side are three small patches of metallic scales, one each in the three segments next the thorax. *Legs* white, annulate with black. *Wing shape:* (Fore wing)—costa evenly rounded, slightly more sharply at the base and apex; outer margin shallowly and evenly rounded, with apex blunt but angled; inner margin straight. (Hind-wing)—costa arched at base, evenly rounded beyond, gradually merging into the outer margin, which is moderately well-rounded, more so at about Cu_1, meeting inner margin bluntly at anal angle. Inner margin evenly curved.

UPPERSIDE:

Male. Both wings lustrous violet. *Fore wing* on costa with moderately broad black-brown border. Outer margin with a similar border, narrow at the inner margin, and thickening considerably above Cu_2, to cover the outer half of the cell-end-to-apex area. This bordering extends slightly basad on the veins. *Hind wing* with outer margin narrowly and evenly black-brown. Costa white. Inner margin to 2A gray. *Fringe* on the specimen examined too poor for description.

UNDERSIDE:

Male. Both wings rather flat white. Just basad of the center of the inner margin of the hind wing is a tiny black spot. *Fringe* on hind wing appears to be black towards the anal angle.

Length of fore wing: male 13 mm.

Holotype, male, Mt. Siwi, Arfak Mts., Dutch New Guinea, 800 m., April–June 1928 (Dr. E. Mayr), Acc. 31075, in the American Museum of Natural History.

Remarks. Evidently closely allied to *P. marginata*[11] but differs in the narrower dark borders, in the shape of the hind wing, *mayri*

[10] The condition of the single specimen examined does not permit a too accurate description of the less obvious parts. Hence there are very likely some discrepancies.

[11] Grose-Smith, Nov. Zool. 1, 1894, p. 579.

having a blunter anal angle than *marginata*. Below on the hind wing *mayri* differs in possessing the black inner marginal spot, apparently lacking in *marginata,* and the anal fringe is apparently blacker.

This species is named for the collector, Dr. Ernst Mayr, whose Ornithological work is well known.

Philiris misimensis, n. sp.

Eyes ringed with white. *Frons* broadly brown between the eyes, contracting sharply towards the palpi to a narrow brown line. *Collar* above with long profuse brown hair, with a few white hairs at the top. Between the bases of the antennae are two short white dashes, both parallel to the body axis. On the sides the brown hair shortens and mingles with white, becoming all white below. *Antennae* black, white annulate; club black, tipped obscurely with dull fulvous. *Thorax* above black, nearly hairless at summit, but along sides with rather long, back-directed hairs, heaviest just behind the head and just before the abdomen. Below covered with profuse long white hair. *Abdomen* above black, below creamy white. Above, frontad, with long, dull, back-directed hairs as on thorax. *Legs* white—prothoracic infrequently annulated with black; mesothoracic with femora and tibiae outwardly almost solid black, inwardly white marked, tarsi black and white annulate (basal segment mostly black); metathoracic similar to mesothoracic. *Wing shape:* (Fore wing)—costa shallowly and evenly rounded; apex blunt; outer margin heavily rounded; inner margin rounded; (Hind wing)—costa slightly rounded, sharply so near base, outer margin merging with it gradually, almost eliminating outer angle; outer margin very rounded; inner margin evenly, well rounded; anal angle blunt, but present.

Upperside:

Male. Both wings dully shining dark purple. *Fore wing* with a moderately narrow costal dark border (towards the base limited by Sc). Outer margin with a heavier border, slightly thickened apically, and extending for a short distance basad on the veins. *Hind wing* with a broad, dark costal border and a slightly narrower and darker outer marginal one, the latter extending shortly basad on the veins. Inner margin dark bordered (same shade as costal border), limited by 2A. *Fringe* of fore wing white towards inner margin (basally dark), becoming grayish towards apex. Obscurely dark at the vein-ends. Outer margin appears to be slightly scalloped, especially towards the anal angle, apparently due to the lengthened fringe at the vein-ends as well as the more produced wing itself.

UNDERSIDE:

Male. Both wings pearly grayish-white. End of cell on each wing crossed by a pale streak. Costa of fore wing edged very narrowly with fulvous. At base of fore wing, below the lower DC and above 2A, is an obscure dark patch, usually hidden by the costa of the hind wing. Inner margin of hind wing, in about 1 mm., and slightly basad of the center, with a small black dot. *Fringe* of both wings white. Cu_1, Cu_2 and 2A prominently tipped with black, the remaining veins obscurely so.

Length of fore wing: male 13.5 mm.

Holotype, male, Mt. Misim, Morobe District, New Guinea, 5–6000 feet (H. Stevens), No. 27628, in the Museum of Comparative Zoölogy.

Remarks. This species belongs to the *subovata-aurelia* group, and seems to find its nearest affinities in *subovata*[12] or *theleos.*[13] It is slightly larger than the former, the color on the upperside darker and less lustrous. It is also darker below. From the latter, as well as from all other members of this group, it may be told by the paler cell-end streak on each wing below. An additional specimen from Wau (Morobe District) may be this species, but it is so worn that it cannot be placed with certainty.

Diostracus prasinus Loew in Tennessee (Diptera, Dolichopodidae).—This peculiar fly was described in 1861 from "New York." Nothing more about it was known in 1911 when Aldrich described another species of the genus from the West. It was recorded in the New York List from Wells, N. Y. (in the Adirondack Mts.) and from Bolton Mt., Vt., and Chester, Mass., by Johnson in the New England List. These seem to be the only records. On June 11, 1946, I took two males close to the water rushing over the rocks in the river at the Chimneys Camp in the Great Smoky Mountains National Park (Tenn.) and on June 15 I took one more male in a similar situation at Elkmont, Tenn., also in the Park.—

GEO. STEYSKAL, Detroit, Michigan.

[12] Grose-Smith, Nov. Zool. **1**, 1894, p. 579.

[13] H. H. Druce, Ann. Mag. Nat. Hist. (6) **19**, Jan. 1897, p. 15.

A NEW SPECIES OF CYMATODERA FROM CALIFORNIA AND OREGON (COLEOPTERA, CLERIDAE).

By William F. Barr,[1] Berkeley, Calif.

The following description is offered at the present time in order that the species name may be used elsewhere.

Cymatodera pseudotsugae Barr, n. sp.

Male: Elongate, slender; dark castaneous; elytra with a pale median fascia. *Head* finely, densely punctured, slightly rugose on front, clothed with short and long, erect, brownish hairs; antennae slender, extending to basal fourth of elytra, second segment three-fourths as long as third, segments three to seven nearly equal in length, segments eight to ten slightly shorter than those immediately preceding. *Pronotum* three-fourths as wide as long, widest at middle; anterior margin slightly wider than posterior margin; sides constricted behind anterior margin, more strongly constricted in front of base; surface finely, densely punctured, slightly, but conspicuously wrinkled, rather abundantly clothed with long, erect, brown hairs; ante-scutellar impression faintly evident. *Elytra* nearly twice as long as basal width, wider than pronotum, widest behind middle; humeri distinct; apices separately rounded; surface finely punctulate, striae evident only at base, consisting of a few, rather fine punctures, interspaces much wider than punctures, rather densely clothed with short, suberect, dark hairs; median fascia interrupted before suture, widest at sides, front margin oblique, hind margin nearly transverse. *Legs* pale castaneous, finely, densely punctured, sparsely clothed with short and long, suberect, pale hairs. *Metasternum* very finely and densely punctured, rather densely clothed with short, suberect, fine brown hairs; carinae absent. *Abdomen* dark testaceous, finely, densely punctured, pubescence very fine, pale and recumbent; fifth sternite broadly, not deeply emarginate at apex; sixth sternite slightly prolonged, sides acute at apex, posterior margin broadly emarginate, truncate at middle; fifth tergite shallowly emarginate at apex, notched at middle; sixth tergite narrower than sixth sternite, broadly rounded and subtruncate at apex, slightly notched.

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[1] The writer wishes to express his appreciation to Dr. E. C. Van Dyke and Mr. Kenneth M. Fender for the privilege of studying some of their material in this genus.

Length: 9 mm., width: 2.5 mm.

Female: Ante-scutellar impression more pronounced than in male; elytra with distinct striae on basal half, punctures rather fine, median fascia indistinct; fifth abdominal sternite broadly, shallowly emarginate at apex; sixth sternite rather narrowly rounded at apex; sixth tergite broadly rounded at apex, completely overlapping the last sternite.

Length: 9.1 mm., width: 2.2 mm.

Holotype, male (No. 5620 Calif. Acad. Sc., Ent.) from Placerville, California, collected by F. B. Herbert; allotype, female (No. 5621 Calif. Acad. Sc., Ent.) from McMinnville, Oregon. The labels on the holotype indicate that it was reared from *Pseudotsuga taxifolia* (Lamb.) on April 10, 1916.

C. pseudotsugae will run to *C. oblita* Horn in Wolcott's key,[2] but may be readily distinguished from that species by the secondary sexual characters of the last two abdominal segments of both the male and the female. Further, the males of *C. oblita* have a pair of longitudinal carinae on the metasternum which are absent in *C. pseudotsugae.* The distribution of the two species is also quite different, *C. pseudotsugae* having only been taken in northern California and Oregon, whereas *C. oblita* is recorded from the extreme southern part of California and from Arizona and Lower California.

***Octhephilum fracticorne* Payk.**—This European and North African Staphylinid has been recently taken in dead swamp grass just above the mud and water on several occasions in the little swamp at Framingham near the Natick Town line. The following dates are on the specimens now at hand: April 2, 1944, April 29, 1945, and October 4 and 14, November 5, and December 10, 1946. I now have six males and one female and a pair have been sent to Mr. M. W. Sanderson of the Illinois Natural History Survey at Urbana, Illinois, who very kindly made the determination. I recently discovered a specimen in a lot of material sent me from the Connecticut Agricultural Experiment Station at New Haven, Conn. This was taken in nursery stock from Holland in December of 1910 by A. B. Champlain.—C. A. Frost, Framingham, Mass.

[2] Wolcott, A. B., 1921, Proc. U. S. Nat. Mus., 59: 284.

NEW SPECIES OF PTYCHOPTERIDAE (DIPTERA). PART III.

By Charles P. Alexander, Amherst, Mass.

The preceding parts under this title were published in the Bulletin of the Brooklyn Entomological Society, 32: 140–143, 1937, and 38: 37–42, 1943. At this time I wish to describe three further new species from Western North America, as well as a further novelty from Burma. A few additional records of distribution for certain rare and little-known Nearctic species of Ptychopteridae are given. The types of the new species herewith described are preserved in my personal collection of Tipuloidea.

Ptychoptera uta sp. n.

Male.—Length, about 9–9.5 mm.; wing 8–8.5 mm.; antenna about 5 mm.

Generally similar to *Ptychoptera lenis coloradensis* Alexander (Bull. Brooklyn Ent. Soc., 32: 141–142, 1937), differing especially in details of structure of the male hypopygium.

Ninth tergite with the lateral lobes distad of the outer spine very small, exceeded by the spine; subtergal spinulose lobe large and clavate; lowermost tergal lobe reduced. Dististyle longer and more slender, sinuous, blackened, the tips pale. Gonapophyses large and massive, blackened, the apex broadly obtuse. Ninth sternite with the setae of the median spatula long and slender; subtending lobes nearly parallel-sided, the tips truncated or weakly expanded.

Habitat.—Utah.

Holotype, ♂, Willard, April 29, 1939 (Knowlton & Harmston). *Paratopotypes*, ♂♂; *paratype*, ♂, May 1, 1939 (Knowlton & Harmston).

I am greatly indebted to George Knowlton and Fred Harmston for these specimens and for many other Tipuloidea from Utah. The detailed record for the state is in press (Amer. Midl. Nat., 1947).

Ptychoptera sculleni Alexander.

Described from Washington and Oregon. Additional records: *Oregon:* Peavine Ridge, near McMinnville, Station 3 (605 feet). September 10–24, 1945 (K. M. Fender); Bald Mountain, Coast Range, Yamhill Co., July 19, 1942 (K. M. Fender).

California: Orick, Humboldt Co., June 21, 1935 (A. L. Melander).

Ptychoptera pendula Alexander.

Utah: Kimballs Fort, June 29, 1943 (G. F. Knowlton).

Wyoming: Yellowstone National Park—Roosevelt Station, July 5, 1923; Old Faithful, July 14, 1923; Spring Creek, July 15, 1923; Turbid Lake, July 20, 1923 (all A. L. Melander).

Ptychoptera townesi Alexander.

Washington: Everett, July 6, 1924; Pluvius, July 16, 1922; Puget, August 4, 1925; Swauk Creek, June 28, 1924; Toledo, June 27, 1935 (all A. L. Melander).

Oregon: Hood River (Leroy Childs).

Ptychoptera monoensis sp. n.

Allied to *pendula;* general coloration of body polished black, the pronotum and mesonotal scutellum yellow; antennae with scape and pedicel yellow; all coxae yellow; wings with a weak brownish tinge, the prearcular field yellow; male hypopygium with the ninth tergite deeply notched, each lobe bearing two blackened lobules, in addition to the apical point; dististyle conspicuously trilobed, the outer one a very large flattened yellow blade, the intermediate arm a darkened subcylindrical rod; innermost arm more compressed, bearing four or five powerful spinous setae.

Male.—Length about 8.5 mm.; wing 8 mm.; antenna about 4.1 mm.

Rostrum and mouthparts yellow; palpi yellow, the terminal segment brownish black. Antennae of moderate length, approximately one-half as long as wing; scape and pedicel yellow, flagellum black; flagellar segments cylindrical, the verticils shorter than the segments. Head polished black.

Pronotum obscure yellow. Mesonotum polished black, the central portion of the scutal region and the scutellum obscure yellow, the parascutella blackened; postnotum black, the dorsal portion of the suture between the mediotergite and pleurotergite more reddened; dorsal pleurotergite with conspicuous setae. Pleura black, sparsely pruinose, more heavily so on the pteropleurite; dorsopleural region buffy yellow. Halteres yellow, the knobs weakly darkened. Legs with all coxae and trochanters yellow; femora yellow, the tips rather narrowly but conspicuously blackened, the amount subequal on all legs; tibiae obscure yellow, the tips narrowly blackened; tarsi brownish black to black, the narrow proximal portions of the basitarsi vaguely obscure yellow. Wings with a weak brownish tinge, the prearcular field yellow; a very restricted brown pattern, especially evident over the central cord; very restricted darkenings at forks of veins R_{1+2} and R_{4+5}; veins brownish black, yellow in the prearcular field. Macrotrichia of cells relatively abundant, including all cells beyond the general level of fork of R_{4+5} and as restricted series in cell R, basal portions of cells R_3 and R_5 and as even more restricted groups in cells C, R_1 and M; no trichia in bases of cells M_2 or M_3. Venation: Rs relatively long; *r-m* connecting with Rs at fork or in R_{4+5} shortly beyond; cell *2nd A* broad.

Abdomen polished black, the posterior borders of the second and third tergites narrowly pale; hypopygium chiefly black. Male hypopygium of the general type of *pendula* but differing in important regards, especially of the tergite and dististyle. Ninth tergite with an unusually deep U-shaped notch, the lateral lobes produced into small conical points, on mesal edge of apex further produced into two blackened hairy lobules, the outer one more slender and elongate. Dististyle trilobed, the outer lobe a very large flattened yellow blade, on inner margin near base bearing a small tubercle; intermediate arm a darkened subcylindrical rod, the distal half and especially the apex with conspicuous dark-colored setae; innermost or lowest arm a flattened-compressed blade that bears four or five strong spinous setae, in cases the terminal one isolated and slightly larger; in other instances the spines arranged more definitely in pairs.

Habitat.—California.

Holotype, ♂, Coleville, Slinkard's Canyon, Mono County, May 28, 1939 (Mont Cazier & T. H. G. Aitken).

Ptychoptera monoensis is most nearly allied to *P. pendula* Alexander and *P. townesi* Alexander, being somewhat closer to the former yet very distinct in the structure of the male hypopygium, particularly the tergite and dististyle.

Ptychoptera persimilis sp. n.

Male.—Length, about 8 mm.; wing 7 mm.

Color characters almost as in *P. annandalei* Brunetti, 1918, that is, the mesonotum uniformly black excepting the yellow scutellum and adjoining portion of the mediotergite. Pleura yellow, apparently darker on the mesepisterum. Femora yellow, the tips narrowly and inconspicuously infuscated, the amount subequal on all legs; tibiae clearer yellow, the tips still more narrowly darkened; basitarsi obscure yellow, the tips and remainder of tarsi blackened. Wings with the outer darkened crossband broken, most distinct at stigma and over each of the forks. Venation: *Rs* short and straight. Abdominal tergites yellow, the caudal borders ringed with brownish black; basal tergite uniformly blackened; a dark ring on proximal half of tergite two; darkened areas on outer tergites more extensive; sternites and hypopygium yellow. Male hypopygium with the tergite profoundly bifid, as in *annandalei* and allied species, but the arms much stouter, especially at bases; arms bent at near midlength, the apical portion stout, provided with abundant pale setae, before apex with a small tubercle. Dististyle of entirely different conformation; basal half expanded into a broad lobe, additional to the two basal lobules in *annandalei;* outer lobes not forceps-like, as in *annandalei,* the main lobe with the outer blackened setae long and abundant; separated from the outer group and nearer the base of style a linear row of about five shorter and stronger spines; outer lobe of dististyle pale, clavate, provided with long slender setae. Sternal lobes long and pale, densly hairy, the setae of inner margin near base of unusual length, the more proximal ones progressively longer. In *annandalei,* the tergal arms are long and slender, provided at apex with a dense brush of blackened setae. Dististyle more or less forceps-shaped, the two outer lobes being opposed to one another at their free ends; no dilation on basal portion of style; spines of the axial portion all short and stout. Sternal lobes much more slender and fingerlike.

Habitat.—Burma.

Holotype, ♂, Shwenyaung, Southern Shan States, August 1930.

For the most recent consideration of the Oriental Ptychopteridae, see Alexander, Arkiv för Zoologi, 38 A, No. 2: 1–10, map, 1946.

Bittacomorphella fenderiana sp. n.

Generally similar to *sackenii;* antennae black throughout; mesonotal praescutum with the disk chiefly black, the four stripes being divided only by paler gray interspaces; ventral pleurites darkened; legs with the basitarsi black, the tips not or but narrowly whitened, tarsal segments two and three snowy white; male hypopygium with the tergal lobes produced caudad into small slender points; lateral tergal arms almost glabrous; dististyles two, there being a small cylindrical style or lobe at the base of the major one; phallosome without blackened parts, the outer lateral angles produced into obtuse hairy lobes.

Male.—Length, about 11–13 mm.; wing 7–8 mm.; antenna about 6–8 mm.

Female.—Length, about 10–13 mm.; wing 7–9 mm.

Frontal prolongation of head yellow, the basal portion silvery; palpi brown basally, passing into black. Antennae black throughout. Head behind black, gray pruinose.

Pronotum very restricted, pale yellow. Mesonotal praescutum with the disk chiefly black, produced by four conspicuous stripes and only slightly paler gray interspaces; humeral and lateral regions pale yellow, sparsely pruinose; scutum pale yellow, each lobe with two separate black areas, the posterior one very small; posterior sclerites of notum yellow. Pleura silvery, the ventral sternopleurite and meron restrictedly brownish black; a more or less distinct darkened area on the anepisternum, sometimes obscured by pruinosity; in cases, the mesopleura even more extensively darkened. Halteres pale, knobs weakly infuscated. Legs with the coxae and trochanters yellow; femora brownish yellow, the tips passing into black; tibiae dirty whitish, the tips narrowly infuscated; basitarsi brownish black, the tips very narrowly to scarcely whitened; tarsal segments two and three snowy-white, four and five black. Wings with a faint grayish tinge, unpatterned; veins brown, those at extreme base more yellowed. Venation: *r-m* variable in position, from shortly before the fork of *Rs* to about an equal distance beyond on R_{4+5}; *Rs* variable in length, in cases only as long as *r-m,* in other specimens nearly twice this vein.

Abdomen of both sexes brownish black, in male the subterminal segments a trifle paler. Male hypopygium with the lobes of the tergite produced caudad into slender spinous points; lateral tergal arms almost glabrous, with only a few long setae just before the acute apical spine. Dististyles two, there being a small cylindrical style or lobe at the base of the major one. What appears to represent an interbase is a slender curved horn, the apical half very attenuated. Phallosome stout, without sclerotized points; outer angles produced laterad into obtuse hairy lobes; apex obtuse.

In *sackenii,* the lobes of the tergite are low and obtuse, hairy, not produced; lateral tergal arms relatively stout, with scattered setae over the entire length, more concentrated about the acute black terminal spine. A single dististyle, provided with numerous setae, broadest at base, narrowed outwardly. The supposed interbase has the basal half thickened, the apical spine nearly straight. Phallosome with heavily blackened, sclerotized armature, the long simple unblackened lobe with coarse setae.

Habitat.—Northwestern North America (Vancouveran).

Holotype, ♂, Peavine Ridge, near McMinnville, Oregon, Station 3 A, May 15, 1946 (K. M. Fender). *Allotype,* ♀, Albright's Ranch, Dayton, Oregon, September 19, 1946 (K. M. Fender). *Paratopotypes,* 4 ♂♂, Stations 3 and 3 A, May 5–26, 1945, August 22, 1946, September 17, 1946 (K. M. Fender); *paratypes,* 1 ♂, with the allotype; 1 ♂, Massett, Queen Charlotte Island, British Columbia, 1898 (J. H. Keen); 1 ♀, Stanley Park, Vancouver, British Columbia, September 3, 1930 (H. B. Leech); ♂♀, Ashford, Washington, August 18, 1940 (H. & M. Townes); ♂, Keyport, Washington, July 1905 (R. W. Doane); Lewis and Clark State Park, Washington, September 28, 1946 (K. M. Fender). Certain of the above paratypes were earlier (Bull. Brooklyn Ent. Soc., 38: 41; 1943) recorded as being *Bittacomorphella sackenii* and the change should be noted.

Mr. Kenneth M. Fender, keen student of the Cantharid beetles, first called to my attention the fact that there were two distinct species of *Bittacomorphella* occurring at his study stations on Peavine Ridge, near McMinnville, Oregon. From a study of the male genitalia there is no question but that two distinct species are involved. I am most pleased to name this new species for Mr. Fender, in appreciation of invaluable co-operation in the study of our western Tipuloidea. Von Röder's description of *sackenii* (Wiener Entomol. Zeitung, 9: 230; 1890), for a copy of which I am indebted to Mr. George Gyrisko, is short but quite sufficient for purposes of identification of the species. It is evident that *sackenii* is a somewhat more southern species, its known range including Nevada and California, as well as Washington and Oregon, as far north as Mount Rainier, Washington. The type was from the Sierra Nevada, in Nevada, presumably from the Lake Tahoe section, taken by Herbert K. Morrison, who collected in the state in 1878 and again in 1884. Aldrich (Psyche, 7: 200–201; 1895) re-described what he considered to be *sackenii* (from Lake Union, Seattle, Washington, August–September 1894, John M. Aldrich) but which is very evidently the new species, *fenderiana.*

SOME NOTES ON THE BIOLOGY OF HYMENARCYS AEQUALIS SAY (PENTATOMIDAE).*

By Charles O. Esselbaugh,
Pullman, Wash.

Like that of several other Pentatomidae, the biology of *Hymenarcys aequalis* is almost completely shrouded in mystery. While recorded from the greater part of the United States, it is usually regarded as a comparatively rare species but, as Blatchley (1926) points out, this view exists because collectors have not looked in the right places or during the hibernating period. While supposedly much less common than *H. nervosa* Say, I certainly have not found it so since only two specimens of the latter were taken during my last five seasons of collecting, while the former could be had in as great numbers as desired if collected during hibernation.

Hibernation.

My best collecting of *Hymenarcys aequalis* has been at the time they were going into their hibernation quarters, namely October 7 on two successive years, when this activity was taking on the aspect of a definite migration. In these instances scores of individuals were at hand in a fringe of blue-grass and low weeds along the edge of an open, grassy woodland bordering the gardens at the University of Illinois. A few days later they were to be found in hibernation there and in the margin of the woods, under a cover of short grass and dead leaves. I have on two other occasions taken hibernating individuals, to the number of a dozen or so, from very light debris in south-facing pockets between the buttress roots of elm trees. The debris consisted, for the most part, of bits of bark little larger than the bugs themselves.

Although Blatchley (1895) reports taking hibernating individuals from beneath logs, mullein leaves, etc., I have never taken a living specimen of this or any other species of pentatomid under such situations. Blatchely further states that rarely nymphs of this species are found in winter. No subsequent author supports this record and Blatchley, in his Heteroptera of Eastern North America, for some reason does not repeat it in his treatment of the species. It seems to be the only such record for American Pentatomidae.

* Contribution No. 271 of the Department of Entomology, University of Illinois.

Summer Habitat.

Blatchley (1926) also states that *aequalis* "occurs in summer on mullein, thistle and other plants in dry or sandy soils." My experience with the species corresponds far more closely with that of Stoner (1920) in Iowa. He reports taking comparatively few by sweeping, most being taken in late fall or early spring in their hibernating quarters, the few taken with a sweep net being on low weeds and usually in more or less moist places. He further reports finding specimens walking about on city sidewalks on warm sunshiny days in late autumn and early spring.

I have taken active specimens on several occasions, for most of which I have insufficient data, but I have the following records. One was discovered May 22 on the upper surface of a leaf of *Hydrophyllum appendiculatum* and it dropped immediately to the ground, where I found it after a few minutes search. Another (no date record) was taken from a sunny window ledge and two were swept May 30 from some low roadside vegetation which consisted mostly of grasses. On July 26 and August 31 four males were swept from a mixed stand of grass and rather low weeds growing around a gravel pit. My specimens are all from Ohio and Illinois and, with the exception of those taken in hibernation, bear dates from May 22 to November 1. In none of these instances is there a definite food plant record. In only one instance have I taken a nymph and that one was not recognized until it had transformed to the adult state.

Life History.

My attempts at rearing this species have met with very scant success. During the season of 1942, adults taken from hibernation during the first week in March were kept in confinement until all died, the last on June 11. During this period of more than three months no individuals were observed feeding or mating and likewise there was no oviposition. The cage, during this time, was placed over potted seedlings of bean and pea and evening primrose, *Oenothera* sp.

During the following season, however, seedlings of corn and garden beet were supplied along with the bean seedlings. The latter were included because it seemed almost incredible that the bugs had not fed upon them, to some extent at least, the preceding season. Feeding has now been definitely observed upon the corn seedlings and on a few occasions an individual seemed to be feeding upon the bean seedlings. All observed feeding took place on the youngest and tenderest seedlings, those not more than two inches tall seemingly preferred.

The manner of feeding is very peculiar. As observed here, feeding took place on the stem near the ground line, the bug in all instances being headed downward. Much of its time is spent either near the base of the stem or on the ground, which is probably a good indication as to why so few are taken by sweeping. When on the ground, this species possesses protective coloration to a high degree and would therefore seldom be observed in the field.

This species has the greatest aversion to flight of any pentatomid I have yet observed. Although possessing apparently functional wings, I have as yet observed no attempt to use them. Caged specimens frequently drop to the ground when observed, as did the one seen on the *Hydrophyllum* leaf. In examining the plants in the cage for egg masses it was not necessary to take any precautions whatsoever to prevent the escape of the individuals on the ground or on the seedlings. As often as not they did not even attempt to crawl away and when they did it was very slowly and only for an inch or two, and crawling usually was limited to those individuals already on the ground, those on the stem near the ground usually remaining absolutely quiet.

Mating.

Mating was first observed April 12, in the laboratory. This pair had been known to be *in coitu* almost 12 hours (continuity not established) when the cage was knocked over and they separated. The same pair were observed mating again on April 20 and also on April 24, but apparently for shorter periods of time. The actual duration of these matings is not known but the second time they had already separated within one and one-half hours after being observed. In the last instance they were *in coitu* about one and one-half hours after first being observed but were not checked again for nearly five hours, when they were found to be separated. Another pair mated on April 27 but, because of infrequency of observation, were only known to be joined 40 minutes.

Oviposition.

Six masses of eggs have now been obtained from this species, all from a single female which was not observed to mate. The first egg mass had hatched when found on the morning of May 24, but the nymphs had not yet dispersed. It is estimated this mass was deposited about May 19. The last was deposited June 11, making an oviposition period of slightly more than three weeks, the last five masses being produced at almost precisely two-day intervals.

The masses ranged in size from four to thirteen eggs, three of the masses being of seven eggs each. From the limited material available, the tendency seems to be to arrange the eggs in two definite, interlocking rows; however the two largest masses showed some tendency toward deviation from this pattern. One mass of 11 eggs contained a partial third row of two eggs, while the largest mass, which consisted of 13 eggs, had 7 arranged in the apparently customary two rows, then three pairs in the same line but spaced at considerable intervals.

At the time of the death of this female, on June 15, the ovarian tubes still contained six eggs, making a total of 55 eggs produced. Five of the six masses were attached to leaves of the corn seedlings and the other to the slender growing tip of a bean seedling.

Rate of Development.

Due to lack of success in rearing, only the incubation period and the length of the first nymphal instar have been determined. Of those eggs whose incubation period is known, about half hatched in four days and the remainder in five. Since the four-day and five-day periods did not alternate, it is to be suspected that fluctuation in temperature played an important part.

Immature Stages.

Egg. Length, 0.70–0.82 mm.; diameter, 0.65–0.70 mm. Form kettle-shaped and more squat than egg of *Mormidea lugens* Fab., which it so closely resembles. Base quite convex, operculum only moderately so; maximum diameter nearer base, side walls straight or slightly constricted at middle. Chorion hyaline, reticulated, the reticulations consisting of a series of close-set secondary spines, these being longer, more robust, and apparently more numerous, than in *Mormidea lugens,* giving the egg a more spinose appearance; cells almost invariably triangles. Primary spines also present, one at each intersection of the reticulations, somewhat longer and coarser than the secondary spines. With exception of a few small spots, contents of egg remain white during embryonic development. Chorionic processes only slightly dilated at apex, 25 to 29 in number.

First Nymphal Instar. Length, 0.81–1.06 mm.; width, 0.74–0.85 mm. Form broadly oval to elliptical. Head (except markings), thorax, plates, legs to apex of femora, fuscous to olivaceous. Tylus roseate, exceeding juga. Two comma-like red marks on vertex and front. Antennae roseate, apical segment somewhat darker. Antennae and front with a few minute pale hairs. Ratio of length of antennal segments approximately 1 : 1 : 1 : 3. Thoracic margins slightly expanded. Abdominal tergites white, heavily flecked with crimson and having sutures and the intervening pseudosutures of same color, somewhat more dilute on disk. First median plate on dorsum of abdomen narrow but somewhat dilated at ends, both plate and glandular slit perceptibly longer than following plates and slits. Second median plate reniform, third oval. Middorsal line and margins of glandular slits on median plates only slightly paler than plates themselves. Lateral plates with apical angles quite acute. Body margins and thoracic nota bearing a few minute, pale hairs, those on nota in three irregular, transverse rows. Ventral surface concolorous with dorsum. Rostrum almost hyaline. Tibiae and tarsi paler than femora, tibiae very broadly and shallowly sulcated on upper side.

Second Nymphal Instar. Length, 1.24–1.51 mm.; width, 0.92-1.09 mm. Form oval to oblong. Head and thoracic nota pale greenish, with coarse, shallow, blue-green punctures becoming almost black; transverse dark area on vertex. Head moderately declivent. Tylus dilated apically, exceeding juga by nearly its own width. Margins of head feebly sinuated before eyes. Tylus and front sparsely pubescent, each hair arising from a puncture. Eyes mahogany. Ratio of length of antennal segments approximately 7 : 9 : 8 : 17, reddish with pale pubescence and slightly paler annulae at articulations, apical segment somewhat darker. Lateral thoracic margins pale, explanate, almost impunctate; pronotal margin straight, mesonotal margin strongly arcuated. Paired markings on thoracic nota almost identical to those on *Euschistus* spp. Abdominal tergites white, mottled with crimson, giving somewhat barred effect. Sutures and intervening pseudosutures crimson. Lateral plates on dorsum of abdomen impunctate, translucent, with inner margin black; anterior pairs with mesal apices acute. Median plates fuscous with mediodorsal line, outline of glandular slit, and lobe mesad of ostiolar openings pale. No plates cephalad of first glandular one. Color pattern of ventral surface like that of dorsum as regards color combinations, but impunctate. Head and thorax more or less greenish-black with pale green or greenish-white markings. Basal rostral segment, and half of second segment, hyaline, remainder almost piceous. Proximal portion of legs to middle of femora hyaline, apical portion of femora and tibiae wine-colored except lateral angles on proximal half of tibiae, which are shining white. Tibiae sulcated on upper side. Tarsi piceous. Venter with series of dark median spots, apex of each lateral plate directed somewhat caudad.

Other Instars. No specimens of other nymphal instars were available. One fifth-instar nymph was taken in the field but was mistaken for another species until the final molt, which occurred on July 19.

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A NEW PARATYNDARIS FROM ARIZONA (COLEOPTERA, BUPRESTIDAE).

By Frank H. Parker, Phoenix, Arizona.

Paratyndaris grassmani, n. sp.

♂—Form robust, cylindrical, black with a vague violaceous lustre; each elytron with three red spots, one irregularly round basal spot covering three intervals midway between humeral umbone and scutellum, two lateral spots one of which is below and extends beyond humeral umbone, the other a median triangular spot that extends to middle of elytron; with recumbent silvery pubescence, much denser, longer, and more noticeably flattened on lateral margins of pronotum, front, and lateral margins of ventral surfaces.

Front convex, shining, coarsely, densely punctate, narrowed above; epistoma broadly emarginate; antennae robust, extending one-third the length of pronotum when laid along lateral margin, distinctly serrate from fifth segment.

Pronotum slightly wider than long, widest at middle, base wider than apex, sides evenly arcuately rounded, apical margin entire, basal margin slightly sinuate and narrowly emarginate at middle; disk convex, narrowly longitudinally sulcate, an impunctate shining line in basal half of the depression; surface alutaceous and coarsely, densely asperate; lateral margins shining, densely, coarsely punctate. Scutellum broadly oval, alutaceous.

Elytra slightly narrower than pronotum at its widest point, slightly expanded behind the humeral angles, sinuately converging to apical third, arcuately converging to irregularly truncate apices which have three large teeth on margin and three above; apical half of lateral margin with a double row of strong serrations; disk slightly convex, striate, intervals convex, punctation of striae and interspaces coarse, dense, sub-equal; apical fourth of fourth interval with a series of stout erect tubercles that are convex anteriorly, concave behind, with margin posterior and acute (similar in structure to those on elytral margins); a similar series of four very large tubercles in sixth interval immediately behind median red spot, a few small tubercles behind these and in seventh interval; a series of ten to twelve large tubercles in eighth interval extending from median spot to apex; umbone prominent.

Thoracic sternites densely, coarsely punctate, except a broad glabrous band just below the lateral margin of the pronotum; ventral abdominal segments densely, coarsely punctate laterally, sparsely punctate medially, finely so on first two segments; second segment with a broadly rounded, alutaceous, impunctate, median lobe extending over basal third of third segment; last segment strongly acutely produced, longitudinally rugose. Tarsi slender, claws simple, swollen at base.

Length 9 to 11 mm.; width 3 to 3.7 mm.

♀ differs from male in having a very small median lobe on posterior margin of second ventral abdominal segment.

Length 10.5 to 12 mm.; width 3.3 to 4 mm.

Holotype male collected at Cave Creek, Maricopa County, Arizona, Sept. 4, 1944, allotype female and one paratype collected at the same locality, Sept. 10, 1944, five paratypes collected at the same locality, two on Sept. 5, 1943, one on Sept. 11, 1943, and two on Aug. 24, 1944, all by the writer. Holotype, allotype and paratypes in author's collection, a male and female paratype in collection of J. N. Knull, Columbus, Ohio. It is with pleasure that I dedicate this remarkable species to my friend, the late Peter C. Grassman.

This species resembles *olneyae* Skinner and *mexicanus* Fisher. The pattern of ornamentation and tuberculate elytra readily distinguish it from *olneyae* Skinner and all other described species credited to America north of Mexico. In the original description of *Paratyndaris mexicanus* Fisher (Proc. of the U. S. N. M., Vol. 82, Art. 27, 1933, pp. 4–5) it is stated that the antennae are serrate from the sixth joint, and "each elytron with a longitudinal row of short, erect teeth near the lateral margin on apical half." The present species has antennae serrate from the fifth segment, in which respect it is unique, and four longitudinal rows of tubercles, three of which are very prominent, on apical half of each elytron.

The specimens were found resting upon dead ironwood (*Olneya tesota*) and palo verde (*Cercidium floridum*) twigs late in the afternoon.

Paratyndaris coursetia Fisher

Eighteen specimens of this species were collected by the writer on dead ironwood (*Olney tesota*) and palo verde (*Cercidium floridum*) twigs at Cave Creek, Maricopa County, Arizona, on Sept. 5 and 11, 1943. This series exhibits considerable variation in markings of elytra. Of these, nine females and five males were marked with only a red marginal spot one third from base of elytra; one female with in addition, on each elytron, a small yellow basal spot adjacent to scutellum; one female with a slightly post median discal orange spot on each elytron, as well as lateral red and basal yellow spots; one female with a discal spot on right elytron, lacking on left, lateral red spots but no basal spots; and another female identical but with basal spots present. In a series of seventeen specimens taken at the same locality on Sept. 10, 1944, fourteen were marked with a red marginal spot only, two had additional basal yellow spots and one had post median discal orange spots, as well.

A series of nine specimens collected on dead Mimosa at Globe, Arizona, July 29 and 31, 1944, are all marked with only a red marginal spot.

One male emerged on August 8, 1937 from a palo verde (*Cercidium floridum*) branch collected at Florence, Arizona in January, 1935.

Paratyndaris tucsoni Knull

One male collected on dead mesquite (*Prosopis chilensis*) at Cave Creek, Maricopa Co., Arizona, Sept. 5, 1943, and a male and female collected at same locality on Aug. 24, 1944, on dead palo verde (*Cercidium floridum*).

Boxelder Bug "Bites" Man.—During recent years, several Utah persons have stated verbally to me that boxelder bug nymphs had "bitten" them. Two such individuals reported being thus attacked while in bed, the supposed offending bugs being found in the beds. One boxelder bug nymph was brought in to me during the fall of 1945 from a woman's dormitory; the young woman concerned declared it had bitten her, while she was in bed, causing definite irritation.

While driving through the town of Axtell, Utah, at 5:25 P.M. on July 12, 1946, I suddenly became aware of a sharp irritation on my upper left forearm, below the inside bend of the elbow. Straightening out the arm revealed a boxelder bug nymph, *Leptocoris trivittatus* (Say), approximately one-fourth inch long. This nymph continued its attempt to "feed" for approximately seven seconds after being observed, then withdrew its mouthparts. Definite local irritation persisted for approximately twenty minutes, with slight discomfort still evident at the end of a half hour. The writer now is convinced that occasionally a *trivittatus* nymph actually does "bite" a person.—G. F. Knowlton, Logan, Utah.

NOTES ON THE GENUS DOLICHOPUS (DIPTERA, DOLICHOPODIDAE). PAPER 3.[1]

By George Steyskal, Detroit, Michigan.

At this time new epigamic observations upon five species are presented, as well as additional notes upon another species, *D. gratus* Lw., upon which fragmentary notes were offered previously (Paper 2). Collection notes principally from the Great Smoky Mountains National Park (Tennessee and North Carolina) are also included.

Dolichopus harbecki V.D.

This species, which has a large dark spot in the apical part of the wing, was observed close to the water on the rocks at the base of the Ramsey Cascades in the Great Smoky Mountains National Park (Tenn.) near noon on June 12, 1946. The male stood close (1 to 2 cm.) before the female in a normal position or slightly elevated. He extended his wings at right angles laterally and vibrated them (fluttered them through a short arc) very rapidly. About every second, or a little more often, he very quickly flipped his hypopygium down and then up again. After a little of this display he flew around to mount the female and attempt to copulate. The females, however, were unreceptive.

Dolichopus sexarticulatus Lw.

At the Chimney Tops Camping Area (Tennessee) in the Great Smokies, on June 11, 1946, this species was observed on the mud among the *Impatiens* growth around a spring. The male stood in a normal position at various distances near the female. The wings were closed and the fore legs extended laterally with the tibiae and tarsi turned forward. He waved the tibiae and tarsi (the tip of which is peculiarly modified) rather slowly sidewise. Although copulation was attempted, here also the females rejected the males.

Dolichopus quadrilamellatus Lw.

This species, which received its specific name from the bilobate form of the hypopygial lamellae of the males, was observed in the Great Smokies near Elkmont, Tenn., on the morning of June 17, 1946. There had been rain, and by lying in the wet vegetation along a muddy rill flowing in a rut in a side road the writer watched this

[1] For Paper 1 see this Bulletin, vol. 33, pp. 193–194 (1938); Paper 2, l. c., vol. 37, pp. 62–67 (1942).

species and *Tachytrechus moechus* Lw. (epigamy reported elsewhere).

The male stood for a short time in a normal position about a centimeter before the female, then he reared up and thrust his hypopygium forward and apparently placed his yellowish lamellae against the female's face, at the same time extending his fore legs straight laterally and quivering them a little. The wings were held motionless V-wise backwards with the lower edge turned forward. The females paid no attention and accepted none of the males. The latter apparently recognized each other. Frequently one male rushed at another and chased him off, or two males would have a tumbling aerial "dog-fight."

Dolichopus finitus Wlk. (*D. scoparius* Lw.)

This close northern relative of *D. quadrilamellatus* was watched on the mud around a spring 2.5 miles west of North Branch, Lapeer County, Michigan, shortly before noon on July 4, 1946. The temperature was 78° F. The male stood at his length from the female, a little reared up forwardly. The fore femora were extended at right angles laterally to the body with the tibiae and tarsi at right angles to them and projecting directly forward. No motion of the fringed fore tarsi was perceptible and the wings remained closed. The females never stayed long in one spot. Sometimes a male moved close to a female after holding his fore tarsi before her, and with his tarsi still extended, he reared up and applied his yellowish lamellae to her face, much in the same fashion as did *D. quadrilamellatus*. There were but few females, all unreceptive.

The males of *D. finitus* also seem to recognize each other's sex. One male often would rush on wing at another male, many times backing up a centimeter or two and repeating the attack (which might be described as "bouncing") several times before the object of the attack would be driven off. Sometimes males would tumble about in the air. The epigamic display was never performed before another male.

Dolichopus lobatus Lw.

This is probably the closest relative of *D. omnivagus* V.D., the epigamy of which was reported in the first paper of this series. *D. lobatus* was observed west of North Branch, Michigan, between nine and ten o'clock on the cool, dewy morning of July 13, 1946, at the same spring at which *D. finitus* was watched, and about a mile from the spot where the observations on *D. omnivagus* were made in 1936. *D. omnivagus* and *D. lobatus,* indeed, commonly occur together, a phenomenon also noted in connection with other closely related species and one which makes especial care necessary to secure a correct identification of the species observed. Although at this time three male *D. lobatus* were captured as well as a single *D. omnivagus,* and, with the exception of the fact that no motion of the hypopygium was observed, the epigamy was identical with that reported for *D. omnivagus,* it is believed that *D. lobatus* was observed. It is possible that the report on *D. omnivagus* may even actually refer to *D. lobatus.* In view of these circumstances the following observation is of greatest importance.

On July 4, 1946, at the same time and place that the observations on *D. finitus* were made, a *D. lobatus* was seen close behind a female *Argyra robusta* Jns. In this case there is no doubt of the identity of the *Dolichopus,* since by a rare stroke of luck, the two flies were captured alone in the net immediately after watching them. The *Dolichopus* was reared up with his hypopygium lowered and in contact with the tip of the abdomen of the *Argyra.* The wings were quivered at a 60° angle backwards. The fore legs were held with the femora projecting laterally. The tibiae and tarsi were extended forward and a little downward in a rather deliberate manner and then rather quickly brought back against the femora. The action was repeated rather slowly several times before the strange female moved away.

Dolichopus gratus Lw.

D. gratus was the most abundant member of the *Dolichopus* fauna at the spring near North Branch, Michigan. On July 13, 1946, many *D. gratus* of both sexes were seen on leaves of *Bidens* and *Polygonum* species. The chasing of females over the surface of the water as previously recorded was abundantly noted here as well as on numerous other occasions, but here a more definitely epigamic behavior was observed. The males would frequently stand in a considerably reared-up position close behind a female. The wings were held at 60° backward with the lower margin turned a little forward, but without any movement. Every little while the male would thrust his hypopygium at the tip of the female's abdomen. She would walk about some, and he would follow, but no copulation was apparently effected.

A week after these observations males were very scarce but females were very abundant, especially at the edge of the spring-pool, where they were flying close over the water and frequently stopping to dip their abdomens into the water, apparently ovipositing. Two weeks later, on July 28, there were many males again, but only the chasing over the water was seen.

Collection Notes.

The following records represent interesting extensions of range in most cases. They are largely from the Great Smoky Mountains National Park (GSMNP) and are the result of a trip made by the writer and Robert R. Dreisbach during June 8 to June 17, 1946. The writer is indebted to Mr. Dreisbach for permission to include material he collected; species taken by him only and in his collection are indicated by his initials, RRD.

Dolichopus dorycerus Lw. GSMNP, along trail from Forney Ridge Parking Lot to Andrews Bald, N. C., June 16: 7♂, 2♀; GSMNP, Ramsey Cascades, June 12, 1♂ (RRD).

D. flavilacertus V.D. GSMNP, Elkmont, Tenn., June 17: 1♂.

D. funditor Lw. GSMNP, Ramsey Cascades, Tenn., June 12: 1♂ (RRD).

D. gratus Lw. (*D. calcaratus* Ald.). GSMNP, Elkmont, Tenn., June 15: 2♂.

D. harbecki V.D. GSMNP, Ramsey Cascades, Tenn., June 12: 13♂, 2♀; GSMNP, Chimneys Camp, Tenn., June 11: 1♂, GSMNP, Elkmont, Tenn., June 15: 1♀; GSMNP, Andrews Bald, N. C., June 16: 2♂, 1♀.

D. laciniatus Coq. GSMNP, Elkmont, Tenn., June 15: 1♂.

D. pantomimus Mel. and Brues. GSMNP, Elkmont, Tenn., June 15: 1♂ (RRD).

D. pulchrimanus Bigot (*D. willistonii* Ald.). Nicholas Co., Ky., June 8: 2♂ (RRD).

D. quadrilamellatus Lw. GSMNP, Elkmont, Tenn., June 17: 7♂, 2♀; GSMNP, Cades Cove, Tenn., June 13: 1♀.

D. scapularis Lw. Lebanon, Tenn., June 9: 1♂, GSMNP, Chimneys Camp, Tenn., June 11: 3♂, 1♀; GSMNP, Elkmont, Tenn., June 15: 6♂, 3♀.

D. sexarticulatus Lw. Lebanon, Tenn., June 9: 6♂; GSMNP, Chimneys Camp, June 11: 6♂; GSMNP, Elkmont, June 15: 1♂.

D. slossonae V.D. GSMNP, Ramsey Cascades, June 12: 2♂; GSMNP, Andrews Bald, N. C., June 16: 1♂.

D. sphaeristes Brues. Lebanon, Tenn., in swale at small creek about seven miles south of town, in company with *D. sexarticulatus,* June 9: 20♂. This species seems not to have been recorded since its description from Austin, Texas, in 1901. The white process on the distal tarsal joint is not an enlarged empodium as stated by Brues, but the tip of a process of the tarsal joint somewhat similar to those of *D. sexarticulatus* and *D. pulchrimanus*.

BOOK NOTES.

Insects of Guam—II. Bulletin 189, Bernice P. Bishop Museum. Pp. i–iii + 1–237. 1946. Published by the Museum, Honolulu, Hawaii.

This part of the entomological survey of the island takes in the Orders in their taxonomic sequence, beginning with the Orthoptera and related Orders, by O. H. Swezey; and continuing with Isoptera, by S. F. Light; Heteroptera, by R. L. Usinger; Homoptera by Z. P. Metcalf; Lepidoptera, by O. H. Swezey; Diptera, By O. A. Johannsen and O. H. Swezey; and Hymenoptera, by D. T. Fullaway and O. H. Swezey. There are also numerous figures, separately numbered for each aggregation in which they appear. A map of the Island of Guam, p. iii, is very helpful.

The parts, or Orders, are of varying extent and treatment. Those on Heteroptera, Homoptera, and Diptera, contain numerous new species, and become basic for an understanding of the Pacific island fauna. The most extensive part is that on the Heteroptera by Usinger, with its numerous and very enlightening comments and many new species. From the point of view of students of the Heteroptera, this is a very important contribution.

Butterflies of Washington, by Ben V. Leighton. University of Washington Publications in Biology, vol. 9, pp. 47–63. 1946. University of Washington, Seattle, Wash. (45 cents.)

This is a careful faunal list for the State, and, as such, has real value—a good paper to have in a library dedicated to the Lepidoptera.

J. R. T. -B.

BOOK NOTES.

The North American Clear-Wing Moths of the Family Aegeriidae, by George P. Engelhardt. U. S. National Museum, Bull. 190, vi + 222 pages, 32 plates, 1946. (Price: $0.75.)

As one of the numerous scientific friends of the late Mr. Engelhardt it is a pleasure and a privilege to be asked to present a review of this the major scientific contribution of his life. The monograph is really the product of over 40 years of continuous study of this small family, especially studies in the field over the whole of the North American continent. It is the good fortune of entomology that although Mr. Engelhardt did not live long enough to see this paper published, he did prior to his death complete a preliminary manuscript which could be and was put into final shape for publication by his good friend and collaborator, the late Mr. August Busck. And so science did not, as it sometimes does, lose the fruits of a lifetime's work by the death of the investigators.

In format, the monograph follows the usual style of U. S. N. M. works in taxonomy. The one unusual feature is the inclusion of 16 colored plates, made possible by the generosity of Mr. Engelhardt's wife and son. Beginning with the discussion of the structural characters of the family, the revision includes a key to the 26 genera recognized (7 being described as new), and then a systematic treatment of these genera and their 171 recognized species, races and forms (of which 16 species and 20 races and forms are described as new). In some cases keys to species and subspecific groups are given, in other cases not. As anyone who knew Mr. Engelhardt would expect, the treatments include extensive notes on the known biologies and food plants of the various species—a feature that is especially valuable in a group that contains over a dozen important economic pests.

Mr. Engelhardt's attitude in approaching his study is well illustrated by an experience the author had with him. In 1930 he looked over my personal collection and picked out the short series that furnished the types of *Conopia richardsi.* He spotted them immediately and turned to ask where I had gotten them. He was very glad to get the specimens but could not completely hide the disappointment from his face when I had to say I had netted them on flowers and so could give him no clues on either food plant or general biology.

The chief criticism of the work noted by the reviewer concerns the treatment of genitalic data. As usual in U. S. N. M. publications in entomology, the male and female genitalia of the genotypes are figured. Unfortunately there is usually no comment about the genitalic characters of other species. Yet in this introductory characterization there appears, ". . . the modifications . . . are constant within the species and furnish excellent diagnostic specific characters and, in our opinion, also dependable generic characters." The fact that this omission will to a certain extent lessen the usefulness of the revision to entomologists not located at the National Museum is readily apparent from the text. Thus, under *Penstemonia dammersi* there appears, "A single worn specimen, labeled San Diego, Calif. . . . was determined easily as a male of *dammersi* from the genitalia." No one could duplicate this from data supplied in the monograph. More seriously, *Carmenta helenis* is admittedly based primarily on characters of the male genitalia, and brief notes are given comparing these characters to those of *C. ithacae;* but the genitalia of *C. ithacae* appear never to have been described or figured and accordingly the comparative notes are of little value. And so although the basic revisional work included a consideration of the genitalic characters, this set of data is not available below the generic level to the user of the monograph. There is one exception: the genus *Thamnosphecia* with 12 included species has the male genitalia of 5 species and the female genitalia of 4 species figured and the text contains very brief notes on the genitalia of some of the other species. I feel inclined to suggest that had Mr. Engelhardt and Mr. Busck been able to complete the manuscript more leisurely the genitalia would have been described and figured more completely.

Forty-five years have elapsed since the last publication of a monograph of this interesting family. It is needed, and it seems likely to stand as a monument for years to come. The entomologists of America will always be indebted to Mr. Engelhardt and Mr. Busck for the completion of this work.

A. Glenn Richards.

DDT and the Insect Problem, by James C. Leary, William I. Fishbein and Lawrence C. Salter. Pp. i-vii + 1–176. 1946. McGraw-Hill Book Co., Inc., New York, N. Y. ($2.50.)

Now that DDT has ceased to be a very hush-hush military secret, we can be certain that we shall hear much about it. And here we have a popularized treatise on the new insecticide by three non-entomologists: James B. Leary, President of the National Association of Science Writers; William I. Fishbein, epidemiologist, Chicago Health Department; and Lawrence C. Salter, of Lawrence C. Salter & Associates, and former Science Editor of the Detroit Free Press.

The authors frankly term it a compilation; and they might well have added that it is a collation and a condensation of numerous Department of Agriculture Bulletins and similar publications of a like nature from other sources, all highly technical. This does not tell against the book, which is not final, for there is still much to be done over the years to delimit the use of DDT. However, the authors categorically say (p. vi): "It is rather a summary prepared with the needs of the user in mind, and emphasis herein stems from that objective."

Following the Preface, there are eight chapters, each with a bibliography. The Introduction sets forth the problem and the general principles. The seven chapters following deal respectively with insects and insecticides, chemistry and pharmacology of DDT, how to use DDT, DDT at war, man's health and comfort, agriculture; forest, shade, and fruit tree insects. A twenty-two page Index winds up the book.

"DDT" is a difficult book to appraise. However, it seems to this writer, who has some experience in non-technical presentation, that the book is far too technical for the average householder, who discovers a few green plant lice in his little garden and a couple of mosquitoes in his house; and he unable to distinguish between *Aëdes*, *Anopheles*, and *Culex*—all bite alike. Nor would such a lay person derive much nourishment from the figures of the benzene ring.

However, until McGraw-Hill produce *the* authoritative book, this one will meet the need of the moment.

J. R. T. -B.

PROCEEDINGS OF THE SOCIETY.

Meeting of November 14, 1946.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on November 14, 1946.

The meeting was called to order at 8:00 P.M. by President R. R. McElvare.

Members in attendance were Messers McElvare, Teale, Nicolay, Naumann, Buchholz and Tulloch.

The minutes of the meetings of October 10, 1946, were read and accepted.

Mr. McElvare reported that because of increased printing costs the yearly subscription rates for the Bulletin and Entomologica Americana have been increased $.50 and $1.00 respectively.

The Society voted to continue the fee of $4.00 to cover both the subscription to the Bulletin and the annual dues for membership in the Society.

Mr. Teale reported on an observation relayed to him by a reader of his column which has a similarity to the phenomenon of "anting" which was discussed at the October meeting. This reader, a resident of Pennsylvania, had spread moth balls over the surface of a lawn as a means of skunk control. After the moth balls had become somewhat decreased in size grackles were observed picking them up and rubbing them in amongst their feathers. It is believed that this is an attempt on the part of the grackles to rid themselves of lice. Other observers have reported a similar action in which the birds employ cigar butts.

The speaker of the evening was Mr. Otto Buchholz who told of his experiences in connection with a six months collecting trip during the spring and summer of 1946. The areas visited were in Virginia, North and South Carolina, Georgia and Florida. The object of the trip was to secure material to study the distribution of members of certain families of the Lepidoptera. Particular attention was devoted to the collection of the species described by Abbott some years ago. Specimens of a skipper which feeds upon the Yucca plant were exhibited.

The meeting adjourned at 9:45 P.M.

Respectfully submitted,

George S. Tulloch, *Secretary pro tem.*

Meeting of December 12, 1946.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on December 12, 1946.

The meeting was called to order at 8:00 P.M. by President R. R. McElvare.

Members in attendance were Messers Moennich, Gaul, Teale, Buchholz, McElvare, Noaks, Naumann and Tulloch. Fourteen visitors were present.

The minutes of the meeting of November 14, 1946, were read, corrected and accepted.

The President appointed Messers Buchholz, Naumann and Noaks to serve as a nominating committee to report at the annual meeting in January.

Mr. Edwin Way Teale delivered the evening's lecture which was entitled *Henry David Thoreau as an Entomologist.* An account was given of Thoreau's life with particular reference being made to the period which this naturalist spent at Walden Pond. Although Thoreau's interests were not restricted to any particular phase of Biology or Natural History he made numerous observations dealing with many different kinds of insects which are recorded in his journals and in his book Walden. Certain of these observations were presented by Mr. Teale who also read certain sections from the Book Walden. A series of Kodachrome slides were projected which showed scenes taken at Concord, Massachusetts, and nearby Walden Pond.

The meeting adjourned at 10:00 P.M.

Respectfully submitted,

George S. Tulloch, *Secretary pro tem.*

Meeting of January 16, 1947.

The annual meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on January 16, 1947.

The meeting was called to order at 8:00 P.M. by President R. R. McElvare.

Members in attendance were Messers Teale, Naumann, Buchholz, McElvare and Tulloch.

The minutes of the meeting of December 12, 1946 were read and accepted.

The Treasurer submitted a report for the period October 1–December 31 as well as an annual report for the year 1946. Both of these were accepted by the Society.

The report of the Publication Committee was read and accepted. Particular appreciation was expressed regarding the fine work which our Editor accomplished during the year.

The report of the Nomination Committee was held over until the February meeting.

The programs for the February and March meetings were announced.

The meeting adjourned at 10:00 P.M.

Respectfully submitted,

George S. Tulloch, *Secretary pro tem.*

VERY SPECIAL NOTICE.

All matters referring to any of the publications of the Brooklyn Entomological Society *must* be addressed either to R. R. McElvare, Treasurer, or to the undersigned Editor. Any communications of any kind whatsoever addressed to the printers or to any other person or agency is subject to delay of from ten days to two weeks. LIBRARIES AND INSTITUTIONS OF ALL KINDS PLEASE TAKE NOTE. THE SOCIETY IS NOT RESPONSIBLE FOR DELAYS CAUSED BY THEIR MISTAKES.

J. R. de la Torre-Bueno, Editor
Brooklyn Entomological Society
925 East 6th St., Tucson, Ariz.

R. R. McElvare, Treasurer,
76 Ivy Way, Port Washington, L. I., N. Y.

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OF THE

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PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO, Editor

GEORGE S. TULLOCH EDWIN W. TEALE

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BULLETIN

OF THE

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ADDITIONS AND CORRECTIONS TO "A GENERIC SYNOPSIS OF THE ALEYRODOIDEA."

By W. W. Sampson, Berkeley, Calif.

Opportunity is taken here to correct several rather glaring mistakes which make the key to the genera of the Aleyrodinae in "A Generic Synopsis of the Hemipterous Superfamily Aleyrodoidea" (Entomologica Americana, XXIII (3): 196–200) entirely unworkable. Two recently described genera are added to those already listed.

Attention is called to the fact that the genera *Septaleurodicus* Sampson and *Hesperaleyrodes* Sampson, described in the above paper, due to a certain amount of confusion during the war, were figured and described as new in the Mexican journal "Anales de la Escuela Nacional de Ciencias Biológicas" (3(3–4): 437–444) a short time later.

Key to Genera of the Aleyrodinae.
(Pupal Cases.)

1. Lingula extremely short, hardly longer than wide; adults with radial sector vein only in fore wing (Neomaskellini). *Neomaskellia*
   Lingula elongate, much longer than wide 2
2. Dorsum completely covered with simple pores; adults with $radial_1$, radial sector, and cubital veins in fore wing (Aleurochitonini) .... *Aleurochiton*
   Dorsum with relatively few simple pores; adults with radial sector and cubital veins in fore wing 3
3. Dorsum with elongate, siphon-like wax tubes; adults lacking tarsal paronychium (Siphonini) .... *Siphoninus*
   Dorsum without siphon-like wax tubes; adults with tarsal paronychium 4

4. Thoracic tracheal folds and combs or pores, or pores or combs only, and anal fold, or only anal fold, present (Dialeurodini) 5
   Thoracic tracheal folds, combs, pores, and anal fold absent (Aleyrodini) 36
5. Thoracic tracheal folds and pores or combs, or pores and combs only, and anal fold present 6
   Anal fold only present 26
6. Dorsal disc separated from submarginal area by a distinct line or fold 7
   Dorsal disc not separated from submarginal area 14
7. Tracheal folds distinctly visible 8
   Tracheal folds indistinct or pores or combs only visible 9
8. Thoracic tracheal folds ending in a pore . . . . . *Asialeyrodes*
   Thoracic tracheal folds ending in a comb of teeth. *Paraleurolobus*
9. Usual marginal ending of tracheal fold forming a pore 10
   Usual marginal ending of tracheal fold forming a comb of teeth 12
10. Dorsal segmental sutures having heavily sclerotized link-like designs . . . . . *Bellitudo*
    Dorsal segmental sutures without these designs 11
11. Dorsum with blunt tubercles, dorsal disc not defined. *Aleurotuberculatus*
    Dorsum without tubercles, dorsal disc defined. *Malayaleyrodes*
12. Vasiform orifice cordate, not surrounded by a trilobed figure, lingula knobbed and exposed . . . . . *Pseudaleurolobus*
    Vasiform orifice subcordate, often surrounded by a trilobed figure 13
13. Margin entire . . . . . *Africaleurodes*
    Margin toothed . . . . . *Aleurolobus*
14. Many lines encircling case . . . . . *Acanthaleyrodes*
    These lines lacking 15
15. Thoracic tracheal pore ending in a pore, or only a pore present 16
    Thoracic tracheal pore ending in a comb of teeth, or only a comb present 17
16. Case with a ring of large submarginal pores . . . *Dialeuropora*
    Case without a ring of submarginal pores . . . . . . *Dialeurodes*
17. Dorsal glands present . . . . . *Aleuroglandulus*
    Dorsal glands absent 18
18. Operculum semi-lunar, filling less than half of orifice. *Pseudaleyrodes*

Operculum otherwise shaped, filling at least half of orifice . . 19

19. Submargin with a series of papilla-like pores 20

Submargin without papilla-like pores 21

20. Dorsum with numerous, large irregular pores, operculum subcordate . . . . *Aleuroparadoxus*

Dorsum without large irregular pores, operculum transversely rectangular . . . . *Stenaleyrodes*

21. Submarginal area with a row of prominent spines 22

Submarginal area without prominent spines 24

22. Abdominal ridge with prominent papillae . . . . . *Mixaleyrodes*

Abdominal ridge without papillae 23

23. Vasiform orifice broadly cordate, projecting posteriorly. *Xenaleyrodes*

Vasiform orifice roundly trapezoidal, not projecting posteriorly. *Corbettella*

24. Vasiform orifice pointed posteriorly, lingula exposed 25

Vasiform orifice rounded posteriorly, lingula hidden. *Aleuroplatus*

25. A series of wart-like structures outlining the developing insect. *Asterobemisia*

The wart-like structures lacking . . . . *Asterochiton*

26. Submarginal area with a series of papilla-like pores. *Trialeurodes*

Submarginal area without papilla-like pores 27

27. Vasiform orifice triangular, operculum not filling most of it 28

Vasiform orifice rounded, operculum filling most of it 30

28. Operculum trapezoidal 29

Operculum rounded . . . . *Bemisia*

29. Submarginal area with many short setae . . . . *Acanthobemisia*

Submarginal area without setae . . . . *Metaleyrodes*

30. Dorsal disc with chitinized tubercles . . . . *Tuberaleyrodes*

Dorsal disc without chitinized tubercles 31

31. Margin smooth . . . . *Aleuroporosus*

Margin crenulate or toothed 32

32. Vasiform orifice situated in a ribbed or reticulated pit 33

Vasiform orifice not situated in a pit 34

33. Operculum rounded . . . . *Setaleyrodes*

Operculum transversely subrectangular . . . . *Pealius*

34. Dorsum covered with raised circular papillae . . . . . *Singhiella*

Dorsum without circular papillae 35

35. Venter of case with a distinct rim, dorsum with four segmented setae . . . . *Taiwanaleyrodes*

Venter of case plain, dorsum with round patches with suture-like markings . . . . *Aleuroclava*

36. Dorsal disc separated from submarginal area by a line or fold 37

Dorsal disc not separated from submarginal area by a line or fold 41

37. Margin smooth or with one row of teeth 38

Margin with two rows of teeth . . . . *Hempelia*

38. Submarginal area elevated, with papilla-like folds. *Aleuromigda*

Submarginal area not elevated, without papilla-like folds . . 39

39. Vasiform orifice transversely elliptical . . . . . . *Hesperaleyrodes*

Vasiform orifice cordate or subcordate 40

40. Operculum subcordate, vasiform orifice elevated. *Tetraleurodes*

Operculum transversely rectangular, vasiform orifice not elevated . . . . *Aleuroputeus*

41. Dorsum with a large number of mammiform papillae. *Aleurotithius*

Dorsum without mammiform papillae 42

42. Margin smooth or slightly irregular, not regularly toothed . 43

Margin regularly toothed 44

43. Vasiform orifice elevated, operculum filling orifice. *Neoaleurodes*

Vasiform orifice not elevated, operculum not filling orifice. *Aleyrodes*

44. Margin with one row of teeth 45

Margin with two rows of teeth 53

45. Inner subdorsal area with a longitudinal line of scallop-shaped thickenings, or furrow or line . . . . *Crenidorsum*

Inner subdorsal area without above lines or furrow 46

46. Sides of case deflexed to meet shortened ventral disc. *Tetralicia*

Sides of case not deflexed 47

47. Dorsal disc separated from submarginal area by a series of pores 48

Dorsal disc not separated from submarginal area 49

48. Submarginal area with prominent setae, operculum subcordate. *Corbettia*

Submarginal area without prominent setae, operculum roundly semilunar . . . . *Bulgarialeurodes*

49. Vasiform orifice elevated, dorsum with many prominent setae. *Aleurocanthus*

Vasiform orifice not elevated, dorsum without prominent setae 50
50. Vasiform orifice subcordate 51
Vasiform orifice subcircular 52
51. Body elliptical, operculum subcordate .... *Aleurotulus*
Body narrowly elongate, operculum trapezoidal. *Aleurocybotus*
52. Body pyriform, operculum subcircular .... *Nealeyrodes*
Body elliptical, operculum trapezoidal ...... *Mexicaleyrodes*
53. Vasiform orifice elevated 54
Vasiform orifice not elevated 56
54. Posterior edge of vasiform orifice prolonged into a bifid horn. *Aleurocerus*
Posterior edge of orifice not prolonged into a horn 55
55. Small, plain circular pores on dorsum .... *Zaphanera*
Small compound-like pores on dorsum .... *Laingiella*
56. Vasiform orifice roundly rectangular or transversely elliptical 57
Vasiform orifice cordate or subcordate 58
57. Vasiform orifice roundly rectangular, situated on an oval area with a posterior projection .... *Luederwaldtiana*
Vasiform orifice transversely elliptical, not situated on an oval area .... *Aleurothrixus*
58. Vasiform orifice cordate, operculum filling half of the orifice. *Aleuromarginatus*
Vasiform orifice subcordate, filling more than half of the orifice 59
59. Submarginal area with a row of setae, dorsum without a prominent ridge .... *Pentaleyrodes*
Submarginal area without a row of setae, dorsum with a prominent ridge .... *Aleurotrachelus*

Genus *Bellitudo* Russell.

Bellitudo Russell, 1943, Proc. Ent. Soc. Wash., 45(6) : 132.

Large in size, circular to oval in shape. Margin dentate; submargin separated from dorsal disc by a line, with a row of tooth-shaped designs behind the margin. Thoracic tracheal folds absent, tracheal pores clearly evident; caudal furrow well defined, deep, ending in a pore. Dorsum with clearly defined segmental sutures having heavily sclerotized, link-like designs. Vasiform orifice cordate, deep, finely ridged; operculum cordate, filling orifice; lingula hidden.

Genotype: *Bellitudo jamaicae* Russell, 1943.

Genus *Crenidorsum* Russell.

Crenidorsum Russell, 1945, Jour. Wash. Acad. Sci., 35(2): 55.

Moderate in size, oval in shape. Margin with one row of teeth; submarginal area not separated from dorsal disc. Thoracic tracheal folds and pores absent; caudal fold absent. Dorsum with longitudinal, differentiated line of scallop-shaped thickenings or ridge or furrow, in inner subdorsal area. Vasiform orifice subcordate to broadly elliptical; operculum nearly filling orifice; lingula hidden. Caudal depression with lateral ridges present.

Genotype: *Crenidorsum tuberculatum* Russell, 1945.

Seasonal Occurrence of Chrysopilus proximus (Walker).—This Rhagionid fly has been collected in Utah more frequently than any other species of snipe fly, if records from the Utah State Agricultural College insect collection are an indication.

No collections were taken until May, then specimens were taken at Benson and Brigham. During June, this species was collected at American Fork, Blacksmith Fork Canyon, Brigham Canyon, Brigham City, College Ward, Eden, Ft. Duchesne, Garland, Hayden, Huntsville, Hyde Park, Laketown, Manti, Mapleton, Mantua, Mill Creek Canyon, Provo, Roosevelt, Salt Lake City, Sandy, Smithfield, Springville, Union and Wellsville. July collections named above only duplicated the localities Brigham, Eden, Huntsville, Laketown and Wellsville. Additional localities were: Amalga, Antimony, Avon, Bicknel, Bluffdale, Card Canyon, Farmington, Garden City, Hooper, Kanab, Lehi, Linden, Logan, Logan Canyon, Ogden, Paradise, Providence, Richmond, St. George and Warren. August collections dropped off sharply, with records being from Kimble Junction, Logan, Manila, Mantua, Wanship and Wolf Creek Pass. In September this species was taken only at Duchesne and Logan Canyon, in Utah.

From the above collection data, covering collection records for several years, it appears that this fly seldom was taken in the same locality during two or more months, even though the species was collected from May into September. In general its occurrence tended to be later at higher elevations, as might be expected. Identifications were made by C. T. Greene, M. T. James, and D. E. Hardy.—G. F. Knowlton, Utah State Agricultural College, Logan, Utah.

THE GENOTYPES (OF COLEOPTERA) FIXED BY FABRICIUS.

By Richard E. Blackwelder, U. S. National Museum, Washington, D. C.

In a previous paper[1] the writer has reviewed the claim of Dr. René Malaise that Fabricius was the originator and first designator of type species of genera. An outline of the system employed by Fabricius was presented, and the conclusion was reached that he made acceptable designations of genotypes.

During the preparation of that paper lists of the genera of Coleoptera employed by Fabricius were assembled, with indication of such designations as occur. A list of these in systematic order is presented here for the use of persons desiring to test this claim and for those who decide to accept the designations and need an index to Fabricius' work.

All of these designations have been checked against original sources (or Sherborn's Index Animalium). Unless statement is made to the contrary, the species designated was originally included or was among the first included in the genus, and the genus was not monobasic. Fabricius' action is listed as a "designation" only where is appears to be the first valid fixation. In cases of previous fixation or erroneous designation his action is listed as "citation."

(All references will be found together preceding Bibliography.)

Cupesidae.

Cupes Fabr. 01–66, *capitata* Fabr., by original designation.

Cicindelidae.

Collyris Fabr. 01–226, *formicaria* Fabr., by original designation.
Manticora Fabr. 81–320, *maxillosa* Fabr., by monotypy.

Carabidae.

Carabus Linn. 58–413, *hortensis* (Linn.), by 1801 designation.
Calosoma Weber 01–20, *reticulatum* (Fabr.), by 1801 designation.
Cychrus Fabr. 94–440, *rostratus* (Linn.), by 1801 designation.
Anthia Weber 01–17, *6-guttata* (Fabr.), by 1801 designation.
Scolytus Fabr. 91–23 (not Geoffroy, 1762), *limbatus* (Fabr.), by 1792 designation.[2]
Agra Fabr. 01–224, *aenea* Fabr., by original designation.
Odacantha Payk. 98–169, *melanura* (Linn.), cited in 1801.[3]
Drypta Latr. 96–75, *emarginata* (Fabr.), by 1801 designation.[4]

Galerita Fabr. 01–214 (not Gouan, 1770), *hirta* Fabr., by original designation.

DYTISCIDAE.

Hydrachna Fabr. 01–255 (not Mueller, 1776), *hermanni* (Fabr.), by original designation.

STAPHYLINIDAE.

Stenus Latr. 96–77, *iuno* (Payk.), cited in 1801.[5]

SILPHIDAE.

Peltis Geoff. 62–117, *grossa* (Linn.), by 1801 designation.[4]
Catops Payk. 98–342, *sericeus* (Payk.), by 1801 designation.

LEIODIDAE.

Anisotoma Knoch 98–69, *humeralis* (Ill.), by 1801 designation.

SCAPHIDIIDAE.

Scaphidium Oliv. 90–1, *4-maculatum* Oliv., by 1792 designation.

LYCIDAE.

Omalysus Fabr. 92–103 (error for *Omalisus* Geoff. 62–179), *suturalis* Oliv., cited in 1792.[6]

MELYRIDAE.

Melyris Fabr. 75–58, *viridis* Fabr., by monotypy.
Zygia Fabr. 75–126, *oblonga* Fabr., by monotypy.

DASYTIDAE.

Dasytes Payk. 99–156, *ater* (Fabr.), cited in 1801.[7]

DASCILLIDAE.

Atopa Payk. 99–116, *cinerea* (Fabr.), cited in 1801.[7]

HELODIDAE.

Cyphon Payk. 99–117, *pallidus* (Fabr.), by 1801 designation.

CLERIDAE.

Clerus Geoff. 62–303, *mutillarius* Fabr., by 1801 designation.[4]
Tillus Oliv. 90–1, *elongatus* (Fabr.), by 1792 designation.
Trichodes Hbst. 92–154, *alvearius* (Fabr.), cited in 1801.[7]
Corynetes Payk. 98–274 (error for *Korynetes* Hbst. 92–148), *violaceus* (Linn.), by 1801 designation.

Anobiidae.

Ptilinus Geoff. 62–64, *pectinicornis* (Fabr.), cited in 1792.[6]
Dorcatoma Payk. 98–319 (error for *Dorkatoma* Hbst. 92–103), *dresdense* Fabr., cited in 1801.[3]

Cebrionidae.

Cebrio Oliv. 90–30 bis, *gigas* (Fabr.), cited in 1792.[7]

Melasidae.

Melasis Oliv. 90–1, *flabellicornis* (Fabr.), cited in 1792.[7]

Buprestidae.

Trachys Fabr. 01–218, *tessellata* Fabr., by original designation.

Dryopidae.

Parnus Fabr. 92–245, *prolifericornis* Fabr., by original designation.

Heteroceridae.

Heterocerus Fabr. 92–262, *marginatus* (Fabr.), by monotypy.

Hydrophilidae.

Spercheus Kugel. 98–241, *emarginatus* (Schall.), by inclusion in 1801.[5]

Byrrhidae.

Chelonarium Fabr. 01–101, *atrum* Fabr., by original designation.

Temnochilidae.

Trogosita Fabr. 92–114 (error for *Trogossita* Oliv. 90–6), *coerulea* (Oliv.), by 1892 designation.

Nitidulidae.

Ips Fabr. 77–23 (not Degeer, 1775), *4-pustulata* (Linn.), by 1792 designation.

Cucujidae.

Cucuius Fabr. 75–204 (error for *Cucujus* Geoff. 62–123), *depressus* Fabr., by inclusion in 1775.[5]
Brontes Fabr. 01–97, *flavipes* (Fabr.), by original designation.

Erotylidae.

Aegithus Fabr. 01–9, *surinamensis* (Linn.), by original designation.
Erotylus Fabr. 75–123, *fasciatus* Fabr., cited in 1801.[7]

Engis Payk. 00–349, *fasciata* (Fabr.), cited in 1801.[7]
Triplax Hbst. 93–146, *nigripennis* (Fabr.), cited in 1801.[7]

Colydiidae.

Colydium Fabr. 92–495, *sulcatum* Fabr., by original designation.
Sarrotrium Ill. 98–339, *muticum* (Linn.), cited in 1801.[3]

Endomychidae.

Eumorphus Weber 01–31, *immarginatus* Fabr., cited in 1801.[7]

Oedemeridae.

Dryops Fabr. 92–74 (not Olivier, 1791), *femorata* Fabr., by original designation.

Pythidae.

Pytho Latr. 96–23, *castaneus* (Fabr.), by 1801 designation.[4]

Anthicidae.

Anthicus Payk. 98–253, *monodon* Fabr., cited in 1801.[7]

Serropalpidae.

Tetratoma Fabr. 90–217, *fungorum* Fabr., by 1792 designation.
Dircaea Fabr. 98–6, *barbata* (Schall.), by 1801 designation.
Melandrya Fabr. 01–163, *serrata* (Fabr.), by 1801 designation.

Meloidae.

Apalus Fabr. 75–127, *2-maculatus* (Linn.), by monotypy.
Horia Fabr. 87–164, *maculata* (Swed.), cited in 1792.[7]

Ripiphoridae.

Ripiphorus Bosq 91–327, *subdipterus* Fabr., by 1792 designation.[4]

Alleculidae.

Allecula Fabr. 01–21, *morio* (Fabr.), by 1801 designation.
Cistela Fabr. 75–116 (not Geoffroy, 1762), *ceramboides* (Linn.), by 1801 designation.

Tenebrionidae.

Eurychora Thunb. 89–9, *ciliata* (Fabr.), by inclusion and designation in 1801.[4]
Scaurus Fabr. 75–253, *atratus* Fabr., by monotypy.

Pimelia Fabr. 75–251, *scabra* Fabr., by original designation.
Platynotus Fabr. 01–138, *reticulatus* (Fabr.), by original designation.
Bolitophagus Ill. 98–100, *crenatus* (Fabr.), cited in 1801.[7]
Diaperis Geoff. 62–337, *boleti* (Linn.), cited in 1792.[5]
Hypophlaeus Fabr. 90–222, *castaneus* Fabr., by 1792 designation.
Cossyphus Oliv. 91–121, *depressus* (Fabr.), cited in 1792.[3]
Upis Fabr. 92–515, *ceramboides* (Linn.), by monotypy.
Cnodulon Fabr. 01–12 (error for *Cnodalon* Latr. 96–23), *cupreum* (Fabr.), by inclusion and designation in 1801.[4]

Lucanidae.

Aesalus Fabr. 01–254, *scarabaeoides* (Panz.), by monotypy.

Passalidae.

Passalus Fabr. 92–240, *interruptus* (Linn.), by original designation.

Scarabaeidae.

Copris Geoff. 62–87, *lunaris* (Linn.), by 1801 designation.[4]
Ateuchus Weber 01–10, *koenigii* (Fabr.), cited in 1801.[7]
Aphodius Ill. 98–15, *fossor* (Linn.), by 1801 designation.
Lethrus Scop. 77–439, *cephalotes* Scop., cited in 1787, 1792, and 1801.[3]
Hexodon Oliv. 89–1, *reticulatum* Oliv., by 1792 designation.

Cerambycidae.

Molorchus Fabr. 92–356, *abbreviata* (Fabr.), by original designation.
Clytus Laich. 84–88, *arcuatus* (Linn.), by 1801 designation.
Gnoma Fabr. 01–315, *longicollis* (Fabr.), by original designation.

Chrysomelidae.

Sagra Fabr. 92–51, *femorata* (Drury), by original designation.
Megalopus Fabr. 01–367, *ruficornis* Fabr., by original designation.
Colaspis Fabr. 01–411, *crenata* (Fabr.), by original designation.
Eumolpus Ill. 98–498, *nitidus* (Fabr.), cited in 1801.[7]
Helodes Payk. 99–84, *phellandrii* (Linn.), cited in 1801.[3]
Adorium Fabr. 01–409, *2-punctatum* (Fabr.), by original designation.
Galleruca Fabr. 92–12 (error for *Galeruca* Geoff. 62–251), *tanaceti* (Linn.), by 1792 designation.[8]
Alurnus Fabr. 75–94, *grossus* Fabr., by monotypy.

Imatidium Fabr. 01–345, *3-maculatum* Fabr., by original designation.

Anthribidae.

Anthribus Geoff. 62–306, *albinus* (Linn.), cited in 1792.[6]

Brentidae.

Brentus Panz. 85–189, *anchorago* (Linn.), cited in 1801.[7]

Curculionidae.

Brachycerus Oliv. 89–36, *obesus* (Linn.), cited in 1792.[7]
Lixus Fabr. 01–498, *anguinus* (Linn.), by original designation.
Rhinomacer Fabr. 81–199 (not Geoffroy, 1762), *curculioides* Fabr. by monotypy.
Calandra Fabr. 01–429 (error for Calendra Schell. 98–62), *ferruginea* (Oliv.), cited in 1801.[7]

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[1] Fabrician Genotype Designations. Bull. Brooklyn Ent. Soc., 41, pp. 72–78.

[2] I have seen a reference to 1790 as the date of this genus. In such a case the designation might be invalid.

[3] Originally monobasic upon this species.

[4] Without originally included species. This was among the first species included.

[5] Without originally included species. This was the first species included.

[6] Without originally included species. This was not among the first species included.

[7] Not among the originally included species.

[8] Possibly monobasic in original.

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ADDITIONS TO VESPINE BIOLOGY. II: CASTE PHASES AMONG VESPINES (HYMENOPTERA, VESPIDAE).

By Albro T. Gaul, Brooklyn, New York.

In this paper I have endeavored to show the actual types and relationships of wasps in a normal nest of some of the North American Vespinae, particularly the genera *Vespula* (s.str.) and *Dolichovespula.* Throughout the literature on the taxonomy and biology of the Vespinae, little or no attention has been paid to the various castes and phases to be found in a normal colony.

On the basis of extended observations I propose the recognition of seven forms, male, queen, worker, and four specialized or intergraded forms. One phase may be produced by parasitism. The others are produced by physiological or nutritive factors. All forms are encountered with enough frequency to warrant the application of an accurate and uniform terminology to them.

Some phases and castes among the ants, as determined by Wheeler (1 & 2) closely parallel the phases among the Vespinae. Whenever possible, therefore, Dr. Wheeler's terminology has been applied.

It is therefore suggested that the following terms be applied to the Vespinae for increased accuracy and understanding of the function of the individuals in the colony.

1. Aner (male)—Only one male form has been found among the Vespines. So far as has been determined there are no intergrades with other castes. The male usually appears toward the end of the colony season and may survive into the spring. It is easily recognized by the genitalia and the thirteen-segmented antennae.
2. Gyne (queen)—The queen is usually the largest member of a colony. She is the only form able to lay fertilized eggs. She founds the colony and lives a full year. In common with all the female phases, she possesses twelve-segmented antennae.

   The queen often intergrades with the workers. Except in the case of *Vespula squamosa* Drury the queen and workers not only intergrade but often bear a close resemblance to each other.
3. Apterogyne (new term)—This form is characterized by a queen, normal in every apparent respect save for the absence of wings. The most frequently encountered apterogyne has small undeveloped wing stubs projecting caudad from the tegulae. The insect is apparently capable of mating and egg producing. Because of its apterous condition, however, it is doubtful if it could

survive the winters, and it would be nearly impossible for it to found a new colony. This aberrant phase has been found in colonies of *Vespula maculifrons* Buy., *V. squamosa* Drury, *Dolichovespula maculata* Linn., and *D. arenaria* F. It will probably be found in the colonies of other species as they are studied.

The apterogyne is presumably the result of an unfortunate environment, heredity, physiology, or a combination of several of these factors. I have observed the production of apterogynes as a result of parasitogenic factors. When young queen pupae of *V. maculifrons* were exposed to the attacks of larvae of *Melittobia* species (Chalcidoidea, Elachertidae), the few survivors became adult apterogynes. Other apterogynes may be encountered in colonies without any parasites. In one such case, the nest had been nearly deserted by the workers at the termination of the colony season. Perhaps incompletely satisfied nutritive requirements may have caused the non-development of wings. At best, the apterogyne is a teratological form, and is described here only because of the frequency with which it is encountered.

4. Ergate (worker)—The ergate represents the largest percentage of the total colony population. It is absent from those species which are inquilines, such as *Dolichovespula adulterina* var. *arctica* Rohwer. The ergate is usually smaller than the queen and similar in color. It is incapable of producing fertile eggs, either because of its physiology or because there are no males about, until the close of the season, with which it can mate. Unlike the ergate of the ants, the Vespine ergate is normally winged and has complete thoracic musculature. Although the true ergate does not produce eggs, it may intergrade with the gynaecoid phase, and in many species may be morphologically indistinguishable from it. The ergate performs the functions of brood nursing, nest construction, and the defense of the colony.
5. Micrergate—This phase of the ergate is found in many species, probably in all species having an ergate caste. I have recognized the form in *V. maculifrons, V. squamosa, V. rufa* var. *vidua* Sauss. and among *Dolichovespula maculata* and *D. arenaria.* The micrergate is essentially a diminutive form of ergate. In some colonies it may attain only about two-thirds of the size of the normal ergate. It is typically the first brood; reared by the foundress queen. It differs from the normal ergate only in size.

This form does not parallel the 'minor workers' among the ants. The minor workers bear a constant size relationship to the other workers and they appear throughout the life of the colony. The micrergate intergrades with the normal workers. So far as can be determined, this form does not intergrade with the gynaecoid and thus cannot produce eggs.

6. Gynaecoid—The gynaecoid is an ergate phase, usually larger than the ergate and somewhat smaller than the queen. It is characterized by its ability to produce eggs. It usually appears in the colony after the mid-point of the season. Its eggs always produce males. The gynaecoids have been observed in my own colonies of *V. maculifrons, D. maculata* and *D. arenaria* and they have been recorded for many other species. In some species the gynaecoid may be indistinguishable from the normal ergate (in *V. maculifrons* for example). In other species, the two are readily separable (*D. maculata* as an example).

   This may be a distinct form of ergate, or it may represent an intergrade between the ergate and the gyne. Like the ergate, the gynaecoid will enter into all the phases of work about the colony. Its ability to produce eggs may be facultative. While the foundress queen is alive and active there will be little or no evidence of gynaecoid eggs. After the death or disfunction of the foundress, the gynaecoids will produce their eggs.

7. Apterergate (new term)—This term, as applied to the Vespinae is designated to parallel the term pterergate among the ants. The pterergate in the ants is a winged worker in species normally composed of apterous workers. The apterergate in the Vespinae is an apterous worker in a species of normally winged workers. Naturally, the apterergate appears only in the species having a worker caste.

   I have observed the apterergates working side by side with the normal winged ergates. Their functions are confined to brood nursing and immediate nest repair. They do not attempt to enter into the defense of the colony although the sting is apparently normal. They do not forage, either for paper pulp or food. This form has been observed only among the ground dwelling species of *Vespula* s.str. It may occur in considerable numbers among some colonies.

   Like the apterogyne, the apterergate has a rudimentary wing stalk projecting caudad from the tegula. In other respects it appears to be normal. It occurs in colonies in apparent good health and economy under conditions where malnutrition and parasitogenic factors could not very well be responsible. It is possible to regard this form as a primitive or mutative step toward the complete loss of wings such as has occurred among the ants. Since it is found only among subterranean dwellers, such a species might be most likely to continue and utilize this phase, supporting to some extent the possibility of the apterogyne being a mutative form.

The apterous phases discussed above are seldom or never found in collections, nor are they mentioned in the literature. Since few collectors gather whole colonies of Vespines, the flying individuals are more or less taken for granted as being the sole inhabitants of a nest. This omission is not strange. Such common forms as the gynaecoids and micrergates, although found in collections, are seldom segregated nor are they observed in living colonies throughout the season.

The only satisfactory way of separating these forms is to collect an entire colony population and to arrange the individuals in each colony. A normal ergate in one colony may be the same size as a micrergate in another colony of the same species. However, colony by colony, it can be demonstrated that some or all of these forms are present.

In this paper, no attempt has been made to catalog any but the most common forms to be encountered in the usual Vespine nest. Gynandromorphs, ergatandromorphs, and other asymmetrical forms, if such occur among the Vespinae, are not within the scope of this paper. Unique teratological forms have been recorded (5) but they too have no place in this discussion.

Winged forms appear in the colony in the following chronological sequence: gyne (foundress queen), micrergate, ergate, gynaecoid, and simultaneously the aner and gyne. Recognition of these forms and of their sequence of appearance in the colony leads inevitably to the conclusion that they are of trophogenic origin. As the season progresses the number of ergates increases and the volume of available insects for food increases. With this increase in food and labor, the larvae receive progressively more and more food, hence the increase in size and in function from the micrergate to the gyne.

The trophogenic origin of caste differentiation among the Vespinae is not a new proposal (3 & 4). An analysis of the phases in the colony, however, seems to constitute more evidence to support the trophogenic theory of caste differentiation.

In conclusion, it is evident that there are seven forms, or phases, of individuals which may appear in the normal Vespine colony. All may not appear at the same time but (except for the atypical wingless forms) rather appear in a certain sequence. All seven forms may not appear in every species of the subfamily. They do occur with sufficient regularity, however, to warrant a record being made of their presence and function. By studying these phases and the sequence of their appearance in the colony, additional evidence may be presented in support of the trophogenic theory of caste distinction among the Vespinae.

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Schizolachnus pini-radiatae (Davidson).—This dark olive-green to slate-brown aphid has been collected on *Pinus ponderosa* at summit of Uinta Canyon, Uinta Mountains, Utah, August 26, 1940; specimens were being fed on by the predacious bugs *Nabis alternatus* Parsh. and *Orius tristicolor* (White) at the foot of Mt. Nebo, Utah, July 12, 1942, near a camp ground area; summit of Emigration Canyon, Idaho, August 24, 1934 (Knowlton-C. F. Smith); Klein, Montana, June 19, and Big Timber, Montana, August 13, 1942 (H. F. Thornley); Flagstaff, Arizona, September 22, 1944; Tahoe National Forest, California, July 23, 1944; North West of Reno, Nevada, August 17, 1945 (Knowlton); Dixie National Forest and Bryce Canyon, Utah, August 10, 1936 (Knowlton-C. F. Smith).—G. F. Knowlton, Utah State Agricultural College, Logan, Utah.

A NEW GENUS (FREQUENAMIA) AND SPECIES OF MEXICAN LEAFHOPPER RELATED TO MESAMIA (HOMOPTERA, CICADELLIDAE).

By Dwight M. DeLong, Columbus, Ohio.

Genus **Frequenamia**, n. g.

Apparently related to *Mesamia* and *Omanana* but with a sloping vertex from pronotum to margin which is thick and blunt. There is a transverse depression just back of margin. Face rather strongly inflated giving the margin a thicker appearance. The elytron has the characteristic crossveins of *Mesamia* on the outer clavus but fewer costal veinlets especially on the anterior portion. There is no cross nervure forming an inner anteapical cell.

Frequenamia guerrera, n. sp.

Resembling an unmarked *Mesamia* in general form, but with a thicker vertex, different coloration and different type of male genitalia. Length 5–5.5 mm.

The vertex is bluntly produced and forms a thick margin with the front. It is almost twice as broad between the eyes as the median length.

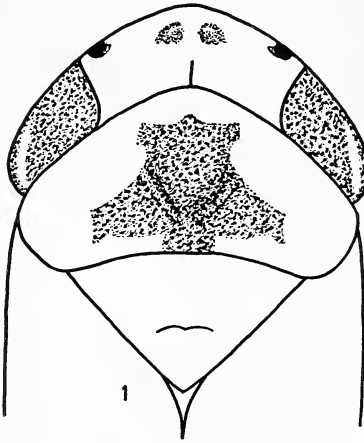
Color: Vertex dull yellow with some brownish mottling. Pronotum yellowish anteriorly, pale brownish posteriorly; scutellum yellowish, elytra pale brownish with dark brown veins. Face yellowish unmarked.

Genitalia: Female last ventral segment with lateral angles produced and broadly rounded, forming a broad deep concavely excavated posterior margin extending about half way to the base, at the apex of which is a narrow median incision which extends half the remaining distance to base. Male plates longer than pygofer, rather narrow and blunt at apex. Styles long and narrow. The broadened portion at the base is abruptly narrowed at about the middle to form a slender apical fingerlike process which about equals in length the basal portion. The aedeagus is slender in lateral view with a dorsally directed basal portion and a caudally directed portion which bears four slender apical processes, two of which extend outwardly and two of which are directed anteriorly. The pygofer bears a broad dorsal spine which extends downward to the apex of the pygofer.

Holotype male and paratype males collected at Pandancuarco, Gro., August 28, 1930 (M. F. 1785). Allotype female and male paratypes from Cutzamala, Gro., August 20, 1930 (M. F. 1768)—all collected by José Parra. Male paratypes from Finca Vergel, Chiapas, May 23, 1935 (M. F. 4268; elevation 2400 feet), collected by Dr. Dampf.

EXPLANATION OF FIGURES.

FIG. 1. Dorsal view of head, pronotum and scutellum.
FIG. 2. Ventral view of male genital structures.
FIG. 3. Lateral view of male genital structures.
FIG. 4. Ventral view of female ninth segment.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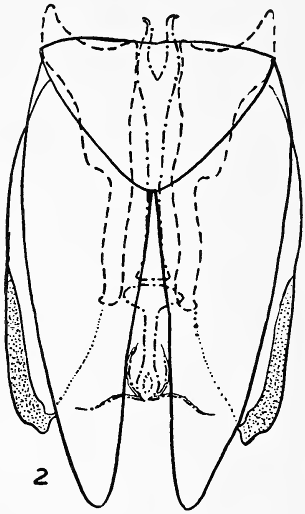
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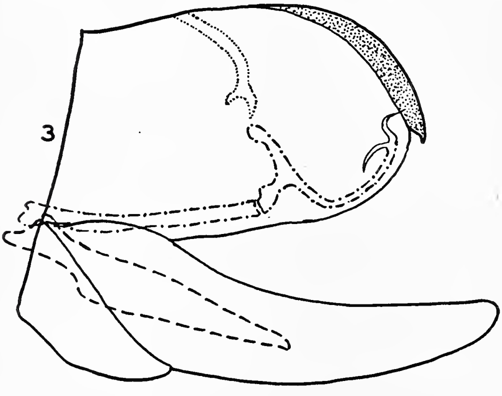

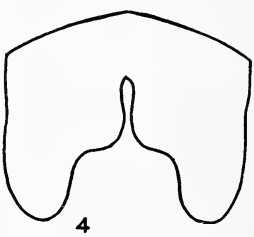
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ON THE GENUS OCHLEROPTERA HOLMBERG (HYMENOPTERA, SPHECIDAE, GORYTINI).

By V. S. L. Pate, Ithaca, N. Y.

Ever since Say described it in 1824, *Gorytes bipunctatus* has had a checkered generic career. Say started matters by remarking that his *bipunctatus* corresponded precisely in its generic characters with *Arpactus* Jurine, i.e., *Dienoplus* Fox as now understood. In 1843, Dahlbom placed the species in *Lestiphorus;* later in 1845 this author transferred it to *Euspongus* where Cresson and most subsequent writers were content to let it rest. However, in 1912 Rohwer erected the genus *Paramellinus* for its reception, and later in 1921 commented very pertinently that although some authors like Mickel and Bradley still assigned *bipunctatus* to *Euspongus,* nevertheless Say's species exhibited none of the characteristics of Lepeletier's genus. In the past quarter of a century Rohwer's name *Paramellinus* has been gradually adopted by many writers and accorded either discrete generic status or placed as a subgenus of various genera such as *Gorytes* or *Ammatomus,* a genus with which however it has little in common save very general consanguity. But as I indicated in 1937, Holmberg had anticipated Rohwer by nine years. For in 1903 he established *Ochleroptera* for the South American species of Handlirsch's *Gorytes aeneus* complex: these are congeneric with *bipunctatus* and consequently Holmberg's name *Ochleroptera* must be used in lieu of *Paramellinus* Rohwer. In 1937, I considered the *Gorytes aeneus-bipunctatus* group merely a subgeneric division of Gay's Chilean and Australian entity *Clitemnestra.* However, in the past decade more data have become available, particularly specimens of the rare and distinctive Eremian genera *Olgia* Radoszkowski and *Kaufmannia* Radoszkowski: as a consequence I am now of the opinion that *Ochleroptera* merits full generic rank. The chief characters for separating *Ochleroptera* from its near relative *Clitemnestra* are presented below in the introductory diagnosis of the following genus.

Ochleroptera Holmberg

Gorytes [*Arpactus*] Say, App. Narrat. Exped. St. Peter's R. (Long's Second Exped.), II, p. 338 (1824). [*Nec* Jurine, 1807.]

Lestiphorus Dahlbom, Hymen. Europ., I, p. 157 (1843). [In part, *nec* Lepeletier, 1832.]

Euspongus Dahlbom, Hymen. Europ., I, p. 480 (1845); [in part, *nec* Lepeletier, 1832].—Cresson, Trans. Amer. Ent. Soc., Suppl. Vol., pp. 117, 280 (1887); [*nec* Lepeletier, 1832].—Ashmead, Canad. Entom., XXXI, p. 300 (1899); [*nec* Lepeletier, 1832].—Mickel, Univ. Nebraska Stud., XVII, p. 352 (1918); [*nec* Lepeletier, 1832].

Gorytes [in part]: Smith, Cat. Hymen. Brit. Mus., IV, p. 367 (1856).—Fox, Proc. Acad. Nat. Sci. Phila., p. 523 (1897).—Dalla Torre, Cat. Hymen., VIII, p. 535 (1897).—Brèthes, An. Mus. Nac. Hist. Nat. Buenos Aires, XXIV, p. 130 (1913).

Gorytes [Group *aeneus* (in part)] Handlirsch, Sitzber. k. k. Akad. Wissen. Wien, XCVII, p. 335 (1888).

Gorytes [*Clytaemnestra:* Artgruppe *bipunctatus* (in part)] Handlirsch, Sitzber. k. k. Akad. Wissen. Wien, CIV, p. 1020 (1895). [*Nec* Dana, 1848.]

Clytemnestra Turner, Ann. & Mag. Nat. Hist., (8), X, p. 58 (1912). [In part, *nec* Dana, 1848 or Spinola, 1851].

Miscothyris Turner, Ann. & Mag. Nat. Hist., (8), XV, p. 67 (1915). [In part, *nec* Smith, 1869.]

Ochleroptera Holmberg, An. Mus. Nac. Buenos Aires, (3), II, p. 487 (1903).

Clitemnestra (Ochleroptera) Pate, Mem. Amer. Ent. Soc. no. 9, p. 44 (1937).

Paramellinus Rohwer, Proc. U. S. Nat. Mus., XLI, p. 469 (1912). —Rohwer, Proc. U. S. Nat. Mus., LXIX, p. 412 (1921).

Gorytes (Euspongus) Maidl & Klima, Cat. Hymen., VIII (1), p. 72 (1939). [In part.]

Gorytes (Miscothyris) Maidl & Klima, Cat. Hymen., VIII (1), p. 107 (1939). [In part.]

Gorytes (*Paramellinus*) Maidl & Klima, Cat. Hymen., VIII (1), p. 109 (1939). [In part.]

Genotype: *Ochleroptera oblita* Holmberg, 1903. (Monobasic.)

The genus *Ochleroptera* is closely allied to *Clitemnestra* Gay, but may be differentiated from the latter by the petiolate first abdominal segment and the presence of a continuous reflexed flange along the dorsal margins of the mesopleura and metapleura. Furthermore, the males of *Clitemnestra* have seven abdominal tergites clearly visible and a distinct pygidial area present on the seventh, whereas in *Ochleroptera* the seventh tergite is completely obtect and the sixth bears a well-defined, semicircular pygidial area.

Generic Characters.—Small, more or less fulgid, generally finely punctate forms. Head transversely subrectangular in dorsal aspect, subcircular in anterior aspect. Eyes large, much more coarsely facetted anteriorly than posteriorly; inner orbits broadly rounded, divergent above and below. Front flat, narrowed medially, generally bisected by an impressed line from anterior ocellus. Vertex with ocelli in a curved line to a very low and broad triangle, the postocellar line longer than ocellocular line. Occipital carina a complete circle in extent and generally separated ventrally from apex of hypostomal carinule bordering the transverse subclepsydrate oral fossa. Antennae situated well above dorsal margin of clypeus toward middle of face; thirteen-segmented in males, twelve-segmented in females; scapes short, cylindrical; flagellum short, filiform to subclavate. Clypeus transversely subelliptical, about twice as broad as long, generally abruptly inflexed subapically before a narrow apical flange. Maxillary palpi six-segmented; labial palpi four-segmented. Mandibles stout; apices acute; inner margins with a stout preapical tooth; lower margins entire.

Thorax with pronotum short, transverse, linear, vertically declivous anteriorly, rounded and ecarinate dorsally, separated from mesonotum by a deep furrow. Mesonotum simple, gently arched; mesonotal laminae very poorly developed, without an oblique, truncate posterior face. Axillae, scutellum and postscutellum simple. Propleura with a well-developed pronotal hamus. Mesopleura with episternal suture distinct, very short, running obliquely from below tegulae to omauli; episternauli obsolescent; sternauli absent; mesopleura and metapleura furnished with a strong horizontal reflexed margin or continuous flange along their dorsal margins; metapleura elongate, subrectangular, tapering only slightly toward truncate base. Mesosternum broadly rounded, ecarinate anteriorly. Propodeum long, arcuately to obliquely declivous behind; dorsal face with an impressed trigonal area; stigmatal grooves completely absent.

Fore wing with marginal cell elongate, lanceolate, nearly five times as long as wide, apex acuminate; three large submarginal cells, all sessile; recurrent veins more or less interstitial with transverse cubital veins, or first recurrent vein received in apex of first submarginal cell; cubital vein relatively straight and not appreciably angled backward in second submarginal cell; basal and transverse median veins interstitial. Hind wing with cubitus arising far distad of the short, straight, perpendicular transverse median vein; anal lobe about one-half the length of the narrow, elongate submedian cell.

Legs short, stout, simple. Tibial calcaria 1–2–2 in both sexes. Tarsi moderately slender and elongate, the last segment somewhat enlarged; tarsal claws simple, symmetrical; arolium moderate.

Abdomen petiolate. First segment more or less coarctate to nodose at apex, occasionally only petioliform. Males with only six tergites and sternites visible, seventh tergite completely obtect; sixth tergite with a broad semicircular pygidial area clearly delimited. Females with a trigonal pygidial area on sixth tergite.

Component Species.—The genus *Ochleroptera* corresponds approximately to Handlirsch's *Gorytes aeneus-bipunctatus* group, and comprehends the following species: *aenea* (Handlirsch) from Brazil; *championii* (Cameron) from Guatemala; *bipunctata* (Say) from North America; *colorata* (Fox) from Brazil; *hirta* (Handlirsch) from Brazil; *oblita* Holmberg from Argentina; *parvula* (Handlirsch) from Brazil and Argentina; *pygmaea* (Bréthes) from Argentina; *sphaerosoma* (Handlirsch) from South America; *subtilis* (Handlirsch) from Venezuela; *tenera* (Handlirsch) from Venezuela; and *violacea* (Handlirsch) from Brazil. Many of the foregoing are known from only one sex, and consequently, when the South American forms are better and more fully known, the total number of species will probably be considerably reduced through synonymy.

Ethology.—Like most other Gorytine wasps, the species of *Ochleroptera* nest in dry or sandy soil and provision their nests with small Homoptera of the families Membracidae or Cercopidae.

Distribution.—The genus *Ochleroptera* is predominantly Neotropical in distribution. Eleven species have been reported and occur in continental Central and South America, exclusive of the Chilean region which is the abode of the closely related ancestral complex *Clitemnestra.* One species, described elsewhere, is now known from Jamaica in the Greater Antilles. In the Nearctic Region, the genus is represented by only the following widely distributed species *bipunctata.*

Ochleroptera bipunctata (Say)

Gorytes [*Arpactus*] *bipunctatus* Say, App. Narrat. Exped. St. Peter's R. (Long's Second Exped.), II, p. 338 (1824); ["Inhabits Pennsylvania"].—Le Conte, Descr. Insect. North America by Thos. Say, I, p. 228 (1859).

Gorytes bipunctatus F. Smith, Cat. Hymen. Brit. Mus., IV, p. 367 (1856); [Penna.; S. C.].—Handlirsch, Sitzber. k. k. Akad. Wissen. Wien, XCVII, p. 355 (1888); [Penna.;

Tenn.; S. C.; Ga.; Mexico].—Fox, Proc. Acad. Nat. Sci. Phila., p. 523 (1895); [throughout U. S., except New England].

Lestiphorus bipunctatus Dahlbom, Hymen. Europ., I, p. 157 (1843); [South Carolina].

Euspongus bipunctatus Dahlbom, Hymen. Europ., I, p. 480 (1845); [South Carolina].—Cresson, Trans. Amer. Ent. Soc., Suppl. vol., pp. 117, 280 (1887); [Penna., "uncommon"].—Ashmead, Canad. Entom., XXXI, p. 300 (1899); [put in Mellinini].—Mickel, Univ. Nebraska Stud., XVII, p. 352 (1918); [Nebraska: Rulo; Omaha. At flowers of *Chamaecrista fasciculata* and *Melilotus alba*].

Gorytes [Euspongus] bipunctatus Cameron, Biol. Centr.-Amer., Hymen., II, p. 71 (1890); [Mexico: Presidio. Temax in northern Yucatan].—Viereck *in* Smith, Ann. Rept. New Jersey St. Mus., 1909, p. 680 (1910); [New Jersey: Great Notch; Camden Co.; Clementon].

Paramellinus bipunctatus Rohwer, Proc. U. S. Nat. Mus., XLI, p. 469 (1912).—Rohwer, Conn. St. Geol. & Nat. Hist. Surv. Bull. 22, p. 656 (1916); [Connecticut: E. Hartford].—Rohwer, Proc. U. S. Nat. Mus., LXIX, p. 412 (1921).—Rau, Trans. Acad. Sci. St. Louis, XXIV (7), p. 19 (1922); [Missouri: Creve Coeur Lake (found dead in a shallow hole in sand)].—Brimley, Insects of North Carolina, p. 446 (1938); [North Carolina: Raleigh; Aberdeen; Edgecombe Co.; Highlands; Mars Hill].—Strandtmann, Ann. Ent. Soc. Amer., XXXVIII, p. 312 (1945); [Texas: nesting in flower boxes at Dallas hospital; provisions nest with *Cyrtolobus acutus* V. D.].

Gorytes (Paramellinus) bipunctatus Maidl & Klima, Hymen. Catal., VIII (1), p. 109 (1939); [Ga.; Tenn.; N. J.; Mexico; Guatemala; Brazil].

Ammatomus (Paramellinus) bipunctatus Bradley *in* Leonard, Cornell Univ. Agr. Exp. Sta. Mem. 101, p. 1015 (1928); [New York: Albany; Nyack].

Clitemnestra (Ochleroptera) bipunctata Pate, Amer. Ent. Soc. Mem. no. 9, p. 47 (1937).

Ochleroptera bipunctata Pate, Bull. Brooklyn Ent. Soc., XLI, p. 99 (1946); [New York: Ithaca, with prey: *Philaenus lineatus* (L.)].

Type.—Pennsylvania [probably Philadelphia or vicinity].

This is a small, dainty, black, finely punctate species, 6 to 8 mm. in length. The clypeus, scapes, pronotum, pronotal tubercles, tegulae, postscutellum, the tarsi in large part, and stripes on the outer faces of the tibiae are white or yellowish-white in color. In addition, the second abdominal tergite, and occasionally the third also, bears a pair of small ovate spots. The sexes are alike, although the male is usually smaller and more finely punctate and sculptured than the female.

Ethology.—The present species usually nests in dry or sandy soil and provisions its nests with various small Homoptera: tree hoppers such as *Cyrtolobus acutus* Van Duzee or spittle bugs as *Philaenus lineatus* (L.).

Distribution.—This little wasp is generally distributed throughout the Upper and Lower Austral zones of the United States and ranges as far southward into Mexico as Yucatan.

A Minute on a Subfamily Name of the Psammocharidae (Hymenoptera).—Ashmead in 1900 (Canad. Entom., XXXII, p. 154) established the subfamily Ageniinae with *Agenia* Schiödte, 1837 as its type genus. Inasmuch as Schiödte's generic name is a homonym, Haupt (Deutsch. Ent. Zeitschr., 1926, Beiheft, pp. 23, 126) altered the name of the subfamily to Macromerinae, based on the oldest included genus, *Macromeris* Lepeletier, 1831. Bradley (1944, Not. Nat., no. 145, p. 3) disagrees with Haupt and remarks: "The type genus must remain the one established by Ashmead under its new name, *Pseudagenia*." Rohwer, however, anticipated Bradley's statement and action by twenty-eight years: in the "Hymenoptera of Connecticut" (Conn. Geol. & Nat. Hist. Surv. Bull. no. 22, p. 627) he designated this complex the Pseudageniini. Banks apparently concurs with Rohwer: he has generally used Pseudagen[i]ini for the group (*v.*: 1946, Bull. Mus. Comp. Zool., XCVI, p. 404; 1945, Bol. Ent. Venezol., IV, p. 112; 1944, Zoologica, XXIX, p. 106). Pate follows a similar course, although since *Pseudagenia* Kohl, 1884 is an absolute synonym of *Pilpomus* A. Costa, 1859 he proposes to change the group name to Pilpomini (1946, Trans. Amer. Ent. Soc., LXXII, p. 117). But all these authors are wrong. For *Pseudagenia* Kohl, 1884 is not the alternate name for *Agenia* Schiödte, 1837 *nec* Descourtilz, 1825. Sustera in 1913 (Verh. k. k. Zool.-Bot. Ges. Wien, LXII, p. 191) rechristened Schiödte's pre-occupied generic name *Deuteragenia* and at the same time renamed the group Deuterageniini (*op. cit.*, p. 176). However, Banks has shown that *Dipogon* Fox, 1897 is congeneric with *Agenia* Schiödte and, as the oldest valid name, takes precedence over *Deuteragenia* Sustera, 1913. Therefore the correct name for Ashmead's subfamily (or tribe) Ageniinae is Dipogoninae.—V. S. L. PATE, Ithaca, N. Y.

Two Poplar Aphids.—While making observations as to grasshopper abundance in fields along the Vernal-Naples highway west of Naples in Uintah County, Utah, on July 25, 1945, an unusually severe condition of poplars due to two species of aphids was observed.

Trees which appeared to be *Populus sargentii* were found to have extremely heavy infestations of large *Mordvilkoja vagabunda* (Walsh) aphid galls; these galls developed from terminal buds. The number of normal leaves on these infested trees was greatly reduced, there being almost as many aphid-filled galls as normal leaves in many cases. A few branches of adjoining poplars (evidently *Populus occidentalis*) which extended right into closely planted, adjacent trees heavily damaged by vagabond aphid galls, also had similar vagabond galls, though these were very scarce or absent elsewhere on the tree.

Trees evidently killed by heavy vagabond gall aphid attack and adorned with great numbers of *M. vagabunda* galls have been found at Myton, Randlett and Roosevelt, in Uintah Basin. Other heavy *vagabunda* infestations were encountered at Richfield, July 25, 1941 (W. E. Peay and the late Ensign H. C. Bennion), at Leeton, July 19, 1941, Vineyard, Lake Shore, Geneva and Vernal, in Utah. This species was found at Litchfield Park and Glendale, Arizona during March of 1945, and collected at Savage, Minnesota, June 2, 1926. Vagabond aphid galls still adhered to trees at Riverside, Nevada, January 11, 1946.

The larger percentage of the trees in the Vernal-Naples highway windbreak evidently were *Populus occidentalis*. From 5 to 16 or more terminal leaves were folded on a large percentage of the twigs of nearly all these trees, the folded leaves sheltering numerous *Thecabius populi-conduplifolius* (Cowen) and occasionally of a few vagabond aphid galls. *Thecabius populi-conduplifolius* also has been collected in folded poplar leaves at Newton, September 26, 1935, abundant at Clinton on July 15, 1937 (Knowlton-C. F. Smith), Ft. Duchesne, Roosevelt, Leeton, and Duchesne, in Utah; Chandler, Arizona, March 1945; and on *Ranunculus* at Puyallup, Washington, September 9, 1937 (H. C. Bennion).—G. F. Knowlton, Logan, Utah.

FREDERICK EDWARD WINTERS.

By F. K. Chamberlain, Albany, N. Y.

With a deep sense of sorrow and personal loss we record the death of Mr. Fred. E. Winters which occurred at his home in Santa Barbara, California, on July 17, 1946. Mr. Winters was well known to American coleopterists chiefly because of his work in North American Hydrophilidae. His interest in this family continued right up to the time of his death and for many years he enjoyed the distinction of being one of the leading American specialists in this difficult group.

Fred. E. Winters was born in Vienna, Austria, March 17, 1885. He was the son of Eduart F. and Barbara Neher Wintersteiner, and it is by the longer name that he will be remembered by the older American coleopterists. For the sake of brevity and greater personal convenience, he changed the name to Winters some twenty-five or thirty years ago. His father died while Fred. was still too young to retain any memory of him. Later, his mother married Ludwig Laula and the stepfather seems to have taken a keen interest in the boy. At any rate, he appears to have stimulated Fred's interest in natural history by taking him on long walks through the Wienerwald (Vienna Woods) so that the boy began collecting insects, salamanders, snails, and young mice at an extremely early age.

Just after the turn of the century, about 1902 or 1903, there occurred an event in Fred's life which may have had considerable influence upon his future entomological career. He was a student at the K. & K. (Kaiser und Königlich) Akademie in Vienna at that time. It was here that he formed, at the age of seventeen or eighteen, a lifelong friendship with a fellow student, Alfred Knisch. Knisch subsequently became one of the world's leading authorities in the Hydrophilidae and is the author of Part 79 of the Coleopterorum Catalogus which constitutes the section devoted to that family. The two youths were approximately the same age, Fred being about two months the older. While we cannot hope to know which one supplied the initial inspiration, it seems more than a coincidence that both should later emerge as specialists in the same family of the Coleoptera.

Knisch died suddenly in Vienna June 7, 1926, at the early age of forty-one. An obituary, written by Franz Heikertinger, appears on pages 87–88 of the Koleopterologische Rundschau, XIII, 1927, and a translation of the second paragraph of this obituary may well be included here:

"Two decades ago—I have a perfectly clear memory of the time—two young collectors joined the ranks of the 'Leber-Gesellschaft.' The 'Leber-Gesellschaft' at that time was under the leadership of Ludwig Ganglbauer, who was the central pivot of Coleopterology in Vienna, Austria. The name was derived from the customary Thursday meetings of a small group in the Leber Restaurant, later known as Deierl Restaurant. The two young collectors mentioned above were two friends, Alfred Knisch and Fritz Wintersteiner. The latter soon departed for America. Knisch remained a member of the 'Gesellschaft,' and somewhat later, when the younger generation became inclined towards specialization, he informed me one day in very few words that he had decided to specialize in the Hydrophilidae. He has followed his decision to the end—one of the few, all too few."

Mr. Winters arrived in America in September or October, 1907, resided in New York City and the immediate vicinity until January, 1916, and in June of the same year he removed to California where he has lived ever since. He became a naturalized citizen in 1914, and on December 26, 1915, he married Miss Thilda Wilhelm of New York City. He is survived by Mrs. Winters and two children, a son and a daughter.

Mr. Winters was a member of the Wiener Koleopterologen Verein, New York Academy of Sciences, New York Entomological Society, Brooklyn Entomological Society, and the Southern California Academy of Sciences. While he had an extensive and accurate knowledge of the Hydrophilidae of both Europe and North America, he was not much inclined towards expressing his views either in public or in private. His publications, therefore, are comparatively few and may be listed as follows:

1913. Environment of Hydrophilidae. Journ. N. Y. Ent. Soc., XXI, pp. 54–55.

1926. Notes on the Hydrobiini of Boreal America. Pan-Pacific Ent., III, pp. 49–58.

1927. Key to the Subtribe Helocharae Orchym. of Boreal America. Pan-Pacific Ent., IV, pp. 19–29.

1944. Sphaeridini Inhabiting Boreal America. Bull. Brooklyn Ent. Soc., XXXIX, pp. 94–95.

At the time of his death, Mr. Winters and the author of this notice were engaged in a revisional study of the North American Species of *Helophorus* (Coleoptera, Hydrophilidae). We hope to complete this study and to publish the revision under joint authorship as originally planned.

As a final tribute to Fred. E. Winters we take the liberty of quoting the words of Mr. John L. Sperry of Riverside, California, a close personal friend and entomological colleague:

"He was an enthusiastic collector and lover of the out-of-doors and in his dealings with his fellows he was a very kindly gentleman in every sense of the word."

The author is greatly indebted to both Mrs. Winters and Mr. Sperry for much of the information used in this notice.

Myzus Aphid Notes.—The green peach aphid and the black cherry aphid are encountered frequently in Utah, often in connection with injury to their hosts. Other *Myzus* species are encountered less frequently.

Myzus cerasi (Fab.) was collected from curled leaves and tips of twigs of *Prunus cerasus* in Utah at Granite, Mill Creek, Lake View, Vineyard, Brigham and Farmington during June, and Perry in May. Also taken at Puyallup, Washington, June 19, 1939.

M. circumflexus (Buckt.) on *Cyclamen* in greenhouse, Logan, February 1936 (R. C. Roskelly); violets, Bear River City, June 11, 1930; asparagus, Plain City, June 27, 1925, in Utah; Wendell, Idaho (D. E. Fox).

M. convolvulae (Kalt.) on tulip, Logan, March 22, 1927 (Knowlton-M. W. Allen); alate on raspberry, Hyrum, October 12, 1938; *Solanum tuberosum,* Provo, July 15, 1925, in Utah. Infesting strawberry in greenhouse, Corvallis, Oregon, July 1934; strawberry, Hood River, Oregon, May 3, 1934 (R. Dimick); *Lactuca,* Bozeman, Montana, August 12, 1926 (C. B. Philip); common on potato in Snohomish and Skagit counties, Washington during July, 1940 (G. A. Huber).

M. persicae (Sulzer) on watermelon, Provo, July 15, 1925; on *Prunus cerasus,* Puyallup, Wash., June 27, 1939 (the late H. C. Bennion); trumpet vine, Overton, Nevada, April 25, 1935; *Roripa nasturtium,* Washington, Utah, May 18, 1945; Kingman, Arizona, May 10, 1945; apricot, Bountiful, Utah, Oct. 26, 1929 (H. J. Pack).

M. porosus Sand. on wild rose, Judith Gap, Montana, June 18, 1942 (H. F. Thornley); Rapolje and Trail Creek, Montana, July 1942 (Thornley); *Rosa,* Kingman, Arizona, May 10, 1945; Naches Pass, Washington, July 18, 1939; Santaquim, Utah.

M. lythri (Schr.) on *Prunus mahaleb,* at Springville, Utah, June 1942; Declo, Idaho (D. E. Fox).—G. F. Knowlton, Utah State Agricultural College, Logan, Utah.

BOOK NOTES.

A Catalogue of the Hesperioidea of Venezuela, by E. L. Bell, Boletín de Entomologia Venezolana, vol. V, nos. 3 & 4, pp. 65/203; dated December 31, 1946.

Mr. Ernest L. Bell, the author of this extensive work, is well-known to students of the skippers as a lifelong and highly competent specialist in this superfamily of the Lepidoptera.

The Catalogue comprises 155 genera and 409 species; it is restricted to the Family Hesperiidae, since the Megathymidae is not known from Venezuela and the Euschemonidae is confined to the Australian Region. The Families and genera of the Hesperiidae are briefly characterized, and the genotypes are noted. Distributions of a general nature, such as "South America," are discarded, although many species not as yet recorded from Venezuela are included.

It should be brought out that in keeping with the policy of *"Entomología Venezolana,"* the commentaries in the Catalogue are in English. No price is given for the double number containing the Catalogue. The subscription price for the journal, for the volume is given as "Bs. 15.00" (Bolivar, the monetary unit of Venezuela, worth at par about 32 cents U. S. currency), which is $5.00 more or less, varying with the rate of exchange.

The Editor is Dr. Pablo Anduze; his address: Departamento Médico, Creole Petroleum Corporation, Los Caobos, Caracas, Venezuela, So. Am. In writing him, this address must be given exactly as above on the envelope.

Nómina de los Artrópodos Vulnerantes Conocidos Actualmente en Venezuela, by Pablo J. Anduze, Felix Pifano C. and Enrique G. Vogelsang. This is an extra number of *Entomología Venezolana,* published January 24, 1947, pages 1/16.

This List was presented to the delegates of the XIIth Pan American Sanitary Conference, held at Caracas. It includes the Arachnoidea as well as the Insecta, as the biting arthropods recorded from Venezuela in the literature. It may be noted that among the biting insects is listed the Lygaeid *Clerada apricornis* Signoret, following the Reduviidae and without indication of the Family—one of those minor oversights that plague editors. It is here mentioned for the benefit of cataloguers. Four hundred and forty-eight species are mentioned, the largest number being the Culicidae, with 183 species, followed by the Tabanidae with 110.

"The Coleopterists' Bulletin" has come to us recently. It is a "mimeoprint" of 12 pages (on one side only), edited by Ross H. Arnett, Jr., and the address is Box 84, Dryden, N. Y., subscription $1.00 for one year, or ten numbers. The present number carries ten pages of names, addresses and specialties of coleopterists, with 4 pages of notes on beetles.

Entomologica Americana, volume 26, for 1946, of which no. 4 is just out is by an accident of Fate, wholly dedicated to the Order Heteroptera. The first article of the two in it, is Part III of the Synopsis of the Heteroptera of America North of Mexico, by J. R. de la Torre-Bueno, parts I and II of which have already appeared in this journal in previous years. It takes up the Family Lygaeidae in pages 1–142, and is solid keys. The second article is "Notes and Keys on the Genus *Brochymena*" by H. S. Ruckes, pages 143–238, with 4 plates of details. In spite of its modest title, this is really a monograph of the genus as far as it is known to date. It is also the basis for all future studies of the genus.

J. R. T.-B.

SIMPLIFICATION.

When we take thought on the apparently ever more burning passion for the actual type specimen as the final criterion of the validity of a species, without which it may not be known or even valid, here is a labor-saving formula suggested to descriptive entomologists:

"*Goldurnya nasopollifer* n. sp.—Agrees in every particular with the type specimen no. 1,000,000½, in the International Museum of Cosmic Culture, Ponapé, Micronesia."

I resisted a violent temptation to give this one of the current numbers of one of our great museums. Some resurrectionist might have madly dug it up and galvanized it into the synonymy.

N. B.—None of the names herein mentioned refers to any living person or institution *in esse;* and if any are construed to have any present application, intent is hereby specifically disclaimed.

J. R. T.-B.

A Few Aphids.—The following records are of a few less commonly encountered aphids.

Aphis bonnevillensis Knlt. was collected on greasewood, *Sarcobatus vermiculatus,* at Winnemucca, Nevada, July 24, 1944; Wells, Nevada, August 16, 1945; a wingless female *bonnevillensis* was being fed on by an aphid lion at Coolidge, Arizona, March 13, 1945; Camanche, Montana, May 27, and Rapelje, Montana, July 1, 1942 (H. F. Thornley); Moab, June 14, Greenwood, June 27, and Gandy, August 8, in Utah during 1945.

A. filifoliae G.-P. was very abundant on *Artemisia filifolia* at Castle Rock, Utah, June 16, 1925. Several *Hippodamia convergens* Guerin were feeding on aphids of this heavy infestation, while large numbers of black ants were attending these and also some larger *Macrosiphum filifoliae* G.-P. aphids occurring on the same plants. A minute pirate bug, *Orius tristicolor* Wh., was feeding on a nymphal *A. filifoliae* at Battle Mountain, Nevada, August 16, 1945. *Aphis filifoliae* also was curling apical leaves on *Chrysothamnus nauseosus* at Maybelle, Colorado, August 18, 1935 (Det. M. A. Palmer).

Rhopalosiphum scirpifolii G.-P. was extremely abundant on tule, *Scirpus* sp., on Antelope Island, Utah, October 12, 1941 (W. E. Peay). A specimen of this aphid was picked up by the writer in sweeping grass and sedge at Gould, Colorado, August 18, 1940.

R. serotinae Oest. was extremely abundant on goldenrod at Boise, Idaho, August 19, 1938 (Knowlton); collected at Buhl, Castleford, Hansen, Hollister, and Murtaugh, in Idaho during October, 1930 (D. E. Fox). Also taken on *Solidago* at Lewiston, Utah, June 18, 1936; at Nyssa, Oregon, August 25, 1944 (Knowlton); and Bozeman, Montana, August 16, 1926 (C. B. Philip).

Amphorophora geranii G.-P. was taken on wild *Geranium* at the summit of Wolf Creek Pass, Utah, July 24, 1945.

Asiphum sacculi Gill. was found in crumpled leaves of aspen on Beaver Mountain, Utah, July 10, 1942.

A. tremulae De G. on *Populus aurea,* Lehman Caves, Nevada, August 31, 1938 (T. O. Thatcher, Coll.; Det. A. C. Maxson).

Trifidaphis phaseoli (Pass.) was found in ant nest at Logan, Utah, March 24, 1933; at Logan, June 25, 1928 (Det. A. C. Maxson); on carrot root at Logan, 1943; on root of bed straw above the mouth of Big Cottonwood Canyon, Utah, June 6, 1935.—George F. Knowlton, Logan, Utah.

PROCEEDINGS OF THE SOCIETY.

Meeting of February 13, 1947.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on February 13, 1947.

The meeting was called to order at 8:00 P.M. by President R. R. McElvare.

Members in attendance were Messrs. Teale, Buchholz, Gaul, Nicolay, McElvare and Tulloch.

The minutes of the meeting of January 16, 1947, were read and accepted.

The program of the evening was devoted to the projection of three motion pictures dealing with (1) Termites, (2) The Yellow Fever Mosquito and (3) Ants, Bees and Wasps.

The meeting adjourned at 9:40 P.M.

Respectfully submitted,
George S. Tulloch.

Meeting of April 10, 1947.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on April 10, 1947.

The meeting was called to order at 8:00 P.M. by President R. R. McElvare. Members in attendance were Messrs. Naumann, Nicolay, McElvare and Tulloch.

The minutes of the meeting of February 13, 1947, were read and accepted.

The Treasurer submitted a report for the first quarter of 1947 which was accepted.

A preliminary discussion of plans to celebrate the 75th anniversary of the founding of the Society was held.

The program of the evening was devoted to the reading of a paper entitled Insects as Food of Man which was presented by G. S. Tulloch.

Attention was called to the fact that insects were recognized as potential sources of food by the military authorities during World War II. Practically all of the survival manuals prepared by the armed services mentioned that the larvae of wood-inhabiting beetles, grasshoppers and termites were acceptable as emergency sources of food.

Although members of the present-day American society do not include insects as standard items in their diet it was pointed out that in other parts of the world certain of the insects are considered to be very suitable for rounding out the daily caloric needs.

A list of edible insects representing ten different orders was discussed. Recipes for the preparation of some of the insects were given.

The meeting adjourned at 9:30 P.M.

Respectfully submitted,
George S. Tulloch.

Geocoris Notes.—*Geocoris decoratus* Uhler has commonly been encountered, often in reasonable abundance, on range as well as crop land, in Utah. In alfalfa fields it usually is exceeded in abundance by both the tiny *Orius tristicolor* White, and the damsel bug, *Nabis alternatus* Parsh, unless during a short time in the spring. All three of these bugs have been observed to prey upon adult and nymphal beet leafhoppers and pea aphids, as well as on certain other insects.

Geocoris decoratus was observed to be feeding on a mature wingless aphid, *Macrosiphum zerozalphum* Knlt. on the ground beneath the low-growing host of the aphid, alfilaria, at Gunnison, Utah, May 19, 1944. On June 8, 1944, a *decoratus* was observed feeding on a large nymphal *M. zerozalphum* at Salt Lake City. This time the predator was on the plant, suspending its aphid prey in space, at the end of its beak. On June 28, 1945, a *decoratus* was feeding on a third instar aphid, *Macrosiphum pisi* (Kalt.), on blossoming alfalfa plant at St. George, Utah. In this case the aphid dangled in space below the predator, suspended at the end of the rostrum, the big-eyed bug being supported on a leaf just below the plant blossoms. *Orius tristicolor* was abundant and *O. insidiosus* (Say) was less abundant in this alfalfa field. A *decoratus* was observed to be feeding on an apterous female of *Aphis chrysothamni* Wilson in a colony of this aphid occurring on young bark of *Chrysothamnus* (*nauseosus?*) at Dodge, Washington, August 11, 1944. At Stinking Water Mountains, Oregon, on August 25, 1944, a *Macrosiphum escalantii* Knlt. upon *Chrysothamnus nauseosus* was being fed on by a *G. decoratus*. *Geocoris atricolor* Montd. was found to be unusually abundant in an alfalfa field at Pleasant Valley, Utah, on September 5, 1945, five being taken in 10 sweeps of the insect net. In this field *Nabis alternatus* averaged 0.6 per sweep and *Orius* nymphs were extremely abundant.—George F. Knowlton, Logan, *tristicolor* 2.5 per sweep, while *Lygus elisus* V. D. adults and Utah.

EXCHANGES AND FOR SALE.

This page is limited to exchange notices and to small For Sale advertisements from members of the Society and from actual paid subscribers to the Bulletin exclusively. *Exchange notices* from members of the Society and from subscribers are limited to *three (3) lines each,* including address; beyond 3 lines, there will be a charge of $1.00 for each 3 lines or less additional. *For Sale* ads will be charged at $1.25 for each 3 lines or part of 3 lines. *Commercial or business* advertisements will not be carried in this page, but will go in our regular advertising pages at our regular advertising rates to *everybody.*

PENTATOMIDAE: Want to buy or exchange Pentatomidae from the United States and Mexico. Herbert Ruckes, College of the City of New York, 17 Lexington Ave. N.Y.C.

ACALYPTRATE DIPTERA OF THE WORLD wanted for determination or in exchange for other insects. Geo. Steyskal, 23341 Puritan Ave., Detroit, Mich.

WANTED.—MANTID EGG CASES from West of the Mississippi River. If interested in collecting, write: Osmond P. Breland, The University of Texas, Austin, Texas.

WILL PURCHASE complete sets of the BULLETIN, Old Series, Vols. 1–7, 1878–1885. Brooklyn Entomological Society, Ivy Way, Port Washington, L. I., N. Y.

LEPIDOPTERA AND ORTHOPTERA from Florida in papers and local specimens mounted to exchange for other Lepidoptera. —Alex K. Wyatt, 5842 N. Kirby Avenue, Chicago (30), Ill.

"LEPIDOPTERISTS! Drawer front labels 2 7/8″ × 1 6/16″ on white-faced board at cost! Non-profit! Don't delay, write today! Kent H. Wilson, 430 Ridgewood Rd., Fort Worth 7, Texas."

WANTED—Geometrid moths, for cash or exchange. John L. Sperry, 3260 Redwood Drive, Riverside, Calif.

CERAMBYCIDAE AND CHRYSOMELIDAE from Asia and Pacific desired for determination; purchase; exchange.—J. Linsley Gressitt, Lignan University, Canton, China.

FOR COLEOPTERA OF THE WEST INDIES and Chrysomelidae of the world, will collect entomological material from Cuba, by previous arrangement. Am interested in buying literature in the above-mentioned classes, and would be glad to be advised by individuals or institutions of such articles; or to send them to me. Manuel Barro, Calle 12, no. 220, altos, apto. 3, Vedado, Habana, Cuba.

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VARIATIONS IN THE LARVAE OF THE MOSQUITO, ORTHOPODOMYIA ALBA BAKER (DIPTERA, CULICIDAE).

By Osmond P. Breland,[1] The University of Texas.

When a biologist describes a new species he should have ideally a large number of specimens collected from many localities. When such a situation obtains, individual variations, and variations occurring within different parts of the range of the species can be taken into consideration in making the original description.

Sometimes it has seemed advisable to a worker to describe a species from only a few specimens collected at a single locality. Under such circumstances, it is almost inevitable that a later study of a large series from an area some distance from the type locality will reveal variations that did not occur within the specimens upon which the original description was made. Mutations may arise in various parts of the range of a species, and the resulting characteristics persist, but these different features may be incorporated within the members of the species in a limited area, rather than spreading throughout the whole population.

The mosquito, *Orthopodomyia alba* Baker, is of considerable interest in this connection. The species was described from a relatively few specimens from a single locality, Ithaca, New York (Baker 1936). At the time of the original description, it was recognized that the adults of *O. alba* and of its relative *O. signifera* Coq., are quite similar, although the larvae of the two species are distinct. Recently it has been pointed out that at the present state of our knowledge, there are no known features by which the adults of the

[1] The writer wishes to express his appreciation to Mr. Orin Wilkins, a graduate student, who helped with the collections, and who has checked some of the features discussed with his own specimens.

two species can be separated (Jenkins and Carpenter 1946), and for this reason, only larval collections should be accepted as positive proof of the presence of *O. alba* in a given locality. The species has been so rare to date that its collection has usually been considered worthy of comment. As of 1946, less than 100 larvae of *O. alba* had been reported collected from some twelve localities (Jenkins and Carpenter 1946), and five of these collections were represented by a single specimen. In the summer of 1947, the writer discovered the species at Austin, Texas[2] and during subsequent weeks, several hundred larvae of the species were obtained.

A study of a large series of the larvae has revealed considerable variation from the original description, and from subsequent publications in which the original description has been modified. In view of the relatively few specimens of this species in existence, and the distance of this area from the type locality, it has seemed advisable to point out the most important of these variations. This is especially true when it is noted that some of the variations are so striking that a worker might believe he was dealing with a new species, if he were to collect only a few specimens possessing these features. Most features that have been studied show certain variations, as might be expected, but only those are discussed that are of such a nature as to appear significant when compared to the generally accepted description of the larvae.

In drawing the conclusions set forth in this paper, more than forty fourth instar larvae of *O. alba* have been studied intensively, while certain structures have been checked with several dozen additional specimens. Recently killed specimens as well as preserved larvae and those mounted on slides have been examined so that any possible distortion of preserved or mounted specimens could be taken into consideration. Preserved larvae sometimes become somewhat distorted, but specimens killed in warm water and mounted immediately retain their significant features considerably longer. It has been thought best to consider each part of the body separately.

Head: The principal variations that were observed in this region were in the length of the upper and lower head hairs, and in the length and attachment of the antennal tuft. Baker (1936) in his original description of the larvae states that the upper and lower head hairs are multiple and long, and in a drawing of the head, shows that the upper hairs reach to the posterior edge of the preclypeus, while the lower hairs extend slightly beyond the anterior margin. Carpenter, Middlekauf and Chamberlain (1946) state that these hairs reach to or beyond the preclypeus. Most of the writer's

[2] Proc. Ent. Soc. Wash. **49**: 185/187.

specimens agree with these descriptions, but in an occasional individual, the head hairs are relatively short, and do not even reach the posterior edge of the preclypeus.

According to Baker (1936) the antennal tuft is one half the length of the shaft of the antennae, while Carpenter *et al.* (1946) state that the tuft is short and attached at the basal fourth of the shaft. In the illustration of the antenna in the latter publication, the tuft is shown to be considerably less than one half the length of the antennal shaft. All of these conditions are represented in the writer's series, but in the majority, the antennal tuft is approximately half as long as the shaft, and is attached to the shaft somewhat more distally than indicated by Carpenter.

No striking variations were noted in the thorax.

Abdominal Segments 1–7: The abdominal segments bear several important groups of hairs, and some of these were described by Baker from the dorsal, lateral and ventral surfaces. This worker notes the presence of a long pair of tufts on the ventral surfaces of segments 3, 4, and 5, and states that a pair of short but conspicuous fan-like tufts occur on the ventral surface of segment 6. No mention is made of comparable tufts on the ventral surfaces of segments 1, 2, and 7, and it is not possible to determine from the drawing of the larva whether or not such occurred in Baker's specimens. The larvae examined by the writer possess the pair of long hairs on segments 3, 4, and 5 and the shorter more bushy pair on segment 6. In addition, however, there is a pair of tufts on the ventral surfaces of segments 1, 2, and 7. These tufts occur in line with the hairs mentioned above, and those on segments 1 and 2 are frequently longer than those on segment 6. The branches of the tufts on segments 1, 2, and 6 are feathered, and as a rule, these secondary branches are longer and more numerous on the tufts of segment 6.

Some workers (Carpenter and Jenkins 1946; Carpenter *et al.* 1946) state that the upper lateral hairs on abdominal segments 1 and 2 have either two or three branches. In some of the writer's larvae, these hairs are four or five branched.

Terminal Segments: Considerable variation occurs in the number of scales in both the anterior and posterior rows of the comb. Some of these variations have been previously indicated (Baker 1936; Jenkins and Carpenter 1946; Shields and Miles 1937). Baker reports 10 to 12 in the anterior row of his specimens, while others indicate that as many as 18 may occur. Baker states that the posterior row of comb scales contains 8 to 9 teeth, while other workers (Carpenter *et al.* 1946) report the presence of 9 to 11. In the present larvae the scales in the anterior row varied from 12 to 16, while there were from 9 to 12 in the posterior row.

The anterior row of comb scales overlaps the posterior row in the specimens examined by the writer considerably more than has been indicated in previous publications. In most instances, the anterior row overlaps at all places where the two rows are opposite each other, and near the center, the ends of the anterior scales extend to the middle of the posterior scales, and in a few instances, even past the middle. The bases of the scales of the two rows are frequently almost in contact with each other.

Carpenter, Middlekauf and Chamberlain (1946) point out the presence of a small sclerotized plate near the base of the anal segment, but this structure is not mentioned by Baker in his original description of the species. All larvae studied by the writer possess this plate.

The dorsal plate of the anal segment exhibited the most striking variation that was observed. Baker states in his original larval description that this plate does not ring the ninth or anal segment, and his drawing indicates that the plate ends some distance dorsal to the ventral edge of the segment. All other publications that have been noted agree in general with Baker's description. In most of the larvae studied from this locality, this dorsal plate extends to or beyond the ventral margin of the segment, and in approximately half of the specimens, the dorsal plate passes ventrally on each side and fuses in the mid-ventral line. Sometimes there is only a small strip that extends to the midventral line, while in others there is a fusion throughout the width of the plate. Considering the complete series, there is every gradation from a dorsal plate that ends dorsal to the ventral segmental margin, to one that completely rings the segment. This variation is considered to be of particular importance, since the incomplete dorsal plate in previously reported larvae of *O. alba* has been considered to be one of the key characteristics by which *O. alba* can be distinguished from *O. signifera* (Baker 1936; Carpenter *et al.* 1946; Matheson 1945). It is now obvious that this distinction frequently breaks down, although there are other features by which the larvae of the two species may be separated.

Some variation exists in the point of attachment of the lateral hair of the anal segment, and in the number of its branches. In Baker's specimens, this hair was sometimes attached to the dorsal plate, and sometimes to the segment posterior and ventral to the plate. The hair had two branches. Some of the larvae examined by Shields and

Miles (1937) possessed a three-branched hair, while Carpenter *et al.* (1946) indicate a variation of two to three hairs. The attachment of the hair in the figure of the species in the latter publication is upon the plate itself. In most of the writer's larvae, the attachment of this hair has been posterior to the dorsal plate, although in a few specimens it was attached to the plate's posterior edge. The number of branches varied from two to four.

Despite the variations that have been noted in the larvae of *O. alba,* the writer has never experienced any difficulty in distinguishing the larvae of this species from those of *O. signifera.* All specimens of *O. alba* that have been seen have been white in color with no indication of a dorsal plate on segments 6, 7, or 8. All larvae of *O. signifera* have possessed a reddish color, even in the young instars, while a dorsal plate occurs on segment 8 in the fourth instar, and in addition one is frequently present on segments 6 and 7. Jenkins and Carpenter (1946) have listed a series of features by which the two species of larvae may be distinguished. It was pointed out above that larvae of *O. alba* from this region sometimes have 4 or 5 branches in the upper lateral abdominal hairs on segments 1 and 2, rather than 2 or 3 as stated in this list. The specimens examined by the writer can in general be distinguished on the basis of the characteristics listed by Jenkins and Carpenter with one other exception. According to these authors, the preantennal tuft of *O. alba* is prominent, while that of *O. signifera* is minute. Carpenter *et al.* (1946) however, point out that the preantennal tuft is quite large, and this is true for the writer's specimens. It is thus possible that a misprint occurred in the previously cited article, and that the authors had another tuft in mind rather than the preantennal.

Summary.

1. A study of a large series of larvae of the mosquito, *Orthopodomyia alba* Baker from Austin, Texas, has revealed several variations in structure from the original and subsequent descriptions of the species. The most significant of these variations have been discussed.

2. Of the variations noted, probably the most important concerns the dorsal plate of the anal segment. Until now it has been generally accepted that in *O. alba* this plate is incomplete, while in *O. signifera,* a related species, the plate rings the anal segment. This structural difference has been used as a key characteristic in distinguishing the two species.

3. Of the larvae of *O. alba* examined by the writer, approximately half possessed a dorsal plate that completely ringed the anal

segment, and for this reason, this feature should not be relied upon to separate the larvae of the two species.

4. Although the structure of the dorsal plate cannot now be considered important in the differentiation of these larvae, other relatively constant features have been found to be reliable in this area. These include the color of the larvae and the presence or absence of a dorsal plate on abdominal segment 8.

5. It seems very probable that a study of other large series of larvae from additional localities will reveal variations different from those indicated in this paper.

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Two Mantids from Utah.—Recently Dr. A. B. Gurney identified the following material, present in the W. W. Henderson collection of Orthoptera at Utah State Agricultural College, Logan, Utah:

Litaneutria minor Scudder, at Bountiful, Utah, August 10, 1941 (D. Ashdown); Delta, July 15, 1941 (Knowlton—F. C. Harmston); Timpie, August 5, 1940 (Knowlton—G. S. Stains); Emery County, June 25, 1941 (W. W. Henderson).

Stagmomantis californica R.-H., taken at Dolomite, Tooele County, Utah, October 28, 1941 (W. D. Fronk).—G. F. Knowlton, Logan, Utah.

ADDITIONS TO VESPINE BIOLOGY III: NOTES ON THE HABITS OF VESPULA SQUAMOSA DRURY (HYMENOPTERA, VESPIDAE).

By Albro T. Gaul, Brooklyn, New York.

This paper presents some observations on the habits of *Vespula squamosa* Drury. Since the habits of this species seldom appear in the literature on Vespinae, it was thought worth while to place these notes on record.

A nest of *Vespula squamosa* Drury was found at Baldwin, Long Island, N. Y. on August 18, 1946. It was located in a sandy field which had been overgrown with grasses. About ten yards to the east, the field sloped rapidly down to a marsh. About five yards to the east was a thriving colony of *Vespula maculifrons* Buy. Apparently the proximity of the two colonies did not interfere with the economy of either species.

This is the first colony of *V. squamosa* to be recorded in the State of New York. A number of individual queens and workers have been captured in the state previously.[1] Since no nest or colony has been previously identified in New York, it was assumed that the individuals captured might have been introduced through human transportation facilities, or that the species may have been living in the state and that its colonies may have remained unnoticed. That the latter is the more likely case may be indicated by my field trip record for June 12, 1941. This record shows that I observed a queen *squamosa* at Yaphank, Long Island, N. Y. She was scraping wood pulp from a deserted barn door. This would be a normal activity of a foundress queen at that time of the year.

The species of *Vespula* (s.str.) with which I am familiar all build their nests underground and in juxtaposition to the nest entrance. This colony of *V. squamosa,* however, built a twenty-four-inch tunnel from the nest to the ground entrance. This tunnel slanted at an angle from the ground to a position about nine inches below the surface where it joined the nest cavity. Daecke[2] states that this tunnel is lined throughout its length with regular wasp paper. Manee[3] mentions no tunnel or paper lining. Although the tunnel of this nest from Baldwin was lost occasionally by the caving in of loose sand during excavation activities, it was rediscovered regularly by the unearthing of bits of paper. Since this colony built a long tunnel, at least partly lined with paper, Daecke's observations are confirmed.

The nest was about eight inches in diameter and four inches deep (Figure 1). It was covered with a typical paper envelope. This

FIG. 1. *Vespula squamosa* nest.

envelope was absent on the bottom of the nest, leaving the brood comb exposed to the earth a few millimeters below. The paper of the envelope was built in horizontal strips similar to the paper envelope of *Dolichovespula maculata* L. and very unlike the "clam shell" pattern frequently encountered in *V. maculifrons*.

At the time of capture the nest comprised two full tiers of comb (six inches in diameter) and one half tier (four inches in diameter). It was estimated that the colony contained two hundred adult workers, some of which perished during the removal of the nest, and some of which were afield. About one hundred and fifty workers and the foundress queen were taken with the nest. The colony was etherized and taken to Brooklyn, N. Y. for further observations and experiments.

In the early evening of August 18, 1946, the nest and its inhabitants were placed in a large rearing cage. This cage had been sprayed with DDT some months before, and unfortunately a number of workers were killed by the residual poison before the error was noticed. The colony was quickly placed in another cage and no further mortality was noticed. The queen, who seldom leaves the nest at that time of year was not effected by the DDT.

The new cage had a sandy bottom. The nest was placed in the sand in an inverted position (i.e., with the brood comb facing upward). The queen and remaining workers were given a supply of glucose, sucrose, water, chopped beef, fish, meat juices and living Lepidopterous larvae. Except for the water and the sugars which were greedily devoured, these provisions were largely ignored.

The nest was retained in complete captivity until August 26, 1946. During this time the workers became cannibalistic. Cannibalism was first noticed on the evening of August 21, 1946. The workers were removing larvae from the brood cells and eating them.

Throughout this period of social degeneration, including cannibalism, the prepupae were consistently refused as food by the ergates. Perhaps any silk accumulated in the glands prior to spinning was repellent to the adults. Larvae and pupae were regularly eaten during this period.

There were several methods of seizing the brood for cannibalistic purposes.

FIG. 2. *V. squamosa* worker removing pupa from cell. Note silk pupal caps torn open by adults.

1—The most frequent method: an adult worker would reach into a brood cell with its head, grasp the larva with its mandibles, and by a combination of lifting and pulling backwards remove the larva from the cell. Such larvae often became the objects of "tug of war" tactics between two or more workers. With tugging and biting the larvae would be torn into pieces and devoured. At least, the juices would be extracted from the tissues. Whether the solid parts of the body were eaten could not be ascertained with absolute accuracy.

2—If the victim were a pupa, the silk pupa cap would be torn open (Figures 2 & 3). Usually only a small part of this pupa cap was removed; just enough to permit the seizure of the pupa.

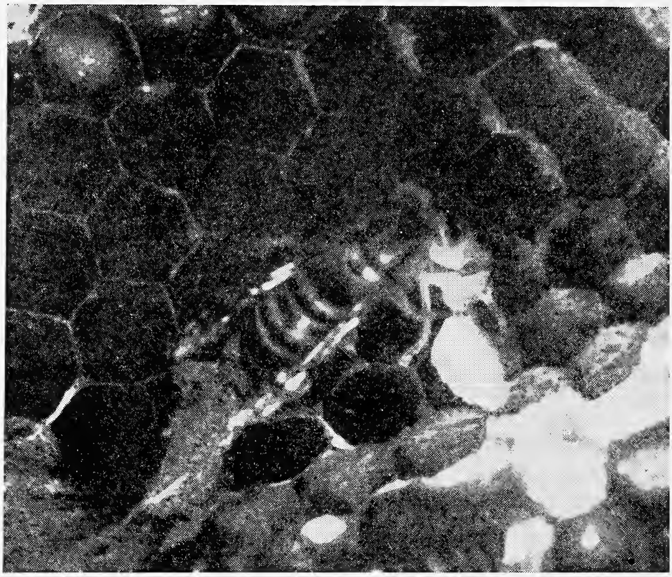

FIG. 3. *V. squamosa* worker eating pupa which is partially dismembered.

The pupae would then be dismembered and eaten in much the same fashion as the larvae.

3—In several instances the ergate would crawl head first into a brood cell containing a smaller larva. While in the cell, the ergate would eat the larva.

4—A variation on the above-mentioned method was noted when an ergate crawled into an empty cell, tore away a part of the paper partition to gain access to an adjacent cell, and ate part of a pupa in the adjacent cell.

The queen never became cannibalistic. The ergates never fed her with malaxated pieces of cannibalized larvae or pupae. In fact, during this period of social degeneration, the ergates never brought the queen any food at all. However, the queen helped herself to water and sugar solutions. Every evening between eight and ten P.M. she engaged in ovipositing. She even placed eggs in brood cells from which the young had just been removed by cannibals.

It was soon apparent that cannibalism was but one phase of a general social degeneration on the part of the workers.

No worker made any attempt to repair the nest although several pieces of weathered wood and old Vespine paper were placed in the cage. During this time, the queen endeavored to keep the nest and colony on a sound basis. She made about two square inches of paper which she used for minor repairs on the nest. This indicates that the foundress queen can and will enter into communal activities other than ovipositing after the appearance of the first workers.

No worker fed any larvae, either with food provided in the cage or with dismembered parts of other larvae. In consequence, the larvae survived without food and with what little water and glucose solution I spattered on the combs.

The only normal communal activity in which the ergates indulged was the ventilation of the nest. This activity was completely unnecessary as the nest envelope had been completely removed and the bare comb was exposed to whatever air currents there may have been. It is my conclusion therefore, that the "ventilation" or beating of wings by the workers may be an entirely automatic response to temperature and humidity conditions, or it may be a method of exercising. It is my opinion that it is primarily an individual response and that its social function, if any, is secondary.

On August 26, 1946, the colony was placed out of doors and the cage door was opened. As soon as the workers were permitted their freedom they made the regular orientation flights and resumed a social life, quite wholesome and typical.

It is concluded, therefore, that this case of social degeneration was caused primarily by the circumscribed space in which the wasps were retained. Normally the ergates would forage for food, paper pulp and would remove diggings from the nest cavity. During abnormal confinement they might be expected to behave abnormally. The foundress queen on the other hand would not normally leave the confines of the nest at that season; she would not then be subjected to any abnormal conditions while confined to the cage. She did not behave abnormally.

As soon as the orientation flights were made, cannibalism ceased; the brood was fed; the nest was repaired. By August 30, 1946, the nest envelope had been rebuilt to the extent that I could no longer observe the activities within. Consequently on the evening of August 30, the colony was anaesthetized for further observations and for photographs.

Up to this time the nest was kept in the inverted position described above. Although the wasps can use their comb when inverted, their normal instinct is to build the comb cells with the opening underneath. Any new comb added between the 26th and the 30th of August was built normally. Therefore, some of the comb cells were at 180° to the others. I have observed this same phenomenon among the colonies of *V. maculifrons* (Figure 4) and *D. arenaria* F.

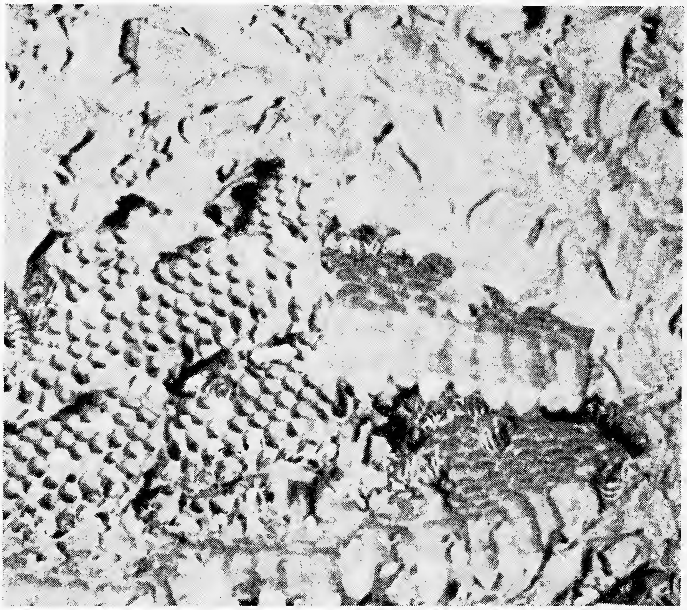

FIG. 4. *V. maculifrons* nest showing inverted comb.

About forty new cells had been built along the periphery of the old comb. One small new comb was started between the tiers of the old comb. This was built in the normal position (180° to the old comb) and contained three cells. A few of the peripheral comb cells were built at 90° on the base of the old comb. Some new cells were "U"-shaped as the cell's hexagonal walls were swung to meet the requirements of habit. One cell of this latter type contained a large larva whose body had been bent over in an arc.

The new nest envelope was somewhat modified. It is normally attached to the first comb. It touches the periphery of the other combs. Regardless of the position of the nest the wasps have no instinct to construct the envelope in any other way. With the nest inverted, therefore, they build their envelope attached to the top of the comb. The paper was placed over the mouth of the cells, effectively covering eggs, larvae and pupae. The paper-making individuals had difficulties with the brood nurses. The nurses tore away the paper to gain access to the young. The paper makers stubbornly replaced it. Not until the larvae pupated and the nurses lost interest in them did this conflict cease. It is interesting to note that the workers evolved no plastic behavior pattern to circumvent this trouble. The emerging imagines had no trouble in tearing their way out of this unusual paper covering.

A new nest entrance had been made just below the level of the sand in the cage. The entrance was facing the gate of the cage.

At this time the nest population had increased to an estimated three hundred workers. The queen was found and appeared to be in good health.

Before the effects of the ether had dissipated, the nest was turned right side up, replaced in the cage, and returned out of doors (in exactly the same place). The cage gate was closed to prevent the aimless wandering of the wasps upon their recovery from the anaesthetic.

The next morning, August 31, 1946, the cage gate was opened again. The wasps flew out but made no orientation flight, apparently because they recognized their surroundings.

As the nest envelope had again been completely removed the previous evening, the wasps began rebuilding it. Ninety workers were counted engaged in this work. One wasp whom I learned to recognize by her clypeal markings made regular four-minute round trips to an old weathered oak clothes post in the back yard. The flight was ten feet from the nest. Her activities were followed for one-half hour. She had selected a part of the post six feet four inches from the ground level. She flew directly from the nest to the post. Alighting on the post head upward, she would turn around until facing directly downward to work on the wood. Using her forelegs and mouthparts to gather wood pulp, she clung to the post with her two posterior pairs of legs. After collecting a large wad of pulp, she would turn again, facing upward, and holding the pulp in her mandibles and forelegs would fly directly to the nest.

Never did she, nor any other wasps engaged in paper-making, share the pulp brought in, as do the foraging workers with the nurses.

Since the colony was well along in the season, the method of effecting repairs was different from the construction methods of a new colony. Primarily many more workers were available at one time to make repairs than there would be in a younger nest. None of the repairs to be made were of a structural nature, as none of the tiers of comb had been damaged. All that was required was the construction of a new envelope. A primitive envelope was begun along the periphery of each tier of comb. A number of workers were engaged on each tier. They applied a ring of paper straight out as a continuation of the base of the comb. As this ring expanded in diameter, the weight of the wasps working on it caused it to bend downward. When this single layer of paper touched the next lower tier of comb, it was immediately affixed to this comb. The first single paper envelope was completed in eleven hours, a job of approximately 990 wasp hours. In subsequent days additional layers of the envelope were added to the nest.

At the same time a number of wasps were busy expanding the living quarters by excavating the sand under the nest. By using the mandibles and forelegs to gather sand grains, and using saliva to effect the adhesion of these grains into a pellet, excavation was efficiently carried on. The wasps who prepare these pellets of sand grasp them in the mouth and fly from the nest. The pellets are then dropped. Never was sand dropped less than five yards from the nest. As soon as the pellet was dropped, the wasp circled back to the nest for another load of sand.

Although the efficiency of the nest labor could have been improved had each sand dropping wasp continued her flight for forage or wood pulp before returning to the nest, this was never observed. It would seem that any individual wasp who assumes one responsibility will not combine this responsibility with another, even at the expense of efficiency. This was also noted among the paper makers who never stopped to eat or drink while repairing the nest. It was also noted among the foraging workers, returning to the nest with food and finding a number of workers rushing out in defense of the colony (at my own provocation). The foragers would never deviate from their normal habit, but would take the food in to the young and the nurses. Whether they would then adapt to the emergency and become defenders I have never waited to determine. It seems evident that a wasp who assumes one duty will fulfill that duty to the exclusion of any other.

During the season it was noted that there were a number of apterergates.[4] They do not leave the nest although they fit well into the labor scheme of the colony. Some work on the internal expansion of the nest, tearing away inner layers of the nest envelope and replacing it on the outside. Others help the foraging workers as nurses in the distribution of food to the brood. Although they possess a functional sting they never attempt to defend the colony. None were found at the time of the capture of the colony, although they may have been buried under the loose sand. They were present throughout the colony season in varying numbers.

When the nest was captured on August 18, 1946, it contained an estimated two hundred workers. Despite cannibalism, DDT, and other forms of sudden death, by August 30 the population had increased to an estimated three hundred. By September 9, 1946, the population peak of the season, I estimated four hundred workers present. By September 17 the wasps had dwindled until there were only about one hundred and seventy left. This decline in population continued more slowly until by October 11 there were no workers at all. From the 25th of September males began to appear and increase in number. When the nest was brought indoors on October 16, there were only males wandering about the deserted comb. There were fourteen empty queen brood cells which had never been used.

During the season the nest itself had been considerably enlarged. It now comprised four full tiers of comb, and one small comb of six cells. At some time in the season the first two tiers of cells had been rejected for further brood rearing and the comb walls were torn away for reclaimed paper.

At the close of the colony season about ten per cent of the brood cells contained dead pupae. There was no evidence of insect parasites, but there were several fungus covered or diseased individuals in the comb. There were many mites on the comb, whether fungivorous or carnivorous has not been determined.

In conclusion, *Vespula squamosa* Drury has been found nesting in New York State. Social degeneration may follow when the activities of ergates are circumscribed. Wasps engaged in one duty will not readily deviate from this duty, nor will they adapt nest building habits to a change in nest position.

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NOTES ON HELIOTHIINAE.

By Rowland R. McElvare, Port Washington, Long Island, N. Y.

Heliosea fasciata Hy. Edw.—Originally described in 1875 and placed in the genus *Melicleptria.* This species was reduced to a synonym of *Heliosea pictipennis* Grote by F. H. Benjamin (Bull. So. Calif. Acad. Sci., Vol. 34, 1935, p. 194). Actually *fasciata* is not a heliothid moth but is a valid species belonging in the genus *Heliothodes* Hamp. in the Amphipyrinae. In the original description Edwards comments that *fasciata* is "very nearly allied to *M. vaccinae* of which it may possibly be the other sex." John B. Smith (Synop. N. A. Heliothinae, 1882, p. 246) considered it a variety of *diminutivus* Grote and put both in the genus *Heliaca* H.Sch. of which he said "tibiae not spinose, anterior unarmed." Inspection of the Edwards type of *fasciata* at the American Museum of Natural History confirms this observation of the tibiae. Apparently Benjamin was not familiar with the actual type of *fasciata* as it differs markedly from *pictipennis* in general appearance and lacks the tibial arming with which he credits it.

Melicleptria sabulosa Smith—Considered a synonym of *Heliosea fasciata* Hy. Edw. It is a synonym of *H. pictipennis* Grote, as Benjamin indicates. A type of *sabulosa* is in the Smith Collection at New Brunswick, and another, somewhat faded, in the U. S. National Museum.

Heliosea pictipennis Grote—Apparently the distinctive vinous purple marking in the primaries of *pictipennis* is subject to considerable variation. Specimens of both sexes entirely devoid of this coloring are taken in some number in the Mojave Desert, and on occasion, some in copulation with similar specimens and others in copulation with specimens having the characteristic purple coloring. The absence of the purple does not seem to be accompanied by any other distinctive differentiating characters.

SOME NEW SUBSPECIES OF BUTTERFLIES FROM DOMINICA, B. W. I.

By Lawrence S. Dillon, Reading Public Museum, Pa.

Among the lots of butterflies from Dominica received during the past several years from Mr. P. K. Agar were the following new forms, one of which is particularly striking. The writer is grateful to Mr. William P. Comstock, of the American Museum of Natural History, for his many kindnesses during the course of the study of these and other Antillean insects. His thanks are also extended to Dr. William T. M. Forbes, of Cornell University, and to Mr. V. Nabokov, of the Museum of Comparative Zoology, for the loan of material.

Appias (*Glutophrissa*) *drusilla* **comstocki** Dillon, subspec. nov.

Apparently most closely related to *d. jacksoni* Kaye from Jamaica and *d. monomorpha* Hall from Grenada, this form is, nevertheless, quite distinct from these and the other races, especially in its peculiar greenish coloration.

Male: Expanse 39–51 mm. *Upper surface* very pale greenish-white, glossy near base, especially of forewing, without markings of any sort, except for a fine line of fuscous along anterior edge of forewing, extending along distal margin to Cu_1 or beyond, and a streak of fuscous scales along costal margin of the same wing as far as the origin of R_1. *Lower surface* of forewing pale greenish-white, its apex, and entire hind wing, glossy dull creamy; base of forewing cell yellow, evanescent distally.

Female: Expanse 41–48 mm. *Upper surface* as male but more distinctly greenish, hindwing tinged with yellow towards base; the forewing with the same fuscous markings as male but extending to tornus, expanded to a width of 2.5 mm. at apex and to about 1 mm. along distal edge, the narrow band thus formed being irregular in outline. *Under surface* as in male but the white more strongly tinged with greenish, the creamy areas paler and more glossy, and the yellow markings brighter.

Wing shape quite as in the corresponding sexes of *A. d. poeyi* Butler.

Male genital armature quite similar to that of *boydi* as illustrated in Comstock (American Museum Novitates, No. 1238, 1943, p. 4, f. 1), differing only in minor details. The principal differences are the somewhat broader form of the harpé, which is less deeply emarginated in its anterior end, in the narrower form of the tegumen, approaching *punctifera* in this respect, and the aedeagus is more strongly flexed.

Holotype: Male; La Haut, Dominica, Dec. 26, 1926; (P. K. Agar); [Reading Public Museum number 127].

Allotype: Female; same data as holotype; [R.P.M.].

Paratypes: 14 males, 6 females; topotypic, Nov. 1944 to Feb. 1945; (P. K. Agar) [R.P.M.].

This species is named for William P. Comstock, research associate of the American Museum of Natural History, whose revisional and faunistic studies have contributed so greatly to our knowledge of the Antillean butterflies.

Phoebis agarithe **pupillata** Dillon, subspec. nov.

Apparently this is quite the most distinct subspecies of *agarithe,* differing to a much greater extent from *antillia* Brown than that race does from either of the mainland forms. It may be characterized as follows:

> *Male:* 38–44 mm. *Upper surface* of forewing rather brighter than Cuban specimens, edged with a series of prominent fuscous bars, in size equal to more than half the space between them; hindwing similarly with a series of distinct bars, the disk a clear light yellow, contrasting sharply with the usual band of modified scales, which are of the same color as the forewing. *Lower surface* uniformly clear yellow, somewhat lighter in shade than forewing above, sprinkled rather lightly with Indian-red and fuscous scales, forming a pattern less distinct than in *antillia* but stronger than in *maxima;* the spot at end of discal cell more distinct than in *antillia* (which is far more pronounced than in *maxima*) and pupillated with silvery; hindwing with the two small spots beyond discal cell pronounced and both very strongly pupillated with silvery.
>
> *Female:* Expanse 52 mm. Very similar to specimens from Florida, but differs from specimens both from there and from the Greater Antilles in the fuscous edging of forewing rather more pronounced, in lacking Indian-red scaling on upper surface of hindwing, and in wanting the scattered silvery scales on the under surface of the hindwing.

Holotype: Male; Springfield, Dominica, June 4, 1945; (P. K. Agar); [Reading Public Museum No. 129].

Allotype: Female; St. Lucia, B.W.I., Aug. 31, 1927; [American Museum of Natural History].

Paratypes: Dominica: 2 ♂; Antria Valley, June 8, 1945; (P. K. Agar); [R.P.M.]. ♂; La Haut, Feb. 9, 1945; (P. K. Agar); [R.P.M.]. ♂; Springfield, Jan. 5, 1945; (P. K. Agar); [R.P.M.]. ♂; Roseau Valley, Nov. 18, 1920; (Cornell U. Exped.); [C.U.]. St. Lucia: ♂; Castries, Sept. 10–22, 1919; (J. C. Bradley); [C.U.].

The male genitalia agree essentially with the figure of those of the nymotype published by Brown, in American Museum Novitates, No. 368, 1929, p. 14.

Eurema Hübner

Either as *Terias* or *Eurema,* the New World species of this genus have received considerable attention in comparatively recent years. Klots, in *Entomologica Americana,* vol. IX, 1928, and D'Almeida, in *Memorias Instituto Oswaldo Cruz,* vol. 31, 1936, have revised the American species. Yet, in spite of the general excellence of these two works, there is still an unfortunately large amount of confusion concerning the identity of certain of the forms. Notable among these confused species are *nise* and its allies which occur in the antillean region. Perhaps the following notes will serve to help remedy the disordered state of affairs to a small degree:

Eurema nise Cramer

Papilio nise Cramer, Pap. Exot., I, 1775, p. 31, pl. 20, fig. K,L. Not *Terias nise* Boisduval, Spec. Gén. Lepid., 1836, p. 657.

Eurema nise Cramer. Möschler, Verh. Zool. Bot. Ges. Wien, 1882. Klots, Ent. Amer., IX, 1928, p. 140.

Terias nise Cramer. D'Almeida, Mem. Inst. Oswald. Cruz, XXXI, 1936, p. 244.

As Klots states, there has been a great deal of confusion as to the correct application of the name *nise* Cramer. For this, Boisduval is in large part responsible; he assumed that Cramer's figure, showing the upper surface of both pairs of wings of the same shade of yellow, to be an error. On this assumption, he redescribed the species as having the hind wings much paler than the fore. However, as Möschler points out, the figure was not in all likelihood erroneous, for Cramer compares his species to an Old World form, *hecabe L.,* which has concolorous wings.

Eurema venusta Boisduval

Terias nise Boisduval [non Cramer], Spec. Gén. Lepid., 1836, p. 657.

Terias venusta Boisduval, op. cit., p. 658.

Eurema diosa Möschler, Verh. Zool. Bot. Ges., Wien., 1882.

Concerning *venusta* Boisduval, Klots states that "Mr. N. D. Riley of the British Museum . . . had examined the type, a male from Martinique." This appears certainly to be in error, for Boisduval, in the first place, like almost all early workers, probably did not select a single specimen as a type. Secondly, in his original description, he lists the species as from Jamaica and Colombia. Hence it appears evident that the Martinique specimen must have been labelled at a later date and probably was not among the original type material, and is, therefore, invalid. On this assumption, the present writer proposes to accept Colombia as the type locality, due to the lack of any Jamaican examples and also because Boisduval's description applies very aptly to the Colombian variety.

Eurema venusta venusta Boisduval

Male: Expanse 32–39 mm. Upper surface of forewing bright yellow, with a border of fuscous scales along costal margin, where it is sparsely overlaid with yellow scales but usually not interrupted by these, and continued around distal margin to broadly beyond tornus on anal margin, at its widest point it attains a width of 19% to 27% the length of the wing (4.2 mm. on a 19 mm. wing). Hindwing nearly white, more strongly tinged with yellow distally, with a border of fuscous from R_s to 2A, sometimes (in about 25% of the specimens) broken or reduced to small dots at ends of veins. Undersurface pale yellow, a little deeper and brighter anteriorly and in forewing cell at base; forewing nearly entirely free of fuscous scales (except along costal margin); hindwing very sparingly sprinkled with fuscous scales, concentrated along apical quarter of disk to form four or five vague patches) at end of cell with two small dots, the hind one always slightly larger than the other.

Female: Expanse 32–38 mm. Upper surface nearly white; forewing tinged with yellow, the costal fuscous scaling interrupted, distally as broad as in male, but terminating at tornus or only narrowly continued to anal margin. Hindwing tinged with yellow along distal margin and with fuscous maculae at ends of veins. Under surface nearly white, forewing bright yellow anteriorly; fuscous scaling as in male, but sometimes a little more distinct.

Eurema venusta **emanona** Dillon, subsp. nov.

Male: Expanse 24–34 mm. As nymotype but differing as follows, in addition to its much smaller size: Upper surface of forewing with the fuscous border broadly interrupted at base with a strong overlay of yellow scales, attaining a maximum width of between 10% and 15% of the wing's length, usually closer to the former figure, scarcely continued around tornus. Hindwing usually rather strongly tinged over most of disk with yellow, the dark border much reduced or absent. Under surface of hindwing a little more yellow, with the fuscous scaling somewhat diminished.

Female: Expanse 28–33 mm. As in the nymotypic female, but with the forewing bordering of fuscous somewhat narrowed, but not so much as in the male, running between 13% and 17% of the length of the wing. Under surface nearly uniformly pale yellow.

Holotype: Male: La Haut, Dominica, Nov. 6, 1944; (P. K. Agar); [R.P.M. No. 130].

Allotype: Female; topotypic, Nov. 9, 1944; (P. K. Agar); [R.P.M.].

Paratypes: 14 ♂, 3 ♀; topotypic, May to Dec.; (P. K. Agar); [R.P.M.]. ♀, Dominica; [C.M.]. 7 ♂, 3 ♀; Roseau val., Dominica, Nov. 18, 1920; [C.U.]. 6 ♂, 2 ♀; Gastries, St. Lucia; (J. C. Bradley); [C.U.]. ♂; Port Charles, St. Lucia, June 28, 1911; [C.U.]. 9♂, ♀; Grenada, July 13, 1927; [C.U.].

Panoquina nyctelia **agari** Dillon, subspec. nov.

At once distinguished from the mainland form by the darker coloring of the upper surface, which is a rich chocolate brown; the hairy patches are dull fulvous and inconspicuous (not distinct and pale greenish-stramineous as in the nymotype), the hindwings above have the maculae obscure or wanting. Under surface also much darker; forewing without white or whitish scales except those forming the elongate macula behind the hyaline spots, the preapical pale region indicated only by a slight paling of the ground coloration, the scales along basal half of costa fulvous (not pale greenish-stramineous); hindwings pale markings indistinct, the flying scales of disk dark fulvous (not pale stramineous), the median dark band broader. The mat of scales which covers the palpi and the fore part of the body beneath is strongly colored with ochraceous, not nearly pure white as in *nyctelia* sens. str. The hyaline maculae at middle of forewing are somewhat larger. Expanse 33–41 mm. (The foregoing comparison is made against specimens from Santa Catharina, Brazil, Venezuela, and British Guiana, in the American Museum of Natural History.)

Holotype: Male; La Haut, Dominica, Dec. 31, 1944; (P. K. Agar); [Reading Public Museum number 128].

Paratypes: 5 males; topotypic; Dec. 17 and 30, 1944; (P. K. Agar); [R.P.M.]. 4 males; Canefields, Oct. and Nov. 1933, Jan. 1934; (L. E. Chadwick); [A.M.N.H.].

Remarks: Named for P. K. Agar, through whose efforts the above new forms were brought to light.

Two specimens from Santiago de Cuba, in the collection of the American Museum of Natural History, are in many respects intermediate between the above and the mainland form, but are closer to the latter. They agree with *nyctelia* sens. str. in the surface coloration of the upper surface, but the discal hairs of the hindwing are brown; on the underside, the hindwing median dark band is broad as in *agari* and the flying scales are fulvous or brownish, but the pale markings are distinct as in the nymotype. The forewing beneath resembles the latter's closely, except that the scales along the base of the costal margin are fulvous instead of stramineous. The name *coscinia* Herrich-Schaeffer is available for this form, which may prove to be distinct.

SAY'S BLISTER BEETLES.

By FREDERICK HOUGHTON, Buffalo, N. Y.

One June day in 1941 we noticed that the air about locust trees in our gardens at the Peak in Springville, New York, was filled with large flying insects which were evidently feeding upon the locust blossoms. We could not identify them, but Dr. C. P. Alexander of Massachusetts State College, to whom specimens were sent, identified them as Say's Blister Beetles, *Pomphopoea sayi.* Since that time we have been invaded every year by a swarm of these beetles which devour all the locust blossoms and thereafter devastate our shrubbery borders.

The beetles are uniformly seven-eights of an inch long. The males are slender and active, the females heavy-bodied and sluggish. Their bodies, including their wing covers, are soft. The wing covers are dull green, the rest of the body being bright metallic green. The legs are orange or red with black joints. The under part of the abdomen is pubescent. They fly well and high but they seem to find difficulty in rising when on the ground, and are apt to climb a blade of grass or twig from which to rise. When a flower or twig upon which they are feeding or resting is shaken they drop inertly to the ground. They are active in hot, bright sunlight, but after dusk or when the sky is overcast, they rest upon flowers or twigs.

The beetles arrive suddenly in a swarm of many hundreds of males and females, and the arrival of this swarm coincides exactly with the blooming of locust trees, *Robinia Pseudo-Acacia.* They feed so voraciously upon the blossoms of these trees that in two days our two large locusts and several small ones are entirely stripped of their flowers. They mate on the flower clusters as they feed. After having devoured the locust blossoms they move to our shrubs.

Our locust trees adjoin a long border of tall shrubs. Excepting for the past two years these shrubs have bloomed at the same time as the locusts and during the years 1941–1945 the beetles have moved directly from the locusts to the shrubs, and have completely stripped all blossoms from those shrubs which bear light-colored flowers. In 1946 and 1947 however the locusts bloomed ten days later than usual, so that although the beetles invaded the shrubbery, most petals had dropped and the damage was slight.

Two days after their arrival the beetles have usually departed as abruptly as they had appeared. This year their arrival, activities and departure have been carefully noted, and the details have been set forth below.

June 26, 1947. No beetles have appeared.

June 27 and 28. A few, perhaps a dozen, were seen flying about the tallest locust tree.

June 29. This was a hot, sunny day. The locust trees were filled with beetles which were feeding upon the petals, possibly also the stamens, of the flowers on all the trees. We dusted three small trees with DDT, reaching as high as possible from a ladder, and the beetles left those portions which we reached with the dust. All the trees were almost stripped of blossoms.

June 30. The morning was cool, and no beetles were flying or feeding. We searched carefully under the trees which we had dusted but found no beetles alive or dead. We shook the trees, using a tree pruner on a long pole, and beetles dropped down in a shower. Under one tree we killed and counted 110 beetles, under another, 79. The swarm stripped all the trees and in the afternoon they moved to the shrubbery border. They passed by large bushes of pink and yellow roses, white philadelphus and peonies, and red weigela, and settled on two kolkwitzia bushes whose pink blossoms were just beginning to drop, and on a white rugosa rose which was in full bloom. They fed on the petals of the kolkwitzia and on the stamens and petals of the rose. We dusted the bushes heavily with DDT, without immediate visible effect, and saved the rose by hand picking all afternoon. At dusk the beetles ceased feeding.

July 1 was cool and the sky overcast. We examined the locusts and shrubs but found no beetles. In the afternoon the sun shone, and we picked about two dozen beetles from the white rose, but only a few from the other shrubs. By evening only about a dozen were to be seen, and during the whole day not one female was seen.

July 2 and 3. About a dozen males were killed as they were feeding on the rose. No others were seen. The swarm had vanished.

Several problems present themselves.

Where did the swarm come from? No local gardeners have ever seen them. They are unknown to the Director of the local Forestry project.

Where did they breed? The manuals describe briefly the probable habits of some genera and species of the Family Meloidae to which these belong, but none to which I have access mention this species. We submitted specimens to Mr. R. B. Fales, Director of Forestry in Erie County, and he sent them to Dr. A. H. Mac Andrews, on the staff of the New York State College of Forestry, who writes, "As you perhaps know, the life history of the blister beetle group, as a whole, is very imperfectly known." Further he writes, "The eggs are laid in large numbers in the soil and the larvae spend their life in the soil feeding on other insects or on vegetation depending upon the species. Pupation takes place in the soil and large swarms of the beetles emerge to attack vegetation."

This checks a statement made by a careful observer who visited us just when the swarm was arriving. He said that he had observed beetles emerging from holes in the soil under our locust trees. Yet we have dug carefully and repeatedly under our trees and shrubs without having found any evidences of larvae or pupae which might be attributed to these beetles.

The fact that the swarm arrives exactly at the time that the locusts blossom seems remarkable. In 1946 and 1947 these trees bloomed ten days later than they had done in the previous five years, yet the beetles arrived every year just as the blossoms opened.

The fact that the swarm disappears as abruptly as it arrives, and the place to which they depart, need some investigation. This year DDT might have exterminated the whole swarm, but though this is slow in acting, there should be some dead beetles on the ground. In 1946 we sprayed with lead arsenate, and the ground was littered with dead beetles. To observe the effect of DDT upon them I placed some in a glass jar and dusted lightly with DDT. They moved feebly for a little time, but remained alive for four hours.

This abrupt disappearance is not confined to our swarm. Mr. James Blackmer, a careful observer, has informed me that on June 3, 1942, "myriads" appeared at his preserve in Wethersfield, Wyoming County, New York, four days later few were to be seen, and on June 10 none was found.

The need of a careful study of these beetles seems indicated.

CONGRESS OF ENTOMOLOGY.

The eighth International Congress of Entomology will be held in Stockholm, Sweden, August 8–15, 1948. The fact that all steamship sailings are currently booked to capacity for months in advance makes it seem necessary for those expecting to attend the congress in 1948 to arrange for passage as early as possible. Steamship companies have not issued sailing lists for 1948, but expect to do so in the early fall. A number of lines have listed sailings for the present season, among them, the Cunard, French, Belgian, Swedish, Norwegian, Gdynia (Polish), Holland-American, etc., the first mentioned expecting soon to have two new steamers in service. It is understood that the Thirteenth International Congress of Zoology will be held in Paris some time in July, 1948, and it is hoped that all entomologists going to Stockholm will plan to attend the Zoological Congress also in order that the interests of the entomologists may be fully represented before the more comprehensive body. Should a sufficient number of individuals indicate that they expect to sail about mid June, it may be feasible to engage passage on the same steamer. Early information as to the probable number of participants is especially desired in order that the housing committee in Stockholm may make the necessary arrangements. The undersigned, as member of the executive committee, would appreciate it if he be kept informed as early as possible as to plans of those expecting to attend the sessions.

O. A. Johannsen,
Comstock Hall, C. U.
Ithaca, N. Y., June, 1947.

EDITORIAL.

In this Bulletin (Vol. XXXVIII, p. 177), the Editor presented a brief study of the correct use of the words PART and PORTION.

PORTION is a falsely elegant word favored by writers of pseudo-literature, which has crept into common usage. The basis for this is the notion that the use of a longer word for a shorter and less learned one is a symbol of culture and refinement.

Now, entomological and other scientific writing is not literature in the generally accepted meaning of the term; such writing is purely factual and requires no adornment. For this reason, it must be *clear;* this clarity can come only from the correct and exact use of words to express definite and exact things and concepts. We cannot cloud our meanings or the ideas in our minds by misty wording, which inevitably leads to ambiguity and misunderstanding.

There are times and places in entomological writing where we may use graceful language to form a mental image and to express subjective thought, such as beauty, or harmony. But there is a symmetrical elegance in correctly expressed technical writing; however, this symmetry and this elegance certainly do not derive from loose usage of so-called literary values—they are born of the lucidity of correct, terse and accurate wording.

We ask our authors to read our article for their guidance; for PART and PORTION will be correctly used in our journals, even if we find ourselves compelled to "emend" the writings of valued contributors and cherished friends.

J. R. T.-B.

BOOK NOTES.

Elementos de Entomología General, con Especial Referencia a los Insectos de Interés Forestal. By Gonzalo Ceballos. Published by the Escuela Especial de Ingenieros de Montes, Madrid, 1945. (Price, 50 Pesetas) 251 pp., 76 text figures.

In the course of my dealings during the past twenty years with entomologists and students from the Spanish-speaking countries of the Americas, I have often deplored the lack of an original Manual of Entomology in the Spanish language. I heard therefore with much interest of the recent publication of the book with the above title. Through the author's generosity a copy is now in my hands. I take great pleasure in introducing it to the American entomological public.

Intended primarily for beginners and laymen, as the title implies, this Manual will serve its purpose admirably. The introductory chapters, dealing with the external and internal morphology and general classification, cover some 70 pages, or a little less than one-fourth of the book. They are clearly written, with up-to-date terminology and adequate illustrations. The remainder of the book discusses the taxonomic and biological aspects of the several orders. Here the slant is decidedly on the forest insects, as indicated by the subtitle of the book. As a result, the two orders Coleoptera and Lepidoptera receive in proportion more attention than the others. The purpose and limitations of this approach are explained by the author in a footnote (p. 133). Notwithstanding the author's modest claims, his book contains much valuable first-hand information on the forest pests of Spain. Some of this is not, or scarcely, accessible elsewhere and should be of value to North American entomologists, many of the pests discussed being also prevalent with us.

Special mention should be made of the clear and accurate illustrations, one of the most attractive features of the work. Some are copied or adapted from previous publications, due credit being given in each case; but the majority are from original drawings. The typographical presentation is up to the best standards. I have noted remarkably few misprints, which are particularly troublesome in textbooks, as they are likely to lead the beginner astray.

Entomology deals with many small or minute creatures and a multitude of details, whose interpretation is often contradictory or hopelessly in dispute. The writer of a general text could therefore not possibly be expected to agree with every other entomologist's opinions, particularly in such matters as morphological interpretations and terminology. Even so, very few statements in Professor Ceballos' book are open to question and it would seem hardly fair to harp on such minor defects, which will no doubt be removed in future editions, when the author's attention is called to them.

It is to be hoped that Professor Ceballos' book will rapidly become popular among South American entomologists. Perhaps it will incite one of them to produce a companion Hispano-American textbook based on New World tropical insects. Such a work would be a real boon and emulate the several manuals produced in recent years by Brazilian entomologists in the Portuguese language. —J. Bequaert, Museum of Comparative Zoölogy, Cambridge, Mass.

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THE SUBGENUS PHORBIA ROBINEAU-DESVOIDY IN NORTH AMERICA, GENUS HYLEMYIA SENS. LAT. (DIPTERA, MUSCIDAE).

By H. C. Huckett, Riverhead, New York.

The species dealt with in this paper belong to a group commonly associated with the name *sepia*,[1] and forming an integral part of the genus *Hylemyia sens. lat.* Their kinship is plainly revealed by the peculiar appearance of the ovipositor (Karl, 1917, 1928)[2] and by the

[1] The identity of the species *sepia* within the group still remains a matter of considerable conjecture. Meigen (Syst. Beschr., V: 152, 1826) described the fly from specimens provided by Wiedemann and von Winthem, and named it *Anthomyia sepia*. Villeneuve (Notices diptérologiques, Ann. Soc. Ent. France, LXXXVIII: 259, 1919) on finding the type missing from the Meigen collection at Paris decided to adopt Meade's interpretation of the species, which, Collin informs me, was probably that of *genitalis* Schnabl. Stein (1916) on referring back to the Winthem collection at Vienna came to the conclusion that *sepia* was none other than *curvicauda* (Zett.), and further that many authors had mistaken *sepia* for another species, for which he proposed the new name *Chortophila penicillaris*. Karl (1917) following up Stein's work and with the type of *curvicauda* before him limited the name *sepia* to specimens of another species, namely *Adia flexicauda* Schnabl, pointing out that the specimens under *sepia* in the Winthem collection consisted of many species, including *curvicauda*. Karl evidently was of the opinion that Stein in his diagnosis had confused *flexicauda* with *curvicauda*. On the other hand, Ringdahl (1933) and Séguy (1923) have alluded to *sepia* as having a short tuft of setulae on the cerci, a character not present in *flexicauda*, and which is not unlike that present in *sepia* of authors according to Stein.

[2] Reference to literature cited in the synonymies is signified by dates of publication.

interrelated form of the male appendages to the fifth abdominal sternum (Tiensuu, 1935). The terminal segments of the ovipositor are sharply flattened vertically, being sheathlike and bristleless; the male appendages of the fifth sternum are more or less scalloped or notched distad, and possess fine setulae arranged in series or as a mat on inner border.

The species occurring in North America include the European forms *Phorbia curvicauda* (Zetterstedt), *P. genitalis* (Schnabl and Dziedzicki), *P. penicillaris* (Stein), the native forms *P. sinuata* (Malloch), *P. lobata* (Huckett), and five additional undescribed species.[3] The larvae of several are reported to feed in stems of cereals and grasses (Séguy, 1934, 1937), to such a degree in some instances as to cause injury of economic importance.[4, 5]

Phorbia Robineau-Desvoidy

Phorbia Robineau-Desvoidy, p.p. Essai Myod., p. 559 (1830). —Coquillett, Proc. U. S. Nat. Mus., XXXVII: 589 (1910).—Karl, Tierwelt Deutschlands, XIII, Pt. 3, p. 178 (1928).—Ringdahl, Ent. Tidskr., LIV: 34 (1933). —Tiensuu, Act. Soc. Faun. Flor. Fenn., LVIII: 14 (1935).—Kloet and Hincks, List Brit. Ins., p. 425 (1945).

Chortophila Macquart, p.p. Hist. Nat. d. Ins., II: 326 (1835). —Westwood, Introd. Mod. Class. Ins., II Suppl., p. 142 (1840).—Rondani, Dipt. Ital., Prodr. I: 96 (1856).— Lioy, Att. Inst. Venet. Sci., IX, ser. 3, p. 991 (1864).— Karl, Stett. Ent. Zeitg., LXXVIII: 292 (1917).—Collin, Ent. Month. Mag., LXIII: 134 (1927).

Adia Schnabl and Dziedzicki, Abh. K. Leop.-Carol. Deutsch. Akad. Naturforsch., XCV (2): 97 (1911).

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[3] Malloch (Descriptions of diptera of the families Anthomyidae and Scatophagidae, Ohio Jour. Sci., XX (7): 273, 1920) has provisionally recognized *sepia* Zett. as occurring in North America. I have not seen the specimens on which this record was based, and in view of the difficulties surrounding the name *sepia* it has seemed preferable to leave the matter open for further enquiry. Ringdahl (1933) has noted that *sepia* of Zetterstedt (not Meigen) is a synonym of *Hylemyia pratensis* (Meigen), a species not belonging to *Phorbia* as herein delimited.

[4] Schiner, J. R. 1865. Dipterologische Miscellen. Verh. zool.-bot. Gesell. Wien, XV: 999.

[5] Mesnil, L. et Pétré, F. 1932. Un Anthomyidae (Dipt.) nuisible aux céréales en France. Bull. Soc. Ent. France, XXXVII: 217–222.

Genotype: *Phorbia musca* Robineau-Desvoidy (by designation of Coquillett, 1910).

The genus *Phorbia* was erected by Robineau-Desvoidy in 1830 for the reception of five nominal species, none of which has since been recognized with any degree of confidence by subsequent workers. Macquart in 1835 included *Phorbia* as a part of a composite grouping entitled *Chortophila,* retaining therein the nominal species *musca* and *grisea* of the original series and also *Anthomyia sepia* Meigen. The species *Phorbia musca* was selected by Coquillett (1910) as the genotype of *Phorbia.* Earlier Westwood (1840) had recorded *Anthomyia sepia* Meigen as type of *Chortophila.* I have accepted this early association of the name *sepia* with *musca* as indicating that the two species may be regarded as congeneric. Hence preference has been given to the retention of the older name *Phorbia* for the group in place of *Chortophila.*[6] It should be noted that the species *Anthomyia sepia* Meigen has been cited by Karl (1928) and Kloet and Hincks (1945) as the genotype of *Phorbia.* The validity of such action, in my opinion, depends on whether it may be shown that *sepia* can be recognized as being represented among the original species included in *Phorbia.*

Subgeneric characters.—Small stoutish species, well bristled, markings poorly defined though extensive on male abdomen. Latter subcylindrical and truncate, increasingly lustrous and stronger bristled caudad, hypopygium large; abdomen of female shining black with little trace of pruinescence, unmarked. Parafrontals in male with a pair of minute setulae adjacent anterior ocellus, arista subnude or minutely haired, vibrissal angle not prominent, proboscis of slightly reduced proportions, mesopleura devoid of bristlelike seta on upper border near anterior notopleural bristle; prealar bristle long. Legs not slender, fore femur with a few semierect setulae on median plane of anterior (inner) surface. Processes of fifth abdominal sternum of male with inner margin more or less scalloped

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[6] Mr. J. E. Collin has kindly pointed out in correspondence that Macquart had introduced the name *Chortophila* for a combination of four of Robineau-Desvoidy's little-known genera, *Nerina, Adia, Phorbia, Chloe,* without using the name *Chortophila* for any one of the contained groups. It thus seems evident that if the name *Chortophila* is to survive the genotype for that group should at least be selected with a view to avoiding the prior claims of Robineau-Desvoidy's older names.

or notched distad, with a fringe or mat of minute blackish setulae on inner border, and with one or two short erect bristles on apical region directed ventrad; ovipositor strongly chitinized and extensively flattened laterally, sheathlike, caudal sclerites bristleless.

None of the species here recorded has an apical posteroventral bristle on hind tibia, as is present in the European species *grisea* Ringdahl, *moliniaris* Karl,[7] and *singularis* Tiensuu.[8]

In formulating the keys it has been found necessary to rely largely on the structure of the copulatory appendages for distinguishing the species. Many of the parts forming these appendages in the male are likely to be obscured in unrelaxed specimens. This is a hindrance that should not hide the fact that in such structures may be found the most dependable means of specific recognition and differentiation.

Key to Species.

Males

1. Mid tibia with no median anteroventral bristle 2
   Mid tibia with one or more median anteroventral bristles . . . 5
2. Cerci (upper forceps) armed with a shaggy tuft of setulae, the latter about equal to the length of hind metatarsus; processes with a small callosity near middle on inner margin; posthumeral bristles strongly duplicated. **masculans,** n. sp.
   Cerci with no such tuft, setulae shorter than hind metatarsus 3
3. Processes imperceptibly notched distad, and fringed for nearly entire length of inner margin, less densely so apicad; inner margins of processes subparallel basad, not convergent; cerci divided laterally into two hairy lobes. *lobata* (Huck.)
   Processes abruptly notched distad and not fringed for nearly entire length of inner margin; inner margins convergent basad; cerci not formed into lateral folds or lobes 4
4. Processes slender, much longer than hind metatarsus, marginal mat of setulae extending along median half of inner

[7] Ringdahl, O. 1929. Übersicht der in Schweden gefundenen Hylemyiaarten mit posteroventraler Apikalborste an den Hinterschienen. Ent. Tidskr., LI: 268.

[8] Tiensuu, L. 1938. Beiträge zur Kenntnis der Musciden (Dipt.) Finnlands. Ann. Entom. Fenn., IV (1): 24.

border (fig. 8); tergum 5 with one or two well-developed discal bristles laterad .... **portensis,** n. sp.

Processes scarcely longer than hind metatarsus, marginal mat of setulae restricted to a small subapical patch (fig. 6); tergum 5 with discal bristles lacking or weak. **conicans,** n. sp.

5. Cerci armed with a shaggy tuft of setulae, the latter slightly longer than hind metatarsus .... *penicillaris* (Stein)

Cerci armed on distal half with numerous slender setulae, not densely grouped nor as long as hind metatarsus; apical margin of cerci not deeply cleft; gonostyli (inferior forceps) not indented nor notched on inner margin (fig. 5). **barbicula,** n. sp.

Cerci deeply cleft on distal region, lateral processes with numerous slender setulae which appear as a marginal fringe when viewed from above; gonostyli notched on inner margin (fig. 1) .... *curvicauda* (Zett.)

Cerci not tufted nor coarsely fringed 6

6. Mesonotum densely pale bluish gray pruinescent; parafacials conspicuously receding ventrad, at narrowest not wider than half breadth of parafacials at base of antennae; tergum 5 conspicuously narrowed laterad (ventrad), lateral margin not half as long as that of tergum 4 .... *sinuata* (Mall.)

Mesonotum sparsely pruinescent, subshining; parafacials at narrowest at least equal to half its width at base of antennae; lateral margins of terga 4 and 5 about equal in length 7

7. Processes armed with a fringe of short setulae on median third of inner margin; dististylus (inner forceps) compressed laterally and strongly notched, crooklike in profile, apex rounded (fig. 11) .... *genitalis* (Schnabl)

Processes fringed for nearly entire length of inner margin; dististylus slender, in profile not compressed nor notched, apex pointed .... **impula,** n. sp.

Females

1. Upper (dorsal) margin of anal palpi[9] in profile sharply angular apicad (fig. 16) 2

Upper margin of anal palpi at most slightly inclined apicad (fig. 22) 3

[9] Cerci of Crampton (The Diptera or true flies of Connecticut, Bull. 64, Conn. Geol. Nat. Hist. Surv., p. 153, fig. E, 1942).

2. Wing membrane uniformly brownish tinged, not notably darker basad; cephalic margin of parafacials in profile receding sharply ventrad from base of antennae, at an angle comparable to that of parafrontal margin sloping dorsad; anal palpi sharply angulate at apex (fig. 16). *curvicauda* (Zett.)

   Wing membrane largely clear, or by contrast much darker basad; cephalic margin of parafacial in profile receding from base of antennae at an angle wider or more obtuse than that of parafrontal margin sloping dorsad; anal palpi obtusely angulate at apex (fig. 17) .... *genitalis* (Schnabl)
3. Parafacials becoming much narrower ventrad, at narrowest about equal to half its maximum breath at base of antennae 4

   Width of parafacials well maintained ventrad, at narrowest exceeding half its maximum breadth at base of antennae 5
4. Mesonotum and scutellum pale bluish gray, densely pruinescent; hind tibia with a robust apical posterodorsal bristle; halteres reddish .... *sinuata* (Mall.)

   Mesonotum and scutellum slate gray, subshining; hind tibia with a weak apical posterodorsal bristle; halteres yellowish. **portensis,** n. sp.
5. Wing membrane largely hyaline, clear basad. *penicillaris* (Stein)

   Wing membrane partly brownish tinged, darker basad 6
6. Fifth abdominal tergum with weak or slender discal bristles; lower sternopleural bristle of caudal pair usually weak. **conicans,** n. sp.

   Fifth abdominal tergum with well-developed discal bristles; lower sternopleural bristle of caudal pair usually well developed 7
7. Caudal pair of ocellar bristles longer than presutural acrostical bristles .... *lobata* (Huck.)

   Caudal pair of ocellar bristles shorter than median pair of presutural acrostical bristles .... **barbicula,** n. sp.

Hylemyia (Phorbia) barbicula, n. sp.

Male: Black, mesonotum lightly dusted and with trace of darker lines along planes of dorsocentral and acrostical bristles; abdomen subshining, with poorly defined dorsal mark. Wings slightly brownish tinged, densely so basad; calyptrae whitish, halteres purplish. Narrowest distance between eyes about equal to that between posterior ocelli inclusive, frontal vitta well maintained caudad, ribbandlike; parafrontals at base of antennae as wide as breadth of third antennal segment, slightly receding ventrad, height of cheeks slightly less than width of third antennal segment; arista subnude. Acrosticals composed of weak irregularly paired bristles, three presutural pairs, posthumeral bristle not duplicated; lower bristle of caudal pair of sternopleurals weak. Abdomen subcylindrical, lateral discal bristles on terga 3, 4, and 5 lacking; distal half of cerci with a loose grouping of slender setulae, the latter scarcely as long as hind metatarsus, processes shorter than gonostyli (inner forceps), distinctly notched apicad, marginal mat confined to median third of inner margins, the latter convergent basad, gonostyli slender, pointed at apex, not incised (figs. 5, 10). Fore tibia with a fine median and apical posteroventral bristle, mid tibia with 1 median anteroventral, 1 anterodorsal, 2 posterodorsal and 2 posteroventral bristles, hind tibia with 2 anteroventral, and with 2 stronger and 2 weaker bristles on anterodorsal and on posterodorsal surfaces, with a weaker bristle on proximal half of posteroventral surface. Costa with a sparse series of slightly longer setulae, costal thorns well developed, veins R_{4+5} and M_{1+2} subparallel to wing margin, *m-cu* crossvein erect. Length, 4 mm.

Female similar to male, abdomen shining; frons at level of anterior ocellus about one third as wide as diameter of head when viewed from above, fifth abdominal tergum with discal bristles, dorsal margin of anal palpi weakly angulate at apex.

Holotype: ♂, Cypress Hills, Alberta, V.15.26 (F. S. Carr). [C.N.C.]

Allotype: ♀, Cypress Hills, Alberta, VI.25.27 (F. S. Carr). [C.N.C.]

Paratype: ♂, Saskatoon, Saskatchewan, V.11.25 (K. M. King).

The male of *barbicula* may be distinguished from those of *penicillaris* and *masculans* by the much weaker vestiture arising from the cerci. The specimens have stood before me as *sepia sensu* Ringdahl, and as such were submitted to Mr. J. E. Collin for comment. The species was unknown to Mr. Collin, in view of which it has seemed preferable to regard it as distinct, pending the results of further enquiry.

Hylemyia (Phorbia) conicans, n. sp.

Male: Black, subshining, thorax and abdomen slightly pruinescent, mesonotum with trace of three stripes, abdominal marks broad, dilating along cephalic and caudal margins of each segment. Wings blackish or brownish tinged, deeply so basad; calyptrae white, halteres yellow. Narrowest distance between eyes equal to that between posterior ocelli; frontal vitta reduced to sublineal dimensions caudad, parafrontals in profile at base of antennae about as wide as breadth of third antennal segment, narrower ventrad; presutural acrosticals weak and irregular, lower bristle of caudal pair of sternopleurals slender, lateral discal bristles on abdominal terga 3, 4, 5 weak and scarcely distinguishable, anal sclerite (tergum 9) notably angular dorsad (caudad as viewed from below), cerci with a few longish setulae apicad, processes short, sparsely bristled on outer surface, abruptly notched, inner margins convergent basad and with a patch of fine black setulae situated immediately basad of notched region. Fore tibia with a fine median and apical posteroventral bristle; mid femur with 2 or 3 strong anteroventral bristles, mid tibia with 1 anterodorsal, 1 or 2 posterodorsal, 2 posteroventral bristles; hind femur with a strongish preapical seta on posteroventral surface, hind tibia with 2 or 3 anteroventral, 3 anterodorsal and 3 posterodorsal bristles, and with 2 or 3 weaker bristles on median half of posteroventral surface, apical posterodorsal bristle weak. Costal thorn short, costal setulae fine, *r-m* crossvein erect, straight. Length, 4 mm.

Female: Frontal vitta black, abdomen shining, black; caudal region of frons, viewed from above, about one third as wide as maximum breadth of head, dorsal margin of anal palpi, in profile, weakly extended apicad. Fore tibia with a median anterodorsal bristle, mid tibia with a median anteroventral bristle, hind femur with bristles on proximal half of anteroventral surface weaker, hind tibia without bristles on posteroventral surface. Otherwise similar to male.

Holotype: ♂, Cuchara, 8000 ft., Colorado, VIII.7.40 (F. M. Snyder) [U.S.N.M.]

Allotype: ♀, Mt. Lemmon, Santa Catalina Mts., 8000 ft., Arizona, VII.27.17. [U.S.N.M.]

Paratypes: ♂, Pinery Canyon, Chiricahua Mts., Cochise County, Arizona, ♀, Flagstaff, Arizona, VIII.5.33 (R. H. Beamer). [Univ. Kans.] ♂, Jemez Springs, New Mexico, VI.29.—(J. Woodgate),

♂, ♀, Cloudcroft, New Mexico, VI.27.40 (R. H. Beamer). [Univ. Kans.] ♂, Cuchara, 8000 ft., Colorado, VIII.7.40 (F. M. Snyder).

The male of *conicans,* as in *portensis,* has no median anteroventral bristle on mid tibia, and no fascicle or grouping of setae on cerci, thereby differing from other males of similar habitus. The male of *conicans* differs from that of *portensis* in the shorter processes and less expansive proportions of the gonostyli (figs. 6, 14).

Hylemyia (Phorbia) impula, n. sp.

Male: Black with brownish cast; mesonotum and abdomen lightly pruinescent, markings on thorax and abdomen lacking, wings and calyptrae slightly tinged, the former darker basad, halteres purplish. Frontal vitta prominent, broadly maintained caudad; narrowest distance between eyes greater than that between posterior ocelli, parafacials in profile notably receding ventrad, cheeks as high as width of parafacials at base of antennae, arista nearly bare. Acrosticals weak and sparse, lower bristle of caudal pair of sternopleurals slender; notched section about equal to half length of process; inner margin fringed along entire length, basal half composed of a mat of minute coarse setulae and apical half of finer longer setulae; inner margins of processes subparallel basad. Fore tibia with a median anterodorsal and posterior bristle, mid femur with 3 well-developed bristles on median half of anteroventral surface; mid tibia with 2 anteroventral, 1 anterodorsal, 1 posterodorsal and 1 or 2 posteroventral bristles, hind tibia with 2 or 3 anteroventral, 2 or 3 anterodorsal, 3 or 4 posterodorsal, and 2 or 3 weaker bristles on median third of posteroventral surface, apical posterodorsal bristle long. Costal thorns robust, as long as *r-m* crossvein, *m-cu* crossvein erect. Length, 3.5 mm.

Holotype: ♂, Nicola Lake, British Columbia, IV.16.22 (E. R. Buckell). [C.N.C.]

The male of *impula* is notably small, and may be separated from males of similar appearance by the form and bristling of the processes. In *impula* the inner margins are subparallel basad (not convergent), and are fringed with setulae for nearly their entire length, the notched region comprises half their length.

Hylemyia (Phorbia) masculans, n. sp.

Male: Black with slight brownish cast, subshining, mesonotum and abdominal terga brownish gray pruinescent; mesonotum weakly striped, abdomen with a fuscous dorsocentral band, broader basad. Eyes narrowly separated caudad (parafrontals contiguous in type), mesonotum with a pair of stronger presutural acrostical bristles, posthumeral bristle strongly duplicated. Lower bristle of caudal pair of sternopleurals slender; lateral discal bristles well developed on abdominal terga 3, 4, and 5; cerci densely clothed with longish flaccid setae; processes slender, coarsely bristled on outer border, fringed with fine setulae along inner margin, notched distad, with a small shining callosity on inner margin basad of notched region. Fore tibia with a median posteroventral bristle, apical posteroventral fine; mid femur with a series of weak short bristles on proximal half of anteroventral surface; mid tibia with 1 anterodorsal, 2 posterodorsal, 2 or 3 posteroventral bristles; hind tibia with 3 or 4 anteroventral, 4 anterodorsal, 4 posterodorsal, and a few weaker bristles on proximal half of posteroventral surface, apical posterodorsal bristle as long as apical anterodorsal. Wings with *m-cu* crossvein slightly oblique, costal setulae weak, costal thorns not long, cell R_5 slightly narrowed toward wing margin owing to curved course of vein R_{4+5}. Length, 4.5 mm.

Holotype: ♂, Cloudcroft, New Mexico, VI.18.02. [A.N.S.P.]

The type of *masculans* is slightly teneral, hence it seems inadvisable to state more fully the breadth of frons, coloration of wings and halteres. The male may be distinguished by the dense clothing of long setulae on cerci, as in *penicillaris,* absence of a median anteroventral bristle on mid tibia, and by the small shining callosity on inner margin of process, situated basad of notched region.

Hylemyia (Phorbia) portensis, n. sp.

Male: Black, mesonotum and scutellum infuscated, humeral and notopleural regions in contrast paler, whitish gray; mesonotum with darker streaks along planes of dorsocentral bristles; abdominal terga 1 + 2, 3, 4, with trace of pruinescence laterad, dorsocentral marking wider than long on each segment. Wings infuscated, densely so basad, calyptrae whitish, halteres yellow. Narrowest distance between eyes equal to that between posterior ocelli, frontal vitta uninterrupted, reduced to lineal dimensions caudad; narrowest width of parafacials about half as wide as third antennal segment; height of cheeks about equal to half length of third antennal segment; arista finely haired. Mesonotum with one or two pairs of slender presutural acrostical bristles, posthumeral bristle weakly duplicated;

lower bristle of caudal pair of sternopleurals well developed. Abdomen stoutish, tergum 5 narrowed ventrad by oblique forward slant of caudal margin, terga 3, 4, 5, with discal bristles laterad; processes about one and a half times as long as hind metatarsus, slender, deeply notched, and coarsely bristled on apical region, median third of inner margin fringed with a mat of minute black setulae, inner margins of processes convergent basad (fig 8). Fore tibia with a median anterodorsal and posteroventral bristle; mid femur with 2 to 4 longish bristles on median half of anteroventral surface, mid tibia with 1 anterodorsal, 2 posterodorsal and 2 posteroventral bristles; hind tibia with 3 to 5 anteroventral, 4 or 5 anterodorsal and posterodorsal bristles, and with a series of weaker bristles on proximal half of posteroventral surface, apical posterodorsal bristle weak. Costal thorn robust, as long as *m-cu* crossvein, costal setulae in an extensive semierect series, veins R_{4+5} and M_{1+2} subparallel towards wing margin. Length, 5 mm.

Female: Thorax paler, abdomen shining black and unmarked, frontal vitta black; frons caudad, viewed from above, narrower than one third maximum width of head; dorsal margin of anal palpi, in profile, slightly undulated at apex (fig. 20). Mid tibia with 1 or 2 anteroventral, 1 or 2 anterodorsal, 2 posterodorsal and 2 posteroventral bristles. Otherwise comparable to male.

Holotype: ♂, Waldport, Oregon, VI.7.42 (R. E. Rieder). [U.S.N.M.]

Allotype: ♀, Waldport, Oregon, VI.7.42 (R. E. Rieder). [U.S.N.M.]

Paratypes: 2♂, Newport, Oregon, V.24.31 (J. Wilcox), ♂, Boiler Bay, Oregon, V.11.30 (J. Wilcox), ♀, Waldport, Oregon, VI.7.42 (R. E. Rieder).

The male of *portensis* may be distinguished by the form and bristling of processes, differing from *lobata* in the marked apical notch and in the convergence of inner margins basad. The cerci are not divided laterally as in *lobata,* and the gonostyli are in proportion considerably more expansive than in other species (fig. 15).

Hylemyia (*Phorbia*) *curvicauda* (Zetterstedt)

Aricia curvicauda Zetterstedt, Dipt. Scand., IV, p. 1618 (1845).

Anthomyia curvicauda Schiner, Faun. Austr., I, p. 639 (1862).

Chortophila curvicauda Meade, Ent. Month. Mag., XXV: 449

(1889).—Pandellé, Rev. ent. France, XIX: 265 (1900). —Karl, Stett. Ent. Zeitg., LXXVIII: 301 (1917).

Hylemyia (*Adia*) *curvicauda* Schnabl and Dziedzicki, Abh. K. Leop.-Carol. Deutsch. Akad. Naturforsch., XCV (2): 98 (1911).

Hylemyia curvicauda Ringdahl, Trømso Museums Årshefter, XLIX (1926), p. 41 (1928).—Séguy, Gen. Insect., Fasc. 205, p. 88 (1937).

Phorbia curvicauda Karl, Tierwelt Deutschlands, XIII, Pt. 3, p. 180 (1928).—Tiensuu, Act. Soc. Faun. Flor. Fenn., LVIII (4): 16 (1935).—Kloet and Hincks, List Brit. Ins., p. 425 (1945).

Hylemyia (*Phorbia*) *curvicauda* Ringdahl, Ent. Tidskr., LIV (1): 34 (1933).—Ringdahl, Opus. Entom., IV (3–4): 147 (1939).

Alberta: ♀, Edmonton, V.2.37 (F. O. Morrison).

Quebec: 2 ♀, Aylmer, V.19–21.27 (Curran & Walley). [C.N.C.]

I have regarded the above female specimens as representative of *curvicauda,* having compared them with specimens collected at Åre, Sweden. Males from the latter locality have been utilized for comparative purposes. The male of *curvicauda* may be distinguished by the bifid form of the cerci, the border of which has numerous longish setulae (fig. 1). In comparison the setulae of *barbicula* and *penicillaris* are grouped on the discal surface of the cerci. The female of *curvicauda* has the anal palpi of ovipositor angularly extended at apex, and wings more uniformly brownish tinged, not notably darker basad.

Hylemyia (*Phorbia*) *genitalis* (Schnabl and Dziedzicki)

Hylemyia (*Adia*) *genitalis* Schnabl and Dziedzicki, Abh. K. Leop.-Carol. Deutsch. Akad. Naturforsch., XCV (2): 248 (1911).

Chortophila genitalis Karl, Stett. Ent. Zeitg., LXXVIII: 299 (1917).

Phorbia genitalis Karl, Tierwelt Deutschlands, XIII, Pt. 3, p. 181 (1928).—Tiensuu, Act. Soc. Faun. Flor. Fenn., LVIII (4): 17 (1935).—Kloet and Hincks, List Brit. Ins., p. 425 (1945).

Hylemyia (*Phorbia*) *genitalis* Ringdahl, Ent. Tidskr., LIV (1): 34 (1933).

Hylemyia genitalis Séguy, Encyl. Ent. Dipt., VII: 235 (1934). —Séguy, Gen. Insect., Fasc. 205, p. 94 (1937).

Colorado: ♂, Florissant, VI.1.38 (M. T. James). ♀, Spring Creek Pass, VI.29.37 (C. L. Johnson). [Univ. Kans.]

Saskatchewan: 2 ♂, Saskatoon, V.14.24, ♀, same locality, V.4.23 (K. M. King). [C.N.C.]

The male of *genitalis* may be distinguished by the spatulate crook-like form of the distal half of gonostylus when viewed in profile (fig. 11). In both sexes the wings are largely clear or faintly grayish tinged with basal region clear or by contrast infuscated. The anal palpi of ovipositor are angularly extended at apex. The species *genitalis* has been reported by Mesnil and Pétré[10] as a common pest

Hylemyia (*Phorbia*) *lobata* (Huckett)

Hylemyia lobata Huckett, Can. Ent., LXI: 137 (1929).—Séguy, Gen. Insect., Fasc. 205, p. 101 (1937).

Alaska: ♂, Headly, VI.26.21 (J. M. Aldrich). [U.S.N.M.]

Alberta: 3 ♂, 2 ♀, Banff, V.25–27.22 (C. B. D. Garrett). [C.N.C.] ♂, Edmonton, VI.6.35, ♀, Wabamun, VI.30.40 (E. H. Strickland).

Arizona: 2 ♂, Santa Rita Mts., VII.19–22.38 (Hepner & Sailer).

British Columbia: 4 ♂, 1 ♀, Fort St. John, VI.15.27 (P. N. Vroom). ♂, Vancouver Isl., Cowichan Bay, VII.12.24 (A. L. Melander).

Colorado: ♂, Tennessee Pass, VII.23.17 (J. M. Aldrich). [U.S.N.M.] 2 ♀, Grant, Geneva Park, 10,000 ft., VII.2.16 (E. C. Jackson).

Oregon: 2 ♂, Parkdale, VII.1.38 (Gray & Schuh). 3 ♂, 3 mi. E. of Ochoco Ranger Sta., V.3.39 (Schuh & Gray). ♂, Corvallis, V.8.29 (V. T. Shattuck). ♀, Salem, IV.27.28 (J. Wilcox).

Utah: 2 ♀, Cache Junction, IV.27.38 (G. F. Knowlton).

Washington: ♀, Seattle, V.25.—(J. S. Hine). ♂, Tacoma, V.27.17 (A. L. Melander). ♀, Mt. Rainier, Yakima Park, VII.22.24 (A. L. Melander).

Wyoming: 2 ♂, 1 ♀, Yellowstone Park, Apollinaris, VII.8.23 (A. L. Melander).

The male of *lobata* may be distinguished by the laterally divided form of cerci (Huckett, 1929, fig. 10). The processes are finely fringed for nearly entire length of inner margin, are imperceptibly notched distad, and the inner margins are largely subparallel basad, not convergent. The presutural acrostical setae in both sexes are of cereal grains in France, where it had become known generally by the name *sepia*.

[10] Mesnil, L. et Pétré, F. *Loc. cit.*, p. 217.

weak, and the anal palpi of ovipositor are not angularly extended at apex.

Hylemyia (*Phorbia*) *penicillaris* (Stein)

Chortophila penicillaris Stein, Arch. f. Naturgesch., (1915) LXXXI A, heft 10, p. 193 (1916).—Karl, Stett. Ent. Zeitg., LXXVIII: 296 (1917).

Hylemyia (*Chortophila*) *penicillaris* Séguy, Faune de France, VI, p. 132 (1923).

Phorbia penicillaris Karl, Tierwelt Deutschlands, XIII, Pt. 3, p. 179 (1928).—Tiensuu, Act. Soc. Faun. Flor. Fenn., LVIII (4): 15 (1935).

Hylemyia (*Phorbia*) *penicillaris* Ringdahl, Ent. Tidskr., LIV: 101 (1933).

Hylemyia penicillaris Séguy, Gen. Insect., Fasc. 205, p. 106 (1937).

Alberta: ♂, ♀, Clymont, V.20–24.37 (E. H. Strickland).

Saskatchewan: ♂, Dundurn, V.16.23 (K. M. King). ♂, ♀, Swift Current, V.15.36 (A. R. Brooks). [C.N.C.]

The males of *penicillaris* and *masculans* have dense flaccid setae arising from discal surface of cerci. In the male of *penicillaris* the mid tibia has a median anteroventral bristle, and abdomen lacks lateral discal bristles on terga 4 and 5, thereby differing from the male of *masculans*. In both sexes of *penicillaris* the wings are largely clear, as in *genitalis*.

Hylemyia (*Phorbia*) *sinuata* (Malloch)

Hylemyia sinuata Malloch, Psyche, XXXI (5): 196 (1924). —Séguy, Gen. Insect., Fasc. 205, p. 114 (1937).

Michigan: ♂, Midland County, V.18.40 (R. R. Dreisbach).

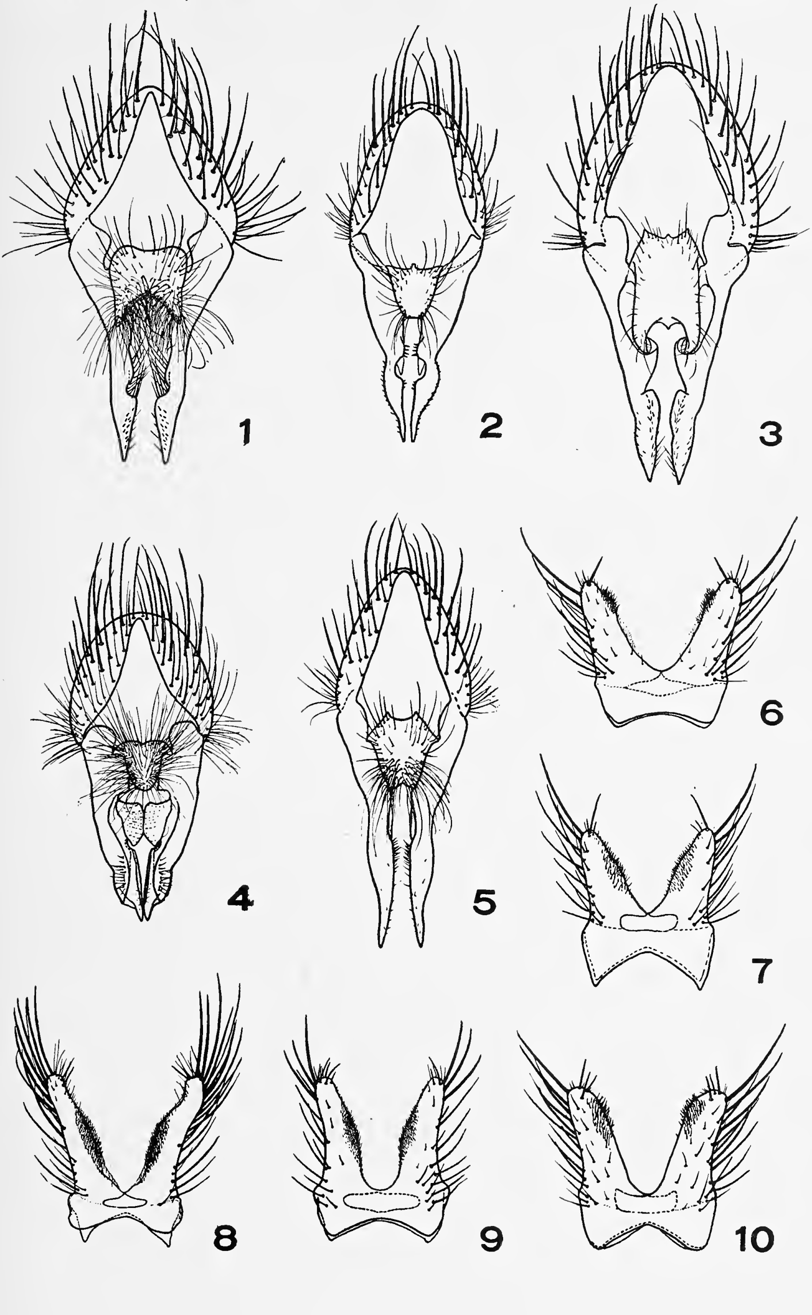
New Hampshire: ♂, Hampton, IV.11.10 (S. A. Shaw).

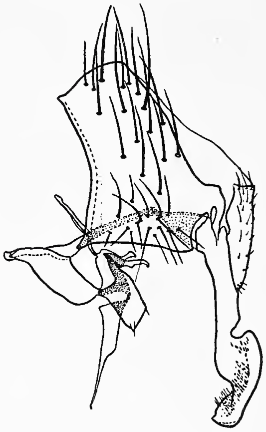
New York: ♂, Karner, IV.27.06. ♀, Hempstead, Long Island, IV.10.21 (H. C. Huckett).

The species *sinuata* may be distinguished by the dense whitish pruinescence of the thorax, strongly receding parafacial margin, and by the robust development of apical posterodorsal bristle on hind tibia. In the male, tergum 5 is sharply narrowed ventrad by the oblique direction of caudal margin cephalad.

Postscript: Since submitting this paper for publication I have had the privilege of reexamining the types of *Pegomyia nitidula* Coquillett, deposited in the collections of the Academy of Natural Sciences of Philadelphia, and have concluded that this species also belongs to Phorbia. The specimens were taken at Beulah, New Mexico, on August 17.

BULL. B. E. S., VOL. XLII PLATE I





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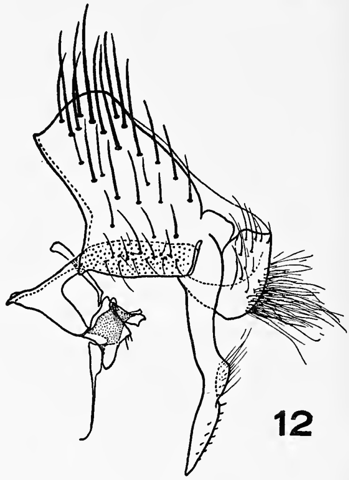

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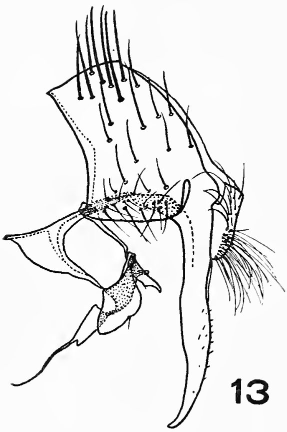

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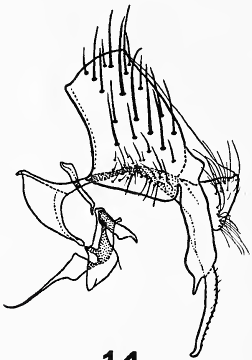

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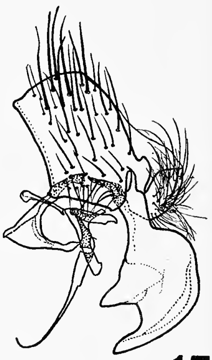

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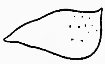

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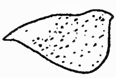

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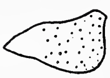

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Explanation of Plates.

Plate I

Male copulatory appendages, showing dorsal or caudal aspect of tergum 9, and ventral aspect of sternum 5.

Figures 1, 7. *Phorbia curvicauda* (Zetterstedt).
Figures 2, 6. *Phorbia conicans,* new species.
Figures 3, 9. *Phorbia genitalis* (Schnabl).
Figures 4, 8. *Phorbia portensis,* new species.
Figures 5, 10. *Phorbia barbicula,* new species.

Plate II

Male and female copulatory appendages, showing lateral aspect of tergum 9 in male and of anal palpus in female.

Figures 11, 17. *Phorbia genitalis* (Schnabl).
Figures 12, 16. *Phorbia curvicauda* (Zetterstedt).
Figures 13, 19. *Phorbia barbicula,* new species.
Figures 14, 18. *Phorbia conicans,* new species.
Figures 15, 20. *Phorbia portensis,* new species.
Figure 21. *Phorbia penicillaris* (Stein).
Figure 22. *Phorbia lobata* (Huckett).

Silpha Feeding on Dead Bees.—During years of heavy adult honeybee death loss in Utah, such as 1939 and 1943, large numbers of dead bees often have occurred in front of hives.

Silpha ramosa Say and *S. lapponica* Hbst., and larvae typical of this genus, have on various occasions been observed to be eating out the body contents of the dead honeybees. It has not been unusual to see bodies of dead bees "moving," either with the *Silpha* in sight, or discovered when several dead bees are moved at the point of disturbance. Adult *S. ramosa* were collected from such situations during 1945 on various occasions at Roy, Slaterville, North Farmington, Lehi and Pleasant Grove, in Utah. At Spring City, with sometimes approximately a quart of dead bees in front of individual hives of bees poisoned by calcium arsenate dusting, *Silpha* adults and larvae were particularly abundant and feeding on body contents of the dead bees, on June 25, 1945. Ants frequently were found eating out the body tissues of the dead bees. A number of Dermestidae, Staphylinidae and fewer adult Nitidulidae also have been present among the dead bees.—G. F. Knowlton, Logan, Utah.

ON THE USE OF DIETHYLENE GLYCOL IN THE PREPARATION OF BALSAM MOUNTS OF THE MALE GENITALIA OF CERTAIN COLEOPTERA.

By K. F. Chamberlain, New York State Museum, Albany, N. Y.

During the past two years, in the course of a revisional study of the North American species of the genus *Helophorus* (Coleoptera, Hydrophilidae), the present writer has had occasion to make a great many mounts and dissections of the male genitalia of the various species of this genus. Early in the study, it became evident that transparent balsam mounts of these structures would be very desirable, but certain complications in dehydrating and clearing the dissections were encountered which, we believe, were primarily due to the fact that we had previously used a 5% solution of ammonia for relaxing and cleaning the specimens.

The male genitalia of *Helophorus* are quite fragile and very thinly chitinized, and it is believed that the ammonia removed some of the natural fats and oils so that serious shrinkage and distortion occurred when the usual methods of dehydration were employed. It was the effort to overcome this difficulty that led ultimately to the use of diethylene glycol as a dehydrating agent, and the choice of this chemical proved to be a happy one. Not only is diethylene glycol an efficient dehydrating agent, but it also clears the tissues so that the dissections may be transferred directly into balsam without further manipulation.

Some explanation of the use of ammonia is perhaps in order at this point. It is a well-known fact that the various species of *Helophorus* secrete a peculiarly stubborn surface exudation in which particles of dirt, mud, and other foreign substances become embedded, with the result that the more minute surface characters are usually almost completely obscured. Dr. David Sharp considers this condition at some length in his "Studies in *Helophorini*" (Ent. Mo. Mag., LI, 1915, pp. 116–117) and states: "Specimens are best cleaned by soaking in very hot water, then washing them with soap and afterwards with benzine." We have never tried Dr. Sharp's method, but for some years have used an aqueous solution of ammonia of a strength of about 5% for this purpose. Ordinary commercial household ammonia averages about 5%.

The use of ammonia for the cleaning of certain Coleoptera was first brought to my attention by my good friend C. A. Frost of

Framingham, Mass., who, in turn, believes that the method originated with Roland Hayward. At any rate, whatever its origin, the present writer has found that ammonia of this strength yields excellent results, and is particularly valuable in cases where a stubborn surface coating is involved. It has been my custom, therefore, to soak specimens of *Helophorus* in a 5% solution of ammonia for a period of fifteen to twenty minutes, after which the surface coating may be rather easily removed, either by means of a camel's hair brush, or with the point of an insect pin. The ammonia softens and swells the coating so that it frequently comes away in large flakes leaving the true surface of the specimens bright and clean. No injurious effects, either to colors or otherwise, have been observed as a result of the use of ammonia in the manner just described. At the same time, prolonged soaking in ammonia will frequently cause pale colors to become permanently darkened. On one occasion, several specimens that were normally of an ochraceous color, were forgotten and remained in ammonia over night. The next morning they had become very dark piceous and subsequent efforts to restore the original color were useless. Another possible objection to the use of ammonia has already been cited, namely, the tendency of the male genitalia to shrinkage and distortion when dehydrated in alcohol series, or by some of the other methods commonly used.

In the case of dried specimens, soaking in ammonia for twenty minutes usually results in a nearly complete relaxation of the specimen, accompanied by a certain amount of softening and swelling of the connective tissues. This is a decided advantage in the genus *Helophorus* since the primary separation of two main divisions of the genus depends upon an accurate count of the number of antennal segments. The counting of these segments often proves to be rather troublesome, since the antennae are usually closely appressed to the under side of the head, and the individual joints are often difficult to see. When ammonia-treated specimens are examined in a drop of the solution under a binocular microscope, the counting of antennal segments becomes relatively simple. It will be found that the antennae may be readily drawn away from the head, and the swelling effect of the ammonia causes the chitinized portion of each segment to become definitely separated from those adjacent to it. Likewise, it is a relatively simple matter to remove the male genitalia of ammonia-relaxed specimens. Because of these obvious advantages, we have been reluctant to discard the use of ammonia in favor of some other cleaning and relaxing agent and; for the same reason, we have sought to overcome the lesser disadvantages involved in its use.

The male genitalia in *Helophorus* are of the usual trilobed type, flattened, so that all of the characters of taxonomic value lie in one plane,[1] and quite small, the average length for all of the North American species known at present being about 0.6 mm. The abdomen in this genus has five visible ventral segments, but closer examination will reveal that there is a sixth segment which is normally concealed beneath the fifth. The male genitalia are located between the tergite and sternite of the sixth segment and, in fresh or in perfectly relaxed specimens, are rather easily extracted with a fine needle or the point of a slender insect pin. Because of the minute size of the structures, the extraction and subsequent handling of the genitalia has been performed under a binocular microscope. The members of this genus show a remarkable lack of secondary sexual characters, and the sexes, except for the average smaller size of the males, can only be recognized with certainty by actual extrusion of the genitalia.

In the preparation of male genitalia for mounting in balsam, the following method seems to work equally well for all specimens regardless of the media in which they may have been collected. We have used this method for specimens that have been collected in alcohol, in ethyl acetate, and for many other specimens, from various sources, for which the collecting medium was wholly unknown. It works equally well for either dried or freshly collected specimens, whether they have been cleaned and relaxed in ammonia or not. In short, we believe that it will prove satisfactory regardless of preliminary technique, so that any one may use it and still adhere to his favorite methods of collection and preparation. Inasmuch as our own method involves the use of ammonia as described above, that is the method that will be described herewith.

The student should provide himself with a dozen pairs of watch glasses, each pair numbered consecutively; also a dozen glass microscope slides numbered to correspond with the paired watch glasses. After the specimens have been cleaned and relaxed in ammonia, a single specimen is removed from the solution, and placed ventral side up under a binocular microscope. A drop of ammonia solution is immediately added so that the specimen is completely immersed. The number of antennal joints is first counted and recorded on a temporary penciled pin-label. Next, the genitalia are extruded, and if the specimen proves to be a female, it is placed in alcohol in one of the watch glasses and covered with another glass which contains

[1] It is obvious that balsam mounts can only be used for genera in which the genitalia lie in the same plane.

the penciled label, locality labels, and other data that may pertain to that particular specimen. Should the specimen prove to be a male, the same procedure is followed with regard to the antennae, next the genitalia are extracted and allowed to remain in ammonia under the microscope, while the specimen itself is placed in alcohol exactly as in the case of the female.

Returning now to the genitalia, the ventral flap and enveloping tissues are teased away with a pair of fine needles, and the dissection is then transferred to a drop of ammonia placed on one of the glass microscope slides. This slide bears the same number as the watch glass in which the male specimen was placed. With the container of diethylene glycol ready at hand, draw off as much of the ammonia as possible with a strip of lintless blotting paper that has been cut to a diagonal point at the tip. As soon as most of the ammonia is drawn off, add a drop of diethylene glycol immediately, and with the point of a needle make certain that the dissection is completely immersed and free of air bubbles. Slide and dissection may now be set aside for dehydration and clearing. It is important to keep the dissection immersed in ammonia right up to the moment that the glycol is applied.

Additional specimens may be carried along in the same way until all of the numbered watch glasses contain specimens. Each male, of course, is kept in its own numbered glass so that it may be reassociated with the genitalia on the slide of corresponding number. Females bearing the same collecting data may be placed together in the same watch glass. Each student can devise his own methods for keeping these important items straight. By the time a dozen specimens have been completed, No. 1 dissection should be ready for mounting in balsam.

We have found that cellulose acetate sheeting[2] is the most satisfactory material for mounting the dissections. For the mount itself, we use acetate sheeting 0.015 inch thick cut into strips 3/16 inch wide. The cover slips are made from 0.010-inch sheeting cut into 1/8-inch squares. The dissection is transferred from glycol directly to the base slip and the excess of glycol drained off by means of a pointed strip of blotting paper. Balsam is added immediately and the cover slip placed in position. Meanwhile, the specimens have been removed from the alcohol and mounted upon paper points in the usual manner. The acetate mounts are trimmed to suitable size and pinned directly beneath the specimen from which each dissection was made. The advantages of this method lie in the fact

[2] Cellulose acetate sheeting should now be obtainable in various thicknesses from the Eastman Kodak Company, Rochester, N. Y.

that the mount takes up no more room than the average locality label and the genitalia are available for examination and study at all times.

The use of diethylene glycol, as a clearing and dehydrating agent in the preparation of insect tissues for mounting in balsam, appears to be new. The advantages attending its use would seem to be obvious. Clearing and dehydrating is accomplished in a single operation and the dissections may be transferred directly to balsam without further treatment. No subsequent deterioration of the mount has been observed when a small quantity of glycol is carried into the balsam with the dissection. Mounts that were made in this manner nearly two years ago are still in first-class condition. As a check, several mounts were made in which the excess of glycol was not drained from the dissection. These mounts, at the end of a year, show a slight iridescence in the balsam which, at the present time, does not greatly impair the transparency of the mount.

Diethylene glycol ($CH_2OH \cdot CH_2 \cdot O \cdot CH_2 \cdot CH_2OH$)[3] is nearly colorless and odorless, with a specific gravity of 1.1318 at 0 degrees centigrade. It is very hygroscopic and will absorb more than its own weight of water at ordinary room temperatures.

Pygmy Grasshopper Notes.—Recently Dr. A. B. Gurney identified a number of pygmy locusts which included the following records:

Tettix acadicus (Sc.). Vernal, Utah, June 17, 1940 (B. A. Haws).

T. subulatus (L.). In Utah at Bear River City, May 5, 1939; Cedar City, June 10, 1938; Soldier Summit, May 16, 1939; Vernal, April 27, 1939; and Woodruff, June 11, 1939, by Knowlton and F. C. Harmston. Other collections included Lewiston (K. and D. E. Hardy), Logan (D. E. Hardy), Logan Canyon (R. E. Nye), Mantua (K. and D. L. Bischoff), and Kanab (K. and W. E. Peay).

Paratettix cucullatus extensus Morse. Riverdale, July 10, 1937, and Monticello, Sept. 5, 1937 (Knowlton); Moab and Roosevelt in June (K. and Harmston); Ogden, July 6, (W. D. Fronk); Logan, August 5, 1903, all in Utah.—G. F. KNOWLTON, Utah State Agricultural College, Logan.

[3] I am indebted to the Carbide and Carbon Chemicals Corporation for information regarding the chemical and physical properties of diethylene glycol.

NEW OR INSUFFICIENTLY-KNOWN CRANE-FLIES FROM THE NEARCTIC REGION (DIPTERA, TIPULIDAE). PART VIII.[1]

By Charles P. Alexander, Amherst, Mass.

The preceding part under this title was published in 1941 (Bull. Brooklyn Ent. Soc., 36: 12–17). Most of the species described herewith were taken in California by the writer, one further species of unusual interest being from Oregon where it was taken by my good friend Mr. Kenneth M. Fender. The types of all the novelties are preserved in my personal collection of these flies.

Dicranoptycha laevis n. sp.

Size small (wing, male, 8 mm. or less); general coloration of thorax light gray, the praescutum with four very poorly indicated darker gray stripes; wings with a weak grayish tinge; costal fringe short; abdomen pale brownish gray, with a black subterminal ring; male hypopygium with the outer dististyle relatively slender, entirely smooth; phallosome produced into two flattened reniform plates that lie side by side, produced beyond the other phallosomic elements.

Male.—Length about 7–8 mm.; wing 7–8 mm.

Female.—Length about 9 mm.; wing 9 mm.

Rostrum gray; palpi black. Antennae with the scape darkened, heavily pruinose; pedicel yellow; flagellum chiefly brownish black, the proximal two or three segments paler. Head clear light gray.

Thorax almost entirely light gray, the praescutum with four very poorly indicated darker gray stripes. Pleura a little paler gray, appearing yellow with a relatively light gray bloom. Halteres with the stem pale, knob infuscated. Legs with the coxae and trochanters pale yellow; femora obscure yellow, the tips narrowly and inconspicuously darkened; tibiae and tarsi yellow, the outer tarsal segments brownish black. Wings with a weak grayish tinge, the prearcular field narrowly pale; veins pale brown. Costal fringe short. Venation: *Rs* short, only a little longer than the basal section of R_5 and approximately two-thirds cell *1st* M_2; *m-cu* from about one-half to nearly its own length beyond the fork of *M*.

[1] Contribution from the Entomological Laboratory, University of Massachusetts.

Abdomen pale brownish gray, with a conspicuous black subterminal ring; hypopygium obscure yellow. Male hypopygium with the outer dististyle relatively slender, blackened but smooth, lacking the conspicuous denticles of other regional species. Inner dististyle slightly broadest at the very obtuse tip. Lateral tergal arms pale, expanded into broad obtuse blades. Phallosome massive, with two flattened reniform plates that project beyond the other elements.

Habitat: California (San Diego County).

Holotype: ♂, Palomar Mountain, altitude 4700 feet, July 12, 1946 (*C. P. Alexander*). *Allotopotype:* ♀. *Paratopotypes:* 3 ♂♂.

The present fly is readily told from other regional species by the structure of the male hypopygium, particularly the smooth outer dististyles and the phallosome. It is very different from certain Eastern Nearctic species, as *Dicranoptycha minima* Alexander and *D. pallida* Alexander that likewise have the outer style smooth, at least on its outer face.

Pedicia (Tricyphona) actaeon n. sp.

Allied to *macrophallus;* antennae 17-segmented; mediotergite dark brown with a broad central gray area; pleura variegated with brown; femora yellow, the tips conspicuously brownish black; wings pale yellow, sparsely but conspicuously patterned with dark brown; male hypopygium with the caudal border of tergite with a deep U-shaped notch; interbase narrowly obtuse at apex, with a conspicuous subapical flange; no spines on mesal face of basistyle; aedeagus elongate, with a conspicuous lobe beyond the base.

Male.—Length about 17 mm.; wing 15.5 mm.

Rostrum and palpi black. Antennae 17-segmented; scape black, pedicel yellow, basal flagellar segments obscure yellow, the outer ones passing into brown; flagellar segments cylindrical, the outer ones more elongate. Head dark gray; tubercle on anterior vertex conspicuous.

Pronotum above fulvous, more darkened medially, especially on the scutellum; pretergites whitened. Mesonotal praescutum pale yellow with three fulvous stripes, the cephalic end of the median one narrowly darker; scutellum dark brown in front, the posterior half gray, the lateral callosities paling to yellow; scutellum gray, parascutella brown and yellow; mediotergite dark brown, the broad central area light gray, pleurotergite yellow. Propleura light yellow; mesepisternum infuscated, more heavily so on the sternopleurite; pteropleurite less evidently darkened. Halteres yellow, the knobs weakly darkened. Legs with the fore coxae clear light yellow, the remaining pairs slightly infuscated, especially the cephalic face of the middle pair; trochanters yellow; femora yellow, the tips conspicuously brownish black; tibiae yellow, the tips more narrowly darkened; tarsi yellow, the terminal segments brownish black. Wings with the ground pale yellow, sparsely but conspicuously patterned with dark brown; cells *C* and *Sc* medium brown, the proximal half of *Sc* darker; dark brown spots at origin of *Rs*, along cord, including the tip of Sc_1, R_2 and *m;* a yellow suffusion behind vein *Cu;* veins brown. Venation: R_{2+3+4} subequal to or longer than *r-m;* R_{1+2} about twice R_2; *r-m* just beyond the fork of *Rs,* the basal section of R_5 thus very short; cell *1st* M_2 elongate, subequal to cell M_1; *m* connecting veins M_2 and M_3; *m-cu* from one-third to one-fourth its length beyond the fork of *M*.

Abdomen elongate; first tergite dark brownish gray; succeeding tergites yellow, the broad margins dark brown, more or less pruinose; sternites more uniformly yellow; sixth and succeeding segments, including the hypopygium, dark brown to brownish black. Male hypopygium generally as in *macrophallus* but differing in important details. Ninth tergite narrowed outwardly, the caudal border with a deep U-shaped notch, the narrower lateral lobes truncated. Basistyle with the interbase narrowly obtuse at tip, with a conspicuous subapical flange; no spines on mesal face of style above the origin of the interbase. Conformation of the apical lobe of basistyle and the dististyle distinctive in the two species. Aedeagus elongate, as in *macrophallus,* with a conspicuous ventral lobe or flange beyond the base.

Habitat: California (Humboldt County).

Holotype: ♂, Prairie Creek State Park, in coastal redwood forest, July 31, 1946 (*C. P. Alexander*).

Although it is very different in its general appearance from *Pedicia* (*Tricyphona*) *macrophallus* Alexander, the structure of the male hypopygium indicates that the two flies are allied. Both have the elongate aedeagus and the dististyle of characteristic form. The present fly differs in the coloration of the body and wings and in important details of the hypopygium, particularly the tergite and interbase.

Dicranota (Rhaphidolabis) nuptialis n. sp.

Size small (wing, female, 5.5 mm.); general coloration dark brown, the praescutum unpatterned; legs black; wings with a strong blackish tinge, the stigma only a little darker than the ground; R_{2+3+4} and *r-m* subequal in length.

Female.—Length about 5 mm.; wing 5.5 mm.

Rostrum and palpi brownish black. Antennae black throughout; flagellar segments oval to long-oval. Head brown.

Thoracic notum almost uniformly dark brown, the praescutum unpatterned; lateral praescutal border and the postnotum slightly more pruinose. Pleura dark brown, sparsely pruinose. Halteres with stem pale, knob dark brown. Legs with the coxae brown, paling to yellow at tips; trochanters obscure yellow; remainder of legs black. Wings with a strong blackish tinge, the stigma only a little darker than the ground; veins brown. Venation: *Rs* relatively short, gently arcuated; R_{1+2} shorter than R_2, the latter transverse; R_{2+3+4} and *r-m* subequal in length; *m-cu* nearly its own length beyond the fork of *M*.

Abdomen brownish black, the cerci brown, paling to yellow at tips.

Habitat: California (Yosemite National Park).

Holotype: ♀, Bridalveil Creek, above the Falls, altitude 7075 feet, July 22, 1946 (*C. P. Alexander*).

A very distinct species, readily recognized by the unpatterned praescutum and the strongly darkened wings. The most similar species include *Dicranota* (*Rhaphidolabis*) *stigma* Alexander and *D.* (*R.*) *vanduzeei* Alexander.

Tasiocera (Dasymolophilus) squiresi n. sp.

Size medium (wing, male, 3.3 mm.); general coloration of body black; wings with a strong dusky tinge; macrotrichia of wing cells relatively numerous; male hypopygium with the dististyle terminal in position, the base broad, the inner angle abruptly narrowed into a long curved spine, the corresponding outer angle bearing a small fingerlike lobe that is tipped with small spiculose points; aedeagus terminating in a long slender spine; gonapophyses paired, symmetrical, each a blackened rod, the outer margin with a few appressed teeth.

Male.—Length about 2.5 mm.; wing 3.3 mm.

Rostrum, palpi and antennae uniformly black, the last short. Head black.

Thorax uniformly black. Halteres blackened, the base of stem abruptly pale. Legs with the coxae testaceous yellow; trochanters yellow; remainder of legs brownish yellow, clothed with long dark colored setae; pretarsal armature complex, as in the genus. Wings with a strong dusky tinge, even darker along the costal border; pale streaks along vein *M* and behind the outer half of *1st A;* veins pale brown. Macrotrichia of cells relatively numerous and well-distributed, especially in the centers of the cells, especially numerous in the outer ends of cells *R* and *M*. Venation: R_{2+3} perpendicular at end of *Rs,* R_2 in direct transverse alignment with R_{2+3} or virtually so; a long backward spur at point of forking of R_{2+3}, jutting into cell R_1; R_{4+5} subequal in length to basal section of R_5, in direct longitudinal alignment with *Rs* and R_4; cell M_2 open by the atrophy of *m; m-cu* about one-third to one-fifth its length beyond the fork of *M;* cell *2nd A* relatively broad.

Abdomen, including hypopygium, black. Male hypopygium with the dististyle terminal in position, of distinctive shape; basal portion broad, slightly widened outwardly, the inner angle abruptly narrowed into a long curved spine; outer angle at point of narrowing with a small fingerlike lobe that is tipped with small blackened spiculose points. Aedeagus with the base dilated, the outer half a strongly curved acute spine. Gonapophyses paired, each a small blackened curved rod that narrows to the acute tip, the outer margin with a few appressed teeth.

Habitat: Oregon (Yamhill County).

Holotype: ♂, Peavine Ridge, Station 3, May 16, 1946 (*K. M. Fender*). *Paratopotypes:* Stations 3, 3 A, May 15–16, 1946; May 20–30, 1947 (*K. M. Fender*).

I take great pleasure in naming this interesting fly for Mr. Vernon Squires, of McMinnville, Oregon, owner of Station 3 on Peavine Ridge, to whom Mr. Fender and others are very indebted for much appreciated co-operation in Fender's detailed survey of the Insect Fauna of Peavine Ridge, in the Oregon Coast Range. The fly is entirely different from the three other Nearctic species so far made known, including the western Nearctic *Tasiocera* (*Dasymolophilus*) *subnuda* (Alexander). The latter has all details of the male hypopygium quite distinct, as described in the original description (Pan-Pacific Entomologist, 3: 77; 1926).

THE GENUS FLEXAMIA (HOMOPTERA, CICADELLIDAE) IN MEXICO.

By Dwight M. DeLong and Ruth V. Hershberger,
Ohio State University, Columbus, Ohio.

The Genus *Flexamia* was erected by DeLong[1] in 1926 to include those species of the Deltocephaloid group which have strongly reflexed veins on the apical portion of the costal margin of the first pair of wings. *Deltocephalus reflexus* O. and B. was cited as the genotype. Some 27 species have been described for the United States and are recognized as distinct. No previous records have been published for Mexican species, three of which are treated at this time, all new. From field collecting in many states in Mexico it is apparent that the species of this genus are not as common nor abundant as they are in the United States. They occur upon grasses of various types, more especially prairie grasses, and are common in grazing areas.

The three species seem to be distributed in different areas as regards ecological factors. *F. mexicana,* a large and conspicuous species, has been taken in abundance at Iguala, Gro., on grasses of the semi-desert at an elevation of 2300 feet. *F. zamora,* a medium sized species, was taken from grasses on the high plateau at Zamora, Mich., at an elevation of 5600 feet. *F. minima,* a small species was collected in the low hot country at Valles, S. L. P., from grasses in the tropical area at an elevation of 300 feet.

Flexamia mexicana n. sp.

A large species, in general appearance somewhat resembling *albidus* but much longer and with distinct genitalia. Length 5.5–6 mm.

Vertex flat, strongly produced and bluntly pointed at the apex about two thirds as wide between eyes at base as median length. The vertex is one third longer than the pronotum.

Color: Vertex creamy white with a conspicuous dark marginal spot either side of apex. There is a transverse dark band not extending to the margin on anterior portion, about one fourth the distance from apex to base. There are six dark longitudinal bands extending across pronotum. The central pair arise on the posterior portion of the vertex and extend across the scutellum. The elytra are milky white subhyaline and the veins are margined with dark brown. The broadest marks are on the disc. The apical and costal cells are tinted with pale brown.

Genitalia: Female last ventral segment broadened apically. The lateral margins strongly produced to form long narrow pointed lateral angles between which the posterior margin is broadly, deeply excavated and forms a slightly produced lobe either side of middle. Male plates long and broad, rather broadly rounded on apices. Styles rather short, gradually narrowed to two-thirds their length where they are abruptly narrowed to form finger-like apices which are pointed on outer margin of apex. The aedeagus is composed of a narrow basal process which curves ventrally beneath a broad dorsal process. The dorsal portion curves ventrally near base then extends caudally, is broadened, flattened and is impressed medially on the ventral side. The pygofers are produced laterally to form a process each side which bears a long curved, broadened, spear-like spine which is margined with coarse hairs.

Holotype male, allotype female and male and female paratypes collected at Iguala, Guerrero, Mexico, November 11, 1939 and October 25, 1941 by C. C. Plummer, E. E. Good and D. M. DeLong. Male paratype was collected at Atencinga, Puebla, 1930 (M. F. 1703) by Dr. Dampf.

Flexamia zamora n. sp.

Resembling *reflexa* in general appearance but with distinct genitalia. Length 3.5–4 mm.

Vertex produced and bluntly pointed three fourths as wide between eyes at base as median length.

Color: Vertex cream with a dark circular spot around apex and a pale brown transverse dash on either side at about the middle. Pronotum cream with scattered longitudinal brownish markings. Elytra cream subhyaline, a dark brown spot on disc, the costal veinlets heavily margined with dark brown. The veins on the posterior portion narrowly brown margined. Face black above, pale brown on lower portion.

Genitalia: Female last ventral segment with posterior margin broadly shallowly emarginate with a set of four produced black teeth at middle. Each side of a median notch there is a narrow produced rounded lobe separated from a pointed produced tooth by a narrow V-shaped notch. Male plates with outer margins straight to about two thirds their length where they are rapidly narrowed by a sloping margin to blunt apices which are separated by a notch formed by the inner apical concave margins. Styles decidedly narrowed on apical half, the apices are long, narrow, finger-like and directed outwardly. The aedeagus is rather short, slender, tapered to a pointed attenuated apex and directed caudally and dorsally. There is a basal portion which extends dorsally and is enlarged and bears a horizonal portion on its dorsal margin.

Holotype male, allotype female and male and female paratypes collected at Zamora, Michoacan, Mexico, October 2, 1941 by Plummer, Good, Caldwell and DeLong.

Flexamia minima n. sp.

Resembling *zamora* in general appearance but smaller and with different male styles. Length, male 3 mm.

Vertex produced and bluntly angled about one fourth longer at middle than basal width between the eyes.

Color: Vertex cream with a dark brown circular mark enclosing apex. Pronotum with a short longitudinal dark brown band behind each eye near lateral margin. Scutellum unmarked. Elytra creamy white with two small brown marks near base, just back of claval suture. A dark brown spot on disc and costal veinlets conspicuously brown margined. A dark brown spot on first apical cell. Upper portion of face dark brown with pale arcs. Lower portion of face yellowish.

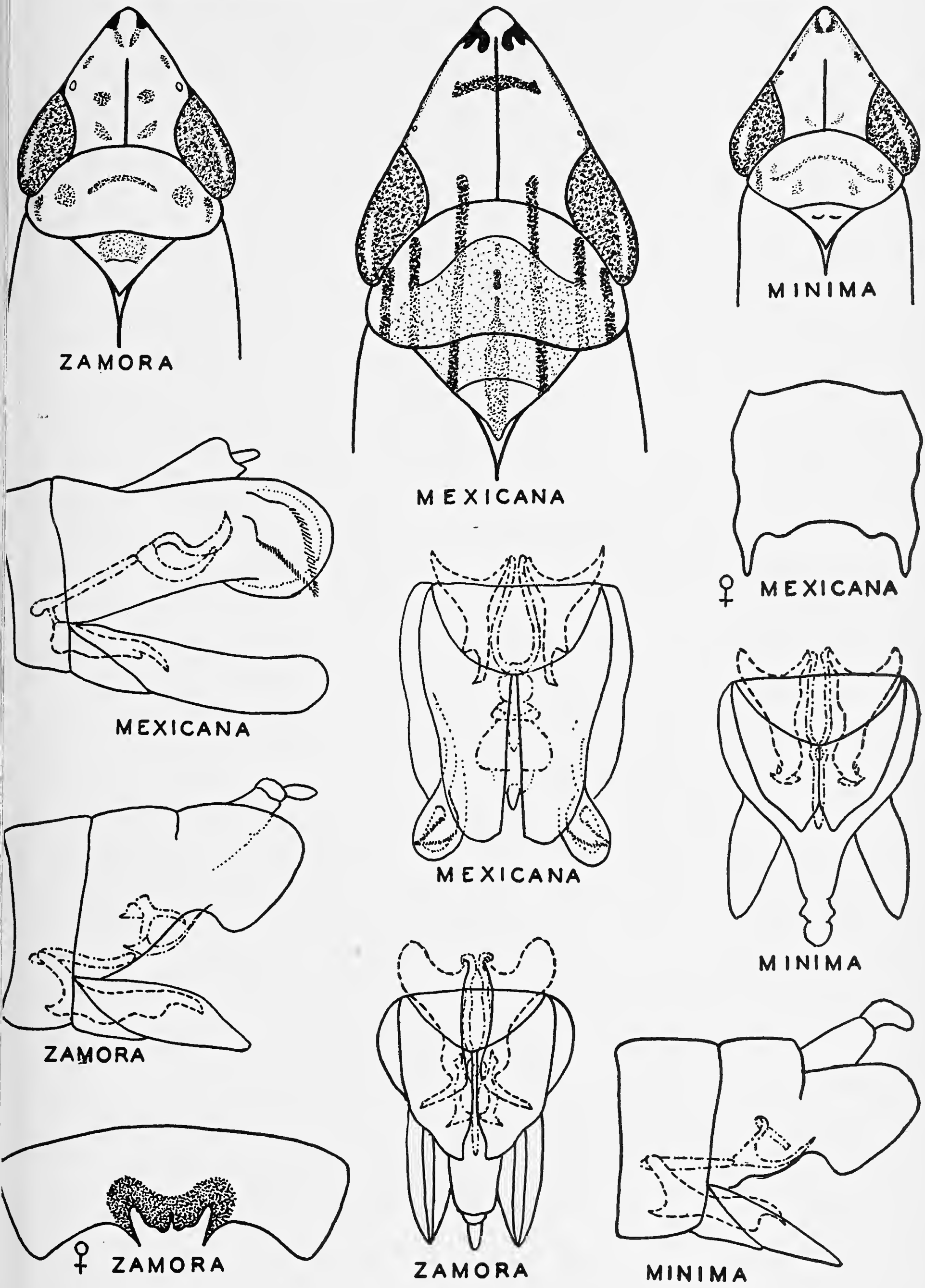
Genitalia: Male plates rather short, strongly sloping from base and curved convexly then slightly concavely to form blunt pointed apices which are separated by a V-shaped notch formed by the oblique slope of the inner apical portion. The styles are elongate narrowed on apical half, curved outwardly at apex and bluntly pointed. The aedeagus in lateral view is short, broadened at base with a dorsally produced process and narrowed on ventral portion to form a rather long, curved slender process which curves dorsally on apical half. The pygofer is produced into a divergent wing-like structure on each side at apex.

Holotype male collected at Valles, S. L. P., Mexico, December 1, 1938 by J. S. Caldwell.

Explanation of Plate III

Dorsal view of heads; ventral view of last ventral female segment (marked ♀); and ventral and lateral views of male genitalia of species as labeled.

Bull. B. E. S., Vol. XLII — Plate III



NOTES ON THREE BUPRESTIDAE.

By Jacques R. Helfer, Mendocino, California.

Melanophila obtusa Horn, 1882, Trans. Am. Ent. Soc., 10, p. 106.

This little-known species was based upon a single specimen from Georgia, now conserved in the Philadelphia Academy of Sciences. Recently I acquired a specimen of this species. It agrees with the description of *M. obtusa* very well in all respects excepting that my specimen is slightly larger, 5.75 mm. as compared to the 5.5 mm. of the type. The data on this specimen is: "Bear Mtn., N. Y., VII, 5, 1925, F. M. Schott." This extends the known range of this species more than 750 miles Northeast from the type locality.

In Sloop's paper on Melanophila, 1937, Univ. Calif. Pub. Ent. 7, p. 12, a copy of Horn's original description is given wherein is contained a confusing misquotation as follows: "Length 0.22 inch, width 5.5 mm." Of course the word "width" is Sloop's and Horn was giving the length only, in two different systems of linear measure, not mentioning the width at all. The width of my specimen is 2.1 mm.

Buprestis catoxantha Gory

Examination by the writer of the type of *Buprestis elongata* Casey,[1] preserved in the U. S. Natl. Museum, has revealed that *B. elongata* Casey is in every way a typical specimen of *B. catoxantha* Gory, a well-known Mexican species. Thus the synonymy as given by Nicolay and Weiss[2] and Helfer,[3] placing *B. elongata* as a synonym of *B. rufipes* Oliver, is incorrect. The type specimen of *B. elongata* is labeled "N. Y." Casey doubted the authenticity of this locality and wrote: "more probably from Colorado." Now it appears that he was guessing too far North even at that as there are, to my knowledge, no records of *B. catoxantha* from anywhere in the U. S.

Chrysobothris subopaca Schaeffer, 1904, N. Y. Ent. Soc. Jour., 12: 208.

The type of this species has been lost for many years. It is in my possession having turned up in the F. M. Schott collection of Buprestidae which I acquired. There are four labels: "Type ♂,"

[1] 1909, Proc. Wash. Acad. Sc., 11: 105–106.

[2] 1918, Journ. N. Y. Ent. Soc., 26: 99.

[3] 1941, Ent. Am., 21, 3: 173.

"Tulare Co., Cal.," "*Chrysobothris subopaca* type Schffr.," and "*subopaca* Schffr." This spelling of the specific name verifies the observation of Mr. W. S. Fisher in his revision of N. A. Chrysobothris[4] that Schaeffer's original spelling, "subapaca," was probably a typographical error.

A Breeding Focus of *Dermacentor variabilis* (Say), the American Dog Tick, in New Hampshire.—When I wrote my account of the ticks of the northeastern United States (1946, Entomologica Americana, XXV), I was unable to find a published record of the occurrence of *D. variabilis* in New Hampshire. I also failed to obtain specimens collected there, although I had heard it stated that "spotted ticks" had occasionally been taken from dogs by summer residents. Whether or not these might have been casual introductions from farther south, on the dogs themselves, it was, of course, impossible to trace. I have now, however, obtained conclusive evidence that there is a breeding focus of *D. variabilis* in at least one section of the state. While spending most of the summer of 1947 at Center Ossipee, my former colleague Dr. David Weinman kept a sharp lookout for ticks. During July he obtained several females and males of *Dermacentor variabilis* from dogs and from people. There cannot be the slightest doubt that they were picked up in the surrounding woods and had been produced by local larvae and nymphs. Several specimens were removed from Dr. Weinman's dog, which had been taken directly from Boston to Ossipee and could not have picked up any ticks in the woods before reaching New Hampshire. From this evidence *D. variabilis* appears to be slowly extending its breeding territory northward. It would be well worth investigating what particular ecological conditions favor its breeding in the Ossipee area. It might also be advisable to stamp out this breeding focus in its early stages, so that the tick will not spread to other favorable sites in the state. tain spotted fever in certain sections of Cape Cod and Long Island show that the problem of the spread and survival of this tick is not purely academic.—J. Bequaert, Museum of Comparative Zoölogy, The well-known relations between *D. variabilis* and Rocky Moun- Cambridge, Mass.

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[4] 1942, U. S. Dept. Agr. Misc. Pub. 470: 141.

Snowy Tree Cricket Eats Pea Aphids.—During July of 1939 an adult female *Oecanthus niveus* (De Geer) was observed to be feeding on a pea aphid, *Macrosiphum pisi* (Kalt.) in an aphid infested pea field near Logan, Utah. This snowy tree cricket was collected and brought into the Agricultural Experiment Station laboratory, where it was caged with fourth-instar pea aphids. Almost immediately the *niveus* fed on an aphid, manipulating it with its palpi, its legs not being used. The aphid abdomen was eaten first, then the legs, head and antennae. Following a three-minute rest, this cricket moved around the small cage, biting into the abdomens of three other aphids, from which the body fluids were observed to flow. Six of the twelve aphids attacked the first day were completely consumed.

Following one day of caged existence without food, 10 fourth-instar *pisi* were introduced with this tree cricket. The first aphid was consumed within ten seconds; three pea aphids were entirely eaten within 125 seconds. Eight aphids had been consumed within an elapsed time of 15 minutes while the abdomens of the remaining two aphids had been bitten and the body fluids were escaping freely. At this time a small bug, *Orius tristicolor* White, was introduced; it was devoured immediately.

A few other snowy tree crickets were collected from the same pea field and caged. These also proved to be voracious feeders. Often a fourth-instar or a mature *pisi* was completely devoured within a few seconds. As a rule the abdomen first was bitten or chewed, the juices consumed, then the remainder of the body eaten. Occasionally legs or antennae were discarded, or the bitten body soon passed up, in case aphids were numerous in the cage. During another 15-minute period a male *niveus* entirely consumed 6 adult pea aphids while a number of others were so severely bitten that they soon died. In two of the latter cases, juices were largely "sucked" from the torn openings in the aphid bodies, before the plant lice were discarded. One *O. niveus* killed 148 fourth-instar pea aphids and consumed most of them while it was caged for 24 days; this constituted an average of 6 pea aphids per day. Usually only 10 aphids per day were provided. It was observed that when a larger number of pea aphids were caged with this predator, more *pisi* were killed and eaten. Another *niveus* ate 121 fourth-instar *pisi* in 15 days, an average of 8 pea aphids per day.—George F. Knowlton, Utah Agricultural Experiment Station, Logan, Utah.

PROCEEDINGS OF THE SOCIETY.

Meeting of May 15, 1947.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on May 15, 1947.

The meeting was called to order at 8:00 P.M. by President R. R. McElvare. Members in attendance were Messrs. Naumann, Nicolay, McElvare and Tulloch. One visitor was present.

The minutes of the meeting of April 10, 1947, were read and accepted.

The Treasurer reported that Information return #990 had been filed with the Collector of Internal Revenue.

The President appointed Messrs. Teale, Nicolay and Tulloch to serve as a committee to arrange plan to memorialize the 75th anniversary of the society.

There followed a discussion of plans for summer collecting by the members present.

The meeting adjourned at 9:30 P.M.

Respectfully submitted,

George S. Tulloch, *Secretary.*

Meeting of October 16, 1947.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on October 16, 1947.

The meeting was called to order at 8:00 P.M. by Vice President Otto Buchholz. Members in attendance were Messrs. Naumann, Nicolay, Buchholz, Teale and Tulloch.

The minutes of the metting of May 15, 1947, were read and accepted.

The report of the Treasurer for the second and third quarters of 1947 was read and accepted.

There was a discussion of plans for the celebration of the 75th anniversary of the founding of the Society.

The program of the evening was devoted to a discussion of the summer collecting activities of the members.

The meeting adjourned at 9:30 P.M.

Respectfully submitted,

George S. Tulloch, *Secretary.*

EXCHANGES AND FOR SALE.

This page is limited to exchange notices and to small For Sale advertisements from members of the Society and from actual paid subscribers to the Bulletin exclusively. *Exchange notices* from members of the Society and from subscribers are limited to *three (3) lines each,* including address; beyond 3 lines, there will be a charge of $1.00 for each 3 lines or less additional. *For Sale* ads will be charged at $1.25 for each 3 lines or part of 3 lines. *Commercial or business* advertisements will not be carried in this page, but will go in our regular advertising pages at our regular advertising rates to *everybody.*

PENTATOMIDAE: Want to buy or exchange Pentatomidae from the United States and Mexico. Herbert Ruckes, College of the City of New York, 17 Lexington Ave. N.Y.C.

ACALYPTRATE DIPTERA OF THE WORLD wanted for determination or in exchange for other insects. Geo. Steyskal, 23341 Puritan Ave., Detroit, Mich.

WANTED.—MANTID EGG CASES from West of the Mississippi River. If interested in collecting, write: Osmond P. Breland, The University of Texas, Austin, Texas.

WILL PURCHASE complete sets of the BULLETIN, Old Series, Vols. 1–7, 1878–1885. Brooklyn Entomological Society, Ivy Way, Port Washington, L. I., N. Y.

LEPIDOPTERA AND ORTHOPTERA from Florida in papers and local specimens mounted to exchange for other Lepidoptera. —Alex K. Wyatt, 5842 N. Kirby Avenue, Chicago (30), Ill.

"LEPIDOPTERISTS! Drawer front labels 2 7/8″ × 1 6/16″ on white-faced board at cost! Non-profit! Don't delay, write today! Kent H. Wilson, 430 Ridgewood Rd., Fort Worth 7, Texas."

WANTED—Geometrid moths, for cash or exchange. John L. Sperry, 3260 Redwood Drive, Riverside, Calif.

CERAMBYCIDAE AND CHRYSOMELIDAE from Asia and Pacific desired for determination; purchase; exchange.—J. Linsley Gressitt, Lignan University, Canton, China.

FOR COLEOPTERA OF THE WEST INDIES and Chrysomelidae of the world, will collect entomological material from Cuba, by previous arrangement. Am interested in buying literature in the above-mentioned classes, and would be glad to be advised by individuals or institutions of such articles; or to send them to me. Manuel Barro, Calle 12, no. 220, altos, apto. 3, Vedado, Habana, Cuba.

Vol. XLII DECEMBER, 1947 No. 5

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OF THE

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PUBLICATION COMMITTEE

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BULLETIN

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NEW SPECIES AND RECORDS OF NEARCTIC HYDROPTILIDAE (TRICHOPTERA)

By D. G. Denning, University of Wyoming, Laramie, Wyo.

A recent study of Hydroptilidae disclosed not only several new species but a number of interesting and unsuspected distributional records. The seven new species described herein will increase the number of Hydroptilidae known from the United States and Canada to 127 species. Unless indicated otherwise all types are in the authors collection at the University of Wyoming. I would like to take this opportunity to thank Mr. M. W. Wing, Mr. W. W. Wirth and Mr. R. E. Pfadt for collecting some of the specimens discussed in this paper.

Leucotrichia pictipes (Banks)

This is the first time this species has been recorded from California. In all specimens collected the claspers were directed rather sharply ventrad instead of caudad and slightly ventrad as is usual. Other differences between these and specimens collected elsewhere in its wide range are of minor importance. However, an extreme condition in which the claspers (viewed ventrally) are not fused their entire length is illustrated, fig. 1.

California: Kaweah River, Tulare County, July 2, 1947, 14 males (W. W. Wirth).

Tascobia brustia (Ross)

Not recorded since the holotype was collected at Parco, Wyoming. The specimen was taken from the swift flowing North Platte River at an approximate elevation of 7500 feet. Wyoming: 8 miles north of State Line, North Platte River, September 7, 1947, 1 male (D. G. Denning).

Tascobia delira (Ross)

Previously recorded from Wisconsin, this species apparently has a wide distribution as shown by the following records, Wyoming: Laramie River, Laramie, Wyoming, July 28, 1947, 1 male (D. G. Denning). Colorado: Permanent Pond, Rocky Mt. National Park, August 10, 1947, 1 male, 1 female, (D. G. Denning); Stream South of Walden, August 10, 1947, 1 male (D. G. Denning); Poudre River, 15 miles west of Ted's Place, August 17, 1947, 8 males, 2 females (D. G. Denning); Poudre River, 15 miles east of Cameron Pass, August 17, 1947, 9 males, 6 females (D. G. Denning); Junction Elkhorn Creek and Poudre River, east of Cameron Pass, August 19, 1947, 2 males, 5 females (D. G. Denning).

Mayatrichia ayama Mosely

This species has not been recorded from Canada, which constitutes a considerable extension in its known northerly range.

Saskatchewan: Saskatoon, August 1, 1947, Light trap, 21 males, 40 females (R. Coleman).

Wyoming: near Wheatland, Bluegrass River, at lights, 1 male, 4 females (D. G. Denning). The Wyoming male indicates that minor variations in the apex of the aedeagus and ventro-lateral processes will be encountered.

Ochrotrichia stylata (Ross)

This species is one of the most abundant Hydroptilidae in Wyoming. The species has been collected from June 19 to October 1, and although the weather conditions were favorable none could be taken later than that date. The species was taken only from clear, fast flowing streams. It is here recorded from Colorado, Utah and South Dakota for the first time. Several hundred males and females from southern Wyoming, June 19 to October 1, 1947. South Dakota: Legion Lake, near Custer, August 28, 1947 (D. G. Denning). Colorado: Boulder River, near Boulder, September 28, 1947 (D. G. Denning). Utah: Duchesne, Strawberry River, September 26, 1947, 3 males, 4 females (R. E. Pfadt).

Ochrotrichia potomus, n. sp.

This species is closely related to *tarsalis* (Hagen) but can be distinguished from it by the dorsal aspect of the tenth tergite. Color and general structure typical of genus. Antennae long reaching almost to apex of tenth tergite, consisting of 27 to 28 segments.

Male: Length 2.7 mm. Genitalia as in fig. 2. Mesal incision of ninth tergite wide, deep, extending almost to base;

segment almost quadrate from lateral aspect, except that dorso-caudal corner is produced caudad. Apical part of tenth tergite from dorsal aspect, fig. 2, divided into a group of sclerotized processes. Ventral plate concave, bounded on left by "A"; slender apically widened aedeagus rests on this plate. The right part, "B," terminates at base of "F." Process "C" short and acute, extends caudad to base of "D." The prominent very heavily sclerotized process "D," acute distally, gradually curved mesad (degree varies in individuals, in some almost at right angle); seen from lateral aspect apex curved slightly dorsad above any other portion of tergite. Hidden from dorsal view by base of "D" is a small acute process "G" which extends laterad to edge of structure. Long stout right process "F," has distal portion twisted, apex attenuated and bent sharply laterad and slightly cephalad; seen from lateral aspect apex turned dorsad. Claspers symmetrical, mesal surface concave, apex bluntly pointed, entire structure directed gradually dorso-caudad to a point just dorsad of tenth tergite; inner margin of apex and ventral distal third clothed with dense, short black setae. Left clasper with a single short black-tipped spine on mesal surface just beyond base, seen laterally directed dorsad; dorso-mesal margin with a single short spine base. Mesal margin of right clasper, just beyond base, with one short cephalad directed spine.

Female: General structure, size and color similar to male. Genitalia as in fig. 2A. Eighth sternite heavily setose, mesal lobe wide, rounded, distinct emargination near lateral margin. Shape and position of bursa copulatrix as in figure.

Holotype, male.—Torrington, Wyoming, North Platte River, October 1, 1947 (D. G. Denning).

Allotype, female.—Same data as for holotype.

Paratypes.—Torrington, Wyoming, North Platte River, September 19, 1947, 2 males, 1 female (D. G. Denning): Torrington, Wyoming, North Platte River, September 19, 1947, 1 male (R. E. Pfadt); Torrington, Wyoming, North Platte River, August 27, 1947, 1 male (D. G. Denning).

Ochrotrichia oregona (Ross)

This species has not been recorded since its original description from La Grande, Oregon. Apparently *oregona* is quite a plastic species, in the relatively small series of males examined by the writer (13) considerable variation was exhibited in the contour of the clasper, in the density and arrangement of the cluster of black spines along the ventro-mesal margin of each clasper and in the two basal sclerotized points of the tenth tergite. In this latter respect eight of thirteen males were very similar to that illustrated by Ross (1938) while five varied from a condition in which the larger most caudad spine was directed slightly cephalad to an extreme where it was curved sharply cephalad and slightly laterad and lying just above the main structure, in the same specimen the most basal spine is curved sharply mesad and cephalad.

Female: Length 3.1 mm. Genitalia as in fig. 3. Mesal process of seventh sternite slender, acute. Apical margin of eighth sternite nearly straight, merges almost imperceptibly into ninth. The shield-shaped area of the eighth sternite has a reticulate surface composed of oblong almost linear reticules, apical margin acute, lateral margin arcuate, basal margin withdrawn into seventh segment. Present near the basal portion of the eighth sternite is a prominent heavily setose, acute mesal projection, surface bearing short tubercle-like structures, several long prominent setae along margin. Bursa copulatrix long, reaching cephalad into seventh segment, apical branches incised.

Allotype, female.—Granby, Colorado, Colorado River; September 27, 1947 (R. E. Pfadt).

Colorado: 10 males, 8 females, same data as for allotype.

Wyoming: 8 males north of State Line, North Platte River, September 8, 1947, 3 males, 1 female (D. G. Denning).

Oxyethira cibola Denning

This recently described species was previously known only from Macon, Georgia. The species is evidently present either in rivers or lakes.

Wyoming: Douglas, at light, July 29, 1947, 1 male (D. G. Denning); Cheyenne, along small lake in park, August 2, 1947, 2 males (D. G. Denning); Cheyenne, along small lake in park, August 7, 1947, 22 males (D. G. Denning).

Oxyethira serrata Ross

This species was previously recorded from Illinois, New York, Wisconsin, Minnesota and British Columbia. The species is probably transcontinental in distribution.

Wyoming: Cheyenne, along small lake in park, August 2, 1947, 7 males (D. G. Denning) ; Cheyenne, along small lake in park, August 7, 1947, 93 males, 7 females (D. G. Denning).

Hydroptila argosa Ross

This species has been found widely distributed throughout the eastern half of Wyoming and has been collected from June 19 to September 20.

Hydroptila callia, n. sp.

This species bears some resemblance to *Hydroptila amoena* Ross but differs radically from it in the three filamentous processes of the aedeagus, the long slender ventrad directed clasper, the prominent process at the base of the clasper and several other details of the genitalia.

Male: Length 3.5 mm. Genitalia as in fig. 4. Mesal projection of the seventh sternite, fig. 4C, long, reaching to the ninth sternite, slender, about same width throughout, ventro-apical margin serrate. Ventral margin of ninth segment bordered with dense prominent setae, lateral lobe projected ventro-caudad, bearing several large prominent setae. Invaginated lateral part of ninth segment long, reaching into seventh segment. Tenth tergite from dorsal view, fig. 4B, deeply cleft along meson, has appearance of being divided almost entire length; viewed laterally apex nearly truncate, a small blunt point at dorsal corner. Base of clasper withdrawn into ninth segment, exposed part directed ventro-caudad, slender throughout, extreme apex with an acute tooth, fig. 4A; claspers closely appressed on meson. Arising from near base of clasper is a prominent dorsad directed process bearing a long caudad directed spine; from ventral aspect these processes are arcuate apex directed slightly mesad, apical spine extending caudad beyond claspers. Seen from ventral view there is a pair of small, not easily discernible, caudad directed tubular processes bearing a caudad directed spine. Aedeagus, when viewed laterally has main part arcuate; viewed ventrally, fig. 4, apical portion divided into three filamentous processes, the largest one gradually tapering to an acute apex and gently curved laterad, the next process slender, about the same width throughout and reaching almost to apex of first mentioned branch, the third process is shortest with a slender acute apex.

Holotype, male.—Raleigh, North Carolina; June 9, 1947, at light (Merle W. Wing).

Hydroptila wyomia, n. sp.

This species bears some resemblance to *Hydroptila modica* Mosely, but differs from it and other described species in the beak-like apex of the aedeagus, and several other details of the genitalia.

Male: Length 3.5 mm. Sternite of fifth segment bears a pair of protuberances laterally which give rise to a long and a short seta. Mesal style of seventh sternite long, slender, extends caudad beyond margin of eighth sternite for about one-half its distance, apex slightly enlarged, ventral margin somewhat irregular, a few long setae at base.

Genitalia as in fig. 5. Lateral lobe of ninth segment slender, apex curved caudad, dense cluster of caudad directed setae near base, dorsal portion with a cluster of four long stout setae one of which extends beyond the tenth tergite. Near base of lateral lobe arises a prominent tubular process which bears a long seta at ventral corner of apex, fig. 5A; viewed ventrally processes slightly arcuate, apical setae markedly so. Tenth tergite lightly sclerotized, apex blunt from lateral view, emarginate from dorsal view. Claspers short, fig. 5A, somewhat saber-shaped, curved ventrad; viewed from ventral aspect apices darkly pigmented, contiguous along meson, a few minute setae discernible, viewed ventrally a pair of small tubercles, each bearing a long seta, present just cephalad to base of claspers. Aedeagus, fig. 5, long, nearly straight, tubular, basal portion about same length as apical portion, actual length slightly over 1 mm; near base of apical portion arises a slender acuminate filament, distal portion bulbous then abruptly narrowed to a beak-shaped apex; near constriction inner tubular part extends outward to a point beyond apex; beak-shaped apex either blunt or acute, depending on angle of view.

Female: Size, color, general characteristics same as for male. Tergite of eighth segment emarginate. Eighth sternite with a single row of 5 to 6 stout, wavy setae. Sixth sternite with a minute acute mesal projection.

Holotype, male.—Laramie River, Laramie, Wyoming, July 1, 1947 (D. G. Denning).

Allotype, female.—Same data as for holotype.

Paratypes.—Same data as for holotype, 3 males, 2 females.

Hydroptila pullatus, n. sp.

This species is closely related to *angusta* Ross differing from it in the very slender claspers which are constricted near the center, the acute ventral plate, the rounded mesal lobe of the tenth tergite and details of the aedeagus. The female of this species differs from *angusta* in the short wide mesal lobe of the eighth sternite, the wider, flattened bursa copulatrix as well as other details.

Male: Length 2.3 mm. Seventh sternite with mesal process acuminate, short, about one-half its length extending beyond margin. Genitalia as in fig. 6. Claspers from ventral aspect very slender, narrowed near middle, apices acute, divergent, a dark pigmented spot near base of curve; seen from lateral aspect clasper is directed slightly ventrad, apex curved dorsad. Ventral plate, fig. 6, translucent, membranous, acute apically, bearing three short erect spines just below center. Tenth tergite, fig. 6A, cleft about one-third its length, lateral lobes acute, mesal lobe short and bluntly rounded; lateral margin sinuate, somewhat more heavily sclerotized than remainder. Aedeagus from dorsal view, fig. 6B, slender, long, originating in fifth segment; basal tube gradually narrowed to a creased area which extends almost to spiral process, this portion slender and sinuate; distal portion with bulbous base, gradually narrowed to an acute apex projected laterad almost at right angles; seen from lateral aspect apex acuminate and sharply turned ventrad; spiral process encircles tube one and one-half times, long, apically very slender.

Female: Length 3.1 mm. Mesal style of seventh sternite acute, short, does not reach to margin. Eighth sternite, fig. 6C, with a subtriangular reticulate area about center; apical margin with a wide blunt mesal lobe. Eighth tergite, fig. 6D, with a deep blunt incision (not truncate as in *angusta*), lateral lobes rounded. Bursa copulatrix as in fig. 6E, main body compressed, heavily sclerotized, triangular reticulate area on basal margin extends cephalad to cover entire next portion, this and remainder translucent.

Holotype, male.—Bluegrass River, near Wheatland, Wyoming, August 29, 1947 (D. G. Denning).

Allotype, female.—Same data as for holotype.

Paratype, female.—Same data as for holotype.

Hydroptila pecos Ross

This species has not been recorded since its original description from Carlsbad, New Mexico. The following records constitute a considerable extension to the northward of its known range.

Female: Length 2.8–3 mm. Genitalia as in fig. 7. Eighth sternite meson produced into a rounded lobe. A truncate darkened area cephalad to mesal lobe bears several irregularly placed prominent setae along margin. Eighth tergite with a prominent, rounded, heavily sclerotized mesal lobe. Bursa copulatrix as in fig. 7, long, extending to seventh segment, apical margin deeply incised.

Allotype, female.—Torrington, Wyoming, North Platte River, August 27, 1947 (R. E. Pfadt).

Wyoming: Same data as allotype, 7 males, 3 females; Torrington, North Platte River, August 27, 1947, 16 males, 7 females (D. G. Denning); Bluegrass River, near Wheatland, at lights, August 29, 1947, 1 female (D. G. Denning). Colorado: Boulder River, near Boulder, September 28, 1947, 2 males (D. G. Denning).

Hydroptila xera Ross

This species has not been recorded since its original description in 1938 from two localities in Idaho. Apparently it can be found either in lakes or rivers.

Female: Length 2.3–3.5 mm. Genitalia as in fig. 8. Tergite of eighth segment with a shallow mesal incision. Sternite of eighth segment with truncate mesal lobe extending slightly beyond the ventro-lateral lobes. A single row of prominent, wavy setae near apical margin. Lateral margin sinuous. Bursa copulatrix large, as in fig. 8.

Allotype, female.—Sodergren Lake, near Woods Landing, Wyoming, August 10, 1947 (D. G. Denning).

Wyoming: Same data as allotype, 10 males, 2 females; Laramie River, Laramie, July 1, 1947, 4 males, 1 female (D. G. Denning); Cheyenne, along lake in park, August 2, 1947, 1 male (D. G. Denning); Cheyenne, along lake in park, August 7, 1947, 2 males (D. G. Denning); Bluegrass River, near Wheatland, at lights, August 29, 1947, 1 male, 4 females (D. G. Denning).

Neotrichia ersitis, n. sp.

This interesting species is not only one of the smallest of the known members of the genus, but it also occurs further north than any other recorded *Neotrichia* in North America.

The species belongs to the *okopa* Ross section of the genus. It can easily be separated from other described species of the genus by the serrate ventrad directed claspers and the three sclerotized hooks of the aedeagus.

Male: Length 1.9 mm. Genitalia as in fig. 9. Dorsum of ninth segment with a scattering of dense short setae, apica margin apparently produced caudad to help form the very irregular appearing tenth tergite, division between the two not discernible. Claspers, seen from lateral aspect, fig. 9A, directed ventro-caudad, thick at base and tapering to a rather acute apex, dorsal margin serrate and bearing a few minute setae. Dorsad to the claspers is a prominent beak-shaped structure directed ventro-caudad and bearing a large seta at apex. Cercus, short, base narrow, tapering gradually to an expanded apex, entire structure heavily setose. Tenth tergite membranous, distal margin irregular in outline, extends caudad slightly beyond claspers. Ventral aspect, fig. 9, shows claspers with mesal margin serrate, apex sub-acute, lateral margin sinuate; cercus finger-like in shape, divergent. Aedeagus, seen from dorsal view, fig. 9B, with base very wide, tubular; suddenly narrowed to a bulbous base bearing a slender filament which encircles structure once and follows aedeagus to near head of apex; apical portion consists of two heavily sclerotized hooks side by side and a shorter, slender, arrow-shaped hook to which the main internal duct is connected.

Female: Length 2.3 mm. Apical portion of seventh sternite with a pair of dark colored androconial scale-like structures. Apical margin of eighth segment irregular, bearing six long setae. Main structure of bursa copulatrix as in fig. 9C.

Holotype, male.—Saskatoon, Saskatchewan, August 1, 1947, light trap (R. Coleman).

Allotype, female.—Same data as for holotype.

Paratype, female.—Same data as for holotype.

Neotrichia halia, n. sp.

This species is similar to *kitae* Ross but can easily be differentiated from it and other described species by the shape of the subgenital plate, the acute claspers with an apical spine, the terminal processes of the aedeagus and several other details of the genitalia.

Male: Length 2 mm. Sternite of eighth segment fringed with long setae. Ninth segment with sternite projected caudad a short distance. Genitalia as in fig. 10. From lateral aspect claspers directed caudad with apex only slightly upturned; from ventral view, fig. 10, claspers short, mesal margin suddenly narrowed about midway to form an acute apex bearing a prominent seta. Cercus from lateral view broad, gradually narrowed apically, fig. 10A; from ventral view it is elongate, divergent, reaching beyond subgenital plate, quite heavily setose. Subgenital plate viewed from ventral aspect with distal margin arcuate, bearing a pair of prominent divergent spines; viewed from lateral aspect lateral margin flared dorsad, a large horn-like process arises from near distal margin, directed ventrad. Tenth tergite lightly sclerotized, widely emarginate; viewed laterally apex broadly rounded. Aedeagus, fig. 10B, with broad tubular portion over twice as long as apical portion, just beyond narrowed neck is a prominent spiral process encircling tube one and one-half times, directed laterad apically; apex consists of a pair of heavily sclerotized processes, one acuminate, the other hook-like; extending to base of these processes a large heavily sclerotized internal tube is discernible.

Female: Length 2.2 mm. Apical part of seventh segment lightly sclerotized and with a dense covering of minute spicules. Eighth segment with apical portion darker than remainder which is translucent. Eighth sternite, fig. 10C, with several long setae along margin; central ornamentation not plainly marked, apex acute; on meson near base of sternite are two very dark androconia scale-like structures, their basal part covered by margin of seventh sternite. Bursa copulatrix, fig. 10D, long, extending from margin of seventh to apical margin of eighth segment.

Holotype, male.—Bluegrass River, near Wheatland, Wyoming, August 29, 1947, at lights (D. G. Denning).

Allotype, female.—Same data as for holotype.

Paratypes.—Same data as for holotype, 2 males.

Neotrichia panneus, n. sp.

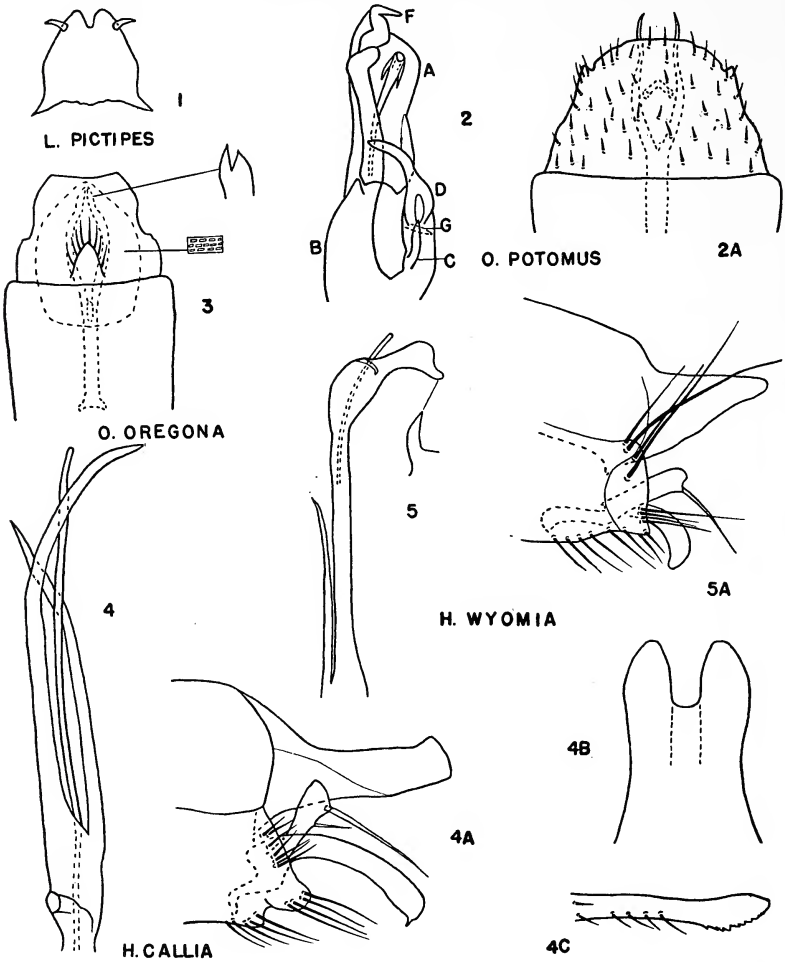
This species is closely related to *osmena* Ross but differs from it in the slightly upturned apex of the clasper, the ventrad directed apex of the heavily sclerotized structure dorsad to the clasper, the large evenly rounded ventral margin of the cercus, the deeply incised apex of the aedeagus as well as several other details of the male genitalia.

Male: Length 2.5 mm. Color of body and appendages light brown. Genitalia as in fig. 11. Dorsum of ninth segment covered with minute rather dense setae, apical margin produced beyond the tenth tergite as an irregular membranous hood, incised mesally; lateral margin difficult to discern clearly; sternite produced caudad as a triangular process. Tenth tergite, fig. 11B, bluntly rounded, margin irregular, a pair of long prominent spines arise from apical margin. Viewed from lateral aspect base of claspers withdrawn into ninth segment, directed caudad with truncate apex slightly upturned, a few minute setae present; seen from ventral aspect fig. 11C, base of clasper broad, at about three-quarters distance to the apex mesal margin tapers suddenly to an acute apex; dorsal hook of clasper extends caudad to this point, the pair contingent on meson. Dorsad, to the claspers arises a pair of heavily sclerotized processes, triangular from lateral view and gradually directed ventrad, slightly convergent from ventral view. Cercus, fig. 11, large, considerably expanded distally, quite heavily setose; laterally it covers all of genital processes except portion of clasper, no indication of mesal surface being concave. Apparently arising from the side of the tenth tergite, discernible from the lateral view, fig. 11, there is a pair of broad spine-like points directed dorso-caudad, and near its base a long slender seta. Aedeagus, fig. 11A, with neck constricted, spiral process encircles tube one and one-half times; from lateral view a distinct constriction present at point where spiral process arises; apex deeply incised, lateral processes convergent, mesal projection triangular, a large internal tube extending from its base to constricted portion; apical portion slightly enlarged distally.

Holotype, male.—Little Laramie River, Albany County, Wyoming, August 11, 1947 (R. E. Pfadt).

Notes on Six Aphis Species.—*Aphis artemisicola* Wms. was very abundant on *Artemisia tridentata* at Huntington, Oregon, June 18, 1939. *Aphis forbesi* Weed was abundant in one patch of strawberries at Mill Creek, Utah, June 28, 1925; also taken on strawberry plants at Farmington, August 4, 1925, and abundant in greenhouse at Logan, Utah, March 26, 1942. *Aphis illinoisensis* Shimer was taken on grape tendrils at Bloomfield, Mo., May 19, 1922 (A. C. Burrill), and Mercersburg, Pa., June 12, 1931 (J. O. Pepper). *Aphis marutae* Oest. on *Cineraria*, Pullman, Washington, November 17, 1941 (L. K. Jones). *Aphis nasturtii* Kalt. was moderately abundant on watercress, *Roripa nasturtium*, at Locomotive Springs, Utah, April 10, 1930. *Aphis tulipae* (Boyer) was damagingly abundant on carrots in storage at Logan, January 1942, and Salt Lake City, April 3, 1942.—George F. Knowlton, Logan, Utah.

BULL. B. E. S., VOL. XLII PLATE IV



EXPLANATION OF PLATES IV, V AND *VI*.

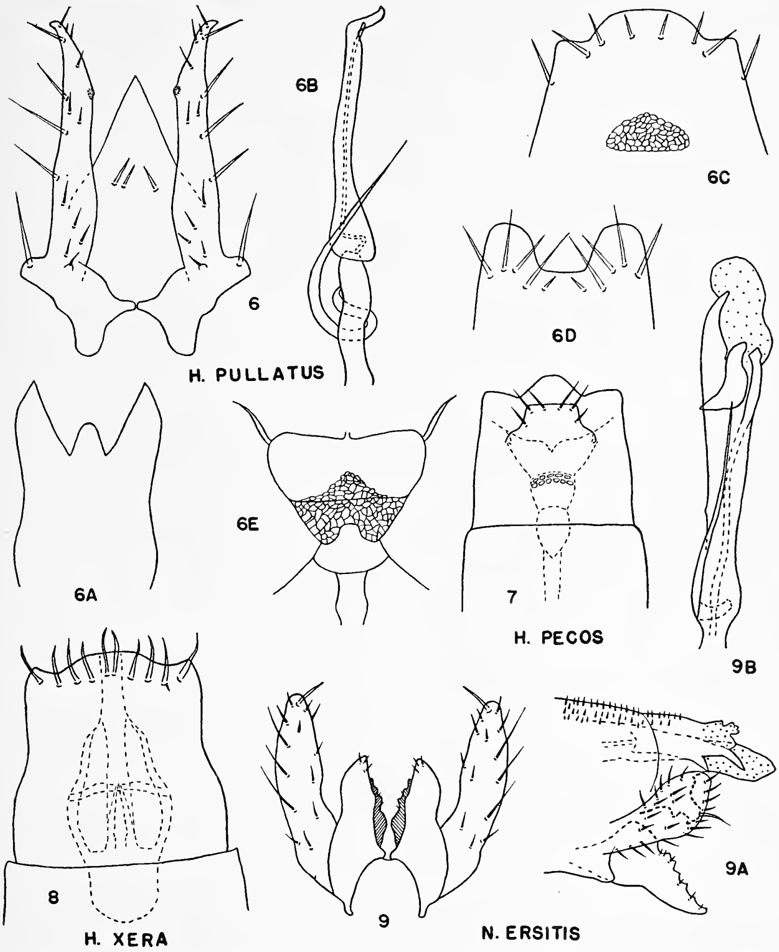
FIG. 1. *Leucotrichia pictipes,* claspers, ventral aspect.

FIG. 2. *Ochrotrichia potomus,* tenth tergite, dorsal aspect; 2A, female genitalia, eighth sternite.

FIG. 3. *Ochrotrichia oregona,* female genitalia, seventh and eighth sternite.

FIG. 4. *Hydroptila callia,* aedeagus, ventral aspect; 4A, lateral

Bull. B. E. S., Vol. XLII Plate V



aspect; 4B, tenth tergite, dorsal aspect; 4C, projection of seventh sternite.

Fig. 5. *Hydroptila wyomia;* aedeagus; 5A, lateral aspect.

Fig. 6. *Hydroptila pullatus,* ventral aspect; 6A, tenth tergite, dorsal aspect; 6B aedeagus, dorsal aspect; 6C, female, eighth sternite; 6D, female, eighth tergite; 6E, female, bursa copulatrix.

Fig. 7. *Hydroptila pecos,* female, eighth sternite.

Fig. 8. *Hydroptila xera,* female, eighth sternite.

Fig. 9. *Neotrichia ersitis,* ventral aspect; 9A, lateral aspect; 9B, aedeagus, dorsal aspect; 9C, female, bursa copulatrix.

BULL. B. E. S., VOL. XLII PLATE VI

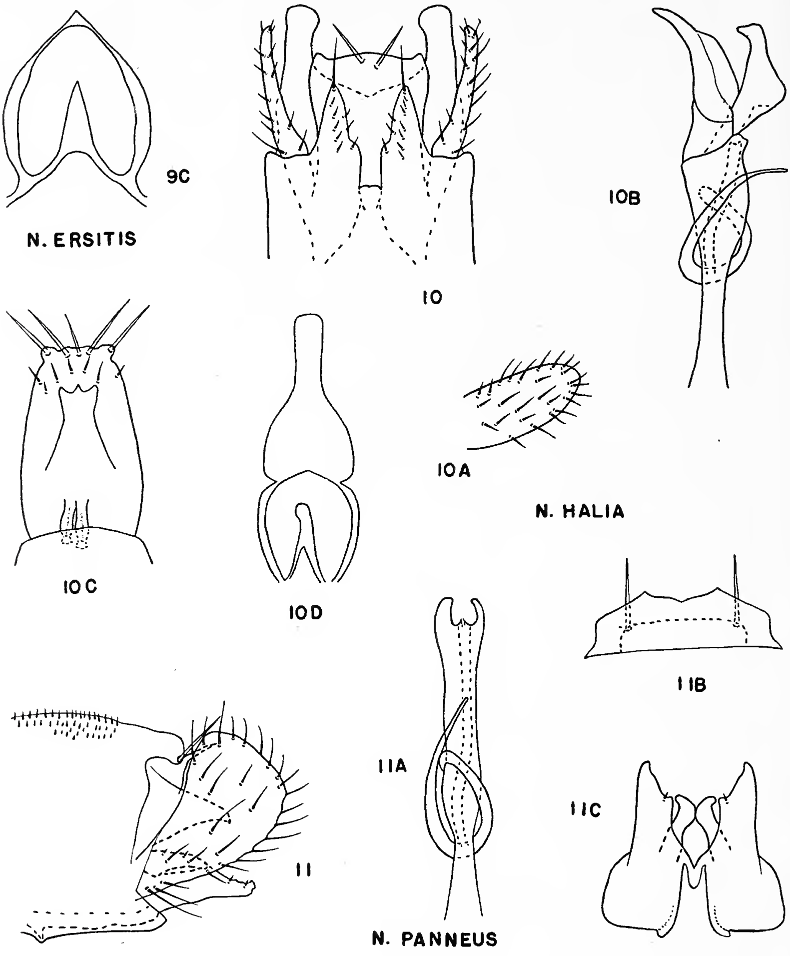


FIG. 10. *Neotrichia halia,* ventral aspect; 10A, cercus; 10B, aedeagus; 10C, female, eighth sternite; 10D, female, bursa copulatrix.

FIG. 11. *Neotrichia panneus,* lateral aspect; 11A, aedeagus; 11B, tenth tergite, dorsal aspect; 11C, ventral aspect.

A NEW GENUS, NEODONUS, AND SPECIES OF MEXICAN LEAFHOPPER (HOMOPTERA, CICADELLIDAE) RELATED TO IDIODONUS.

By Dwight M. DeLong and Ruth V. Hershberger,[1] Ohio State University, Department Zoology-Entomology, Columbus, Ohio.

Related to *Idiodonus* and other blunt headed forms of the *Thamnotettix* group. The vertex is short and blunt, almost parallel margined and is broad. The head is decidedly narrower than the pronotum. The margin of vertex is thick and rounded to the front, meeting the front at almost a right angle; face appearing inflated. Clavus of elytra with a few reticulate veins.

Genotype, **Neodonus piperatus**, n. sp.

The specimens of this species are known only from Mexico.

Neodonus piperatus, n. sp.

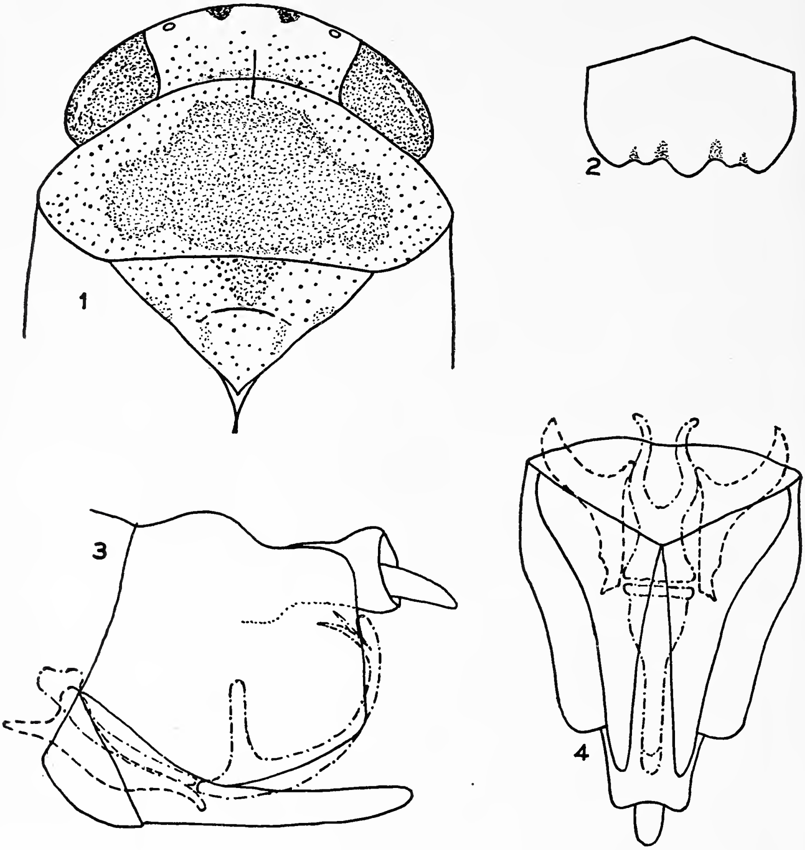
In general form and appearance resembling *Idiodonus morsei* but with a broader, blunter vertex; head decidedly narrower than pronotum; more robust with face more inflated and with cross veins on the clavus. Length 5.5 to 6.5 mm.

Vertex blunt, transverse, scarcely longer at middle than next the eyes. More than twice as wide at base as median length. Pronotum more than twice as wide as vertex. Elytra with several crossveins on clavus.

Color: Straw to pale brownish marked with dark peppered pigment spots. Male more heavily marked than female, usually with the disc black or dark brown. Vertex with a pair of round black spots on margin, about equally distant from each other and the eyes. Ocelli red, equidistant from eye and nearest marginal spot. Face straw, heavily peppered with brown pigment in the male, faintly marked in the female.

Genitalia: Female last ventral segment with posterior margin rather shallowly, concavely excavated either side of a median, blunt, slightly produced tooth which is about the width of the ovipositor. Male plates long and narrow, bluntly pointed at apex, concavely tapered on outer margins. Styles

[1] The authors wish to acknowledge with appreciation the assistance obtained from a Grant-in-Aid from the Sigma Xi research fund.



Explanation of Figures.

Fig. 1. Dorsal view of head, pronotum and scutellum of *Neodonus piperatus*.

Fig. 2. Ventral view of ninth abdominal segment of female.

Fig. 3. Lateral view of male genital structures.

Fig. 4. Ventral view of male genital structures.

short, broad and curved on outer margin at base, rapidly narrowed to form a narrow, obliquely truncated apex, the outer margin of which is pointed and a little more produced than the inner margin. Aedeagus in lateral view with a rather long, narrow, dorsally produced basal process. The body of the aedeagus is narrowed from this basal process to form a dorsally curved portion, which extends to the ventral margin of the anal tube, is narrowly rounded at apex, with a pair of rather long spine-like processes rising on the inner margin a short distance from the apex.

Holotype male, allotype female, and male and female paratypes collected at Morelia, Mich., Mexico, September 30, 1945, by Plummer, Elliott, Hershberger and DeLong. Paratype males and females from Tasquilla, Hgo. (K–172), October 1945, collected by DeLong, Hershberger and Elliott; October 29, 1941, by Good and DeLong; Valles, S. L. P., November 7, 1941, by Good and DeLong; Carapán, Mich. (K–432), October 2, 1941, by DeLong, Good, Caldwell and Plummer.

These were taken from shrubs on the semi-desert and have been found at elevations from 300 to 6000 feet. They have not been found under any other habitat conditions.

Prociphilus Aphid Notes.—The following notes deal with *Prociphilus* records:—

Prociphilus corrugatans (Sirrine) collected in slightly rolled leaves of *Amelanchier alnifolia* in Emigration Canyon, Utah, June 21, 1925; Logan Canyon, June 14, 1936, and Bluff, in Utah, June 19, 1933; in Idaho at St. Anthony, Upper Sand Creek and Rexburg, June 13, 1936. Collected by W. W. Baker on *Amelanchier florida* in Washington at Crosby, May 20, and Spanway, May 29, 1934.

P. fraxinifolii (Riley) on *Fraxinus americana,* severely damaging 10 per cent of the plants in the College nursery at Logan, Utah, June 30, 1941, with 95 per cent of the aphids infested by internal parasites; curling ash leaves at Brigham, July 13, 1938, Smithfield, June 3, 1930, Garland, Salt Lake, and Provo, in Utah. Also Bozeman, Montana, July 3, 1926 (C. B. Philip).

P. tessellatus (Fitch) on *Alnus* at Columbus, Ohio, May 16, 1925 (Knowlton); Clarks Valley, Pa., on *Alnus rugosa,* May 20, 1930 (J. N. Knull).

P. venafuscus Patch on bark of *Fraxinus pennsylvanica* at Evans (Box Elder County), Utah, May 13 and 18, 1930; Pleasant View and Utah Hot Springs (Weber County) October 9, 1937; Centerville, May 19, 1931; and Logan, the alate taken on October 17, 1929, evidently being an accidental on *Juniperus.*—George F. Knowlton, Utah State Agricultural College, Logan, Utah.

OBSERVATIONS ON THE BIOLOGY OF SOME MUTILLID WASPS (HYMENOPTERA, MUTILLIDAE).

By David G. Shappirio, Washington, D. C.

Dasymutilla obscura (Bl.)

On July 10, 1947, Mr. Richard Boettcher, of Washington, remarked that while collecting wasps in Rock Creek Park, D. C., he had noticed a colony of *Cerceris clypeata* Dahlb. (Hymenoptera, Sphecidae) which not only displayed *clypeata* engaged in their nesting activities, but also numerous mutillid wasps which were decidedly interested in burrows of the former species. He noted that a female mutillid entered one of the *clypeata* nests, and also observed two female mutillids fighting outside the entrance to another nest. I accompanied Mr. Boettcher to the location on the morning of July 11. Immediately three mutillids, definitely *Dasymutilla obscura,* were seen walking on the ground among open *clypeata* burrows. The mutillids did not run hurriedly over the ground in their customary manner, but held their abdomens high, and slowly patrolled the area, constantly making the squeaking noise often described.

A *C. clypeata* returned to her nest. She seemed reluctant to enter it for some reason, and indeed, a female *D. obscura* was watching her from under a leaf only a few inches away. This reluctance appeared to be universal, but the larger *clypeata* never attempted to drive the mutillids away. Later, an *obscura* entered one of the burrows, then removed and scattered some of the dirt piled up around the entrance by *clypeata.* All these activities continued until dusk, about 7:30 P.M., E.S.T. By 7:45, no mutillids were active, although a few *clypeata* were present. It was not then apparent whether the mutillids spent the night in *clypeata* burrows, but this would be suggested by later observations.

At 7:30 the next morning, many *clypeata* were about and active. The first mutillid suddenly appeared at 7:50, and before 8:00 two more had arisen from burrows in the ground. Whether these burrows were originally *clypeata* burrows is questionable, since none of them contained weevils (as did all those definitely *clypeata*), and both of these mutillids were caked with dirt, indicating probably that they had been digging considerably.

These observations were verified repeatedly during July. We were unable, however, in reaching to definite proof that *Dasymutilla obscura* lives at the expense of *clypeata.* Nevertheless, regardless of their absolute conclusiveness alone, these observations are at least very suggestive of such activity, and any other explanation seems unreasonable.

Dasymutilla lepeletierri (Fox)

Both males and females of this species (kindly determined by Dr. K. V. Krombein) were very numerous in a sandy area near Odenton, Anne Arundel County, Maryland, on July 26, 1947. At about 3:00 P.M. a pair was taken in copula. Apparently it has not previously been taken mating.

Dasymutilla nigripes (Fab.)

Two mating pairs of this species were taken during July, 1947, by Mr. Boettcher. In July, 1946, I observed another pair which remained in copula for less than ten seconds.

Timulla vagans (Fab.)

Timulla seems to be the genus of Mutillidae which most frequently is encountered mating. Possible explanation for this lies in the fact that the wasps of this genus remain in copula for a longer period than other mutillids.

On July 29, 1947, in watching a female *vagans* climb a steep bank, a male of the same species was seen to dart down from a height of several feet upon her. He had no difficulty in finding her. They remained in copula for several minutes, surprising when compared with the mating times for other genera. *Pseudomethoca simillima* and *P. frigida*[1] remained together for only about fifteen seconds.

Note on a Geographical Name—From Arizona, many collectors have received specimens from Mount (or Mt.) Lemmon, Santa (or Sta.) Catalina Mountains (or Mts.). The correct spelling of the name is as above, since it is a surname, bearing no relation to *lemon,* the well-known acid fruit. J. R. de la Torre-Bueno, Tucson, Arizona.

[1] See *Scientific Monthly,* XLIV, No. 4, Apr. 1947, pp. 348–50. The *Dasymutilla nigripes* referred to above also remained together for a very short period. And another species of *Dasymutilla,* this unidentified, remained together about thirty seconds.

SOME REMARKS ON THE GENUS CHLOROCHROA (HEMIPTERA, PENTATOMIDAE) AND A NEW SPECIES.

By Charles O. Esselbaugh, Pullman, Wash.

In making some observations on the immature stages of some Pentatomidae in eastern Washington, some nymphs with accompanying adults were collected from *Opuntia polyacantha* Haw., a species of prickly pear cactus growing in the Snake River canyon near Clarkston, Washington. Similar observations concerning *Chlorochroa persimilis* Horv. in the sandhill country of Illinois on another species of prickly pear, *O. rafinesquii* Engelm., readily suggested a comparison. Although it was assumed at first, because of the food plant, that the pentatomid species was the same, some discrepancies began to assert themselves.

The first discordant note was that, even making allowance for climatic conditions, first generation nymphs seemed too far advanced in their development and instead of being dark green in color, as in *C. persimilis,* they ranged in color from a sky blue to a deeper blue, the deeper shade confined mostly to the younger instars. Also the egg masses were readily found on the spines of the food plant, which had not been the case with *C. persimilis* in Illinois, the eggs not being found there or anywhere else so far as field observations were concerned. Even those in captivity never oviposited upon the cactus spines. In addition to the above, the adults could readily be distinguished from those of the above species by little more than a casual glance, probably due largely to the difference in color, yet a definite morphological character for their separation was not readily in evidence.

The matter of determining whether the species is a new one has been complicated by the inadequacy of the literature and the accompanying uncertain status of some of the species. The most recent generic key (Torre-Bueno, 1939) is a recast of the one by Van Duzee (1904) with some added characters, some gleaned from the original descriptions and others apparently by Torre-Bueno himself. I regret to say I still find the key unsatisfactory in some respects. Chief among my troubles has been my ability to reconcile either *persimilis* or *uhleri* to the key in question. Van Duzee (1916) synonymized these two species and seems to have been followed by other authors for some thirty years, with attendant confusion of distribution records. As regards *persimilis,* I would not consider the color to be a deep, clear green, as indicated in the key, but nearer a pea green, in pinned specimens at least. I would interpret the terminology "clear green" to imply the absence of pale dots or points, such as are present in some of the other species, but these are also present in varying degree in more than half my specimens, nearly all of which are from Illinois. Neither have I been able to recognize the character "male genital segment strongly produced on the ventral surface," but most misleading is the part relating to the relative length of the antennal segments, the difficulty apparently arising from faulty translation of Horváth's original latin description. Instead of "antennal segment II one-half as long as III," I translate it to read "one-half longer than third," which is approximately true of the specimens at hand. The specimens in my personal collection also measure 13–16 mm. in length, most of them longer than the 14 mm. indicated in the key and as per the original description.

In fact, Horváth's description does not well describe the species at present recognized as *persimilis* but it cannot well be applied to any other known species. In addition to the above discrepancies, the specimens I have examined have a black abdominal tergum rather than a green one.

As regards *uhleri,* in the few specimens I have (two of them determined by Dr. H. M. Harris), the three smooth dots at the base of the scutellum are moderately conspicuous, as are also smooth calloused points on pronotum, scutellum and hemelytra, hence giving difficulty in couplet 9 of Torre-Bueno's key. Van Duzee (1904) himself expresses much uncertainty regarding this species and suggests it may be still a plastic group or alternatively that his material contained two or more species he had been unable to delimit.

Perhaps less important is the discrepancy in size between that indicated for the various species and what I find in measuring my specimens. It seems that in most cases I have specimens 2 to 3 mm. longer than the indicated maximum. In addition to the instance of *persimilis,* I also have a specimen of *sayi* 14 mm. in length and a *ligata* 17 mm., although I have only a very few specimens of these species. The indicated 15 mm. for *ligata* is in close agreement with the eleven-twentieths inch given in Say's original description, which may well have been based upon a single specimen.

I have not seen the species *C. congrua* Uhler. Van Duzee (1904) says plainly that it is somewhat of a puzzle to him, adding that Uhler's description agrees very well with some of his smaller specimens of *uhleri* but he chose to follow the lead of other authors and identified it with a smaller species that had come to him from various correspondents. It is to be noted here that localities given for it include Moscow, Idaho, but Harris and Shull (1944) do not include it in the list of Hemiptera from that state, although the University collection at Moscow must have been one of the sources of data.

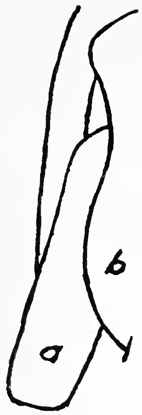
The species described below has been compared with all the listed North American species except *congrua*. It is distinct from them and seems to be definitely excluded from *congrua* by size and antennal characters. If, as Van Duzee states, Uhler's description of *congrua* agrees with small specimens of *uhleri*, the smooth white spots on pronotum, scutellum and hemelytra would be indicated and likewise the three dots at base of scutellum, none of which are present in the species described below.

Chlorochroa opuntiae, n. sp.

Oval, abdomen, measured across scutellum at apical third, slightly wider than across humeri. General color varies from clear blue-green to olivaceous, the latter color on specimens taken in autumn. Most strongly resembles *C. persimilis* Horv. in form and coloration but having no conspicuous raised pale spots on corium or base of scutellum. It is also a larger and slightly more elongate species. Pale margin of thorax and abdomen stramineous, not conspicuous. Fourth and fifth antennal segments subequal, fuscous; third shorter and less infuscated, second about one-third longer than third; first two segments concolorous with head. Head more elongate than in *persimilis,* being longer than wide and with lateral margins more deeply sinuated and parallel for a perceptible distance. First rostral segment surpasses bucculae by about one-third its own length (Fig. 1), or some three times as much as in other species in the genus (Fig. 2). Third rostral about three-fourths as long as second and slightly longer than fourth, which reaches fourth abdominal segment. Lateral margins of pronotum reflexed and nearly straight as compared to shallowly sinuate in *persimilis.* Lateral margins of scutellum, opposite basal one-third, less sinuate than in *persimilis.* Elytra much as in *persimilis* but membrane usually somewhat more infuscated, not spotted. Legs may be entirely green or tibiae and tarsi may be infuscated in varying degrees, more so in olivaceous specimens. Claspers as shown in Fig. 3.

Length (to apex of membrane) 13.5–15.0 mm.; width, 7.5–9.0 mm.

Described from 29 specimens taken near Clarkston, Wash., from



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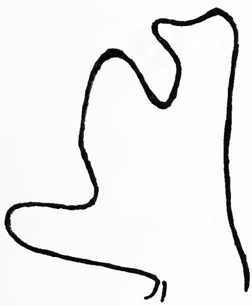

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4

EXPLANATION OF FIGURES.

FIG. 1. *Chlorochroa opuntiae,* n. sp.; *a,* basal segment of rostrum, *b,* buccula.

FIG. 2. *Chlorochroa persimilis* Horv. *a,* and *b,* as above. Also representative of other presently known species.

FIG. 3. Left genital clasper of *C. opuntiae.*

FIG. 4. Left genital clasper of *C. persimilis* Horv.

May 20 to September 29, 1947. Holotype, male taken at above location May 20. Paratypes, 16 males, 12 females. Holotype and 2 paratypes to be deposited in U. S. National Museum and two paratypes in each of the following museums: Washington State College, Pullman, Wash.; University of California College of Agriculture, Berkeley, Calif.; Illinois State Natural History Survey, Urbana, Illinois.

To date the species has not been observed on any food plant other than *Opuntia polyacantha* Haw. and no locality other than the above has been established. It is my understanding that *O. polyacantha* occurs as far east as the eastern base of the Rockies and there may well be other food plants, especially among the rather numerous species of *Opuntia.* One specimen of *C. uhleri* was also taken from this food plant on September 29.

As was true of *C. persimilis,* both nymyhs and adults prefer the fruits for food so long as these remain succulent, but when they have dried up the bugs move to the flattened stems which serve the function of leaves. The adults oviposit principally upon the spines of the cactus but sometimes upon the slender stem of some other plant which happens to be growing among the cactus. The eggs are arranged in two interlocking rows and usually number from 20 to 30 per mass; so far as noted to date they are identical with those of *C. persimilis* (Esselbaugh, 1946). According to my observations, three generations are produced annually.

Addendum.

After completion of the above paper, I have been informed through correspondence with Dr. Reece Sailer of the U. S. National Museum that the genus *Chlorochroa* has been found to be a homonym. He seems inclined to think that the species described above will eventually land in the genus *Rhytidolomia* Stål. Since this is in no sense a revisional paper, I am keeping the *status quo* until Dr. Sailer's forthcoming revision.

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Vestal, A. G. 1913.—An associational study of Illinois sand prairie. Bull. Illinois St. Lab. Nat. Hist., 10: 29–30.

Leafhopper "Bites" Man.—A green leafhopper, *Opsius stactogalus* Fieb. (Det. Dr. P. W. Oman), was present in extreme abundance on severely bleached *Tamarix* on grounds of the Garfield Smelter, Salt Lake County, Utah. A few sweeps with the insect net yielded nearly a half pint of these leafhoppers, plus a few predators and other insects. A pocket cyanide bottle was filled, the balance of the insects being permitted to escape.

Several dozen living leafhoppers still rested on my clothing when I entered an automobile and drove away. Within five minutes, one leafhopper had "bitten" me on the left wrist, a second had entered through the open neck of my shirt and "bitten" me on the chest, a third leafhopper "bit" me on the right wrist, and another "bit" me on the neck. While I was discussing this with my companion, Dr. A. F. Barney, one "bit" him on his left wrist. The irritation did not persist long from any of these "bites," inflicted about 4:10 P. M. on August 19, 1947. The day was warm and overcast, but we were not particularly moist from perspiration.

On numerous occasions during the past 23 years, in the summer while "working over" the day's collection of insects beneath a light at night, I have been "bitten" by leafhoppers, including *Eutettix tenellus* (Baker), *Erythroneura ziczac* (Walsh), *E. coloradensis* (Gill), *Empoasca* sp., and others. This most frequently happened at "auto camps" or in rural hotels on evenings of heavy insect flight to lights.—G. F. Knowlton, Logan, Utah.

NOTES ON ROBBER FLIES (ASILIDAE) PREYING ON HONEYBEES IN THE SAN ANTONIO AREA DURING 1946.

By A. H. Alex, Texas Agricultural Experiment Station, San Antonio, Texas.

Robber flies, Asilidae, are of much interest in Texas because of their wide distribution over the State, the relatively large number of their species, the abundance of individuals, and their economic status.

Since asilid larvae live in soil and dead wood and feed on larvae of Phyllophaga and other beetles they must be considered beneficial.

Adult asilids feed almost exclusively on insects. Dr. P. W. Fattig lists the prey of 47 asilid species in Georgia. The prey comprises 112 species of insects of seven orders. In so far as the prey includes flies, beetles, butterfiies, moths, grasshoppers and true bugs, robber flies may be considered beneficial. Since a portion of asilid prey consists of pollinating insects, including honeybees, and the latter constitute the prey of 30 asilid species, these predacious flies are to be considered detrimental.

Dr. S. W. Bromley lists 161 species of asilids for Texas of which at least 20 are known to kill honeybees. Four species show preference for honeybees and often take a heavy toll of bees in the vicinity of apiaries.

Robber flies are encountered in large numbers, every year in the apiaries of the Apicultural Research Laboratory of the Texas Agricultural Experiment Station. During 1946 robber flies were collected in five apiaries of the Laboratory. Flies with honeybee prey were collected as they were observed in the apiaries during routine manipulation of the colonies. The more abundant species *Saropogon dispar* and *Mallophora orcina* were collected only in representative numbers. However, effort was made to collect all specimens of the less abundant species in order that as many as possible of the bee-killing species might be included in the collection. Determinations were made by Dr. S. W. Bromley.

Two permanent apiaries are located in southeastern Bexar County. Soils in this area vary from a heavy clay loam to a sandy loam. The native vegetation consists of a heavy growth of mesquite trees and a heavy cover of underbrush, cacti and grasses. Three apiaries operated for the production of queen bees were located in Wilson County at a distance of eight to twelve miles from the laboratory. The soil in this area consists of coarse sand of considerable depth. The native vegetation consists of a dense growth of post oak and hickory and cover of grasses, legumes and composites.

In the apiaries in Wilson County robber flies with honeybees prey collected are as follows:

9, *Mallophora orcina* Wiedemann 6–17, 6–24
2, *Promachus bastardii* Macquart 6–6, 6–24
1, *Andrenosoma rubidum* Williston 6–23
1, *Stenopogon latipennis* Loew 6–24
1, *Erax estuans* Linnaens 6–26

Numerous robber flies of other species were observed. The prey of these consisted chiefly of grasshoppers, flies and stink bugs. Among the bee-killing species only *Mallophora orcina* was plentiful and preyed almost exclusively on honeybees. Several hundred specimens of this species with honeybee prey were observed during about 50 hours spent in the apiaries in that area. In addition to the loss of worker bees it seems probable that some loss of queens resulted from the depredation of *Mallophora orcina*.

Robber flies with honeybee prey collected in the apiaries in Bexar County are as follows:

28, *Saropogon dispar* Coquillett 6–5 to 6–23
7, *Diogmites symmachus* Loew 6–16, 6–23, X–12
3, *Diogmites angustipennis* Loew X–2, X–16, X–28
1, *Andrenosoma rubidum* Williston 6–26
1, *Erax completus* Macquart X–12
3, *Erax grandis* Hine 4–30, 5–6, 5–27 recorded in Bexar County during 1947

In Bexar County *Saropogon dispar* is by far the most abundant and serious "bee-killing." At least 3,000 specimens were observed with honeybee prey during June, July and August 1946. This robber fly is abundant every year. Some years ago these flies were very abundant in a queen-rearing apiary. One was observed catching a queen bee, and it seemed probable that loss of queens suffered at the time might be caused by these depredations. Over 700 specimens of *S. dispar* were killed in three days with insect nets and wooden paddles. Thereafter loss of queens was less evident, until the flies again became common. *Saropogon dispar* seized its prey boldly, often at the hive entrances. Occasionally the bees are able to seize, overpower and kill the attacker. As many as eight dead flies have been observed near the entrance of one colony. *Diogmites symmachus* was not plentiful in the laboratory apiaries during 1946, but is considered more serious in other areas, and will prey on other asilids. *Diogmites angustipennis* usually less common than *S. dispar* was not plentiful in 1946. While honeybees appear to be the favorate prey, this species preys also on other asilids and is often cannibalistic.

It is significant that the two localities covered in the collection differ greatly in types of soil, vegetation and also in their respective asilid fauna. *Andrenosoma rubidum* is the only species collected in both localities in 1946.

Asilids appear to be sufficiently selective in their food habits to permit differentiation of beneficial and injurious species. While most species may be beneficial, four species, *Saropogon dispar, Diogmites symmachus, Diogmites angustipennis* and *Mallophora orcina* in their habits of killing bees are detrimental in Texas. *Saropogon dispar* is especially detrimental in the San Antonio area.

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THE EIGHTH INTERNATIONAL CONGRESS OF ENTOMOLOGY IN STOCKHOLM.

The Congress will assemble in Stockholm from August 9th to 14th, 1948. The following sections are provided for discussion: Systematic Entomology. Physiology. Oecology and Zoogeography. Morphology and Anatomy. Embryology. Agricultural and horticultural Entomology. Apiculture. Forest Entomology. Stored products insects. Medical and Veterinary Entomology. Methods of control and insecticides. Nomenclature and history. Bibliography. Arachnids. Specific information about the Programme of the Congress and the arrangements in connection therewith, will be forwarded in the next time.

Address of the Congress Office: Stockholm 50 (Sweden).

BOOK NOTES.

A synopsis of the Hemiptera-Heteroptera of America North of Mexico. J. R. de la Torre-Bueno. Part I, Entomologica Americana, XIX: 141–304, 1939; Part II, op. c. XXI: 41–122, 1941; Part III, op. c. XXVI: 1–141, 1946. Brooklyn Entomological Society, Brooklyn, N. Y.

In the year 1917 a new era dawned in North American hemipterology. The Van Duzee Catalogue brought together all of the loose ends of this vast subject. As a logical outgrowth of this pioneer work, one would have expected a period of integration. But the time was not right for comprehensive works. The catalogue brought to light glaring gaps in our knowledge and showed that hundreds of genera and species remained to be described. There followed a period of intense specialization. The only general work of this period was Parshley's "Bibliography of the North American Hemiptera-Heteroptera" (1925). "The Hemiptera of Connecticut" (1924) and Blatchley's "Heteroptera of Eastern North America" (1926) were noteworthy attempts at complete taxonomic treatment but they were local in character and, as mentioned above, they were poorly timed with respect to the advancement of specialized knowledge.

Now, after a quarter of a century, we have the beginnings of a taxonomic outgrowth of the Van Duzee catalogue. It comes from the pen of one of our elder hemipterists, a colleague of Van Duzee and other pioneers of the profession. It comes in a spirit of humility. In the words of the author, "It *must* be borne in mind that these keys have no pretensions to a monographic status—they . . . are the distillation of widely scattered data, to make such facts available in one place." (Pt. II, p. 42). "It is hoped that the keys . . . will be found helpful by hemipterists, especially by those with private collections who are far from too-busy museums and their overworked staffs." (Pt. III, p. 1). My copy is signed, "With regards from the *compiler.*" (Italics mine). This, then, is the spirit in which the Synopsis is offered and hence, also, the spirit in which I agreed to review it.

First there are some errors. I recall an old adage, "To avoid criticism, do nothing, say nothing, be nothing!" Torre-Bueno has chosen to do something, say something and be something and I do not know any *one* hemipterist in the world who would presume to review critically all of the thirteen families which he has done to date. For my own part, I have simply browsed through certain sections which were of special interest to me at the time. The errors or omissions which I encountered are trivial but are probably representative. *Neottiglossa cavifrons* Stål was used in place of *tumidifrons* Downes (Canad. Ent., 60: 90, 1928). *Vanduzeeina aenescens* Usinger was misspelled *"senescens"* and *Calisius contubernalis* Bergroth was misspelled *"cotubernalis."* In part II, the varieties *artuflava* McAtee and *artuatra* McAtee (Bull. Brook. Ent. Soc., 14: 8, 1919) of *Chelinidea vittiger* Uhler were omitted and the "subspecies" *vittiger* and *aequoris* were called varieties. Dubious though McAtee's treatment may be, we recall that, "This Synopsis is *in no sense* a revision—it simply reflects current practice, right or wrong." (Pt. II, p. 43).

As to content, the Synopsis now covers three parts with a total of 385 pages. Part I includes a glossary and key to families followed by keys to the genera and species of Scutelleridae, Cydnidae, Pentatomidae, Aradidae, Dysodiidae and Termitaphididae. Part II covers the Coreidae, Alydidae, Corizidae, Neididae, Pyrrhocoridae, and Thaumastotheriidae; and Part III is devoted entirely to the family Lygaeidae. Each part contains an annotated bibliography of references to the literature since the Van Duzee Catalogue. Part IV is being prepared at the present time and the author writes that it will "contain the remaining families, *except* Miridae and probably Corixidae." Additions and corrections have appeared as follows: Part I, containing revised keys to the genera of Podopini with the addition of *Allopodops mississippiensis* Harris and Johnston, a key to *Coenus* and a correction in the key to *Rhytidolomia, Liodermion,* and *Chlorochroa* (Bull. Brook. Ent. Soc., 35: 51, 1940); Part II, an insertion sheet containing a revised key to the genera of Mictini.

It is stated in the Preface to Part I that nomenclature adheres closely to the Van Duzee Catalogue. This was a wise policy since the Synopsis "introduces *no* innovations . . . in nomenclature." But what of the numerous changes since 1917? *Allocoris* McAtee and Malloch, 1933 for *Corimelaena* White, 1839, is rejected (and rightly so in the reviewer's opinion). (See Sailer, Proc. Ent. Soc. Wash., 47: 128, 1945; McAtee and Malloch, Proc. Ent. Soc. Wash., 47: 212, 1945.) *Macroparius* Stål for *Nysius* Dallas was ignored along with other changes proposed in Part 8 of "The Generic Names of British Insects" by W. E. China, Royal Ent. Soc. Lond., 1943. Appeals have been submitted to the International Commission on Zoological Nomenclature for suspension of the Rules in some of these cases (China, *loc cit.*; Usinger and Sailer, Proc. Ent. Soc. Wash., 46: 260, 1944) but some of the changes such as *Pachybrachius* Hahn for *Orthaea* Dallas will probably have to be used.

I cannot forego some comment on the author's philosophy with respect to descriptions and types. The inadequacy of existing descriptions is decried on nearly every page of the Synopsis and is well known to all working taxonomists. The only satisfactory solution known to me and other "worshippers of the Type Fetish" (Pt. III, p. 4) is to continue our annual or sabbatical pilgrimages to the four corners of the globe and to impose upon the time and good nature of curators and colleagues to loan authentic specimens. I cannot see that this leads us along "a road going nowhere, except to confusion." Quite the contrary. On the other hand, it must be admitted that such work is monographic rather than synoptic and therefore would be impossible to see through to completion in the case of the Synopsis.

Mr. Torre-Bueno should be praised for his vision, industry and patience in carrying out this project and for the pleasing format of the Synopsis. Let us hope that he may carry the work on to completion and that it may fulfill the objectives which he has so clearly defined.—Robert L. Usinger.

Phymatid Kills Honeybees.—An adult ambush bug, *Phymata pennsylvanica coloradensis* Melin, was observed to have captured and to be feeding on a recently dead worker honeybee at Huntington, Utah, on September 2, 1947. The dead bee was sprawled awkwardly on top of the flowering heads of rabbitbrush, *Chrysothamnus nauseosus*. On nearby flower heads another *P. p. coloradensis* was feeding on a female cluster fly, *Pollenia rudis* (Fabr.), which it had captured. A third *Phymata* was feeding on a smaller fly, while eight others observed on rabbitbrush blossoms at the time held no prey.

Next day a dead worker honeybee was found on the outermost disk flowers of a sunflower head, 6 miles north of Monticello, Utah. Close examination showed this freshly dead bee also was held by a *Phymata p. coloradensis*. This phymatid also held to the anterior end of the body of its prey and fed in the region of the head. Only a few phymatids were observed on other blossoming sunflowers here, but numerous adult *Lygus* bugs, worker honeybees, and a few wild bees were working these blossoms. In both above instances the observations were made at stops along the highway and at approximately 5 P.M., the sky being overcast and threatening storm.—G. F. Knowlton, Logan, Utah.

EXCHANGES AND FOR SALE.

This page is limited to exchange notices and to small For Sale advertisements from members of the Society and from actual paid subscribers to the Bulletin exclusively. *Exchange notices* from members of the Society and from subscribers are limited to *three (3) lines each,* including address; beyond 3 lines, there will be a charge of $1.00 for each 3 lines or less additional. *For Sale* ads will be charged at $1.25 for each 3 lines or part of 3 lines. *Commercial or business* advertisements will not be carried in this page, but will go in our regular advertising pages at our regular advertising rates to *everybody.*

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Number of New Genera in this Index, 2.
Number of New Species and other forms in this Index, 40.

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J. R. de la TORRE-BUENO

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Vol. XLIII February, 1948 No. 1

DR. C. ANDRESEN HUBBARD ON FLEAS OF WESTERN NORTH AMERICA—A REVIEW, WITH CRITICAL NOTES (SIPHONAPTERA).

By Henry S. Fuller, M.D., The Bowman Gray School of Medicine, Winston-Salem, North Carolina

Fleas of Western North America. Their Relation to the Public Health; by Clarence Andresen Hubbard; pp. i–ix plus 1–533, 5 half-tone plates, and many text figures. 1947. (The Iowa State College Press, Ames, Iowa. $6.00.)

This volume on a subject of importance to workers in several fields is far more comprehensive than any previous attempt of this nature. It concerns the fleas, their hosts, and their relation to the public health, in a zone of North America west of the 100th meridian of longitude and north of Mexico. The 100th meridian was chosen because the fleas of the United States east of this line had been treated by Irving Fox, 1940, "Fleas of Eastern United States." Hubbard's area includes Alaska, and parts of Canada and the United States, and it is therefore neither a faunal nor a political region.

In view of the accepted importance of fleas as parasites and as vectors of disease, and in view of the widespread presence of certain flea-borne diseases in the area under consideration, a competent and reliable book on the subject has been a long-felt need. Furthermore, the flea fauna of this area is rich in species, and precise identifications are essential to critical work in medical entomology. Without a comprehensive catalogue, the task of the systematist is bewildering, and he may be unable to give anything better than generic determinations. The present work is an attempt to cover the entire subject, from the standpoints of taxonomy, distribution, host relationships, and medical importance. Presumably, therefore, it is of interest to medical men, veterinarians, public health workers, epidemiologists, and incidentally to mammalogists and ornithologists, as well as students of the taxonomy of Siphonaptera. With these points in mind, it is believed that a critical review of the book will be a constructive and useful contribution.

The book is divided into three parts. The first part, consisting of just forty pages, contains four chapters on general topics of orientation. Part II is the body of the book, concerning the taxonomy of the Siphonaptera of this region. Part III contains the detailed host index, a selected bibliography, and several indices.

It is a pleasure to note the dedication to Doctor Karl Jordan. Critical British readers may be surprised, however, to find that the name of one of their counties, Hertfordshire, has been abbreviated to "Hertz" on the dedicatory page.

Chapter 1 concerns the students of western American fleas, and their contributions. Many interesting facts are presented in a somewhat anecdotal style. Half-tone plates present portraits of most of those whose contributions are discussed.

Chapter 2 is devoted to the medical importance of fleas in western North America. It is extremely disappointing, and in the reviewer's opinion it should have been edited before publication by a medical man or by a medical entomologist. The important human infectious diseases of western North America in which fleas are known to play a role are bubonic plague, endemic or murine typhus, and tularemia. On page 17, in writing of the origin of plague in North America, Hubbard states, "It is supposed . . . that rats infested with the Oriental rat flea . . . escaped off ships . . . to spread the infection through uninfected rats and later to ground squirrels." To find a mention of the alternative theory we must turn to page 394, where it is expressed as follows: "One [view] holds that plague has been on the continent for long periods of time and the slowness in its discovery is due primarily to lack of research." This is an allusion to the fact that wild rodents may have been infected with plague long before its presence was actually observed in man and rats.

In a discussion of plague in 1939 in the province of Alberta (page 19), we read that fleas from *Citellus columbianus* were shown to be plague positive. The ground squirrel involved was not this species, but *Citellus richardsonii richardsonii* (Sabine, 1822), according to Holland, 1944, Proc. Ent. Soc. British Columbia, *41,* reprint, pp. 1–12.

On page 21, if Hubbard chooses to discuss immunity in plague, he should give facts concerning the efficacy of vaccine, its availability, and the probable duration of immunity following its administration. Space which might have been given to these fundamental matters was devoted on page 26 to minute details of "Flea Antigen" to be given to persons suspected of suffering from flea allergy.

The name of the etiologic agent of endemic or flea-borne typhus is given as *R. p. mooser* (sic, page 23). This is a lapsus for *Rickettsia prowazekii mooseri.* The name *R. p. typhi* (Wolbach and Todd, 1920) is accepted as having priority by Philip, 1943, Amer. Jl. Hyg., *37,* no. 3, pp. 301–309.

We read (page 23): "Recovery from either type of typhus is said to result in a solid and lasting immunity to both." This statement is absolutely incorrect, and therefore quite misleading.

One is unable to find in this chapter a list of the states west of the 100th meridian from which flea-borne typhus has been reported. Hubbard might have included a specific reference to a list of the flea vectors of plague in the area under consideration, or at least a list of the species incriminated, together with their known distribution. The subject of sylvatic plague is inadequately treated in this chapter, at the expense of space devoted to the role of fleas in the transmission of tularemia. The name of Dr. Karl F. Meyer appears only in the bibliography on page 517, and this fact alone suggests the inadequacy of Chapter 2.

Furthermore, Hubbard discusses control of fleas, but he makes no reference to DDT, or to pyrethrins and other well-known preparations. Information on these matters was available when the book was being written. (See Bishopp, 1945, Bull. N. Y. Acad. Med., *21,* no. 11, pp. 561–580, for DDT.)

A paragraph is devoted to the subject of fleas as farm pests. In referring to fleas which may menace poultry and pigs, we read, "All three fleas can be controlled by liberal applications of kerosene or used engine oil about the premises." This advice will be of little practical help to the chicken farmer who might possibly consult the book in an effort to eradicate fleas infesting his brooders. He would regard this advice as rubbish on account of the possible fire hazard. The use of derris powder or creosote oil was known as long ago as 1937. (See Bishopp, 1937, U. S. Dept. Agr. Leaflet No. 152, 4 pages.)

Chapter 3 concerns field and laboratory technique in the collection and preservation of fleas. Much helpful and useful information is given, particularly on methods of collection of small mammals. Detailed information on methods of handling nests would have been helpful, and Hubbard might have discussed the use of a Berlese funnel type of apparatus for recovering fleas from nests and debris.

Chapter 4 consists of two pages of text and a full page of figures on the anatomy of the flea in relation to its taxonomy. One is disappointed to find such a superficial treatment of this very important aspect of the subject. It will be of no help to the beginner, who may be puzzled later by the term vinculum (page 309), or by frequent references to the female stylet, to mention only two examples. One gains the distinct impression from this chapter that Hubbard has considered only those structures which he believes to be of use in making determinations of species of fleas. There is much more to taxonomy than the mere determination of the correct scientific name to be applied to a dead specimen. (See Ferris, 1928, The Principles of Systematic Entomology; Stanford University Press.)

Since Part II, on systematic classification, occupies the major portion of the book, a detailed review had best be preceded by general remarks. Hubbard has correctly discarded a primary division of Siphonaptera into suborders, adopting instead the direct grouping into five families. There is no attempt to define these families, beyond giving a key after Ewing and Fox (1943). Each species is considered in detail, with descriptions of both sexes, when known, and data on host, seasonal, and geographical distribution. In certain instances notes on medical importance are included, when data were available. In mentioning flea hosts, Hubbard gives the scientific name of the bird or mammal, indicating subspecies wherever possible, followed by the common name in parentheses. This commendable practice enhances the usefulness of the host records, making them more easily understood by those who are unfamiliar with Latin host names. It is unfortunate that Hubbard has not given complete references to synonymy, referring the reader (page 43) instead to Jellison and Good, 1942, Nat. Inst. Health Bulletin No. 178. He should at least have indicated the synonyms, even if space for complete references was not available. In a monographic work, it is customary to include information on the depositories of type material. This has not been done uniformly by Hubbard.

In many instances keys to genera and species are given, apparently enhancing the usefulness of the book. These keys will not bear close scrutiny, however, and one need not be an advanced student of flea taxonomy to observe the inclusion of hosts and localities as characters, or a sudden shift from male to female characters. In general, then, the calibre of the keys is poor to mediocre.

Insofar as possible, each species is illustrated, emphasis being given to the head, to parts of the modified male segments or genitalia, and to the female spermatheca. It is useful to have a collection of such illustrations in a single publication. The criticisms are two: namely, that many of the drawings are too schematic, and that for purposes of comparison there should have been uniformity in making all of them face either to the left or to the right. Most drawings currently published show the flea facing to the left.

A word about Hubbard's literary style may be appropriately included in a review. One notes frequent omissions of pronouns, prepositions, etc., leading to a telegraphic style, similar to the headlines of a newspaper. For example, we read (page 190): "It is possible flea is a nest flea with distribution during winter or spring." Hubbard frequently uses the verb "release" when he means publish or submit for publication; perhaps this usage has been borrowed from the field of journalism. On page 189, we read that two fleas were collected from pocket gophers, ". . . which were working in school yard at Fort Dick. . . ." Such usage of colloquialisms may lead the uninitiated reader to wonder what compensation these pocket gophers received for their work. In general, then, Hubbard's style is sufficiently variable to be interesting and provocative, although it is frequently ungrammatical, and at times abominable.

The following new genus and four new subspecies are described: *Thrassoides* (page 144); *Foxella utahensis arizonensis* (page 184); *Monopsyllus ciliatus kincaidi* (page 232); *Megarthroglossus procus oregonensis* (page 299); and *Megarthroglossus divisus wallowensis* (page 301). A blunder has been committed in placing the dates 1945 or 1946 after these names. In article 25 of the International Rules, it is specifically recommended that ". . . the date of publication be not added to the name in its first publication." The date of publication of these names is February 1947.

Hubbard recognizes five families of fleas in western North America: Hectopsyllidae, Pulicidae, Dolichopsyllidae, Hystrichopsyllidae, and Ischnopsyllidae. His treatment of these will now be considered in detail.

Family Hectopsyllidae Baker, 1904. Hubbard should have pointed out that the name Tungidae was proposed by C. Fox, 1925, Insects and Diseases of Man, pp. 120 and 130. He should have given some attention to the classification into subfamilies Echidnophaginae Wagner, 1927, and Tunginae Jellison and Good, 1942, new name for Sacropsyllinae Wagner, 1927. Hubbard's key to the three genera treated in this family is workable. The generic name *Tunga* is correctly attributed to Jarocki, 1838, Zoology, pp. 50–52, as pointed out by Rothschild, 1921, Ectoparasites, *1,* part 3, p. 129. But in company with many other writers on fleas, Hubbard fails to consider *Dermatophilus* as used by Guérin-Méneville, 1838, Iconogr. Regne Animal, Text p. 14 (*Pulex penetrans,* Atlas, 1836, Pl. II, fig. 9). This matter has been brought up by Bequaert, 1926, Medical Report of the Rice-Harvard Exped., pp. 246–247, who points out that Rothschild credited Guérin-Méneville's *Dermatophilus* to Lucas (1839), having evidently overlooked Guérin's earlier publication of the name in 1838. It would probably be very difficult to decide which of the two names, *Tunga* and *Dermatophilus,* was actually published first, and probably this matter should be submitted to the International Commission on Zoological Nomenclature for an opinion.

Tunga penetrans (Linnaeus). Hubbard fails to cite or discuss a paper entitled, "The Tropical Chigoe in California," by G. F. Augustson, 1942, Science, *96,* no. 2504, p. 581. In a footnote to this paper, it is stated that the flea might be *Hectopsylla psittaci* Frauenfeld, and Hubbard cites the record under this latter name, without explaining the original confusion in determination, however, and without citing the reference in his bibliography. In the discussion of the medical importance of *Tunga penetrans* (page 55), Hubbard cites a reported case of human attack by the larva of this species. The actual reference (not given) is Faust and Maxwell, 1930, Arch. Derm. and Syph., *22,* pp. 94–97, figs. 1–6. Hubbard states, "Infestation occurred in a man into whose pubic and inguinal regions the larva had penetrated." Anyone familiar with the normal life history of this flea realizes that penetration of larvae of *any* species of flea into the skin is so unusual as to require critical evaluation. In the reviewer's opinion, there is a strong possibility that the original determination of these larvae was incorrect.

Family Pulicidae Stephens, 1829. The key to genera appears to be workable. Under *Ctenocephalides canis* (Curtis, 1826), we read (page 62) that it has been reported as the intermediate host of *Leishmannia* (sic) *donovani* and *Leishmanni* (sic) *infantum.* These organisms are hemoflagellate protozoa. *Leishmania donovani* (Laveran and Mesnil, 1903) is now known to be transmitted by *Phlebotomus* species (Diptera: Psychodidae—sandflies), and *L. infantum* Nicolle, 1908, which may be identical with *L. donovani,* although apparently serologically distinguishable, is presumably also transmitted by these flies in the Mediterranean littoral area. The earlier reports of flea transmission of pathogenic species of *Leishmania* were made by workers, for example Basile (1910), who were confused by a morphologically similar organism, *Leptomonas ctenocephali,* which is a normal inhabitant of the intestinal tract of the dog flea. At present there is no critical evidence that fleas can act as vectors of pathogenic species of *Leishmania.*

Xenopsylla cheopis (Rothschild, 1903). In discussing the medical importance of this flea (page 66), Hubbard states, "It seems to have the honor of being the insect which spreads plague from harbor rats to ground squirrels about San Francisco Bay, California." In this section of the book, no evidence is given to support this contention. We must turn to page 405 to discover that *X. cheopis* has been taken from *Citellus beecheyi beecheyi* (Richardson), the California ground squirrel, in the San Francisco Bay area. To the average reader, this form of presentation may seem somewhat illogical.

Furthermore, with regard to the medical importance of *X. cheopis,* it is stated, "Lately this flea has been found to be a vector of endemic or murine typhus fever in this country." Experimental transmission of this disease by *X. cheopis* was reported by Dyer, Ceder, Rumreich, and Badger, 1931, Public Health Reports, *46,* no. 41, pp. 2415–2416. It is possible that the information has only "lately" come to Hubbard's attention.

Genus *Hoplopsyllus* Baker, 1905. A key to the males of western species of this genus is provided, but the primary dichotomy is according to geographical range; presumably this character would separate females as well. Hubbard has omitted reference to the division of *Hoplopsyllus* into the two subgenera *Hoplopsyllus* and *Euhoplopsyllus* by Ewing and Fox, 1943, U. S. Dept. Agric., Misc. Publ. No. 500, pp. 105–106; this involved a suppression to subgeneric standing of *Euhoplopsyllus,* proposed as a genus by Ewing, 1940, Proc. Biol. Soc. Wash., *53,* p. 37, type *H. affinis* (Baker) by original designation. In the reviewer's opinion the recognition of these two subgenera as such is warranted on morphological grounds, and this point merits some comment by Hubbard.

Hoplopsyllus foxi Ewing, 1924, is treated as a subspecies of *H. glacialis,* and this decision should be attributed to Ewing and Fox, 1943, U. S. Dept. Agric., Misc. Publ. No. 500, p. 107. *H. tenuidigitus* Stewart, 1940, is likewise treated as a subspecies of *H. glacialis,* and no reason is given, although this may be inferred from Hubbard's statement, "Opinion generally expressed by California collectors is that this flea is only a slight variation or dimorphic form of *Hoplopsyllus glacialis foxi* Ewing." In discussing the medical importance of *H. glacialis lynx* (Baker, 1904), he states that there is the possibility that this flea might have been partially responsible for the spread of tularemia in southern Alaska, although it was not found tularemia positive, at the time varying hares were reported with this disease in 1937. In this regard, see Philip, 1938, Jl. Parasitol., *24,* no. 6, pp. 483–488.

Cediopsylla inaequalis interrupta Jordan, 1925. In discussing the possible role of this species as a vector of plague, Hubbard states that it is ". . . very difficult, if not impossible . . ." to infect this flea under laboratory conditions. He points out that where wild rabbits suffer from plague, it is probable that infection comes through the bite of an infected ground squirrel flea. The reader is left in doubt as to the potential role of rabbit fleas in maintaining the infection *after* rabbits have acquired it.

Genus *Anomiopsyllus* Baker, 1904. Hubbard (page 79) cites Jordan (1945, *in litt.*) as stating that this genus should be associated with *Stenistomera, Callistopsyllus, Conorhinopsylla,* and *Megarthroglossus.* The reader will later find these genera treated as members of the family Hystrichopsyllidae, and he may rightly wonder how *Anomiopsyllus* got left behind in Pulicidae, or equally, why the other four genera were placed in Hystrichopsyllidae.

Under *Anomiopsyllus nudatus* (Baker, 1898), Hubbard should list the reference, "not Dunn and Parker, 1923." The reader must discover this for himself under *A. montanus* Collins, 1936. *A. californicus,* a synonym of *A. nudatus,* dates from Baker, 1904, Invert. Pac., *1,* pp. 39–40; it does not date from "Rothschild 1915" and furthermore this 1915 reference should be to Jordan and Rothschild, in which they synonymized *A. californicus* under *A. nudatus.* Under *A. falsicalifornicus* (C. Fox, 1929), Hubbard should mention that the male of this species was incorrectly described under the name *A. californicus* Baker by Fox, 1926, Pan-Pac. Ent., *2,* pp. 183–184, text-figs. 5 & 9.

Family Dolichopsyllidae (Baker, 1905) Oudemans 1909. Since two keys are given, neither of which includes all of the genera treated, it is doubtful that either will be helpful to individuals who do not possess identified reference material, particularly as not all of the characters mentioned are explained or illustrated. *Odontopsyllus* and *Augustsonius* are separated on the basis of host preference rather than morphological characters; *Thrassis* and *Thrassoides* are not separated satisfactorily from each other.

Genus *Polygenis* Jordan, 1939. Hubbard might have justified his assignment of this genus to this family. The species described as *Rhopalopsyllus gwyni* C. Fox, 1914, is assigned to this genus, and *R. sigmodoni* Stewart, 1930, is regarded as a synonym of it on the basis of a personal communication from Dr. M. A. Stewart.

It has been pointed out by Traub that Hubbard's inclusion of *Arctopsylla* Wagner, 1930, in the Dolichopsyllidae will meet criticism. One wonders why Hubbard did not follow Jellison and Good, 1942, and others, in recognizing the family Vermipsyllidae Wagner, 1889, and assigning *Arctopsylla* to it.

Genus *Orchopeas* Jordan, 1933. The reviewer agrees that it is difficult to make a key to the species of this genus. However Hubbard is inconsistent, in that he gives a specific example of how geographical range may become useless as a help in identification, and then he proceeds to mention range in his key. The emendation of *Orchopeas howardii* (Baker, 1895, 1899) to *howardi* (sic) is questionable. Hubbard has followed Ewing and Fox, 1943, U. S. Dept. Agric., Misc. Publ. No. 500, p. 33, in deciding that this name is correct, and in regarding *O. wickhami* (Baker, 1895, 1899) as a synonym. It is to be hoped that the name of this common species has been correctly settled.

Genus *Opisodasys* Jordan, 1933. The key to this genus is based on a primary division into "Northwest species" and "Southwest species," followed by an intermingling of male and female genital characters. That this geographical division is of no help is shown by California records of *Opisodasys keeni* (Baker, 1896), placed in the key as a northwest species. Under *O. robustus* (Jordan, 1925), *O. spatiosus* I. Fox, 1940, is listed as a synonym, without giving the authority. This synonymy was first published by Ewing and Fox, 1943, U. S. Dept. Agric., Misc. Publ. No. 500, pp. 37 and 123.

Genus *Thrassis* Jordan, 1933. Separate keys to males and females are provided for this genus. Their usefulness to the individual worker will depend upon his own resourcefulness; the reviewer has been unable to work them satisfactorily. On page 117, *T. bacci* (sic) is a lapsus for *T. bacchi* (Rothschild, 1905). *Thrassis spenceri* dates originally from Wagner, September, 1936, Zeits. f. Parasitenk., *8,* pp. 654, 655. Hubbard gives only the reference to Wagner's paper in the Canadian Entomologist, which was published in October, 1936.

The new genus *Thrassoides* is proposed (page 144), to include two species: *Thrassis aridis* Prince, 1944, as genotype, and *T. campestris* Prince, 1944. The generic name first appears in the key (page 85), where it is separated from *Thrassis* by the character, "On Kangaroo rats." It may be a valid genus, but the morphological characters for distinction from *Thrassis* are not clearly defined by Hubbard.

Genus *Oropsylla* Wagner and Ioff, 1926. It is stated (page 169) that *O. alaskensis* (Baker, 1904) is known only from the type locality at Point Barrow, Alaska. It should be noted that this species was recorded from Northwest Territories, Canada, by Holland, 1944, Canad. Ent., *76*, p. 246, Plate XVIII, figs. 8 & 9. Since one of Hubbard's figures (page 162) of this species is labelled "After Holland," one infers that the record might also have been included.

Genus *Foxella* Wagner, 1929. This genus dates from 1929, not from "1930." Hubbard has made a good attempt to unravel the species and subspecies, and his contribution will be appreciated. *Foxella ignotus utahensis* Wagner, 1936, is elevated to full specific rank and divided into two subspecies: *F. u. utahensis* Wagner, 1936, and a new subspecies, *F. u. arizonensis* Hubbard, based on four males from Utah-Arizona state boundary at Fredonia and Kanab, off *Thomomys fossor* Allen, the holotype deposited in the U. S. National Museum.

Genus *Dactylopsylla* Jordan, 1929. This was treated by Ewing and Fox, 1943, U. S. Dept. Agric., Misc. Publ. No. 500, pp. 38–43, as consisting of three subgenera: *Dactylopsylla* Jordan, 1929, *Foxella* Wagner, 1929, and *Spicata* I. Fox, 1940, the latter originally described by Fox as a subgenus. Hubbard has elevated *Dactylopsylla* and *Foxella* to full generic standing, and has regarded the subgenera *Spicata* and *Foxelloides* Hubbard, 1943, as synonyms of *Dactylopsylla*. On page 185 there are two misprints, in that subgeneric names are not commenced with capital letters. *Ceratophyllus stimsoni* C. Fox, 1914, is listed (page 191) as a synonym of *Dactylopsylla bluei* (C. Fox, 1909), without giving the authority, which is Jordan and Rothschild, 1915, Ectoparasites, *1*, part 1, p. 54.

Genus *Malaraeus* Jordan, 1933. The key to species of this genus is useless and it might well have been omitted. Under *Malaraeus penicilliger dissimilis* Jordan, 1938, Hubbard has failed to cite records from Northwest Territories, Canada, published by Holland, 1944, Canad. Ent., *76*, p. 246, Pl. XVIII, fig. 10.

Genus *Nosopsyllus* Jordan, 1933. According to Jellison and Good, 1942, Nat. Inst. Health Bull. No. 178, p. 99, *Ceratophyllus californicus* Baker, 1904, is a synonym of *Nosopsyllus fasciatus* (Bosc, 1801). Hubbard fails to consider Baker's species, and the reviewer is unable to find it listed in the indices or elsewhere. As this concerns a species of public health importance, it is a rather serious omission.

Genus *Megabothris* Jordan, 1933. The species *M. abantis*

(Rothschild, 1905) and *M. adversus* Wagner, 1936 are both regarded as valid and distinct by Hubbard. No mention is made of the fact that the latter was shown to be a synonym of the former by Holland, 1942, Canad. Ent., *74,* p. 158. Holland's records from Alberta and British Columbia have apparently escaped Hubbard's attention.

Genus *Monopsyllus* Kolenati, 1857. *M. ciliatus kincaidi* is described as a new subspecies from Wallowa Lake, Wallowa County, Oregon, off *Eutamias amoenus luteiventris* Allen, holotype male and allotype female deposited in the U. S. National Museum.

Genus *Ceratophyllus* Curtis, 1832. *C. vagabundus* Boheman dates from 1866, not "1865." Hubbard states that the first Alaskan record of this species was "released" by Jellision and Kohls (1939). It was actually published earlier by Philip, 1938, Jl. Parasitol., *24,* no. 6, p. 486, Table 2.

Genus *Tarsopsylla* Wagner, 1927. It is stated that specimens of *T. coloradensis* (Baker, 1895) listed from British Columbia belong to an undescribed species. Presumably this refers to the record published by Holland, 1941, Proc. Ent. Soc. British Columbia, no. 37, p. 11, based on specimens determined by Wagner; if this is true, the fact should have been stated.

Genus *Odontopsyllus* Baker, 1905. The species *O. multispinosus* (Baker, 1898) is not mentioned. One wonders whether it may not occur west of the 100th meridian, since it was recorded from Oklahoma off jack rabbits by Ward, 1934, Proc. Okla. Acad. Sci., *14,* p. 31.

Genus *Augustsonius* Hubbard, 1941. This is simply a synonym of *Geusibia* Jordan, 1932, genotype: *G. torosa* Jordan, 1932, by original designation. The monotypic genotype of *Augustsonius* was *G. ashcrafti* Augustson, 1941, by original designation. In the original description of the genus by Hubbard, it is stated, "This genus differs from *Geusibia* Jordan among other features in the shape and armature of the coxae." In this book he points out (page 269) that synonymy has been suggested. While Hubbard's book was in press, the genus was correctly synonymized, without comment, by Costa Lima and Hathaway, 1946, Pulgas, etc., Mongr. Inst. Osw. Cruz, no. 4, p. 251.

Family Hystrichopsyllidae Tiraboschi, 1904. The family is defined as follows: "Genera of this family of fleas characterized by presence of dorsal sulcus separating frons from posterior position of head, which allows motion between two regions" (page 273).

This definition is unsatisfactory, and furthermore it is merely a rewording of the definition of the old suborder Fracticipita Oudemans, 1908. Inasmuch as Hubbard (page 46) had already decided correctly to disregard the subdivision of fleas into suborders, he should have given an adequate definition for this family. It must be realized that Hubbard has included in this family the following genera which do not conform to his definition: *Callistopsyllus, Conorhinopsylla, Megarthroglossus, Trichopsylloides, Micropsylla, Actenophthalmus, Paratyphloceras,* and *Rectofrontia.* Furthermore, bat-fleas are not excluded from the Hystrichopsyllidae by this definition. These facts are obvious from an examination of the illustrations, or a study of known specimens, but they are pointed out here as a probable source of confusion to the uninitiated beginner who may attempt to use the book to identify his fleas.

In the key to western genera of Hystrichopsyllidae, *Carteretta* and *Ctenophthalmus* are separated on a geographical dichotomy, and *Leptopsylla* and *Micropsylla* are distinguished on the basis of host preference. These important considerations are not morphological characters, and they are out of place in a key except as supplementary information.

The key to the western species of the genus *Atyphloceras* is unsatisfactory for the same reason: geographical dichotomy is used to separate *A. echis* and *A. longipalpus,* and the key is inadequate for the determination of males.

Genus *Callistopsyllus* Jordan and Rothschild, 1915. This genus appears for the first time in the Hystrichopsyllidae, having been placed in Dolichopsyllidae by Jellison and Good, 1942, Nat. Inst. Health Bull. No. 178, p. 4; and in Pulicidae by Ewing and Fox, 1943, U. S. Dept. Agric., Misc. Publ. No. 500, p. 111. The reason for the present assignment of this genus would be of interest. Hubbard treats two species: *C. terinus* (Rothschild, 1905) and *C. deuterus* Jordan, 1937. He has apparently overlooked *C. paraterinus* Wagner, 1940, Zeits. f. Parasitenk., *11,* p. 465, figs. 5 & 6. This species was described from a single male taken from *Peromyscus maniculatus* ssp., probably *artemisiae* (Rhoads), at Eagle River, British Columbia, and Wagner stated that it might prove to be the male of *C. terinus,* which at that time was known only from three females. (See Holland, 1941, Proc. Ent. Soc. Brit, Columbia, no. 37, p. 11.) Since Hubbard records males of *C. terinus* and figures the male genitalia and head, it would be desirable to know whether he believes that Wagner's *C. paraterinus* is conspecific and therefore a synonym.

Genus *Catallagia* Rothschild, 1915. The key to the species of this genus is inadequate, owing to the use of geographical dichotomies in three instances. In the body of the text several species are considered as distinct, and they are separated in the key. Yet in the synonymic index (page 519), we read that two of these are probably dimorphic forms of two others; that "*Catallagia rutherfordi* Augustson, 1941, is not essentially different from *Catallagia chamberlini* Hubbard, pp. 289, 292"; and that *Catallagia vonbloekeri* Augustson, 1941, is probably *C. chamberlini* and so forth. This is highly confusing to the reviewer, and it is possible that others may find it at least slightly so. In the discussion of *C. rutherfordi* (page 292), we note that a study of paratypes in Hubbard's collection leads him to believe that it may be the same as *C. sculleni* Hubbard, 1940. Are we justified in concluding that several things equal to the same thing may be equal to each other, and that one name should be applied? Pertinent facts are that *C. sculleni* has only page priority over *C. chamberlini* Hubbard, 1940, and that Augustson's specific names are antedated by those of Hubbard's. Hubbard should have clarified the matter, but the reviewer is unable to do so, owing to lack of specimens at hand for study.

Genus *Megarthroglossus* Jordan and Rothschild, 1915. Adequate reasons are given for the fact that a key to species is not provided. *M. procus oregonensis* Hubbard, a new subspecies, is described and illustrated, but no holotype is designed, and the type host and type locality are not specified. Types are said to be deposited in the U. S. National Museum. On page 300, *M. divisus divisus* is dated from Baker, 1895, directly under the name of the species. The first usage of the name dates from 1898. *M. divisus wallowensis* is described as a new subspecies, based on a holotype female (unique specimen) from Wallowa Lake, Wallowa County, Oregon, off *Tamiasciurus hudsonicus richardsoni* Bachman, deposited in the U. S. National Museum. *M. bisetis* Jordan and Rothschild, 1915, is reduced as a subspecies of *M. divisus,* although adequate reasons for this action are not provided.

Genus *Stenistomera* Rothschild, 1915. Under *S. alpina* (Baker, 1895), *Delotelis mohavensis* Augustson, 1941, is listed as a synonym, without stating a reason or citing a previous authority. The reviewer is unable to comment on the correctness of this synonymy.

Genus *Trichopsylloides* Ewing, 1938. The reference to the original description should be Ewing, 1938, Proc. Ent. Soc. Wash., *40*, p. 94, not "p. 49." Hubbard goes on record as agreeing with Jordan that this genus is near *Rectofrontia* and *Micropsylla,* yet he places it between *Stenistomera* and *Epitedia,* a procedure which seems rather inconsistent. A locality record for *T. oregonensis* Ewing, 1938, from "Cultis Lake" is a lapsus for Cultus Lake, British Columbia (Holland's original spelling was Cultus Lake). The authority for regarding *Phaneris hubbardi* Jordan, 1939, as a synonym of this species should be cited and the reason given.

Genus *Epitedia* Jordan, 1938. The treatment of this genus is confusing and inadequate. Three species are treated as apparently valid: *E. wenmanni* (Rothschild, 1904), *E. stanfordi* Traub, 1944, and *E. jordani* Hubbard, 1940. Under the discussion of *E. stanfordi,* Hubbard records observations which, if correct, could easily warrent its reduction as a subspecies or synonym of *E. wenmanni.* The fact that *E. jordani* has been considered by Good and by Holland to be a synonym of *E. scapani* (Wagner, 1936) is mentioned. Adequate reasons for synonymy were given by Holland, 1942, Canad. Ent., *74,* pp. 157–158; the reviewer has not studied Good's paper. If Hubbard regards his species, *jordani,* as valid, he must then treat *E. scapani* (Wagner, 1936) as also valid, and his inconsistency lies in not doing so. If he agrees with the synonymy proposed by others, then naturally Wagner's name takes precedence. The reviewer hereby accepts the synonymy already proposed. Thus the synonyms of *E. scapani* (Wagner, 1936) are *E. jordani,* on Holland's authority, and *E. stewarti* Hubbard, 1940, on Hubbard's authority.

Genus *Meringis* Jordan, 1937. In the key to species, the primary dichotomy is based on male genital characters; then females are included in the sub-headings. An attempt to use the key reveals that the characters are based on drawings; thus the reader might better have been referred to the illustrations and the key could have been omitted. *Atheropsylla bakeri* Stewart, 1940, is regarded as a synonym of *Meringis cummingi* (C. Fox, 1926), without giving reasons or citing a previous authority.

Genus *Peromyscapsylla* I. Fox, 1939. Under *P. ravalliensis* (Dunn, 1923), Hubbard should cite: "*Ctenopsyllus rawalliensis* (sic) Wagner, 1936, Canad. Ent., *68,* p. 205: lapsus." The name has been cited as if Wagner had spelled it correctly. In considering *P. duma* Traub, 1944, Hubbard states that this species may come well within the range of observed variants of *P. selenis* (Rothschild, 1906). If this is so, then a decision should be rendered on the standing of Traub's species.

Genus *Doratopsylla* Jordan and Rothschild, 1912. The treatment of species included in this genus needs clarification. The synonymy of *D. curvata obtusata* Wagner, 1929, and *D. jellisoni* Hubbard, 1940, was adequately justified by evidence presented by Holland, 1942, Canad. Ent., *74*, p. 157. Hubbard treats his own species, *D. jellisoni,* as valid, and merely states (page 345) : "It has been suggested that this species is the same as *D. c. obtusata* Wagner 1929." If he thinks his own species is valid, and disagrees with Holland's proposed synonymy, then he is inconsistent in not giving separate and adequate treatment to Wagner's species; and likewise inconsistent in using the subspecific name, *Doratopsylla curvata curvata* Rothschild, 1915, when ignoring separate treatment of Wagner's subspecies. These discrepancies can be avoided simply by considering *D. jellisoni* Hubbard as a synonym of *D. c. obtusata* Wagner.

Genus *Hystrichopsylla* Taschenberg, 1880. *H. mammoth* Chapin, 1921, is reduced to subspecific standing as *H. schefferi mammoth,* based on a characteristic eighth sternite of the male.

Genus *Stenoponia* Jordan and Rothschild, 1911. Under *S. americana* (page 362), the date after Baker's name, "1898," is obviously a misprint for 1899.

Genus *Corypsylloides* Hubbard, 1940. In describing the morphology of this genus, Hubbard uses the term "indistinct pseudospines" in quotation marks, without explaining its meaning. The term has been used by Dr. Karl Jordan with reference to relatively weakly sclerotized, lightly pigmented, spine-like or sometimes comb-like extensions of the dorsal and/or lateral thoracic exoskeleton. They occur in several genera of fleas. Under *Corypsylloides kohlsi* Hubbard, 1940, he has synonymized *C. spinata* I. Fox, 1940, without citing as authority Ewing and Fox, 1943, U. S. Dept. Agr., Misc. Publ. No. 500, pp. 96, 123.

Genus *Nearctopsylla* Rothschild, 1915. Under *N. jordani* Hubbard, April, 1940, *N. hygini columbiana* Wagner, May, 1940, is synonymized, without citing as authority Holland, 1942, Canad. Ent., *74,* p. 158, who gave adequate reasons.

Family Ischnopsyllidae Wahlgren, 1907. The distinctive characters of bat-fleas are mentioned, and a workable key to the four genera recognized in western North America is provided.

Genus *Myodopsylla* Jordan and Rothschild, 1911. Hubbard treats two species as valid: *M. gentilis* Jordan and Rothschild, 1921, and *M. collinsi* Kohls, 1937. He would have done well to consider *M. crosbyi* (Baker, 1905). It was recorded from Steamboat Springs, Colorado, off *Myotis evotis,* by Hall, 1911, Colorado Coll. Publ., Sci. Ser., *12*(10), p. 346. The original description by Baker was inadequate, and although its status is uncertain, it was maintained as a separate and valid species by Jellison and Good, 1942, Nat. Inst. Health Bull. No. 178, p. 94. This species should not have been ignored by Hubbard.

Genus *Myodopsylloides* Augustson, 1941. By a process of involved and ambiguous reasoning, Hubbard has arrived at the correct conclusion that this is a valid genus, containing one species, *M. palposus* (Rothschild, 1904), of which *M. piercei* Augustson, 1941, is a synonym. Rothschild's original spelling was palposus, and Hubbard's emendation (page 376) to *palposa* seems unnecessary.

Genus *Sternopsylla* Jordan and Rothschild, 1921. Hubbard recognizes two valid species in his territory, but he does not give a key to them. He might have helped the beginner by pointing out the existence of a deciduous frontal tubercle in this genus, instead of stating, "There may or may not be a frontal tubercle." This fact was confusing to Ewing and Fox, 1943, U. S. Dept. Agric., Misc. Publ. No. 500, pp. 97–98, but it has been clarified in a paper by Jordan, 1945, Proc. Roy. Ent. Soc. London, Ser. B. Taxonomy, *14,* parts 9–10, pp. 113–116. Hubbard should credit the synonymy of *Aptilopsylla* Ewing, 1940 under *Sternopsylla* to Ewing and Fox, 1943, loc. cit. Finally, the species *carlsbadensis* Ewing, 1940, was the monotypic genotype of *Aptilopsylla,* whereas Hubbard erroneously credits the original description of the species to the genus *Sternopsylla.*

Part II of this book is concluded by a tabular "Geographic Index to Western Fleas," omitting the Northwest Territories, Canada. There is a similar index to 56 species of eastern fleas, compiled from Fox's book. It purportedly includes records of eastern fleas published through 1945, but it is incomplete.

Part III is devoted mainly to "The Hosts of Western Rodent Fleas and Western Lagomorpha Fleas. Their relation to plague, tularemia, murine typhus." It opens with a page of maps, showing the known distribution of plague infection in the western United States. The discoveries of plague infection in various genera of rodents and Lagomorpha are tabulated in chronological order. Detailed information on host relationships is given, and when the data are correlated, they will doubtless be of great value. It will be apparent that many of the data are based on personal collections made by Hubbard himself. For this enormous amount of field and laboratory work, he is especially to be commended. Hubbard is probably the outstanding field collector of fleas in North America, and he has amassed an immense amount of information.

Other hosts of western North American fleas are grouped according to records from Carnivora; Insectivora; Bats (Chiroptera); Man; and Birds. The significance of these various records is discussed in each section.

A selected bibliography includes articles published after July 1, 1939, the closing date for entries in the publication by Jellison and Good, 1942.

There is a short "Synonymic Index." From the taxonomic standpoint, it is merely confusing, and it might better have been headed "Addenda."

The remaining indices comprise the following: "Rapid Index to Western Fleas;" "Western Fleas Indexed According to Authors;" and "General Index." None of these is complete, and their usefulness and value are correspondingly decreased.

In conclusion, it will be recognized that Hubbard has performed an extremely valuable service in making available a mass of information which was previously rather inaccessible. In spite of its faults, his book is a welcome contribution which will be appreciated by workers in a variety of fields. The author is to be congratulated for his effort and enthusiasm in the study of fleas, and he is to be commended for his perseverance in producing this book.

Boxelder Bugs Feeding on Honeybees.—On several occasions the writer has observed adult boxelder bugs, *Leptocoris trivittatus* (Say), feeding on dead or dying worker honeybees. Large numbers of recently dead and crawling honeybees were scattered about a home yard at 611 Tenth Avenue, Salt Lake City, Utah, on June 9, 1946. In this yard, boxelder bugs also were moderately abundant, possibly averaging one for each two or three dead bees on the walks and stone terrace. Three adult boxelder bugs were observed to be feeding on dead bees, while two others were feeding on trembling, almost dead worker honeybees. Two of the boxelder bugs thus feeding were at the same time copulating. One bug still was feeding quietly on a bee 28 minutes after first being observed. Two days later, one of five boxelder bugs observed in a bee yard three miles west of Provo, Utah, was feeding on a freshly dead worker honeybee. No evidence was found that boxelder bugs attack active, normal bees.—G. F. Knowlton, Logan, Utah.

SYNONYMICAL NOTES ON NORTH AMERICAN SPHECOID WASPS: I AND II (HYMENOPTERA).

By Karl V. Krombein, Washington, D. C.

This paper contains I and II of a series of notes to be published under this general title. Note I presents evidence to show that the female and male described as *Tachytes obscuranus* Rohwer, 1909, represent, respectively, two distinct species. The female (type) is identical with *Tachytes* (*Tachyoides*) *mergus* Fox, 1892, and it is suggested that the male may represent the hitherto unknown male of *T. birkmanni* Rohwer, 1909. *Tachytes minor* Rohwer, 1909, is synonymized with *T. mergus* Fox. *Tachyoides* Banks, 1942, is reduced to subgeneric rank and characters given to separate it from the other subgenera of *Tachytes.* Note II presents characters showing that *Anacrabro robertsoni* Rohwer, 1920, should be considered the Floridian subspecies of *A. ocellatus* Packard, 1866, and not a synonym of *ocellatus* as treated by Pate, 1947.

I. The Identity of the Male of *Tachytes* (*Tachyoides*) *mergus* Fox.

Several years ago Banks (Bull. Mus. Comp. Zool. 89: 434, 1942) placed *Tachytes obscuranus* Rohwer (Ent. News 20: 205, 1909) as a synonym of *T. mergus* Fox (Trans. Amer. Ent. Soc. 19: 250, 1892). The synonymy was indicated, but never published, by Rohwer, who had placed the label "*Tachytes mergus* Fox, homotype, Roh." on a female paratype of *obscuranus* [USNM]. This synonymy is correct, but only in part, as the male of *obscuranus* (allotype) is another species.

Rohwer based his association of sexes in *obscuranus* on a series of five females and five males from Lee Co., Texas (mostly at Fedor), collected by G. Birkmann on several different dates. The female holotype of *obscuranus* is the same as *mergus,* agreeing with that species in all essential particulars. It is of importance to note that in the female the head and thorax are covered with abundant erect, long, silvery hairs; that a shining, glabrous, impunctate narrow strip is present on the front running obliquely from the supra-antennal prominence toward the eye; and that the propodeum is shining and punctate on the dorsal surface.

The true male of *mergus* probably should agree in most, if not all, of these characters of integumental sculpture and clothing. This is not at all true of the male of *obscuranus,* which has the head and thorax covered mainly with dense, silvery, short to moderately long, appressed hairs, the front dull with dense minute punctures and entirely lacking the impunctate strip, and the dorsum of the propodeum dull and coarsely granulate.

There is a male that does have the same characters of integumental sculpture and clothing as the female of *mergus*, and that is *T. minor* Rohwer (Trans. Amer. Ent. Soc. 35: 127, 1909), also described from Lee Co., Texas. The differences in sculpture are in degree only and not in kind, the puncturation of the front and propodeum being somewhat sparser than in the female; these differences are what one would normally expect between the two sexes of a species. The only noteworthy difference between the female *mergus* and male *minor*, other than those of a sexual character, is that the male has ferruginous tibiae and tarsi whereas these are black in the female except for the ferruginous apices of the tarsal segments. This color difference is unusual (females in this group usually have more extensive ferruginous markings when they are present), but *mergus* is an anomalous species, so much so that Banks erected a discrete genus, *Tachyoides*, for it and the closely related *ariella* Banks from Arizona. Some further data of value in associating *mergus* and *minor* are to be found in the distribution; *mergus* females are known from New Jersey (type of *mergus*) [ANSP], Georgia (Fattig) [USNM] and Texas (type of *obscuranus*) [USNM], while *minor* males are known from Florida (Scudder) [KVK] and Texas (type of *minor*) [USNM]. Males of *obscuranus* are known from the type locality only.

I believe that the similarity of structural characters and distribution leaves no alternative but to consider *minor* a synonym of *mergus*. This belief is strengthened by the fact that one of the characters mentioned above, the narrow impunctate strip on the front, is to be considered of subgeneric value and, in fact, the only one which will separate both sexes of *Tachyoides* from *Tachynana*.

This action leaves the male of *obscuranus* without a name. Perhaps it should be described as new, for it is distinct from other known nearctic males. However, I suspect that the female with which it should be associated probably has been described, so I shall refrain from creating possible additional synonymy. While I have no definite data, other than identical distribution, it appears likely that the male of *obscuranus* may be the hitherto unknown male of *birkmanni* Rohwer (Ent. News 20: 199, 1909), also known only from Lee Co., Texas. The two sexes are similar in characters of the integumental sculpture and clothing, but differ in the female having a ferruginous and the male a black abdomen. However, this difference in coloration of the two sexes is normal for several species of *Tachytes*.

In my opinion *Tachyoides*, which Banks established as a genus for *mergus* Fox (genotype) and *ariella* Banks, merits subgeneric rank only. The male characters which Banks cites for *Tachyoides* are useless, since they are based on the male of *obscuranus*, a member of *Tachytes* (*Tachynana*). The distinguishing characters of *Tachytes* (*Tachyoides*) appear to be the elongate fusiform scape and the sparse bristles on the pygidium in the female, and the narrow, oblique, shining, glabrous, impunctate strip on the front of both sexes. The scape of the male is not elongate, and the pygidial bristles are no more sparse than in some other males of *Tachytes;* the fore femur is shallowly sulcate beneath at base, and the process at apex of fore coxa is a small, short, blunt tubercle.

II. The Status of *Anacrabro robertsoni* Rohwer.

In a recent paper Pate (Notulae Nat., No. 185: 1, 1947) places the New Mexican *Anacrabro boerhaviae* Cockerell and the Floridian *A. robertsoni* Rohwer as synonyms of *A. ocellatus* Packard, remarking (p. 2), "Cockerell's *boerhaviae* is a very fully maculated form of *ocellatus* and might be recognized as a colour variety. Rohwer's Floridian *robertsoni* is merely a melanic specimen." I am in complete agreement with Pate's action in synonymizing *boerhaviae*, but I feel that his synonymizing of *robertsoni* is not justified by the material before me.

Apparently Pate considered only the fuliginous wings and paler maculations of *robertsoni* in deciding that it was just a melanic specimen of *ocellatus*, for he makes no reference to Rohwer's remarks (Proc. Ent. Soc. Wash., 22: 58, 1920) concerning the less coarsely punctured abdomen and opaque and more closely punctured mesonotum as distinguishing *robertsoni* from *ocellatus*. Recently I have had an opportunity to study a series of 16 females and one male from Gainesville, Florida, Sept. and Oct. 1946 and Oct. 1947 (H. E. Bratley; on *Borreria*) and the unique female type of *robertsoni* [USNM] from Inverness, Florida. These specimens are very constant in sculptural characters and vary only slightly in the extent of maculations. They are quite different from *ocellatus*, as shown in the appended key for separating the two forms.

Integument of head and thorax more shining with weaker microscopic impressed tesselation; mesonotum with most of punctures more separated; mesopleuron with upper half very sparsely punctate; puncturation of abdominal tergites coarser, most noticeably so on first tergite, second to fifth tergites in female and second to sixth in male strongly constricted at base; forewing very weakly infumate beyond stigma; pale markings bright yellow.

ocellatus ocellatus Packard

Integument of head and thorax more opaque because of the stronger microscopic impressed tesselation; mesonotum with many of punctures contiguous; mesopleuron with upper half bearing more numerous punctures, many of which are contiguous; abdominal tergites more finely punctate, second to fifth tergites in female and second to sixth in male not strongly constricted at base; forewing beyond stigma strongly fuliginous; pale markings whitish-yellow.

ocellatus robertsoni Rohwer, NEW STATUS

These differences are of degree only, but are constant for the two forms, and I have seen no specimens which I would consider intergrades. Furthermore, the distribution appears to be discontinuous. Typical *ocellatus* is essentially a more northern form and apparently is to be found only at the higher elevations, and then very rarely, as one goes south (the most southern records I have from the Southeastern States are Auburn, Alabama, and Stone Mt., Head River and Covington, Georgia). The atypical subspecies, *robertsoni,* is known from Inverness and Gainesville, Florida, several hundred miles from the most southern locality in which typical *ocellatus* has been taken.

A Case of Synonymy in the Family Neididae (Hemiptera-Heteroptera).—

Jalysus caducus Distant

Neides caducus (Distant) 1893, Biol. Centr. Amer., Rhynch. II, Append., 460.

Jalysus enlongatus Barber 1911, Jl. N. Y. Ent. Soc. XIX: 23.

Professor H. M. Harris of the Iowa State College of Agriculture, recently informed the author that *Jalysus elongatus* Barber from Arizona is the same as *Neides caducus* (Distant), described from Mexico and Panamá. He sent a male specimen collected by him in Guatemala for confirmation.—H. G. Barber, Roselle, N. J.

A MASS COLLECTION AND POPULATION SURVEY TECHNIQUE FOR LARVAE OF TABANIDAE (DIPTERA).

By Norman S. Bailey, Harvard Biological Laboratories, Cambridge, Massachusetts.

Herein are recorded observations made during the late summer of 1946 concerning the habits and distribution of larvae of *Tabanus nigrovittatus* Macquart. The chief center of these investigations[1] was the salt marsh area around Pine Island, Newbury, Mass. However, various points from Gloucester to Salisbury were frequently visited for study and comparison. The field work began on July fifteenth and was continuous until mid-September. Thereafter a few trips were made to the marshes throughout the fall. The last larval collection was taken on Plum Island in early November.

Larvae of *T. nigrovittatus,* the Saltmarsh Greenhead, are typical of the family. They are elongate-fusiform and those collected ranged from two to twenty-four millimeters long when well expanded by killing in 70–80% alcohol. They were remarkably resistant to the alcohol and lived six hours or more in that medium. A distinctive feature is their uniform pale amber color which is noticeable even in the smaller specimens. Their coloration is so similar to that of the marsh straw in which they are commonly found that it requires some practice to notice them. The only other species of the genus whose larvae are at all common in these salt marshes is *Tabanus atratus* Fabricius. Larvae of this species are readily distinguished from the first by their larger size and whiteness. The anterior margin of each segment is also conspicuously marked with irregular dark brown to blackish rings. Furthermore, larvae of *T. atratus* prefer the wettest situations. They are found under straw where the tides regularly flood the surface and are especially abundant under such debris on the mud of undrained marsh areas like those adjacent to the Ipswich Town Farm. They also occur in the algae and other organic materials in the ditches and about the margins of shallow pools.

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[1] These investigations are in progress under the direction of a joint board of the State Department of Public Health and the State Reclamation Board. The study was authorized and financed by the Massachusetts Legislature.

For the first six weeks, or until August twenty-first, larvae were collected by digging in places deemed favorable. Some were located under the thick mat formed by dead culms of the wiry *Spartina patens* (Ait.) Muhlenberg where that grass is dominant. It was easiest to find them by turning over the piles of straw that accumulate near ditches at the upper reaches of the marsh. Even these simple methods, which yielded only the larger individuals, indicated plainly that *Tabanus nigrovittatus* larvae were very generally distributed over the marsh.

Through Mr. Robert W. Wales (State Entomologist) the experiences of Mr. Robert L. Armstrong were brought to my attention. Subsequently we conferred and still later Mr. Armstrong (now Superintendent of the East Middlesex Mosquito Control Project) wrote me personally of the experiments which he had conducted about ten years ago. At that time he had tried out various pyrethrum preparations as mosquito larvicides. In the course of his work the effects on larvae of Tabanidae were noted and the value of such materials for a study of their distribution was appreciated.

A few gallons of pyrethrum-kerosene emulsion manufactured by Seacoast Laboratories, Inc. of New York were then made available to me. The composition is approximately as follows: 65% kerosene, 0.035% pyrethrins, 0.1% thio-diphenyl-amine, 0.5% sodium lauryl sulfate, and 34% water. Starting August twenty-first, this concentrate was used in the manner suggested by Mr. Armstrong with the excellent results tabulated below for a survey of the distribution and numbers of *T. nigrovittatus* larvae in the salt marsh. For this study the larvicide was mixed in the field roughly at the rate of one quart of the concentrated emulsion to 7 or 8 quarts of water and applied by hand with a rubber bulb seed-flat sprinkler. One pail of this mixture was enough to treat five plots each a yard square. The area to be lightly soaked with the larvicide was first cleared of straw, vegetation, or other cover both to insure good penetration and to make the larvae more visible. For cutting the dense, tough stands of *Spartina* on these small plots a linoleum knife with its hooked blade was found very serviceable. At the best it was slow, tedious work. The procedure was to clear and spray a series of about five plots in succession. The sites chosen were usually in a limited area but each was selected because it differed from the others in the type of cover or in the amount of moisture present. Before the last area was cleared and treated, larvae would be coming to the surface on the others and the collector could move in rotation from one plot to another recovering the larvae as they appeared. Within half an hour after the last application of the pyrethrum it was safe to consider that practically all of the larvae had been taken. This technique fully confirmed the fact that larvae are widely distributed in the marsh sod.

An important consideration is that larvae of this species rarely occur where there is any standing water. A few were located in litter in a ditch bottom at low tide. On the other hand, they were as rarely taken in places where the muddy marsh peat was fully exposed. Larger specimens frequently found in the straw piles were seeking these drier situations for pupation as is customary for Tabanidae. Most of the pupae and pupal cases found came from similar places. In general, the larvae were most abundant where there was a cover of living plants. Mats of grasses, their dead culms, or drifted straw maintain uniform moisture conditions which keep the surface sediments soft and favor the free movements of the larvae. The cover also provides shelter for small crustaceans, snails, and other animals on which they may feed. This indicates that marshes ditched for salt marsh hay production and for mosquito control have greater expanses of suitable larval habitat than natural marshes where extensive areas support no plant growth and the bare mud is subject to alternate drying and flooding. These extremes appear to be equally distasteful to this species.

The larvae respond quickly to the effective pyrethrum treatment. About five minutes after the emulsion is applied they begin to appear on the surface. They are evidently only an inch or two deep when temperatures and moisture conditions favor activity. After emergence they writhe in discomfort or crawl rapidly and aimlessly about. In a short time they straighten out, appear stiff and somewhat swollen, and become inactive. The spray mixture kills other Arthropods also. Spiders, the numerous marsh amphipods, and such other insects as may be wetted usually succumb quickly. Other types of larvae, *Culicoides* pupae, and small round worms have been brought to the surface as well. Indications are that all Tabanid larvae present are killed by this material since subsequent applications fail to bring more than one or two larvae from plots that on the first occasion yielded an average number. These few can be accounted for by movement into the area after the original treatment. Also, now and then a dead larva is found on a plot sprayed a day or two earlier when carefully reexamined. These probably came to the surface after the collector left, and died from the effects of the pyrethrum-kerosene, the exposure to sun and air which desiccate them or, probably, from a combination of these factors. From the writer's experience, the pyrethrum emulsion is not to be considered a practical control larvicide. It is, however, a substance which greatly facilitates the location and the collection of large numbers of larvae. It is a useful tool to be used for studies of the seasonal population trends and of the developmental cycles of such species as respond to it in the manner described. The explanation and figures that follow will suggest some of the kinds of information to be gathered by this technique. This data is of a preliminary nature and will serve as a basis for a more elaborate and extensive program to be carried on regularly during the 1947 season.

The following types of evidence are particularly noteworthy. When a large number of larvae are taken in a limited area there is a marked tendency for the average size of the specimens to be small. Where relatively few are present they are commonly of larger average size. This is to be expected with such strongly cannibalistic species. As they grow they must disperse to survive for two reasons. First, they must avoid the predatory instincts of their own species and, secondly, they must find an adequate food supply. The larger doubtless seize and devour many of the weaker individuals which further decreases the local population. Also of note is the high percentage of small specimens. This seems normal for September. Nevertheless, an unanticipated abundance of large larvae was discovered (e.g., plot #31). Variation in larval length bears importantly on what now appears to be an extended period of adult emergence and a correspondingly extended period of oviposition. There is doubtless considerable variation in the rate of growth of individual larvae depending on such uncertain environmental factors as temperature, moisture, cover, and food supply. A notable fact is the concentration of uniformly small larvae (e.g., plots #26 and #30) that occur at points so far from known sites of oviposition as to preclude the possibility of their migration. With the exception of one small cluster, all Tabanid eggs (of other species) found were laid in the usual masses on scattered plants (chiefly *Spartina alterniflora* Loisel. var. *pilosa* (Merr.) Fernald) growing in the shallow water near the edges of ponded places on the marsh. Yet many larvae under 7 mm. long were found hundreds of yards from such egg sites on the Pine Island Marsh. Probably an appreciable number of these small specimens were also overlooked since they are very difficult to see in the grass stubble. The eggs of *T. nigrovittatus* are known definitely only from an infertile cluster laid by a caged female. They are about two millimeters long and, therefore, at the time of hatching the larva is approximately the same length. The general occurrence of small larvae supports the belief that the females oviposit widely over the marsh. This may well account for the success of the species since wide distribution of the eggs would favor a maximum survival of these voracious larvae.

The following table gives about half of the 1946 data since this sample is adequate to reveal the advantages of the methods employed. Each new plot is numbered in sequence and a site previously treated is given its original number followed by *R* for a repeat examination and respraying (i.e., 16R) or followed by *r* for a repeat examination only (i.e., 16r). It is quite significant that after the

TABLE I.—Larval collections from the Pine Island Marsh in Newbury—1946

Date	Plot number	Number of larvae	Size extremes	Average length	Density of cover	Relative wetness	Larvae found before spraying
			mm.	*mm.*			
9/5	16	90	5–23	9.8	Straw	Muddy	24
	17	18	6–20	12.8	Dense	Soggy	....
	18	31	3–17	9.1	Thin–dense	Muddy	....
	11R	1	......	......	(Thin)	(Muddy)	1, dead
	19	0	......	......	Sparse	Muddy	....
9/7	20	5	12–18	15.2	Dense	Moist	....
	21	8	10–16	12.9	Thin-dense	Moist	....
	22	4	7–14	11.3	Dense	Moist	....
	23	3	10–16	12.6	Straw	Soggy	1
	18r	1	......	12.0	(Thin-dense)	(Muddy)	1
	17r	5	7–11	9.8	(Dense)	(Soggy)	5, dead
	16r	4	6– 9	7.5	(Straw)	(Muddy)	4, dead
	13R	0	......	......	(Dense)	(Soggy)	....
9/11	24	29	3–21	11.4	Dense	Soggy	....
	25	32	3–20	9.7	Thin	Muddy	....
	26	69	5–18	9.2	Straw	Muddy	....
	16R	2	9– 9	9.0	(Straw)	(Muddy)	....
	17R	2	10–12	11.0	(Dense)	(Soggy)	....
9/12	27	4	11–18	15.3	Straw	Muddy	....
	28	40	3–20	10.3	Thin	Muddy	....
	29	27	7–21	13.8	Dense	Moist	....
	30	129	3–18	7.6	Sparse–thin	Muddy	....
	16r	4	7–12	9.8	(Straw)	(Muddy)	4, dead
10/6	31	38	6–24	16.9	Dense	Moist	....

initial study there is little or no cover on a plot, which means that the surface is fully exposed to sun and wind and daily becomes noticeably drier. This is emphasized in the table by enclosing the key word to the original conditions in parentheses, e.g., (soggy). Removal of the cover results in surface drying, exposure to light, and higher temperatures which are all unfavorable to these larvae. They therefore avoid such areas. At first the spray residues may be the major factor. But the larvae tend to remain scarce in these plots weeks later when the spray materials must largely have dissipated. Records show an average of 22.68 larvae per square yard of treated marsh based on a total of 726 from 32 different plots. Continuation of these studies during the 1947 season may furnish sufficient additional data to explain the above facts and to make rather accurate interpretation of the larvae cycle possible.

Cover density:

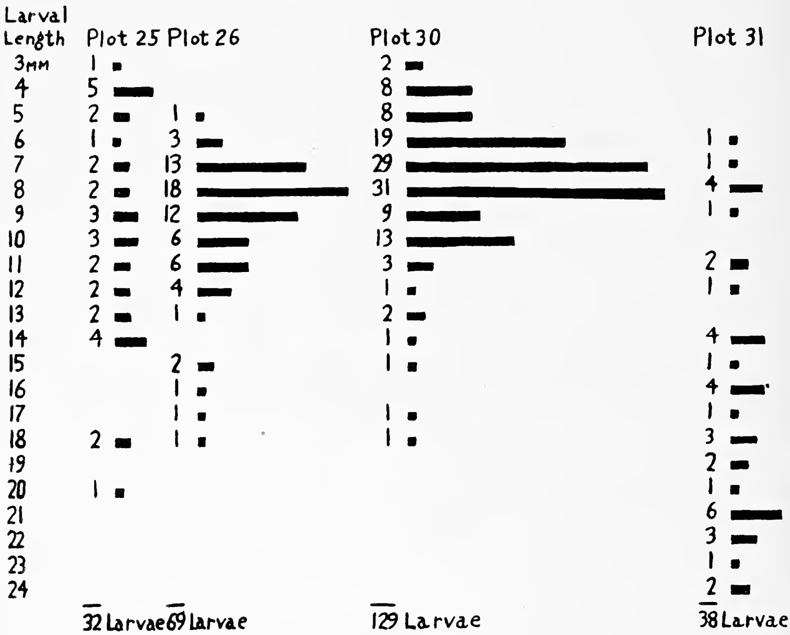
- Barren—no seed plants, algal mat may be present.
- Sparse—scattered plants, soil visible from a few feet away.
- Thin—soil visible from above, typical of *S. alterniflora* stands.
- Dense—thick growth of plants completely obscuring soil, *S. patens.*
- Straw—drifted heaps of debris over mat of dead plants or on bare mud.

Relative moisture (when site was first cleared):

- Dry—barren places after period of dry weather.
- Moist—edges and better drained parts of marsh.
- Soggy—usual where *Spartina patens* is dense.
- Muddy—usual for stands of *S. alterniflora* or under straw.
- Water—shallow depressions where water collects after rains or tidal flooding, impractical to spray where there is more than an inch.

The following graphs show the size distribution of larvae from four of the plots in the table above. The column at the extreme left of the graphs specifies the length of the larvae in millimeters. The number of larvae of each size is indicated for the individual plots by the figures at the left of the bars which are also proportional. Larval totals are given for the different plots at the base of each graph.

Key to observed conditions cited in Table I.



Summary and Conclusions.

Some observations concerning the habits and distribution of larvae of *Tabanus nigrovittatus* Mac. in the salt marshes of Essex County, Massachusetts, are reported. The larvae of this species are readily distinguished from those of *T. atratus* Fab., which are also common in the salt marsh, by their smaller size, pale amber color, and marked preference for somewhat drier, plant-covered situations. *T. nigrovittatus* larvae rarely occur where there is standing water or the marsh peat is bare of vegetation—except in heaps of straw. However, they are found more or less generally abundant in the marsh turf where *Spartina alterniflora* var. *pilosa* and especially *S. patens* form the sod. Consequently, ditched marshes are more favorable since they offer more extensive areas suitable for the growth of these grasses. Many nearly mature larvae were found in the straw piles where most of the pupae and pupal cases were also located.

A method of plot selection, preparation, and treatment is described. By the use of a pyrethrum-kerosene emulsion it is possible to collect large numbers of the larvae. Other Arthropods present also proved susceptible to this mixture. Preliminary results are presented in tabular and graphic form. They support the conclusion that data from such larval studies may be of value in determining larval distribution, population trends, and the developmental cycle.

Seven hundred twenty-six larvae were taken from 32 plots giving an average of over 22.6 per square yard of treated marsh. Yields from individual plots varied from 0–129 larvae. The smaller larvae are more numerous in the moister situations and occur in large concentrations. Much variation in larval length corresponds with adult collections which suggest an extended period of emergence and of oviposition. General distribution of small larvae in the marsh supports the conclusion that the eggs, of which little is yet known, are widely disseminated. This may prove to be a major factor in the success of the species.

To Dr. Joseph C. Bequaert, Curator of Insects in the Museum of Comparative Zoology, I am greatly indebted. He generously took time to determine the Tabanidae and liberally assisted me in many other ways. The progress of this study owes much to his friendly guidance.—N.S.B.

Grasshoppers in Turkey's Crop.—Among the notes in the files of the late Dr. W. W. Henderson, under date of July 3, 1932, I found the following: "Dr. M. H. Knudsen says he helped to count the grasshoppers in one turkey's crop—816." Large turkey flocks in Utah have, in the past, eaten great numbers of nymphal and adult grasshoppers. Often turkeys have been of importance in reducing local grasshopper outbreaks and in eliminating populations of these injurious insects from farms over which flocks of several thousand turkeys have been allowed to range. During 1945, Utah produced 2,036,000 turkeys. The present trend is to raise the turkeys without sending them out on the range to feed on grasshoppers.—G. F. Knowlton, Logan, Utah.

BOOK NOTES.

Pulgas. Bibliografia, catálogo e animais por elas sugados. By A. da Costa Lima and C. R. Hathaway. Monografías do Instituto Oswaldo Cruz, No. 4; Rio de Janeiro, December, 1946; pp. 1–522.

Parasitism, in its manifold aspects, is one of the major phenomena of the organic world. Its many theoretical and practical implications cannot be properly understood, unless the parasites and their hosts have been adequately studied. Parasitologists, well aware of this, devote much of their time to taxonomic matters. In fact the number of newly described parasites increases at such a rate that it baffles both the beginner and the non-specialist. Fortunately, from time to time some industrious specialist has the courage, or temerity, to produce an up-to-date catalogue of his particular group. It is my pleasure to review here such a catalogue covering the fleas of the world.

The authors have divided their voluminous tome into four parts. The first, of some 70 pages, is a bibliography of the order, arranged chronologically, from 1544 to 1944. The bulk of these publications appeared during the past two centuries, those anterior to 1746 covering less than a page. It may be noted, moreover, that it is doubtful whether the first work listed, by Antonio Moschetti, actually appeared in 1544, as given by Hagen, who never saw it. Horn and Schenkling (1928) only saw the 1625 Venice edition (304 pp.). The bibliography is marred by unfortunate misspellings, some authors' names being unrecognizable (f.i., Hoff for Hoof, p. 66; Seg for Séguy, p. 65).

The list of genera, subgenera, species, and subspecies is the bulk of the work (pp. 77 to 332). The genera are arranged taxonomically under families and subfamilies, Wagner's (1939) classification being adopted with slight modifications. Through an oversight Wagner's paper (in Bronn's Klassen u. Ordnungen d. Tierreichs, vol. 5, Sect. 3, Book XIII, pt. f, pp. 1–114) was omitted from the bibliography. In each genus or subgenus the species are arranged in the chronological order of the original descriptions. References to the literature are very complete and are one of the most commendable features.

The third part lists the known hosts, arranged by orders and families, the genera alphabetically in each family, with the fleas recorded for each species (pp. 333–445). The concluding part is an elaborate index of over 100 pages, which is a real key to the book, as it includes the names of the fleas and their hosts, as well as of the authors cited in the bibliography.

The only previous attempt at listing the fleas of the world was by Dalla Torre in 1924. This was extremely sketchy.[1] Dalla Torre recognized 80 genera with 619 species and subspecies. Some twenty years later, these numbers have more than doubled in the present catalogue, to 175 for the genera (with 12 subgenera) and to 1189 for the species and subspecies. All forms described at the close of 1941 and most of those published in 1942 and 1943 are included. These figures give an idea, not only of the activity displayed in the field, but also of the amount of labor involved in compiling the catalogue.

In a work of this magnitude, some errors or oversights are unavoidable; but, so far as I could notice, they are all of minor importance and do not in any way detract from the value of the book. For some years to come it will be an invaluable guide. The authors fully deserve the thanks and congratulations of their fellow workers.—J. Bequaert, Museum of Comparative Zoology, Cambridge, Massachusetts.

New Records for Stygnocoris rusticus Fallén.—*Stygnocoris rusticus* (Fall.) is recorded in Europe as occurring on *Pulvinaria*. Brother Joseph Ouellet of the Institution des Sourdo-Muets, Montreal, writes me that in Canada this species is taken in numbers from the heads of the common yarrow. In addition to the previous Maine and New York records specimens have recently been seen from Belvidere, Ill. (J. A. Slater) and Duckabush, Wash. (Dr. C. O. Esselbaugh.—H. G. Barber, Roselle, N. J.

[1] Dalla Torre also misspelled several generic names: *Gatallagia* (p. 10) for *Catallagia; Amphypsylla* (p. 18) for *Amphipsylla; Malacophsylla* (p. 18) for *Malacopsylla;* and *Roosveltiella* (p. 24) for *Rooseveltiella.* These variants are not listed in S. A. Neave's recent "Nomenclator Zoologicus." Only one of them (*Gatallagia*) is noted by da Costa Lima and Hathaway.

PROCEEDINGS OF THE SOCIETY

Meeting of November 13, 1947.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on November 13, 1947.

The meeting was called to order at 8 P.M. by President R. R. McElvare. Members in attendance were Messrs. Sheridan, Nicolay, Teale, Naumann, Buchholz, McElvare and Tulloch.

The minutes of the meeting of October 16, 1947, were read and accepted. By a supplementary motion the minutes of previous meetings for the calendar year were ratified, and the election of officers confirmed.

It was voted to contribute five dollars to Zoological Record.

Mr. Teale reported for the committee appointed to arrange for activities associated with the 75th anniversary of the Society. This committee recommended that we hold the celebration at the regular December meeting and they presented a program for the consideration of the members. They also recommended that we signalize the occasion by conferring honorary membership on Dr. J. McDunnough of the American Museum of Natural History and Dr. Joseph Bequaert of the Museum of Comparative Zoology. The report of this committee was accepted and they were given authority to proceed with final arrangements for this celebration.

Upon motion of Mr. Naumann which was seconded and carried it was voted to appropriate $250 toward the expenses of the Editor for the year 1947.

Informal consideration was given to the possibility of moving the meeting place of the Society to a more central location.

The meeting adjourned at 9:30 P.M.

Respectfully submitted,

George S. Tulloch.

Meeting of December 11, 1947.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on December 11, 1947.

The meeting was called to order at 8 P.M. by President R. R. McElvare. Members in attendance were Messrs. Gaul, Sheridan, Teale, Buchholz, McElvare, Olsen, Tulloch and Nicolay. Guests for the evening were Dr. James McDunnough, Messrs. Hessel, Glanz, Kellner, Pallister and Crystal.

The regular order of business was suspended and the program of the evening was devoted to an informal celebration of the 75th anniversary of the Society. In his opening remarks President McElvare said in part:

"The Seventy-Fifth Anniversary of the Society finds us in a period of transition to a new age, the nature of which we can not clearly discern. Within the memory of the youngest of those present, we have witnessed the end of an era that began with the Renaissance, a period which recognized the dignity of the individual man and was greatly interested in his experiences and culture. Latterly, we have seen a strong trend toward submerging the individual in great masses of humanity, manipulated for its own ends by powerful centralized bureaucracy. Under such circumstances the work of professional scientists would inevitably be circumscribed and directed into channels of governmental selection, rendering the status of the amateur increasingly significant. Free to pick his own sphere of interest and to pursue it in his own way, the amateur can still explore his subject in the spirit of the Renaissance, despite the blighting shadow of totalitarian planning. So tonight, instead of looking backward as is the custom on anniversaries, it might be significant, for a little while, to look ahead and consider in what phases of entomology the amateur can make his greatest contribution."

Following these remarks, the President announced that the Society had honored itself by electing to Honorary Membership, Dr. James McDunnough, until his retirement, Chief, Systematic Entomology at Ottawa and currently doing research at the American Museum of Natural History, and Dr. Joseph Bequaert, Head of the Division of Insects at the Museum of Comparative Zoology and a life member of the Society.

Mr. Edwin Way Teale reviewed the history of the Society. Mr. Olsen who was Treasurer of the Society for many years added interesting bits of information concerning some of the members who were active around 1910.

Following the discussion of the history of the Society, a symposium entitled *Looking Forward in Entomology* was held. The President posed the question as to how the amateur entomologist best can make a contribution to the science of entomology. Dr. McDunnough was called upon for his thoughts on this subject. Prefacing his remarks with a graceful appreciation of election to Honorary Membership in the Society, he pointed out that although we know a great deal about adult insects, our knowledge of the immature forms in many of the orders and families is extremely meager. He suggested that life history studies would be an interesting and profitable field of exploration for the amateur. There was an extended discussion of Dr. McDunnough's suggestion and it was generally agreed that such studies would be a good way for the amateur to aid in the increase of entomological knowledge.

A sidelight of the discussion related to the lack of cooperation between amateur and professional entomologists. It was thought that relations between these groups could be improved only if the professional entomologist was willing and would be permitted to help the amateur seeking information. It was reported that many professional entomologists are anxious to help the amateurs with their problems but are unable to do so because of institutional or other regulations.

The Secretary read a letter from Mr. Henry Bird of Rye, New York, in which he expressed regret that he would be unable to attend the anniversary celebration. He stated that "doubtless the name of William T. Davis will come up and should I attend permission would be asked to read an excerpt of a letter (a copy of which is attached) reflecting an instance in the history of the Society's past. You may read the excerpt if you think it will fit in." The excerpt was read to the Society and the Secretary was instructed to incorporate it into the minutes.

Excerpt of a letter to William T. Davis from Henry Bird dated November 25, 1911.

"Maybe you are not aware of it, but I fancy you little appreciate what a vacancy in affairs your absence from town makes. As I know it will not make you vain, I want to show you to what an extent this is so.

"I had to go to Brooklyn the 17th, the date of the Brooklyn meeting and concluded to take it in.

"There was time enough to run out to the Museum in the afternoon.

"Saw Doll and asked him if he would attend to hear Mr. Week's paper on *Acronycta*?

"Yes, he might go, but there would be no one there—Mr. Davis was out of town.

"Later saw Schaeffer.

"Discussed last New York Society meeting—nothing doing, Mr. Davis was away, nobody there.

"Arrived early at Franck's.

"Very glad to see me but did not expect much of a meeting. Mr. Davis was away and Prof. Smith sick.

"Soon in comes Schoonmaker.

"Very gloomy. Mr. Davis in Florida and Prof. Smith all gone to pieces; wouldn't have come out only he needed some supplies from Franck.

"Enter Mr. Dow.

"Condition ditto. Likewise a number of others.

"Of the twenty-five or thirty that attended, eight informed me without any leading queries that the meeting was to be a flat failure, *before it began,* all because Mr. Davis was not there.

"So you see it behooves you to employ discretion in the disposition of such an important personality."

The Secretary read a letter from the New York Entomological Society congratulating the Brooklyn Society on this occasion.

The meeting adjourned at 10:00 P.M.

Respectfully submitted,
GEORGE S. TULLOCH.

EXCHANGES AND FOR SALE.

This page is limited to exchange notices and to small For Sale advertisements from members of the Society and from actual paid subscribers to the Bulletin exclusively. *Exchange notices* from members of the Society and from subscribers are limited to *three (3) lines each,* including address; beyond 3 lines, there will be a charge of $1.00 for each 3 lines or less additional. *For Sale* ads will be charged at $1.25 for each 3 lines or part of 3 lines. *Commercial or business* advertisements will not be carried in this page, but will go in our regular advertising pages at our regular advertising rates to *everybody.*

PENTATOMIDAE: Want to buy or exchange Pentatomidae from the United States and Mexico. Herbert Ruckes, College of the City of New York, 17 Lexington Ave. N.Y.C.

ACALYPTRATE DIPTERA OF THE WORLD wanted for determination or in exchange for other insects. Geo. Steyskal, 23341 Puritan Ave., Detroit, Mich.

WANTED.—MANTID EGG CASES from West of the Mississippi River. If interested in collecting, write: Osmond P. Breland, The University of Texas, Austin, Texas.

WILL PURCHASE complete sets of the BULLETIN, Old Series, Vols. 1–7, 1878–1885. Brooklyn Entomological Society, Ivy Way, Port Washington, L. I., N. Y.

LEPIDOPTERA AND ORTHOPTERA from Florida in papers and local specimens mounted to exchange for other Lepidoptera. —Alex K. Wyatt, 5842 N. Kirby Avenue, Chicago (30), Ill.

"LEPIDOPTERISTS! Drawer front labels 2 7/8″ × 1 6/16″ on white-faced board at cost! Non-profit! Don't delay, write today! Kent H. Wilson, 430 Ridgewood Rd., Fort Worth 7, Texas."

WANTED—Geometrid moths, for cash or exchange. John L. Sperry, 3260 Redwood Drive, Riverside, Calif.

CERAMBYCIDAE AND CHRYSOMELIDAE from Asia and Pacific desired for determination; purchase; exchange.—J. Linsley Gressitt, Lignan University, Canton, China.

FOR COLEOPTERA OF THE WEST INDIES and Chrysomelidae of the world, will collect entomological material from Cuba, by previous arrangement. Am interested in buying literature in the above-mentioned classes, and would be glad to be advised by individuals or institutions of such articles; or to send them to me. Manuel Barro, Calle 12, no. 220, altos, apto. 3, Vedado, Habana, Cuba.

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BULLETIN

OF THE

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The Brooklyn Entomological Society

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J. R. de la TORRE-BUENO, Editor,

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XLIII April, 1948 No. 2

ADDITIONS TO VESPINE BIOLOGY—IV: NOTES ON INTERSPECIFIC TOLERANCE, ORPHAN NESTS, AND ORPHAN WASPS (HYMENOPTERA, VESPIDAE).

By Albro T. Gaul, Brooklyn, New York.

This discussion is to record a series of observations and experiments concerning the toleration instincts and the conduct of more or less deserted nests of some of our northeastern Vespinae. The observations have been made over a period of several years in New York, New Jersey and Connecticut.

Interspecific tolerance may be defined as the forbearance of individuals of one species from attacking intruding individuals of an alien species. It has been shown that certain Vespinae have an almost complete *intra*specific tolerance, while they are almost completely *inter*specifically intolerant (1, 2).* An experiment was therefore planned to determine whether individuals of one species could adapt themselves to accept, in the same society, members of another species.

Since ergates kill intruding ergates or gynes of another species (except in the case of inquilines), it was thought impossible to effect a successful transplantation of imagine forms into an alien colony. Consequently, it was decided to place an alien comb with brood in a nest of a closely related species.

The first opportunity for this experiment was presented on September 2, 1946, when I had nests of both *Vespula maculifrons* Buy. and *V. squamosa* Drury at my disposal. It was thought that these two colonies might present optimum possibilities for a successful brood transplantation because both species have the same nesting and feeding habits, and both belong to the same subgenus.

* Numbers refer to Literature Cited.

On September 2, therefore, I anaesthetized the *maculifrons* and *squamosa* colonies; removed a section of comb from the *maculifrons* colony, and placed it (with its eggs, larvae, and pupae) in the *squamosa* nest. On September 3, the *squamosa* nest was placed out of doors and was regularly observed thereafter.

For a number of days there seemed to be no deviation from normal colonial activities. Since the ergates of *maculifrons* and *squamosa* are similar in superficial color pattern and in size, they could not be determined while in flight to or from the nest. On September 15 the nest was again anaesthetized to determine whether this transplantation of brood had succeeded.

The comb of *maculifrons* had been incorporated into the *squamosa* nest. It had been attached to the original nest by new suspensors and was further fastened to the envelope, much as normal repair on a loosened comb. There were 18 ergates of *maculifrons* among the *squamosa* ergates. Some of the *maculifrons* comb contained new eggs, probably deposited by the *squamosa* gyne. The nest was returned out of doors and was not again disturbed until it was found deserted on October 16, 1946. During this time the *maculifrons* brood had all matured and the walls of the comb cells had been stripped, leaving the basement of the comb. There were a few *maculifrons* males left in the nest.

This experiment may be interpreted in terms of the normal instincts of Vespine ergates. Except when social degeneration results in cannibalism, there is no instinct to harm brood. Since there may never before have been brood of an alien species in a Vespine nest (except inquilines) there would be no instinct to harm this transplanted brood. Following their normal instincts, the *squamosa* ergates fed some of the alien brood and reared them to maturity. During this period they learned to accept the brood as their own. The *maculifrons* in turn, knew no other home and accepted the *squamosa* nest as their own. On October 6, I observed a lone *maculifrons* ergate effecting minor nest repairs; showing the *maculifrons'* acceptance of their home.

What factors caused the partial destruction of the *maculifrons* brood comb after it was used is a matter for conjecture. It has been shown, however, that species which are mutually intolerant of intruders can become tolerant toward the brood and reared imagines of the alien species.

Orphan Nests.

Phil Rau defines orphan nests as nests from which all the adult forms have been removed, but which still contain immature brood. His experiments with orphan nests of various species of Polistes (3) show that the first workers to emerge from a nest without adults are the workers which assume some of the duties of the queen, and manage colony affairs.

This also seems true among some Vespinae. On September 2, 1946, I removed a large piece of brood comb from the nest of *V. maculifrons* previously mentioned in this paper. I removed all the adults and placed the brood in a convenient cardboard box. The box had a "nest entrance" hole cut in one end. It was placed out of doors about seven feet from the ground. This position was not in keeping with the normal nesting habits of the species (which is a subterranean builder).

On September 5, 1946, two adult workers had emerged and walked about on the nest. As many individual wasps have clypeal markings of somewhat different configuration, I was able to identify these two wasps as individuals. These ergates could not have wandered into the nest from the original colony, as the original colony had been removed nearly one quarter of a mile on September 2.

By September 6, the two ergates were making regular, alternate, foraging trips. One always remained on the nest. By September 10, there were ten ergates on the comb. At this time, one of the original two ergates had encountered some catastrophe; the other remained on the nest and did not leave it at all. Some of the later arrivals also met their death, because on September 12 there were only seven ergates left. One of these was the same survivor of the first pair to emerge.

This is the only instance which has come to my attention where there has been an orphan nest of a Vespine. I have never seen such a condition in the field. It would seem though, that the behavior pattern of the first emerging wasp is similar to the pattern outlined for Polistes.

Orphan Wasps.

From time to time, when it has been necessary for me to capture colonies of Vespines during the daytime, because of the increased personal hazard presented by flying ergates, it has been expedient to remove the nest from its site and to leave hurriedly. This situation brings to light a new category which can perhaps be best described as "orphan wasps" or wasps whose homes have been removed during their absence in the field. By paying return visits to such nest sites, it has been possible to observe two general types of response on the part of these orphans, to the removal of their home.

The first, and commonest response: the few remaining wasps fly about the former nest site for several days and then either die or desert. This is the usual situation when a comparatively few ergates remain behind. This response has been noted among *Dolichovespula arenaria* F., *D. maculata* L., and *V. maculifrons* Buy. although it is probably a common occurrence among most Vespinae.

The second response, which occurs only when a comparatively large number of ergates are left at the original nest site, involves the construction of a new nest. Frequently, if enough workers are present and the season not too far advanced, they may even build a new comb in the nest. I do not know whether they rear brood in this comb. I have made observations of this type on colonial sites of *D. arenaria* and *V. squamosa,* and I suspect that the same thing will be observed among other species.

In the instance of the *V. squamosa* nest, the site was revisited one week after the capture of the nest. Since the nest was subterranean, the ground was smoothed over and more or less tamped into place after the excavation of the nest. It was rather surprising therefore to see an entirely new, albeit smaller *squamosa* nest in exactly the same place. The new nest was about one and one half inches in diameter, while the nest cavity was somewhat larger and contained about 15 ergates.

To a limited extent this observation conflicts with opinions on the selection of nest sites by the foundress queens, who are reported by Duncan (4) as selecting any available spot having some supporting matter from which to suspend a nest. Here is an instance in which the workers built a nest *where there was no available spot.* Perhaps the workers have no instinct to select a nest site, and therefore had to rebuild on the spot they knew; or (perhaps less likely) the ground in the former nest site was permeated with a nest odor (that boon to all unanswered questions) which continued to attract the workers to that spot alone.

A similar instance appears in my field notes of July 1939 at Lakeville, Conn. when orphan ergates of *D. arenaria* undertook nest reconstruction on the identical currant bush from which the parent nest had been removed.

In conclusion, by experimental methods, brood of one species of Vespine may be reared by another species of Vespine usually inimical to the adults. Brood comb having no adults will be likely to be superintended by the first ergates to emerge from that comb. Workers who are orphaned by the removal of their nest may desert the area or they may rebuild, depending on the number of workers left behind.

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A SPECIES OF WINTER CRANE-FLY NEW TO THE UNITED STATES WITH NOTES ON THE DISTRIBUTION OF THE FAMILY (DIPTERA, TRICHOCERIDAE).

By Edward I. Coher, University of Massachusetts, Amherst, Mass.

While engaged in a search for *Trichocera salmani* Alex., the author captured two males of *T. bituberculata* Alex., which has been known up to this time only from a unique male taken in Alaska in 1917. These flies were swept from Norway spruce in the rear of Fernald Hall, University of Massachusetts, Amherst, on November 13, 1947. Further collecting has failed to produce any more specimens. Since figures of the male genitalia have not been published, they are included below.

I am indebted to Dr. C. P. Alexander for correct identification of the specimens and the following data.

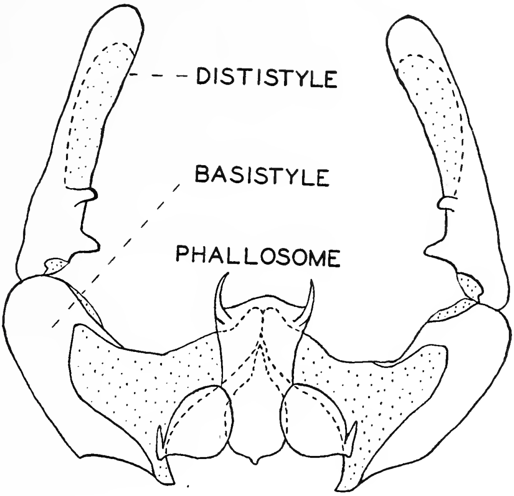
Trichocera bituberculata Alex.

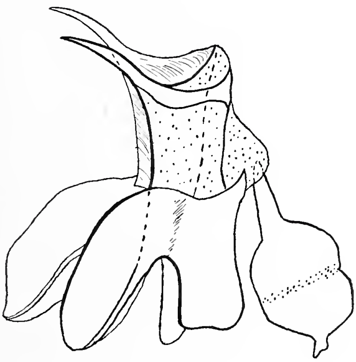
Insec. Insc. Menst. 12: 81–82; 1924.

Described from Bethel, Alaska. Collected September 25, 1917, by A. H. Twitchell.

There are four genera of the Trichoceridae in the world, *Diazosma* Bergroth, which contains two Holarctic species, being the most primitive. *Trichocera* Meigen is next in the ascending scale of evolution, including many species which are mainly Holarctic, most of these having a widespread distribution. A few are found in Chile, Australia, New Zealand, and elsewhere in the Southern Hemisphere, the latter representing well-known European species that have evidently been introduced by man. The next genus *Nothotrichocera* Alex. is a southeast Australian group, including Tasmania, and is composed of four species.

From the point of geographical distribution, the most highly evolved genus, *Paracladura* Brunetti is worthy of note. There are approximately twenty-five species having the following range. Eleven in New Zealand, none in Australia, five in Chile, very probably having spread via Antarctica, a single species is found in North America, *P. trichoptera* (O.S.), occurring in western United States and Canada. Other species occur in Asia being distributed through Japan, Formosa, and the Himalayas, thus forming an almost complete ring around the Pacific.





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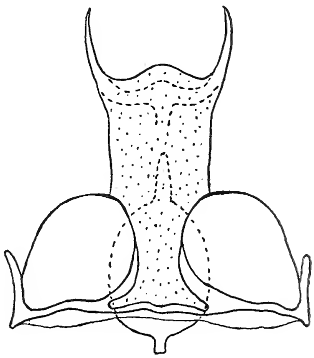


DORSAL

PHALLOSOME

Male genitalia of *Trichocera bituberculata* Alex.

SOME NEW SPECIES AND VARIETIES OF COLLEMBOLA FROM NORTH CAROLINA.

By D. L. Wray, Raleigh, N. C.

During the preliminary preparation of "The Collembola of North Carolina" many collections have been examined and the following new forms are so striking that they are described in the present paper. Of the six forms described, two belong to the Suborder Arthropleona, and four to the Suborder Symphypleona.

The new forms are:—*Lepidocyrtus unifasciatus* James var. *neofasciatus* new variety, *Entomobrya maizeae* n. sp., *Sminthurus virginidari* n. sp., *Sminthurus yonahlossee* n. sp., *Deuterosminthurus batrachos* n. sp., *Deuterosminthurus macgillivrayi* Banks var. *altamontus* new variety.

Family Entomobryidae.

Genus *Lepidocyrtus* Bourlet, 1839.

Lepidocyrtus unifasciatus (James) var. **neofasciatus** new variety (figs. 1–4).

Length up to 1.1 mm. General ground color yellowish-white or white. Antennae white except for very faint trace of blue pigment on Ant. III and slightly more on Ant. IV. With blue pigment on Abd. I, II, and III in variable amounts, but sometimes forming a solid band around body on these segments. With blue pigment forming a median band on Abd. IV, dorsally and ventrally. Some specimens show a narrow band of blue pigment dorsally at juncture of Abd. V and VI. Legs yellowish-white except for broad band of blue pigment on hind femora and traces on hind coxae and base of ventral tube. Furcula yellowish-white except trace of blue at base of manubrium. Dark spot at base of antenna. Eyes 8 on each side on a dark patch. Antennae slightly longer than head or as 105:75. Relative lengths of antennal joints as 17:25:22:41. Mesonotum very strongly projected anteriorly over head. Abd. 4 about 5 times length of Abd. 3. Unguis (fig. 2) with a pair of lamellae ending in a tooth on the inner margin and a tooth beyond the middle, and a pair of basal lateral teeth. Unguiculus three-fourths length of unguis, lanceolate, unarmed. Tenent hair knobbed at end and well developed. Dentes only slightly longer than manubrium. Mucro somewhat elongate with turned up apical tooth and a subequal anteapical tooth and basal spine (fig. 3). Heavily clothed with scales on mesonotum. Antennae, legs, and body with many fringed hairs, and ventral part of abdomen especially clothed with long, fringed setae. Dorsally on body there is one very long fringed seta to the segment (fig. 1). Dorsal crenulations of dentes ending three or less mucro lengths from mucro.

This form is closely related to *L. unifasciatus* James and differs from the latter in the following respects: In the ratio of the lengths of the antennal segments, the mesonotum projects more and is more densely clothed with scales, the dorsal crenulations of dentes ends a shorter distance from the mucro, the unguiculus is longer and narrower; there is a marked difference in pigmentation, the blue pigment is not only on Abd. 4 dorsally and ventrally but is on Abd. I, II, and III sometimes to form a solid band; there is less pigment on the antennae, and there is blue on the hind femorae, base of manubrium, hind coxae, and base of ventral tube.

The North Carolina specimens that I have placed as *L. unifasciatus* James have more pigment on them than the Ontario specimens. In the former the blue band on the fourth abdominal segment is irregular and narrows dorsally and there is some pigment on Abd. III. This may be a new color variety of *L. unifasciatus* James. This difference has been confirmed by Dr. H. G. James to whom I am much obliged for comparing my specimens with his type material of *unifasciatus,* and for giving me many helpful suggestions on this new form. Also Dr. H. B. Mills has informed me that he has taken an apparently white form of *unifasciatus* in Iowa. From this there probably is a series of color forms near *L. unifasciatus* James which need to be worked up.

Localities: Erwin, N. C., Nov. 16, 1946, taken from leaf mould at edge of swamp; Williamston, N. C., Jan. 29, 1947, from leaf mould near swamp, D. L. Wray, collector.

Family Sminthuridae.

Genus *Sminthurus* Latreille, 1804.

Sminthurus virginidari n. sp. (figs. 5–9).

Length 2 mm. Body color pattern in the form of a mosaic of a deep velvety purple-blue with a violet tinge on an ivory white background, giving the appearance of a maze of inlaid tiles of purple, violet, ivory, orange, tan and brown. Head with vertex and front with a network of mostly ivory with some intermingled orange and violet tile-like spots. Oral region ivory, sides of head and jaws mostly purplish-blue, antennae yellowish-orange throughout. Dorsum of body with a light purplish-violet mid-line extending from prothorax posteriorly for half the body length. On each side of this mid-line is a row of ivory colored tile-like spots which terminates in a broad, fan-like area of mostly ivory and tan spots. The anal segments are purple with large light spots anteriorly and ivory posteriorly. Ventrally the body is purplish and ivory colored anteriorly, and mostly posteriorly. The coxae and femora have purplish and ivory bands. The tibiae are ivory colored except for a purplish band dorsally. Manubrium and dentes pigmented except distally. Ventral tube unpigmented. Eyes 8 on each side, on black eyespots.

Antennae about 2 times the head, the relative lengths of the segments as 4 : 9 : 18 : 50; Ant. IV with 14 or 15 subsegments besides the basal and distal segments, with about 15 whorls of hairs. Ant. III with several proximal machrochaetae which are much longer than the many distal setae. Unguis stout and rather broad with a well developed tooth inwardly, and with large pseudonychia, and a well-developed tunica (fig. 7). Unguiculus broad basally, bearing an inner tooth and a heavy, subapical spine which extends beyond the apex of unguis. Tenent hairs absent. There are several heavy hairs on the inner face of the distal end of the tibiotarsus. Dentes with 3 long, erect dorsal spines, with many intervening spines half as long; with about 8 oppressed lateral, and about 6 to 7 oppressed ventral spines. Dens about 2.5 times the length of the mucro. Mucro (fig. 8) trough-shaped, obliquely truncate at distal end, the inner margin with about 15 irregular teeth and the outer lamella smooth. Mucronal bristle present. Subanal appendage of female simple, pointed, stout, and curving in its entire length (fig. 9). Clothing of head and body of long, curving, serrate hairs intermingled with shorter ones. On the vertex behind each eyespot is a large stout serrate hair. Body with at least 3 bothriotricha on each side, and one at the base of the lateral tubercle of the genital segment. The lateral bothriotricha form a wide angle, the middle one closer to the posterior one.

This species is undoubtedly the most beautifully colored insect form that I have ever examined and the beautiful colored mosaic pattern would rival any of the highly colored mosques of India. I have named this species after the supposedly first white child to be born in America, Virginia Dare, because it was collected within sight of the landing of the Lost Colony on Roanoke Island, N. C.

Locality: Manteo, N. C., October 24, 1946, D. L. Wray. Swept from vegetation while insect collecting and caught in net.

Family SMINTHURIDAE.
Genus *Sminthurus* Latreille, 1804

Sminthurus yonahlossee n. sp. (figs. 10–13).

Length up to 1.3 mm. Body dilated broadly behind, subtriangular. Color pattern a mosaic of purplish-blue and violet pigment forming spots, stripes, and light areas over the body on a white background. Vertex of head with a white area between the eyes; a pigmented chain between antennal bases; with a mid-longitudinal stripe and 2 stripes on each side of this on front of head from antennal bases down to base of clypeus where there is a transverse stripe; sides of head with light areas and pigmented spots; dorsal pattern (fig. 10) with a broad light irregular area down mid-line intermingled with pigmented spots and with a faint indication of a lightly pigmented mid-dorsal stripe; laterally and ventrally the body is a mosaic of light and pigmented spots; the ano-genital segment with lateral light spots and a large ventral light area; antennae purplish-violet throughout; ventral tube blue basally and unpigmented distally; legs lightly pigmented throughout, heavier on middle of precoxae, coxae, femora, and tibiotarsi; apex of tibiotarsi pigmented; furcula pigmented heavier basally, and with a trace distally. Eyes 8 on each side on dark eyespots. Relative length of antennal segments as 1 : 2 : 3 : 9, the 4th segment with 15 or 16 subsegments between the basal and distal segments. Antennae twice the head in length. Unguis (fig. 13) with a tunica, 2 inner teeth and a pair of serrate pseudonychia. Tenent hairs absent. Unguiculus 2/3 length of unguis, broad basally, with an inner tooth and a subapical bristle. On the inner face of the tibio-tarsus near the apex are several heavy hairs. With an anterior lobe (fig. 12) on the fore legs between the distal precoxa and the coxa. Mucro (fig. 11) to the dens as 1:3, trough-shaped, obliquely truncate apically, the inner lamella with 8 or 9 irregular teeth, the outer margin smooth or weakly bidentate. Mucronal bristle present. Female subanal appendage simple, curving. Clothing of long, curving, minutely roughened hairs. Two large curving setae on inner margin of each eyespot. At least 3 bothriotricha laterally on body one on each side of ano-genital segment. The lateral ones are almost in a straight line, the middle one nearer the posterior one. Integument minutely tuberculate.

The color pattern varies somewhat in different individuals, but the forma principalis is as figure 10. The subtriangular body places this species close to *S. packardi* Folsom, but it differs in color pattern, unguis, unguiculus; and is somewhat smaller in size.

Locality: Pineola, N. C., July 10, 1946, D. L. Wray. Taken sweeping white pine, hemlock, and *Rhododendron* at an altitude of 3800 feet.

Family SMINTHURIDAE.

Genus *Deuterosminthurus* Börner, 1901.

Deuterosminthurus batrachos n. sp. (figs. 14–18).

Length up to 0.7 mm. Ground color bright yellow with purplish markings in the form of a lacework pattern dorsally and laterally as follows: antennae yellow except for purple pigment on distal 2/3 of segment I. Purple pigment on sides of head from eyespot forward to jaw and a narrow band across the front. A narrow necklace of purple pigment extends all around the ventral side of neck. Purplish pigment on dorsum and ventral sides of body. Ventral and anterior part of head, and venter of body yellow. Vertex of head and dorsum of body with large unpigmented areas or spots along midline (fig. 14). Legs and furcula lighter, unpigmented. Behind middle of abdomen there is a transverse depression. Eyes 8 on each side on partially dark eye patches. Antennae about twice length of head, or as 96 : 50. Relative lengths of segments as 8 : 12 : 22 : 54. The 4th antennal segment with 6 definite annulations besides the basal and apical joints, and with a whorl of hairs on each annulation. End club evident. With a pearshaped protuberance posteriorly on each side of dorsum of abdomen. With at least 3 bothriotricha laterally on abdomen, and one on ano-genital segment. The lateral bothriotricha forming a wide angle with the middle one closer to the anterior one than to the posterior one. Unguis (fig. 16) rather straight with a pair of lateral teeth, unidentate inwardly. Unguisculus nearly straight, lamellate. With at least 7 tenent hairs, well developed. Mucro (fig. 18) spoon-shaped, to the den as 1:3.5. Female anal appendage (fig. 17) curved, ragged, deeply serrate and finger-like. Corpus of tenaculi with anterior and posterior lobe; anterior lobe with 2 apical setae.

Locality: Shulls Mills, N. C., July 17, 1946, D. L. Wray. Taken sweeping foliage of boxwood, hemlock, arbor vitae, and white pine at 3900 ft. altitude near Grandfather Mt.; 21 specimens taken.

The general appearance of this form is peculiar. The head is globular and joins the thorax compactly giving the affects of being pushed together so as to resemble a frog's body, hence "bathrachos" from the Greek meaning "frog-like." The prothorax is hidden and thus it appears "neckless" in comparison to the closely related forms, *D. m. altamontus,* and *D. macgillivrayi* Banks which will be discussed later. In this form as in *altamontus* sometimes the subsegments of the Ant. IV are diagonal, but I have found some that are not.

Family Sminthuridae.

Genus *Deuterosminthurus* Börner, 1901.

Deuterosminthurus macgillivrayi (Banks) var. **altamontus** new variety (figs. 19–23.

Length up to 1.0 mm. Ground color yellow with purplish markings in the form of a lacework pattern dorsally and laterally as follows: antennae yellow except for purple pigment on base and middle of segment 1. Purple pigment extends on sides of head around cheek and eyespot to base of antennae and thence in a narrow band between antennae. A narrow necklace of purple extends all around the ventral side of neck. Purple pigment lacework laterally and dorsally on body. Ventral and anterior part of head, and venter of body yellow. Vertex of head and dorsum of body with large unpigmented areas with almost a wide unbroken mid-dorsal unpigmented line excepting pigmented bars across anterior part of abdomen (fig. 20). Legs and furcula unpigmented. Behind middle of abdomen there is a transverse depression. Eyes 8 on each side, distinct, on a deep orange eyespot, with a dark spot on inner side. Antennae slightly more than twice the head. Relative lengths of segments as 15 : 20 : 30 : 65. The 4th antennal segment with 7 diagonal subsegments besides the basal and apical joints and with a whorl of hairs on each annulation. With a pear-shaped protuberance posteriorly on each side of abdomen which has 5 spines at its base. With at least 3 bothriotricha laterally on abdomen, forming a wide angle and with the middle one about equidistant from the anterior and posterior ones. Unguis (fig. 22) rather straight, with a pair of lateral teeth, with or without a feeble tooth inwardly. Unguiculus nearly straight, lamellate. With 6–7 tenent hairs. Mucro (fig. 23) spoon-shaped with inner corrugations, to the dens as 1 : 3. Female anal appendages (fig. 21) long, broadly truncate, curved, and serrate distally. Tenaculum corpus with anterior and posterior lobes, anterior one with 1 apical bristle; lobes extending beyond rami.

Locality: Pineola, N. C., July 20, 1946, at 3700 ft. altitude, sweeping white pine, *Rhododendron,* and hemlock, D. L. Wray. 56 specimens taken.

This form is close to *D. batrachos* in morphology of the various body structures as unguis, mucro, etc., but differs in size and general appearance of body, in color pattern, the antennae appear longer, and there is some difference in the shape of female anal appendage. This form, which is placed as a variety of *D. macgillivrayi* Banks for the time being, is very close to *D. batrachos* and to *macgillivrayi* in certain structures, as the pear-shaped protuberance on posterior end of abdomen. The main difference between *D. m. altamontus* and the specimens from this area that I have referred as *D. macgillivrayi* Banks is in size and color pattern. My specimens which are placed as *macgillivrayi* agree well with Bank's description in color pattern except that these are bright orange dorsally and there is a wreath of pearly, opaque spots on dorsum of body as—one long spot across vertex of head between eyes; a long angular spot extends across mesothorax and posteriorly on each side of the thorax and back half way of the body; thence another pair of elongate spots begins laterally on the edges of dorsum of abdomen and extend back to anogenital segment; and then there is a large spot across dorsum of abdomen just in front of ano-genital segment.

Family Entomobryidae.

Genus *Entomobrya* Rondani, 1861.

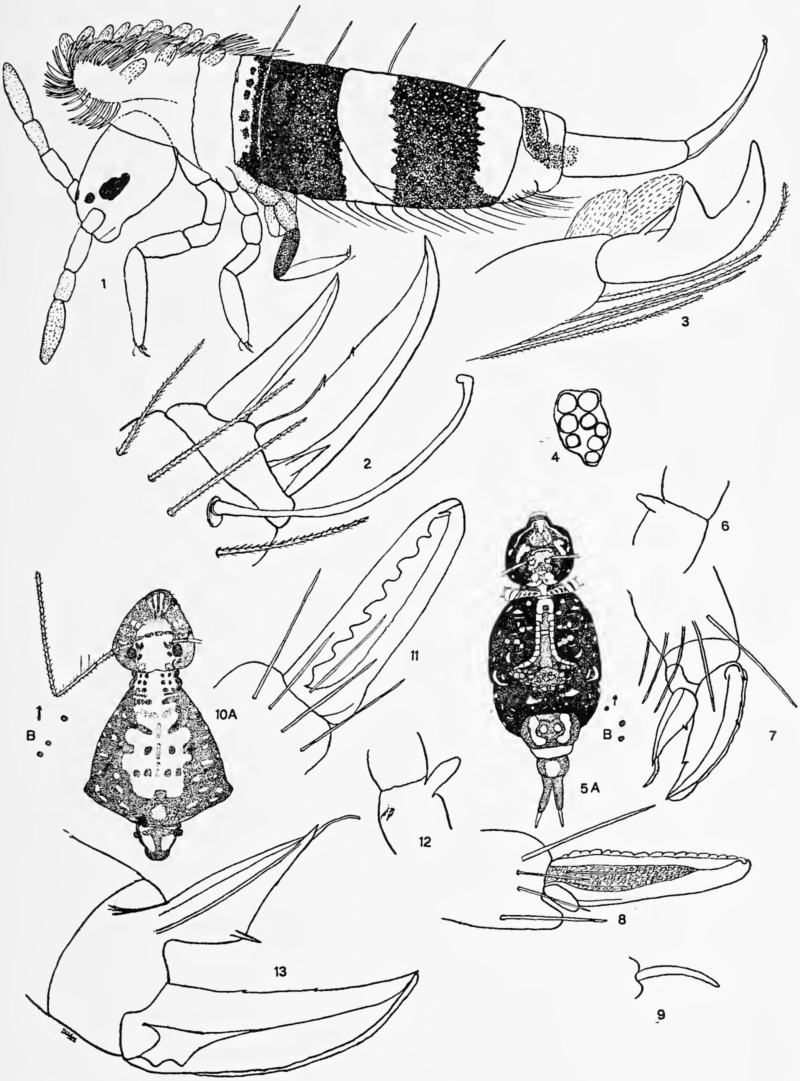
Entombrya maizeae n. sp. (figs. 24–27).

Length up to 1.7 mm. Color pattern (figs. 24 & 25) a bluish-purple with a violet tinge intermingled with many round-oblong unpigmented areas and spots. Antennae pigmented throughout, but somewhat lighter at base of joints.

Explanation of plate II.

Plate II. *Lepdiocyrtus unifasciatus* (James) var. *neofasciatus* new variety. Fig. 1. Lateral view of *L. u. neofasciatus.* 2. Left hind unguis. 3. Lateral view mucro. 4. Right eye patch. *Sminthurus virginidari* n. sp. 5-A. Dorsal view, B-position of lateral body bothriotricha. 6. Process between distal precoxa and coxa of left midleg. 7. Left hind foot. 8. Left mucro. 9. Subanal appendage of female. *Sminthurus yonahlossee* n. sp. 10-A. Dorsal view, B. position of lateral body bothriotricha. 11. Left mucro. 12. Process on foreleg between distal precoxa and coxa. 13. Unguis of middle leg.

Plate II



Dorsum of head with a large light area with a purplish V-shaped mark and a pair of purplish splotches. Sides of head pigmented, with light spots. Venter of head and abdomen only lightly pigmented, the latter almost white on first 4 segments. Segments of body dorsally and laterally bluish-purple intermingled with spots and with the anterior edges of segments light. Dorsum of Abd. IV with many long, light spots anteriorly. Legs pigmented but lighter at end of joints. Furcula pigmented on basal half of manubrium only. Eyes 8 on dark eyespots. Relative length of antennal joints as 20 : 40 : 40 : 55. Unguis (fig. 27) long with an outer, 2 lateral, and 3 pairs of inner teeth. Unguiculus lanceolate, 2/3 length of unguis. Tenent hair stout, slightly longer than unguis. The furcula is shorter than usual for *Entomobrya*. Mucro (fig. 26) with the apical tooth strong and roundly upcurving. The 4th abdomenal segment about 3 times the 3rd. The 1st abdominal segment to the 3rd as 1 : 3. Vertex of head and dorsum of thorax heavily clothed with long, clavate hairs. There are 2 very long, stout, feathered spines dorsally on 3rd abd. segment.

E. maizeae in general appearance is close to *E. marginata* Tullb., but differs in the color pattern, and especially of the dorsum of the head; it lacks the wide straight line between the eyes and the dark lines laterally on the thorax as is found in *E. marginata*. Also there are differences in the lengths of the 1st and 2nd antennal joints, the shape of mucro, and other characters.

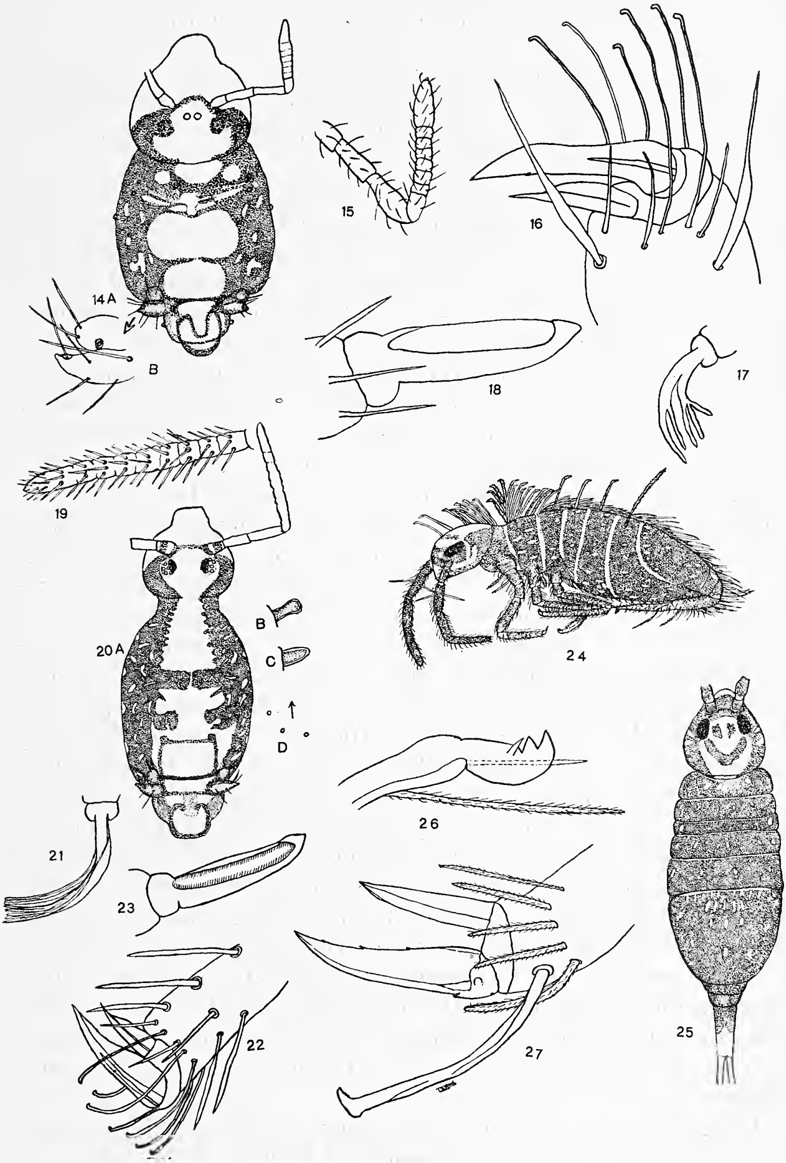
Locality: New Bern, N. C., Oct. 22, 1947, D. L. Wray. Taken in corn fields under damp corn-stalk leaves.

Cotypes of the new species and forms described herein are in the author's collection. I wish to express my sincere thanks and appreciation to Dr. Harlow B. Mills and to Dr. H. G. James for their generous help and suggestions, and for examining these forms and type material.

EXPLANATION OF PLATE III

PLATE III. *Deuterosminthurus batrachos* n. sp. Fig. 14-A. Dorsal color pattern, B. Posterior lateral tubercle showing spines. 15. Right antenna. 16. Left hind foot. 17. Female subanal appendage. 18. Left mucro. *Deuterosminthurus m. altamontus* nov. var. 19. Right antenna. 20-A. Dorsal color pattern, B. Distal precoxal process on midleg, C. Distal precoxal process on hind leg, D. Position of lateral body bothriotrichae. 21. Female subanal appendage. 22. Left hind foot. 23. Left mucro. *Entomobrya maizeae* n. sp. 24. Lateral view. 25. Dorsal color pattern. 26. Left mucro. 27. Right hind foot.

BULL. B. E. S., VOL. XLIII PLATE III



SOUTHWESTERN GEOMETRID NOTES AND NEW SPECIES. I

By John L. Sperry, Riverside, California

The genus *Drepanulatrix* Gump. seems to present more than its fair share of problems to the student of the Geometridae; for example, what is *nevadaria* Hulst? Is it possible that this may be a color form of *carnearia* Hulst?

This would explain the single line of the forewings and if not, how has the species managed to escape capture in an area as well collected as the Sierra Nevada of California? Then we have *ella* Hulst, named from a single specimen, type locality, Washington, no sex given. Barnes and McDunnough in Contributions, III, 3, p. 182 give the sex as female and state that the specimen seems aberrant, the description shows it to be without maculation.

In this genus there is a strong tendency, in most of the species, to produce ochreous female forms and in the species *monicaria* Gn. many of the normal females are immaculate. My friend, Mr. Willliam R. Bauer, of Petaluma, Calif., has in his collection a female *monicaria* taken at Freshwater in Humboldt Co., Calif., 6–21–40, which answers Hulst's description exactly except that the usual extradiscal line of shady triangles shows dimly on the forewing. The specimen seems to be an albinic female and could as well have been immaculate as are some normal females from the same locality. It spreads 29 mm. and if one takes into account Hulst's apparently normal practice of considering the expanse of an insect to be twice the distance from pin to apex of forewing, this specimen would expand 32 mm., which is the distance given in Hulst's description. The author would suggest that there is a very good chance that this hypothesis may well explain *ella*.

Again, does *foeminaria* Gn. equal *pulveraria* Hulst? There are several specimens in the Sperry collection which answer Guénée's description and these we are unable to separate from *pulveraria*. And at long last, has anybody seen *ida* Hulst. We have a specimen or two from Southern California which match the species as it is found in the Cassino & Swett collection in the M.C.Z. but Hulst gives the type locality as Colorado and the possibility of finding a high mountain species near sea level in the southern desert seems remote.

The genus needs revision but it requires someone who can take specimens from the west, the habitat of almost all the species, to the east where the types are deposited and make careful comparisons.

There are at least three undescribed species in the Sperry collection, two of these must await more material or information or both, but the third, thanks to a good series received from our friends, Dr. A. L. Melander and Mr. William R. Bauer, is well represented and the author considers it reasonably safe to describe.

Drepanulatrix baueraria, n. sp.

Male: Head, thorax, abdomen and ground color of forewings pinkish cinnamon (Ridgway color), palpi same, tipped with black. Antennae heavily bipectinate, pectinations longer than in *secundaria* B. & McD., about the same as in *monicaria* Gn. In most specimens of the series three well-defined black lines cross the forewings. The t.a. line, ½ mm. wide, starts at the costa 3/10 out at right angles, curves inward to the cell and goes irregularly straight to inner margin at 1/3; median line from ½, narrower than t.a., curved smoothly subparallel to that line just inside the small black discal dot. T.p. line about the same width as t.a. starts at 2/3 on the costa, curves in more sharply than the other lines to below cell then roughly parallels the median line to inner margin. Halfway between t.p. and apex a shade band starts on the costa and curves sharply inward to below cell approaching the t.p. line to about 1 mm. and parallels it roughly to inner margin. This shade band consists of joined, outward pointing, triangular teeth, three above and from two to four below the cell, sometimes tipped with white scales. There is a terminal row of black dots between the veins. Fringes concolorous with wing. The wing is sparsely strigated with tiny, short, black lines.

Secondaries basally lighter than the primaries but terminally concolorous. There are two lines, t.a. and t.p. which, starting at inner margin, curve slightly for two-thirds the way across the wing and disappear. The continuation of the shade band of the primaries is indicated, there is a small discal dot and a row of terminal dots between the veins. Fringes concolorous.

Beneath, creamy-white sprinkled lightly with dark atoms and shaded apically with cinnamon. Discal dots present on all wings, larger on the secondaries.

There is a tendency to variability in the strength of the maculation but in all specimens in the series the lines are distinguishable.

In the female, although usually distinguishable, the maculation tends to become obsolete and there is usually more orange in the ground color although some specimens are colored as is the male. Expanse: Male, 23 to 28 mm. Female, 23 to 28 mm.

This species falls next to *monicaria* Gn. and the maculation is between that and *secundaria* B. & McD. It can be distinguished from *monicaria* by its lighter color and heavier maculation, which is weak and indistinct in *monicaria*. It can be separated from *secundaria* by its longer and heavier antennal pectinations and by the secondaries, which in *baueraria* are in part concolorous with the primaries, in *secundaria* light throughout and almost devoid of lines.

The male genitalia offer the best characteristics for separation of these species. In both *monicaria* and *baueraria* the vesica is unarmed, *secundaria* has a small, narrow bundle of short spines well below the center of the organ.

In *monicaria* the aedeagus is short ($1\frac{1}{2}$ mm.) and thick and curves to an apex which is thickened into a long bladelike projection. In *baueraria* the aedeagus is thin and longer (2 mm.) and the bladelike projection is wanting, the apex being hardly pointed at all and blunt.

Holotype, male, Big Sur, Calif., June 18, 1947 (A. L. Melander), and in the collection of Grace H. and John L. Sperry.

Allotype, female, Pacific Grove, California, Sept. 27, 1946 (A. L. Melander), and in the Sperry collection.

Paratypes, 13 males, Big Sur and Pacific Grove, Calif. (A. L. Melander), Inverness, Crescent Cr., Petaluma and Orick, Calif. (W. R. Bauer), and Gresham, Ore. (J. Schuh), taken between June 16th and Sept. 29th, 1936 to 1947. 6 females, Pacific Grove, Calif., Sept. 29, 1946 (A. L. Melander), and Crescent Cr., Mohawk, Inverness and Westport, Calif. (W. R. Bauer), June 20 to July 11, 1936 to 1947, and in the U. S. National Museum, Canadian National Museum, Museum of Comparative Zoology, American Museum of Natural History, Los Angeles County Museum, British Museum and collections Bauer and Sperry.

It gives me great pleasure to name this interesting species in honor of my friend, Mr. William R. Bauer of Petaluma, California, whose ability to get the hard ones is uncanny and who in the preparation of specimens for the cabinet is without a peer. May he travel far among the Lepidoptera and may his journeys be always interesting.

During the past several years it has been the indolent practice of the author to allow our common desert Semiothisas to collect in boxes labeled "*colorata* complex" and "*s-signata* and forms" and at long last the sheer pressure of specimens made it necessary to clear these boxes and separate the species.

Fortunately the male genitalia offer excellent characters for separation and Dr. McDunnough has done such a first-rate job in arranging this genus according to genitalia that it is no trouble to place the unknowns.

Colorata Grote is perhaps our commonest southwestern geometrid and complicates matters by flying throughout the year in the same habitat as *parcata* Grossb. and *sirenata* McD. and even up into *californiaria's* domain.

It has at least four broods, that of the summer being small and very light with females almost immaculate, fall and spring broods are moderate in size and well maculated and the winter brood is large past belief, was confused by Cassino with his *davisata,* as McDunnough has pointed out (1945, Can. Ent., 66) and so has been wrongly placed thereunder in most collections. *Parcata* Grossb. is not such a common species and may be separated by its lighter color, finer maculation and the clear distal dots on all wings. Its unexcavated anal plate with two curved ends and two short tufted octavals separate the species at once.

Sirenata McD. is not so easily separated by the maculation as it is so variable, most of our specimens have a heavy brown suffusion from base to beyond the t.p. line and, contrary to the description, are lighter terminally, others are small with indistinct maculation and no suffusion and a few match the description, but the male genitalia with the fish tail projection of the aedeagus and the lack of gnathos separates the species at once. *Colorata* is represented in the Sperry collection from S. Calif. to S.W. Texas and north to southern Nevada. There is a single male from N. Texas small and bright, with distinct genitalia and further material will probably give us another undescribed species.

S-signata Pack., whose type locality is central Texas, is a gorgeously variable species. Cassino and Swett separated no less than four groups of these, making paratype labels but not describing, in which decision they were probably quite right. It might be possible to separate the Arizona and California *s-signata* from the Texas topotypes on the basis of lighter color and less irrorated wings but the genitalia are identical or nearly so, the only difference that the author can see is a possible narrowing of the gnathos as one goes west. The females are almost always light, sometimes having only the curved t.p. line as maculation. The species which might be confused are *puertata* Grossb. and possibly *minuta* Hulst in very rubbed specimens, both of these have annulate discal dots and *puertata* has a very heavy t.a. line which is usually not present at all in *s-signata.*

From the Baboquivari Mts. of southern Arizona, one of our best hot-beds of new species, we have a good series of an *s-signata*-like Semiothisa which is apparently undescribed.

Semiothisa melanderi n. sp.

Palpi, head, thorax and abdomen and ground color of wings light buff (Ridgway color) sparingly irrorated throughout with brown atoms. Antennae heavily short-ciliate; fore tibia unarmed; hind tibia heavily grooved, with hair pencil, hind tarsus short. Forewing maculation deep brown, very similar to *s-signata,* t.a. line heavy (4/10 mm. wide) starts at inner margin $\frac{1}{4}$ out from base, irregular, goes straight to cell at right angles to margin then starts to curve inward and disappears before reaching costa in most specimens, occasionally narrows and reaches costa at 1/3. In most specimens there is indication of a median shade line from a short triangular costal mark, only occasionally present at $\frac{1}{2}$, through the short, upright discal dash and ending on inner margin about 1 mm. from t.a. line, sometimes entirely absent and sometimes indicated only at costa and inner margin. There is a rectangular blotch on costa at 2/3 out from base, above and inside the t.p. line which it does not join. T.p. as in *s-signata,* starts at inner margin $\frac{5}{8}$ out and looks much like an elongated figure 3 with the tips of the number cut off, with the curved side toward the outer margin. It is heavier than the t.a. line, ending at vein 6 and shaded outwardly by a lighter gray-brown shade which continues on to the costa, subterminal area of ground color and a terminal line of black points between the veins. Fringes concolorous, obscurely checkered.

Secondaries lighter than primaries, t.a. line absent, t.p. narrow, starting at right angles to costa at termination of t.p. of primaries, straight to cell, curved slightly inward to vein 2, then straight to inner margin at 1/5 from angle. The line is lighter than those of the primaries and only about 1/5 mm. wide but is always evident. There is a faint shade distad of this line and a slightly darker terminal area, a terminal line of short dashes between the veins. Fringes concolorous, slightly checkered. Small discal dot indicated. Beneath lighter than above, maculation of upper side dimly reflected, discal dot of secondaries stronger than above.

Female: Our single female is light ochraceous salmon (Ridgway color). The lines are as in the male but the irrorations are lacking and the shading distad of t.p. line in primaries is barely indicated. Expanse: Male, 20–22 mm. Female, 21 mm.

Holotype, male, Baboquivari Mts., Ariz., 4–25–47 (G. H. & J. L. Sperry) and in the Sperry collection.

Allotype, female, Baboquivari Mts., Ariz., 4–27–38 (G. H. & J. L. Sperry) and in the Sperry collection.

Paratypes, 23 males, same data, Apr. 22–28, 1937, 1938 and 1948; 1 male, Baboquivari Mts., Ariz., 4–26–47 (A. L. Melander).

Paratypes will be deposited in U. S. Nat. Museum, Canadian Nat. Museum, British Museum, M.C.Z., Am. Mus. Nat. Hist. and Los Angeles Museum and in collections Bauer and Sperry.

This species immediately follows *s-signata* Pack. in the list. It is separated from that species by the well marked t.a. line on the primaries and from *puertata* Grossb. by the lighter and more irregular lines and by the dash shaped discal mark which is annular in *puertata.*

It is easily separated from both these species by genitalic characters. The aedeagus in *puertata* is simple, in *s-signata* lightly armed apically and in *melanderi* armed apically by two long spines one on each side of the organ and parallel to the axis thereof, the right spine being somewhat longer than the left. The free costal arm of *puertata* is simple, in *s-signata* there is a paddle-shaped pad extending from the middle of the costa about twice the diameter of the costal arm in length, in *melanderi* this pad is much longer, narrow and finger-shaped, the pad on the sacculus is simple in *s-signata* with a small raised point centrally, that of *melanderi* is long and finger-shaped, unarmed, and curves in toward the ventral surface. The octavals are spinose in *s-signata* and heavily chitinized in a narrow strip the edge of which is smooth, the excavation is open and rather deep. In *puertata* the tips are not spinose and the chitinization inwardly from the edge of the excavation is weak.

In *melanderi* the excavation is much shallower, the tips of the octavals not spinose, the chitinization very heavy, comb shaped with heavy teeth lining the inner edge. This last feature can be seen in situ by moving a few scales on the tip of the abdomen and the spines of *s-signata* are often evident without even that trouble.

It is much like "bringing coals to Newcastle" to name this species in honor of our friend, Dr. A. L. Melander, who needs no introduction to the Entomological World and is no stranger to Entomological honors. Let it be therefore a small token of our regard and in memory of many fine collecting trips in the southwest and of many fascinating dry washes, with backgrounds of desert or mountain shaded by palo-verde or pines and swarming with diptera by day and geometrids by night. May there be many, many more of these up which we may walk together and where there is always good hunting.

Notice to all Subscribers through Agencies.—We are constantly receiving subscriptions to Entomologica Americana and Bulletin of our Society for sundry institutions through the various magazine subscription agencies. These are far too frequently received short paid; or else they come to us misdirected through our printers; or else addresses to which to send are wrong. We give this notice to avoid misunderstandings with our valued institutional subscribers, which, very naturally we do not like, and in the nature of things cannot be responsible for.

Brooklyn Entomological Society

Birds Eat Scale Insects.—Scale insects, identified by Dr. Harold Morrison as *Orthezia* sp., were present in the stomachs of the following birds: A long-tailed chickadee, taken 5 miles east of Orr's Ranch, in lower Skull Valley, Tooele County, Utah, September 24, 1942; and in stomachs of sage sparrows, collected north of Kelton, Box Elder County, Utah, September 10, 1942, and at Kelton, Utah, September 30, 1942. A total of 39 coccidae, mostly scale insects, were recognized in an examination of 45 sage sparrow stomachs, collected in rangeland areas of Utah.—G. F. KNOWLTON, Logan, Utah.

A NEW SPECIES OF STENOSCELIS, AND NOTES ON OTHER CURCULIONIDAE (COLEOPTERA).

By L. L. Buchanan, Bureau of Entomology and Plant Quarantine, Washington, D.C.

Only one species of *Stenoscelis, brevis* Boh., has been recorded from the United States. In 1943 W. H. Anderson collected a series of larval and adult *Stenoscelis* at College Heights, Md., and later found (Anderson, unpublished manuscript) that the larvae represented two closely related but quite distinct species; and a study of the adults of Anderson's series, and of the adults standing in the National Museum collection as *brevis,* has shown that they also are of two species. One of them is much more abundant than the other, especially in the general region of the type locality of *brevis* ("Carolina") and, in the absence of definite, contrary evidence, this commoner species is here assumed to be *brevis* Boheman. (The type of *brevis* has not been located, though it may be in the Zoological Museum at Halle, Germany, in the Russian zone.) The other species is here described as

Stenoscelis andersoni, n. sp. (Cossoninae) (figs. 2 and 4)

Length 2.4–3.1 mm., width 0.87–1.1 mm. Subcylindrical, black when mature, antennae and tarsi red or yellow brown, elytra often piceous or red brown and often paler than prothorax and head. Upper surface of rostrum minutely shagreened and contrastingly duller than remainder of dorsum of body. Apical declivity of elytra with the hairs longer and the murications more prominent than in *brevis.*

Head finely, rather closely punctate, interocular space with short, subappressed golden hairs; eyes very feebly convex, though slightly more convex than in *brevis;* rostrum very short, widest at base and steadily narrowed anteriorly, sometimes continuous with front but more often vaguely set off from it by a broad, feeble impression; epistoma usually asymmetrical, its fore margin being oblique and having the right end slightly elevated and advanced; basal margin of epistoma with a transverse row of rather long, anteriorly directed, golden setae, usually 6 in number and usually arranged (from right to left) 1–2–2(relatively wide space without any of the long setae)–1, the single seta at each end longer than the others; upper surface of rostrum with fine, short, subappressed, golden hairs, these often scarcely perceptible (? through abrasion), in a broad median area, punctures denser than on head but not forming rugae, the interspaces with a dull, silky sheen produced by a microscopic sculpture which, in some lights, appears as a network of excessively fine lines, and in others as minute, crowded granules. Prothorax about as long as wide, widest near base and thence either subparallel-sided or slightly and gradually narrowed to beyond middle, usually more abruptly narrowed anteriorly to the broad but shallow constriction, the latter sometimes obsolescent, sides broadly emarginate a little behind middle, upper surface convex transversely but nearly flat longitudinally, punctures larger than on head, rather sparse to moderately dense on disk, occasionally absent from a small area each side toward base, denser and usually forming a more or less evident rugose sculpture at side margins. Scutellum sunk below level of elytra, surface of elytra each side of it transversely rugose and usually more or less tumid, the tumid area usually smaller than in *brevis* and extending from scutellum laterally to about stria 4, stria 2 not reaching base. Elytra parallel-sided, serial punctures large, close-set, and in regular rows, striae shallow on disk but deeper on declivity, intervals convex and usually without, or with a few feeble, transverse rugosities, each with a single row of small, frequently widely spaced punctures and, on declivity, with a row of fine, stiff, slanting, golden hairs and a row of small but distinct murications, both hairs and murications, in reduced form, often extending a variable but usually short distance toward base; apical half of interval 9 flattened and inflexed, and carinate on inner edge (next to stria 8); basal half of interval 10 flattened and slightly inflexed, and carinate on inner edge (next to stria 9). Under side with short, sparse, subappressed golden hairs, and moderately close-set punctures which are usually sparser on metasternum than elsewhere; about basal half of intercoxal piece of abdominal sternite 1 set off from remainder by a low, transverse ridge, or transverse groove, or by a low ridge bordered posteriorly by a groove. Punctures on anterior face of femora and tibiae sparse (sparser than in *brevis*). Abdominal sternite 5 flat to slightly convex in male, moderately to strongly convex in female.

Type locality.—College Heights (near Hayttsville), Md., February 7, 1943, W. H. Anderson; in rotting birch log (19 specimens).

Other localities (paratypes).—Millburn, N. J., June 11, 1935, T. H. Jones; in dead elm pith (4). Falls Church, Va., March 9 and 30, 1919, E. A. Chapin (7). Rockhaven, Ky., 7–4–1893, H.

Soltau Collection (1). Louisville, Ky., Soltau Collection (1). Selma, Ala., Hubbard and Schwarz Collection (1) Nicholson, Miss., January 29, 1945, Rau; in wood, *Castanea pumila* (1). Salina, Kans., Popenoe (2); Knaus (6); Hubbard and Schwarz Collection, December 31, cottonwood bark (1). Kansas, Popenoe (1) and C. V. Riley Collection (1). Iowa City, Iowa, May 30, 1900, Wickham (1). Cincinnati, Ohio, June 25, Soltau Collection (1).

Type.—Female, Catalogue No. 58246, United States National Museum.

The two United States species of *Stenoscelis* differ as follows:

Larger and stouter (2.7–3.8 mm. long by 1.1–1.4 mm. wide), upper surface of rostrum densely and, at least in places, rugosely punctate, the summits of the wrinkles and the interspaces shining; sides of rostrum usually subparallel in basal half; prothorax transverse (about 8 to 7), its anterior constriction deeper; basal tumidities of elytra larger and more prominent, and usually attaining stria 5; punctures on discal elytral intervals more closely spaced, not in regular, single rows, but, in places, forming a staggered single row or (especially on intervals 2 and 3) a confused double row (figs. 1 and 3) .... *brevis* Boh.

Smaller and more slender (2.4–3.1 mm. long by 0.87–1.1 wide), upper surface of rostrum with smaller punctures, the sculpture not rugose, the interspaces with a dull, silky sheen; sides of rostrum converging from base forward; prothorax usually very nearly as long as wide, anterior constriction shallower, sometimes obsolescent; basal tumidities of elytra smaller, usually not extending laterally beyond stria 4; punctures of discal elytral intervals more widely spaced and forming a regular or nearly regular single row on each, except basally on 3 where they are often in a confused double row (figs. 2 and 4) .... andersoni, n. sp.

When the two species are compared in series, the more slender form, and the more prominent murications and longer hairs of the elytral declivity of *andersoni* are strikingly evident. *S. brevis* and *andersoni* have been taken in apparently identical conditions at Millburn, N. J., in dead elm pith, and at Nicholson, Miss., in wood of *Castanea pumila,* and have been collected the same day at College Heights, Md., and Falls Church, Va.

The numerous specimens of *brevis* at hand are from Ontario, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, Alabama, Mississippi, Louisiana, Ohio, Indiana, Michigan, Minnesota, and Iowa. One specimen is labeled "Ventura Co., Calif.," but this locality is doubtful. The rather long list of trees and shrubs, under the bark or in the dead wood of which *brevis* has been found, includes apple, ash, bayberry, chinquapin, dogwood, elderberry, elm, hawthorn, hickory, holly, hornbeam, magnolia, maple, oak, poplar, red bay, snowdrop, sweetgum and tulip. There is also one record, based on several specimens, of *brevis* boring in the wood of a basement door at Sterling, Ohio. The cossonine most frequently reported as doing injury indoors is *Hexarthrum ulkei* Horn; and *Tomolips quercicola* (Boh.) has been found in floors and studding of houses at Athens and Savannah, Ga.

Rhamphocolus tenuis Casey, 1892, p. 703 (Cossoninae)

Type locality of *tenuis,* Columbus, Tex. (from type specimen), not Austin, Tex., as stated by Casey.

Phloeophagus variolatus Dury, 1916, p. 14, type locality, Cincinnati, Ohio. (New synonymy.)

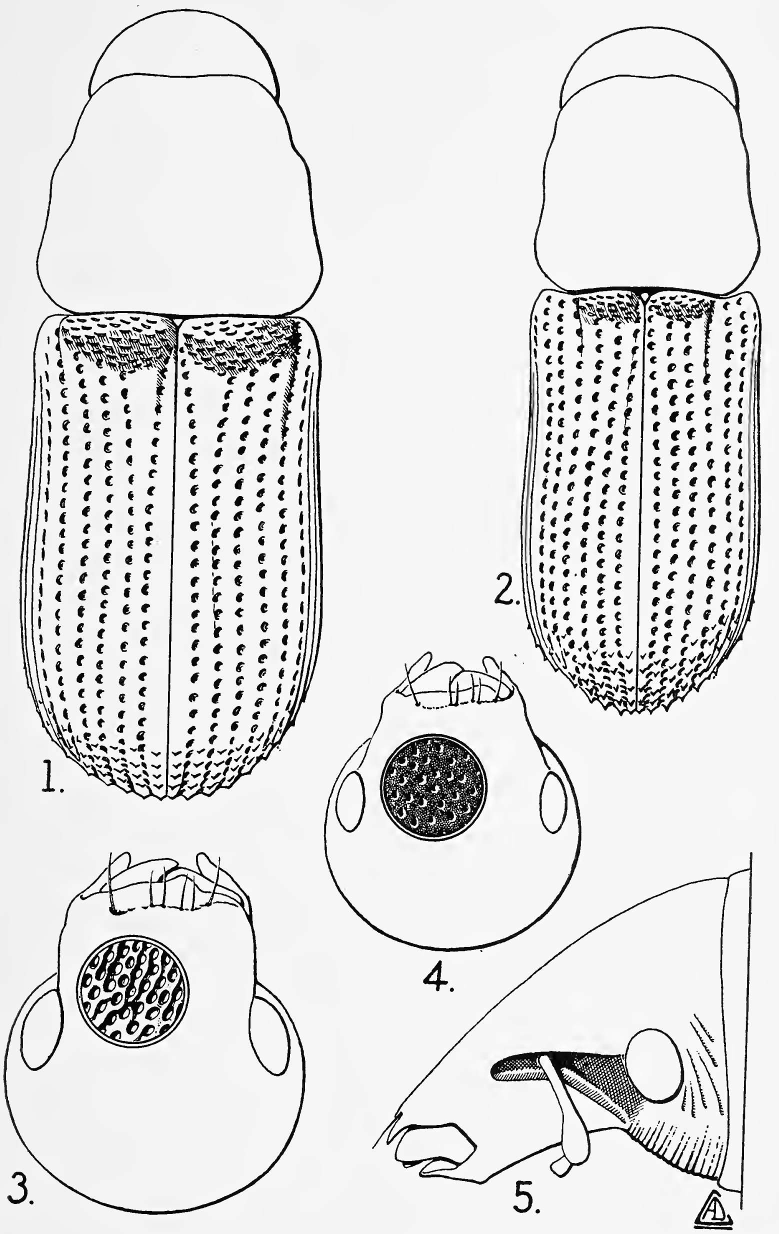
Of *tenuis* I have examined the type and 5 specimens, all from Columbus, Tex.; of *variolatus,* 2 specimens from Cincinnati, Ohio, one of them labeled "cotypes." The two type localities appear to be the only places from which the species has been reported.

Rhamphocolus is peculiar in its conical rostrum, small, flat eyes which scarcely rise above the outline of the head and which are placed well down on the sides of the head, and in the structure of the scrobe. The scrobe itself—i.e., the groove in which the scape lies when retracted—bends sharply downward in front of the eye, but its upper edge, instead of following the curvature of the groove, extends posteriorly toward the eye at about its middle (fig. 5). In *Phloeophagus* the eyes are convex and placed higher up on the sides of the head, and the upper edge of the scrobe curves downward toward the lower margin of the eye.

Explanation of Plate IV

Fig. 1. *Stenoscelis brevis,* ♀, Nicholson, Miss.; fig. 2, *S. andersoni,* ♀, College Heights, Md.; fig. 3, *S. brevis,* head and rostrum, ♀; fig. 4, *S. andersoni,* head and rostrum, ♀; fig. 5, *Rhamphocolus tenuis,* Columbus, Tex., side view outline of head and rostrum.

BULL. B. E. S., VOL. XLIII PLATE IV



Hormops Leconte, 1876, p. 321 (Cylydrorhininae)

Hormops has been shifted from place to place in the classification, its present location among the Cossoninae reflecting the latest opinion, that of Sharp, which was based chiefly on the structure of the male genitalia. Externally, *Hormops* lacks all the more characteristic features of the Cossoninae. The tibiae are mucronate and not unicinate, the under side of the body is not plane, and the first two abdominal sternites are only moderately long; and in addition the structure of the scrobe and of the framework of the mouth cavity, the elongate-cylindrical first joint of the funicle, and the shape of the prothorax are not suggestive of the Cossoninae. In these, and in several other respects, particularly in the large, ventrally subcontiguous eyes, *Hormops* agrees closely with *Ctenomyophila* of the Cylydrorhininae (Cylindrorrhininae), a genus consisting of 9 species from Brazil, Argentina, and Bolivia. *Hormops* and *Ctenomyophila,* though clearly related, are readily separated by differences in the structure of the tarsal claws, these being free and divergent in *Ctenomyophila,* but approximate and basally connate in *Hormops.* In North American lists *Hormops* should be placed next to *Listroderes.* I have examined 8 specimens of *Hormops abducens* Lec. and 5 specimens, probably representing 4 species, of *Ctenomyophila.*

Hormops abducens Lec., 1876, p. 321. Type locality, Capron, Fla.
Hormops latipennis Csy., 1924, p. 336. Type locality, Texas. (New synonymy.)

The distinguishing characters of *latipennis* as given by Casey are largely, if not entirely, sexual in nature, his single specimen being a large female which agrees in essentials with a Florida female of *abducens.*

Metopotoma Casey, 1892, p. 689 (Hylobiinae)

Anculopus Van Dyke, 1927, p. 12. (New synonymy.)

Dr. Van Dyke has kindly compared a specimen of *Metopotoma* with the type of *Anculopus foveatus* V. D., and has confirmed the above synonymy. Only the two type species are known, *repens* Csy. from Humboldt County, Calif., and *foveatus* Van Dyke from Humptulips, Wash.

AN ALL-PURPOSE INSECT NET MADE OF NYLON.

By Robert L. Usinger, University of California,
Berkeley, Calif.

The general collector, like the general medical practitioner, encounters many difficulties in this day of extreme specialization. So much specialized equipment is now available for collecting insects that no one person could carry it, much less acquit himself well in the chase. The inevitable result of this dilemma has been to enforce specialization.

Perhaps the most important piece of equipment for general collecting is the insect net, yet this standard piece of equipment has always limited the field of activity of collectors. Thus a large net bag of light, open bobinet is fine for butterflies, but useless for heavy sweeping of underbrush or for aquatic collecting. Most collectors attempt to solve this problem by carrying two or three nets or by carrying extra net bags which may be slipped off and on or snapped off and on according to the needs of the moment. But extra nets are inconvenient to carry, and changing net bags is time-consuming. In effect, then, a robber fly or bee must be ignored by a collector when he is "sweeping."

During the 1947 season an attempt was made to solve this problem by using a net bag made of light, white, relatively open mesh nylon marquisette or netting. This material was purchased in a dry-goods store for $1.75 a yard. One yard was sufficient. Plain nylon cloth was used for the strengthening band around the net hoop. Incidentally, the complicated pattern of four tapering pieces recommended in recent pamphlets on collecting methods is unnecessary. The bag can be made out of two tapering pieces, rounded at the end, if the pieces are sewed together using a flat-fell seam. The flat-fell seam gives added strength and makes the net reversible.

The nylon netting is as open and light as the usual butterfly net, it is perfectly satisfactory for collecting bees and flies, and yet it is strong enough to be used as a sweeping net. It has the further advantage over the usual unbleached muslin sweeping bag that the contents of the bag are visible. Furthermore, the nylon material is less likely to pick up burrs and stickers in general sweeping. Still another feature of the nylon bag is its resistance to wetting. The material does become wet when used in the water, but it dries within a very few minutes and then is ready for general collecting again.

At the end of five weeks of constant daily use in general collecting, the net was intact and practically as good as new. One small tear appeared after about three weeks of hard use. The hole was small and was near the handle of the net so it was left unrepaired. During the remaining weeks the tear did not increase in size and a "run" did not occur.

BOOK NOTE.

Edwin Way Teale, our distinguished fellow-member, has a most fascinating article on "Audubon's Insects" in *Audubon Magazine* for November-December 1947. Audubon painted birds, as everyone knows, which is his fame. But he also painted them in their natural surroundings and in their natural activities, showing plants and insects associated with them. Teale examined the original paintings for the 435 pictures. More than half a hundred of these contain insects with the birds—moths, butterflies, bees, wasps, beetles, flies, larvae. Some of these are stylized, but most are drawn and colored with such care and accuracy that most often they can be recognized not only as to family but even to species.

Twelve of these Audubon plates, reduced or in part in full size, illustrate this valuable entomological contribution.

J. R. T.-B.

A Suggestion to Authors.—For the purposes of editorial consistency in our publications, we once more remind authors that we use the forms of words, both singular and plural, to agree with "A Glossary of Entomology," which contains a distillation of correct usage. Our end is to try to secure uniformity in usage, at least as far as we are able to control it, emphatically not in order to make this work a terminological straight-jacket. We reserve the editorial privilege, except in those cases in which an author indicates a preference for some specific term or usage.

J. R. de la Torre-Bueno, Editor
Brooklyn Entomological Society,
Tucson, Arizona.

NOTES ON UHLERIOLA FLORALIS (UHL.) IN ILLINOIS (HETEROPTERA, LYGAEIDAE).[1]

By JAMES A. SLATER, Urbana, Ill.

This paper reports *Uhleriola floralis* from Illinois for the first time, together with remarks on its habits and descriptions of the fourth and fifth instar nymphs.

On April 12, 1947, a hibernating colony of this species was discovered at Bondville, Illinois. The hibernation site was under a board and about the roots of burned over grass clumps along a railroad right of way. The insects were active when discovered but still confined to a small area of a yard or two in extent. Several hundred individuals were present at the site. This gregarious type of hibernation was previously reported by Daniels (1929) who discovered a similar hibernating cluster beneath a large rock in Colorado. Gillette and Baker (1895) report *U. floralis* from beneath stones in company with the ant *Formica neoclara* Emery.

Specimens taken from the hibernating site were placed in rearing cages where they fed readily upon lettuce and both fruits and foliage of strawberries. The insects copulated but failed to oviposit, the last female dying on June 14. Copulation takes place in the "reversed" or end-to-end position, which is apparently the normal position for the majority of Lygaeidae.

The general distribution of *U. floralis* is western in the United States. Torre-Bueno (1946) reports it from Colorado, Montana, and California; also from Arizona. That the range extends considerably eastward is now established. The H. M. Harris collection has several specimens from Iowa. In addition to the locality discussed above two other Illinois records are at hand. The Illinois Natural History Survey has a specimen from Summit, Illinois, and there is a specimen in the author's collection from Park Ridge, Illinois. Both of these locations are in the northeast portion of Illinois.

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[1] Contribution No. 278 from the Entomological Laboratories of the University of Illinois, Urbana.

My appreciation is extended to the following persons for assistance in the formulation of this paper: Mr. Sol Kramer for discovery of the central Illinois hibernation site, Mr. C. F. W. Muesebeck and Dr. Reece Sailer for the loan of immature stages from the collections of the U. S. national Museum, Dr. H. H. Ross and Dr. H. M. Harris for allowing me to examine material in the Illinois Natural History Survey and H. M. Harris Collections respectively, and Mr. Frank F. Hasbrouck for reading and criticizing the manuscript.

Immature Stages.

Fourth instar (pinned):

Similar to fifth instar in form and color, but darker, particularly on the pronotum which is ferrugineous-brown; antennae bright ferrugineous and concolorous; second abdominal tergite and basal two-thirds of third reddish-tan; a dark median spot on the fifth abdominal tergite connects spots of second and third abdominal scent gland openings.

Mesothoracic wing pads barely attaining the first abdominal tergite caudad; fore femora only slightly swollen; fourth antennal segment fusiform. Length of antennal segments I : II : III : IV. 0.31 mm., 0.57 mm., 0.52 mm., 0.75 mm. Length of body 3.63 mm. Width between eyes 0.55 mm.

Fifth instar (pinned):

Elongate, very robust; general color bright ochraceous, brownish at base of pronotum; mesal and basal portions of the mesothoracic wing pads, exposed mesal portion of metathoracic wing pads, margins of conjunctiva between third and fourth abdominal tergites, a median apical spot on eighth tergite, all of ninth tergite, large spots on meson of sixth, seventh, and eighth abdominal sternites, and apical segment of rostrum varying shades of dark brown; conjunctiva between tergites three and four broadly margined with white; abdominal segments from five to apex dull reddish; legs ferrugineous; small black area about each abdominal scent gland opening.

Head small; pronotum subquadrate, slightly less than twice as wide as long, anterior margin deeply concave, posterior feebly sinuate, lateral margins broadly explanate, not divided into two lobes by a transverse constriction, but with two shallow transverse depressions near the posterior margins; mesothoracic wing pads reaching caudad to the third abdominal tergite, lateral margins broadly explanate; abdominal scent gland openings three, on conjunctiva between tergites three and four, four and five, and five and six, equal in size; conjunctiva between tergites three and four appearing bifurcate near the lateral margins, the above three conjunctiva curving cephalad from meson to margin; tarsal segments two, basal segment of metatarsus considerably longer than apical segment; rostrum reaching metacoxae; body sparsely clothed with short hairs. Length of antennal segments I : II : III : IV. 0.43 mm., 0.85 mm., 0.75 mm., fourth missing. Length of body 5.45 mm. Width between eyes 0.69 mm.

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Torre-Bueno, J. R. de la—1946. A Synopsis of the Hemiptera-Heteroptera of America North of Mexico, Pt. III. Lygaeidae. Ent. Amer. 22(3): 88–141.

Gregarious Treehopper.—It is not uncommon in Utah to find nymphal and adult treehoppers of certain species, congregating on limited areas of infested ragweed, sweet clover and certain other plants, particularly during their breeding season. This gregarious condition was quite evident on a number of blossoming heads of goldenrod (*Solidago*) along the roadside three miles east of Murray, Utah on the cold fall day of October 7, 1946. 34, 27, 14, 9, as well as smaller numbers of *Pubilia modesta* Uhler were counted from among the phyllaries and along the main stem, within the individual heads. In the above small goldenrod patch, 9 of the 27 stems still contained heads in full anthesis, which housed one or more treehoppers. In addition, eight of 11 dry heads examined sheltered one or more of the treehoppers with 26 and 17 adult *modesta* occurring in the two most populated flower heads; 1 to 5 occurred in the other six heads. A few treehoppers also were found to be present near the apex of still green goldenrod plants, the tops and blossoms of which were lacking, 4 to 7 being maximum numbers encountered where no blossoms were present. No treehopper nymphs, but a few sluggish ants, *Formica* sp., also were present on plants where treehoppers were most numerous. G. F. Knowlton, Logan, Utah.

Spider Kills Honeybee.—On a number of occasions, the writer has observed a spider to be feeding on a honey bee in a Utah bee yard. On July 9, 1947, at Holladay, Utah, a whitish spider, identified by Dr. W. J. Gertsch as *Misumena calycina* L. (= *vatia* of most authors), was observed to be feeding on a worker honey bee which was larger than itself. This flower spider was resting on a dandelion leaf immediately in front of a beehive in a commercial bee yard. When first observed, the bee victim was kicking weakly, but it soon ceased all movement. Large number of bees were coming to and going from this well populated hive, but all appeared to completely disregard this spider and its prey.

A daddy-longlegs was observed to be feeding on a worker honeybee; both were resting on the alighting board entrance at the front of a pollen trap which was being operated in an orchard at Farmington, Utah, on October 11, 1947. This bee was recently dead and still soft-bodied when observed. Dr. C. J. Goodnight identified this phalangid as a female *Phalangium opilio* L. He suggested that, "It is extremely unlikely that the phalangid killed the bee. The phalangids do not possess chelicerae or palpi of sufficient strength for that sort of feat. However, they are quite willing to eat nearly any kind of food when it is available. They particularly like meat, so I think this accounts for your finding it feeding on the bee." G. F. Knowlton, Logan, Utah.

NOTICE

Mr. J. R. de la Torre-Bueno, editor of this bulletin for more than thirty years, died on May 3, 1948. Until a new editor is appointed all communications should be addressed to George S. Tulloch, 22 East Garfield Street, Merrick, New York.

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OF THE

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ADDITIONS TO VESPINE BIOLOGY—V: THE DISTRIBUTION OF LABOR IN THE COLONIES OF HORNETS AND YELLOWJACKETS.*

By Albro T. Gaul, Brooklyn, New York.

The proper distribution of labor in a society is essential to the continued success of that society. In this paper I shall attempt to discuss the distribution and plasticity of labor in the Vespine society. The observations recorded here were made during the summer of 1947 among colonies of *Vespula maculifrons* Buy., *V. rufa* var. *consobrina* Sauss., and *Dolichovespula arenaria* F. at Alpine, N. J., and West Cummington, Mass.

Adult members of the normal Vespine colony engage in a number of occupations. There are eight categories into which their work many be divided, all of which are essential to the welfare of the society. Roughly, these may be listed as: Egg production, Foraging for food, Brood nursing, Nest construction, Adult nursing, General sanitation, Colonial defense, and Water collection.

The distribution of labor among the individuals for the fulfillment of the labor demands of the society may vary somewhat from day to day. During the course of a full season a constant and consistent quantitative change in the distribution of labor may be noted.

Eggs are produced by queens and gynaecoids. Once the colony has been established, and under normal conditions, the queen does little except deposit eggs in the brood cells. During the time when the incipent colony is being built, the mother queen engages in all phases of nest labor; but she relinquishes almost all activities except egg production concurrently with the flight of her first brood of ergates. In times of duress the queen may again work at a function other than egg production (3). The gynaecoids ap-

* Numbers in parentheses refer to Bibliography at end.

pear to be facultative egg producers. Their eggs develop into males. The production of gynaecoid eggs depends upon a complex of social and biological factors. Upon the death, or loss of egg-producing function of the mother queen, the gynaecoids will begin the production of their own eggs. During this period the gynaecoids may carry on other normal labor functions in the nest. Egg production is the only colonial function which requires physiological specialization.

Foraging for food occupies more hornet hours of work than any other occupation. It involves the time and energy of the individual in seeking out and killing suitable prey or finding carrion The meat is then chewed into a size suitable for transit and is taken to the nest where it may be turned over to a brood nurse, or distributed to the larvae by the forager herself. This food is frequently malaxated during the flight to the nest, thus the huntress obtains some of the nourishment she has provided for the young. As soon as the forager has yielded the provender, she returns to the field. If the prey were not completely carried to the nest, the forager will return to it for another piece. Otherwise she will engage in a search for a new supply of meats for the young.

The brood nurses become specialized in community life later than the foragers. The nature of this work indicates that it may be a subdivision of foraging. This division of labor comprises the acceptance of some or all of the food brought in by the foragers and the redistribution of this food to the larvae. These workers are not as sedentary as one might suppose, since there are many small larvae in a healthy nest, and the distribution of food to them requires that the workers crawl into the brood cells several hundred times a day. Brood nursing, while a function which might very well be left to the foragers, is very efficient from a time study point of view. Its primary purpose is the proper distribution of food. Foraging workers arriving with food might deliver the food to those larvae nearest at hand, to the detriment of the larvae less advantageously placed in the nest. Brood nurses insure that all larvae receive their proper share of the food, and the forager is relieved of the necessity of wasting valuable time in the nest when she could be collecting perishable food.

Since queen larvae and worker larvae are believed to be differentiated only by trophogeny (7), and since the brood nurses appear prior to the development of queen larvae, and since the foragers bring non-specialized meat products to the brood nurses, it is apparent that the brood nurses may be responsible for the differentiation between these two castes. It is further apparent that the trophogenic differentiation may be quantitative rather than qualitative. This would be in accordance with Marchal's theory of nutricial castration in accounting for the caste differences among Vespidae (4).

Nest repair, expansion and construction varies in complexity depending upon the nesting habits of the species and the nature of the particular nest site chosen by the mother queen. The founding of the nest is done by the mother queen as the first step in the inception of a colony. She chooses the nest site and builds the first comb and nest envelope. Upon the appearance of the first brood of workers, the queen relegates this activity to them.

In its simplest aspect, among colonies of the genus *Dolichovespula,* nest construction and expansion involves the gathering of wood pulp for paper, and carrying the pulp to the nest and affixing it in the desired place. It may be used either for the strengthening of the comb suspensors, for the enlargement of the comb, or for the enlargement of the nest envelope. As the comb reaches a certain size the inner layers of the envelope must be removed to allow expansion of the periphery of the comb. The paper removed from the inner envelope is salvaged for further use elsewhere, while another layer of envelope paper is usually built on the exterior surface of the nest. The strengthening of the nest and comb suspensors is an important task. As more and more comb is added, the nest becomes proportionately heavier and its supports must be strengthened or increased in number to maintain an ample safety factor against the weather.

Among species of the genus *Vespula* whose nesting habits are almost exclusively subterranean, the strengthening of the nest suspensors is not too important. The underground nests are not required to withstand the shocks of the weather as in the arboreal or surface nests of *Dolichovespula.* In consequence, the safety factor against breaking comb is much lower and the paper is of lower quality (2).

The *Vespula* colonies have an additional problem in nest expansion. Being subterranean, the construction workers must excavate the earth around the nest in order to allow for expansion. Excavating activities may be considered a distinct subdivision of construction labor. Ergates who undertake excavation never seem to participate in other nest building functions while thus engaged. A fairly small but consistent percentage of workers is employed in nest expansion and construction. Upon the occurrence of damage to nest structure, the safety of the colony demands quick repairs and a large number of workers will shift their attentions to the repair of the damage on a temporary emergency basis.

Whenever death comes to a member of a closely knit, permanently located society, the surviving members always make some provision for the disposal of the remains. There exists, therefore, a group of Vespine workers who may be classed as sanitation workers. Dead larvae are removed from their brood cells, grasped firmly in the mandibles and flown away from the nest. Ergates in the "sanitation squad" usually fly, with their dead, in a large circle, often fifty feet in diameter. As the worker reaches a point on the circumference of this circle about 120° from the nest, she drops the dead larva and continues back to the nest. This type of disposal is common among *V. maculifrons, V. rufa consobrina* and *D. arenaria. V. squamosa* and *D. maculata* L. usually fly straight from the nest, dropping their dead before turning back to the nest (5). Dead larvae are accorded prompt disposal, perhaps as a result of the good culture medium for pathogens which they provide. It is not impossible that the colonies who properly disposed of their dead had a greater survival rate than those which left the juicy larvae in the nest.

Frequently, larvae which appear healthy are removed from the nest for disposal. I have rescued some of these larvae from their would be morticians, and in a few cases have been able to rear them to an apparently normal maturity. It seems, therefore, that the sanitation workers are not always discriminating in their selection of larvae.

Dead adults in the nest are seldom accorded such treatment. They are permitted to remain about the nest for hours or days without being removed. When they are removed, they are simply dropped from the nest entrance (in arboreal colonies) or are pulled away from the entrance a short distance (in surface and subterranean colonies). Since the adults are relatively dry they afford less risk of starting a colonial contagion.

When adults emerge from pupation, there is a period of five to seven days during which the teneral individuals become strengthened and agile. The exact time spent in strengthening depends to some extent upon the relative abundance or scarcity of labor in the colony. During this period the young adult must be fed. A large percentage of the needs may be accounted for by trophallaxis. There is a special group of ergates, however, whose duties consist of foraging for food for these new adults. This phase of activity is particularly evident during the period when the brood of young queens awaits embarkation on their nuptial flight.

In an experiment, I removed a comb containing queen pupae from the nest (*D. arenaria*) and removed all eggs and larvae. The comb was placed beside the nest entrance. A number of ergates immediately attached the comb to the nest. Others foraged for food and fed the hatching queens (the queens did not enter the nest, and thus had no trophallactic experience).

Colonial defense is an emergency category in which many workers may take part. Foraging workers, or workers afield for other purposes will not engage in defense activities unless they happen to be within the nest at the time it is disturbed. The number of workers who emerge from the nest with hostile intent seems roughly proportional to the intensity of the disturbing stimulus. A gentle shaking of the nest arouses but few defenders, while a sharp blow on the nest will excite the entire colonial population. There is some evidence that workers will become conditioned to disturbing influences; after some days in the laboratory even a sharp blow on the nest may only arouse six or eight individuals whose typical reaction is to walk nervously about on the nest without taking flight. Colonial defense is a very necessary function in protecting the nest from its natural enemies, the skunk, the mole, the fox and the entomologists (1 & 6).

Another emergency labor category is water collecting. During rainless seasons, particularly when accompanied by periods of low relative humidity, a number of ergates will become emergency water collectors. They forage afield for sources of fresh water. These workers use water taps, rain barrels, mud, ponds, streams, etc. I have never seen any Vespine accept salt water. Water is necessary, not only for the sustenance of life among the larvae and adults; but it is used in fairly large quantities in the paper making industry.

During any given day, the labor distribution in the average nest remains fairly constant. The same individuals seem to remain at the same tasks all day, and in many instances for a number of days at a time. There is no apparent age distinction which dictates the type of work the ergate should perform. One frequently finds young adults working side by side with battered and frayed individuals among all the labor categories.

The distribution of labor, rather, depends upon the labor demands of the colony as a whole. Any emergency within the nest brings a quick response from as many workers as are needed to cope with the trouble.

Although the labor distribution requires certain definite jobs to be done, the behavior of the individual is sufficiently plastic to enable her to interchange any activity, except the physiological activity of egg production.

The quantitative distribution of labor during the colony history shows the development of labor specialization as the need arises. All quantitative studies were made with *D. arenaria.* A large colony was taken at Alpine, N. J., and brought to the laboratory in Brooklyn, N. Y., where constant notes and observations could be made. This colony was maintained under fairly normal conditions; the adults had free access to the outside through an open window.

During the fifth colony week (the fifth week after the founding of the colony by the queen mother) the first ergates appeared. These ergates engaged almost exclusively in nest construction and in foraging-brood nursing combined. About equal numbers of workers were occupied in these two tasks. About the seventh colony week, the first distinct brood nurses appeared. Their numbers increased disproportionately to the general population increase. Until about the end of the eighth week, the brood nurses took over the activities of the adult nurses. At this point the adult nurses became differentiated.

By the tenth week the sanitation workers appeared in small numbers. This group remains small throughout the life of the colony. It is probable that this group expands at the decline of the colony, thereby accounting for the prevalent cannibalism commonly encountered at that time.

About the middle of the eleventh week the new queens appeared. By the twelfth week, the colony had reached the peak of its population. By the end of the fifteenth week the colony was feeble, few workers were left, the brood comb contained only males. The season was drawing to a close. The mother queen had died during the tenth week. Cannibalism was rife.

At the peak of the season an accurate tabulation of the nest population by labor categories was made. It indicates the number of wasps engaged in the several activities and the percentages.

Tabulation of *D. arenarria* labor distribution during the twelfth colony week:

Labor classification	*Number of workers*	*Per cent*
Foragers	49	40
Brood nurses	35	28
Adult nurses	25	22
Nest builders	10	8
Sanitation squad	3	2
Teneral adults	23	

Since 21 of the 23 teneral adults in the above table were queens, they should not be computed with the workers on a percentage basis. It is worthy of note that 23 adults required the attention of 25 adult nurses.

In conclusion, it has been shown that there are certain definite labor categories in the typical vespine society. Individual workers remain in their own particular field of activity until the demands of the society dictate otherwise. No age distinction exists which might predetermine the occupation of any worker. The wasps in all labor groups respond at once to any emergency and can act in concert. The labor groups differentiate as they are needed, and as the abundance of available workers permits. It is likely that the brood nurses control the caste of their charges by regulating quantitative feeding.

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Gyrohypnus emmesus Grav.—The first record of this species from Maine is probably June 27, 1945, when I took three specimens beneath a slab in a mill yard at Paris. Two specimens were taken at Hopkinton, Mass. on May 10, 1925, under bark.—C. A. Frost, Framingham, Mass.

NEW NORTH AMERICAN RYGCHIUM (HYMENOPTERA, VESPIDAE).

By Richard M. Bohart, University of California, Davis, Calif.

A study of the collections of the California Academy of Sciences, Oregon Agricultural College, U. S. National Museum, Museum of Comparative Zoology at Harvard, and University of Kansas has revealed a new species and several unnamed subspecies of *Rygchium*. Holotypes have been deposited in the California Academy of Sciences.

Rygchium macswaini, n. sp.

Male.—Black with the following yellow markings: mandible mostly, clypeus, scape in front, large triangular interantennal spot, lower ocular margin, long postocular spot, humeral margin, tegula, 2 pleural spots beneath, 2 spots on scutellum, stripe across postscutellum, large spot on propodeal angle, legs mostly (last tarsal segment light reddish), abdomen except for X-shaped black marks on tergites I and II, basal margin of sternite II and most of terminal segment. Wings moderately stained with reddish and brownish. Puncturation moderate, fine on clypeus and first two tergites except at apex of second where it is moderately coarse. Pubescence thick, golden brown, 2 to 3 ocellus diameters below ocelli, about 1 ocellus diameter on summit and horizontal face of tergite I, about $\frac{1}{2}$ ocellus diameter on remainder of tergites. Clypeus somewhat broader than long, apex distinctly produced and shallowly concave. Last antennal segment brownish, somewhat curved, flattened, twisted, reaching base of segment X. Humeral angle slightly obtuse, postscutellum serrately crested. Propodeal angles rather blunt, the hind face weakly margined, hardly punctured and with fine indistinct striae. Middle tibia not depressed at base. Abdomen stout, second segment about twice as broad as long. Length to apex of second tergite 7.5 mm.

Female.—Clypeus with a black spot, sometimes elongate, a pair of longitudinal yellow stripes on mesonotum. Clypeus somewhat narrowed and produced apically but not quite so decidedly as in male. Vertex depression almost as broad as ocellar area. Length to apex of second tergite 10.0 mm.

Holotype, male, Mt. Diablo, Contra Costa Co., California, May 19, 1939 (J. W. MacSwain).

Paratypes, 14 males and 8 females from following California localities: Mt. Diablo (G. and R. Bohart); El Portal and Indian Flat, Mariposa Co. (R. Bohart); Briceburg, Mariposa Co. (N. F. Hardman); Putah Canyon, Yolo Co. (R. Bohart); Richardson's Springs, Butte Co. (E. C. Van Dyke); Coalinga, Fresno Co. (R. Bohart); Old Station, Shasta Co. (P. D. Hurd); Tuolumne Co., 3500 feet; Corona, Riverside Co.

This species appears to be related to *discogaster* Bequaert but differs in the more produced clypeus in both sexes, thicker and shorter abdominal pubescence and more extended yellow markings in the female, particularly the 2 mesonotal stripes. There is a superficial resemblance to *R. foraminatum blandinum* Rohwer but in addition to the produced clypeus of *macswaini,* the stouter abdomen, the more even pubescence, the more twisted antennal hook in the male, and the reddish last tarsal segment of the male (instead of brown or black) all serve as distinguishing features.

Key to the Subspecies of Rygchium foraminatum (Saussure).

1. Markings black and red except for yellow clypeus in male, first tergite all red above, wings dark brown and violaceous (central to southern Florida) .... *apopkense* (Robt.)
   Markings less extensively reddish, first tergite not red above . 2
2. Abdominal markings whitish; apical margin of second tergite not membranous, not closely and coarsely punctured (northern half of United States) .. *leucomelas* (Saussure)
   Abdominal markings yellowish 3
3. Wings dark brown and violaceous, tegula of female black, apical margin of second tergite not membranous and not coarsely punctured (S. E. United States) .... **parvirudis** R. Bohart
   Wings brownish or reddish; tegula of female not all black .. 4
4. Apices of second and following tergites not membranous and rather sparsely punctured, the bands usually pale yellow; female scape entirely dark (N. W. United States) **oregonense** R. Bohart
   Apices of second and following tergites membranous and well punctured or at least with deep yellow or orange bands, female scape not all dark 5
5. Markings black and yellow, legs essentially black and yellow, apical margin of second tergite usually upturned and membranous 6
   Markings with an orange or reddish tinge or with legs mostly red and yellow 7

6. Sternite II with free or attached yellow spots, tergite II usually with triangular attached spots, wings reddish brown (California) .... *blandinum* (Roh.)
   Sternite and tergite II without spots; wings brown (Eastern and central U. S.) .... *foraminatum* (Sauss.)
7. Tergite II moderately punctured and not upturned apically; legs mostly reddish and yellow, horizontal surface of tergite I all yellow in most females except for an angular transverse median spot; markings of notum deep yellow; female frons rather finely punctured (Texas) .. *fedoris* R. Bohart
   Tergite II membranous and upturned apically, second and following tergites coarsely punctured toward apex; tergite I of female with a large black area on the horizontal surface; markings of notum (especially in female) tinged with reddish; female frons coarsely punctured (S. W. United States) .... *aequale* (Cameron)

Rygchium foraminatum **oregonense,** n. subsp.

Male.—Black and yellow, abdominal markings tending toward whitish. Pale markings as follows: clypeus, scape in front, mandible mostly, small interantennal spot, small postocular spot, narrow humeral margin, spots on tegula, narrow stripe across postscutellum, legs partly, apical margins of tergites I to V, sternite II (narrowly). Last tarsal segment of mid and hind tarsus dark brown. Wings stained with reddish brown. Tergite II not upturned or membranous apically, its subapical punctures small and well separated. Lateroapical margin of clypeus about 1.3 times as long as lateral margin. Length to apex of second tergite 9.0 mm.

Female.—Clypeus, scape, tergite V, sternite II except laterally, mandible and legs mostly, black. A small spot below tegula. Restricted basal markings on clypeus and a very small free spot on tergite II present in a few paratypes. Length to apex of second tergite 9.5 mm.

Holotype, male, Lick Creek Ranger Station (4600′), Wallowa National Forest, Oregon, August 16, 1937 (Bolinger-Jewett). Paratypes, 5 females, same data as type; 1 male and 3 females, Steens Mts. (7,000 ft.), Oregon (Bolinger-Jewett); 1 male and 2 females, Cornucopia, Oregon (Bolinger, Jewett and H. A. Scullen). Other paratypes from Grant Co., Klamath Lake, Suttle Lake, Wallowa Lake, Oregon; and Wawawai and near Stratford, Washington. I have also studied specimens agreeing in most respects from Elko Co., Nevada; Jenny Lake, Wyoming; Kent Lake (near Beaver) and Salt Lake City, Utah; and Mono Lake, California.

This subspecies most closely resembles typical *foraminatum*, especially in the distribution of thoracic and abdominal markings. It differs, however in the paler yellow color, and particularly in the sparsely punctured and nonmembranous margin of tergite II. The generally finer puncturation, and usually black female clypeus and scape are added points of difference; also the clypeus of *oregonense* averages slightly longer in both sexes.

Rygchium foraminatum **parvirudis,** n. subsp.

Male.—Black with light yellow markings as follows: mandible mostly, clypeus, scape in front, interantennal spot, postocular dot, narrow humeral margin, scape partly, postscutellar stripe, apical margins of abdominal tergites I to VI (becoming progressively narrower), narrow margins of sternites II and III, lateral spots on following sternites, legs partly. Last segment of mid and hind tarsi dark brown. Wings dark brown with purplish reflections. Clypeus well punctured, lateroapical and lateral margins about equal in length. Abdominal tergite II rather finely punctured toward apex and without a membranous margin. Length to apex of second tergite 8.0 mm.

Female.—Clypeus black with small laterobasal spots, mandible black, scape almost all black, 2 spots of humeral margin very narrow, apical band of second tergite nearly obsolete, following tergites and all sternites black. Tegula entirely and legs mostly (entirely in 1 paratype) black. Length to apex of second tergite 11.0 mm.

Holotype, male, Tallahassee, Florida, April 1, 1944 (R. and G. Bohart). Paratypes, 1 male, same data as holotype; 1 female, McClellanville, South Carolina, May 11, 1944 (H. K. Townes); 1 female, Orlando, Florida, March 1944 (R. and G. Bohart).

This subspecies represents the darkest phase of *foraminatum*. In wing color it resembles *apopkense* but *parvirudis* has no reddish markings. It is the only form I have seen with all dark mandibles and tegulae in the female.

KEY TO THE SUBSPECIES OF RYGCHIUM FUSUM (CRESSON).

1. Markings principally black and reddish (Florida and southern Georgia) .... **rubrivestis** R. Bohart
   Markings with considerable amounts of yellow 2

2. Pronotum above entirely red and yellow, the latter covering one-half to three-fourths of area; second sternite mostly yellow (Owens Valley of California) .... **sanneovestis** R. Bohart
   Pronotum not entirely red and yellow, or if so, with latter covering less than half of area, second sternite of females and most males with more black or red than yellow (most of U. S. and parts of Mexico) .... *fusum* (Cresson)

Typical *fusum* varies from almost entirely red and yellow (as in the type from Texas) to specimens with more black than red and yellow combined. As in the color forms of *dorsale* (Fabr.), there seems to be little geographical significance involved. However, Florida and California have distinctively marked subspecies which are described below.

Rygchium fusum **rubrivestis,** n. subsp.

Black and reddish, a small amount of yellow and deep yellow. Yellow markings occur in male only and are: mandible spot, clypeus, scape in front, interantennal spot, lower orbit (these are all reddish in female). Deep yellow to orange yellow markings are: narrow humeral margin, apical margins of tergites I to III. Reddish are: facial markings and scape of female, inner side of flagellum and last two segments of male antenna, postocular spot, most of pronotum above, tegula, spot beneath, scutellum, most of postscutellum, propodeal angles broadly, most of tergite I, lateral spot of tergite II, legs partly except for coxae. Wings stained with dark brown, violaceous. Length to apex of second tergite, male 10.5 mm., female 12.5 mm.

Holotype, male, Orlando, Florida, March 1944 (R. and G. Bohart). Paratypes, 4 males and 3 females from following Florida localities: Ft. Meade (J. Nottingham), Tallahassee (R. and G. Bohart), Ft. Lauderdale (M. Bates), Wildwood (R. H. Beamer), Winter Park, Orlando, Pensacola. One male paratype, Okefenokee Swamp, Georgia (R. H. Beamer). Paratypes were collected in March, June, July, August and October.

Rygchium fusum **sanneovestis,** n. subsp.

Black, marked with yellow and reddish. Yellow are: mandible partly, clypeus, lower orbit, large interantennal spot, scape in front, postocular spot, front half of pronotum (two-thirds in some paratypes), small spot beneath tegula, scutellum mostly, propodeal angles broadly, legs partly (mid femur about one-third yellow, two-thirds orange), abdomen except for last segment and basomedial dark areas on tergites I and II and sternite II. Orange red are: Mandible partly, scape partly, base and inner side of flagellum in male, including all of last segment, tinges around most yellow areas of body, hind half (or one-third) of pronotum, narrow line across middle of postscutellum, legs partly, especially on femora, last abdominal segment. Wings moderately stained with reddish and brownish. Tergite II with apical reflexed edge about 2.5 times an ocellus diameter. Length to apex of tergite II, male 10.5 mm., female 12.5 mm.

Holotype, male, Lone Pine, Inyo Co., California, June 18, 1937 (E. C. Van Dyke). Paratypes, 1 male and 8 females, Lone Pine and Big Pine, Inyo Co., California, June (E. C. Van Dyke, E. P. Van Duzee, R. Bohart).

This subspecies is homeochromic with *R. boscii auranum* (Cameron) which occurs in the same area.

Key to the Subspecies of Rygchium tempiferum (Viereck).

1. Light markings mainly orange or orange and yellow, flagellum reddish, at least at base 2
   Light markings mainly yellow 3
2. With some black markings (S. Colorado and New Mexico). *tempiferum* (Viereck)
   Without black markings (Oklahoma) .. *pritchardi* (Bequaert)
3. Yellow markings strongly tinged with reddish, especially on tergite I, flagellum entirely black (Utah) **subrubeum** R. Bohart
   Yellow markings not or only slightly tinged with reddish ... 4
4. Apical margin of tergite II reflexed less than one ocellus diameter, margin of III not swollen (Northwestern U. S.) *eldoradense* (Rohwer)
   Apical margin of tergite II reflexed more than one ocellus diameter, margin of III swollen a little less than one ocellus diameter (Charleston Mts., Nevada) **birepandum** R. Bohart

Rygchium tempiferum **subrubeum,** n. subsp.

Male.—Pattern black, yellow and some reddish. Yellow are: mandible mostly, clypeus, scape in front, lower orbit, interantennal spot, legs partly, apical margin of tergite I, segments II to VI except for V-shaped basal black spot on sternite II and broad X-shaped black spot at base of tergite II. Reddish are: mandible at tip, scape behind, postocular spot, pronotum above mostly, tegula, spot beneath, 2 small scutellar spots, spots on propodeal angles, legs partly (femora black, red and yellow), large lateral spots on horizontal surface of tergite I (smaller in some paratypes). Wings moderately stained with reddish and brownish, slightly violaceous. Pubescence at summit of tergite I as long as 3 to 4 ocellus diameters. Tergite II with apical margin reflexed slightly less than 1 ocellus diameter. Length to apex of second tergite 11.2 mm.

Holotype, male, Beaver Canyon, Utah (6500 ft.), June 11, 1946 (R. Bohart). Paratypes, 5 males, same locality and collector as type. I have seen a female referable to this subspecies from Creede, Colorado (8844 ft.), August, 1914 (S. J. Hunter). It has the dorsum of the thorax black save for a narrow orange humeral margin and it has a 3-pronged black clypeal mark.

Rygchium tempiferum **birepandum,** n. subsp.

Male.—Black and yellow, legs slightly tinged with red. Yellow are: mandible mostly, clypeus, lower orbit, scape in front, interantennal spot, postocular spot, broad humeral margin, tegula mostly, coxae and femora partly, tibiae and tarsi, broad apical margins of all abdominal segments except sternite I, that on tergite I enlarged laterally to partly enclose a black horizontal area. Tergite I with pubescence at summit as long as 3 to 4 ocellus diameters. Tergite II with apical margin reflexed about 1.5 ocellus diameters, tergite III reflexed about half as much. Length to apex of second tergite 11.0 mm.

Holotype, male, and 5 male paratypes, Charleston Mountain Park, Nevada (9,000 ft.), June 21, 1940 (R. Bohart).

Rygchium alvarado **safranum,** n. subsp.

Black, marked with yellow and reddish yellow. Yellow are: spot on mandible, clypeus, scape in front, lower orbit, a semicircular frontal spot, legs partly (including coxae in front). Orange or reddish yellow are: mandible and basal three antennal segments partly, postocular spot, humeral and posterior margins of pronotum above tegula, spot beneath, a lateral spot on scutellum, band across postscutellum, propodeal spots, legs mostly, broad apical margins of all tergites, those on I and II with large attached spots, broad apical margins of second and following sternites, that on II covering 2/3 of segment. Wings lightly stained with orange and brownish. Last two antennal segments of male reddish brown. Length to apex of second tergite, male 10.5 mm., female 11.5 mm.

Holotype, male, Alpine, Texas, June 30, 1942 (E. C. Van Dyke). Paratypes, 1 male, Valentine, Texas, July 13, 1927 (P. A. Readio); 1 male, Davis Mts., Texas, July 10, 1942 (E. C. Van Dyke); 1 male, Davis Mts., Texas, June 28, 1942 (H. A. Scullen); 1 female, Chisos Mts., Texas, June 10–12, 1908 (Mitchell and Cushman).

Rygchium alvarado (Sauss.) has the size and shape of *R. annulatum* (Say) but differs in having interocellar tubercules and both front and hind margins of the pronotum yellow. It occurs in Mexico, Arizona, and New Mexico. In western Texas it occurs as subspecies *safranum* which instead of being essentially black and deep ivory yellow is marked with orange and reddish yellow.

BOOK NOTES.

Catalogue of the North American Beetles of the Family Cleridae, by Albert R. Wolcott. Fieldiana: Zoology, vol. 32, no. 2, pp. 61–104. Chicago Natural History Museum, Chicago, Illinois.

The author in the opening paragraph of his introduction, states precisely the purpose of this catalogue in these words: "In order that certain necessary changes in nomenclature and systematics may be made known to those interested in the North American Cleridae, the present revision of existing catalogues is offered." This statement is followed by a brief history of the classification of the family. A number of changes in nomenclature have been made to bring the generic and other names in line with the provisions of the International Code. An extensive bibliography closes the paper, which in addition has a general index of species, genera and higher groups, naturally including synonymy.

Mr. Wolcott says nothing of the tedious, exacting labor of putting together such a mass of accurate data; but this reviewer emphasizes this aspect, an aspect to be remembered by those leisurely critics, who look at the fly perched on a work of art, and not at the beauty of the whole.

J. R. T.-B.

SOUTHWESTERN GEOMETRID NOTES AND NEW SPECIES. II.

By John L. Sperry, Riverside, California.

The collecting season in the southwest in 1947, although not the best among the past few years, furnished some good hunting, some surprises and a new species or two, and a few bits of entomological information worth recording.

The season was the driest in the history of the local Weather Bureau, and the geometrid catch was much lighter than is usual. In the Ajo Mts. of Southern Arizona, in April, we obtained small series of *Chlorochlamys zelleraria* Pack. and *Semiothisa hypaethrata* Grote and at Alamo Canyon, a good series of *Stenaspilates flavisaria* Grossbeck. The Baboquivari Mts. were very dry and disappointing as were the White Mts. of Arizona in June. The early September collecting in Oak Creek Canyon, south of Flagstaff, Arizona, was excellent and there were some good things taken on the Upper Santa Ana River in the San Bernardino Mts. of California during the summer.

Dysstroma ethela Hulst

We were fortunate enough to collect a small series of this species which answers Hulst's description exactly, on the Upper Santa Ana River in the San Bernardino Mts. of California during the latter part of the summer. This separates rather readily from *kasloata* Tayl. the best characteristic probably being the basal area of the primaries which is cream in *ethela* and dark in *kasloata,* the extra-basal band being always present in the latter, even in specimens in our collection which are as light as *ethela.* The "shading of blackish scales along costa at base," which Hulst mentions, is present in all specimens of the series and in one specimen a hair line of dots starts across the wing paralleling the curved outer margin of the creamy basal area. It seems probable that *kasloata* Tayl. should be raised to specific rank and it is also quite probable that the author has distributed specimens of the latter as *ethela.*

Genus *Parexcelsa* Pearsall.

This genus was erected in 1912 (Can. Ent. XLIV, 100) for the single species *ultraria,* described from 14 males taken at San Diego, the female was unknown. This year through the kindness of the American Museum of Natural History and Mr. Albert Zerkowitz, the author obtained a specimen of this species and so was able to identify a female which had been in the Sperry collection for some time. The author would therefore add the following female characters to complete the description of the genus: Female. Palpi moderate, longer than in the male, upturned, clothed beneath with mixed scales and hair. Tongue obsolete, head as in male. Antennae simple, with two pairs of short bristles from the apex of each segment on the under side. Legs normal, with all spurs. Venation as in the male.

From Northern Arizona we have a long series of a small Sericosema which is apparently undescribed.

Sericosema meadowsaria, sp. n.

Palpi long, white, drooping, smooth scaled. Head white, lightly speckled with gray. Antennae fuscous, pectinate nearly to the tip which is dentate, in the male. Female antennae simple. Thorax abdomen and all wings light tawny, sprinkled sparingly with gray. The forewings have a tendency to show a rosy tinge in the ground color along the costa and on the outer third of the wing, especially in the female. Maculation of the upper side of the wing is rather constant, beneath very variable. On the forewings the single line starts at about two-thirds out on the costa, at right angles to the costa, curving gently toward the tornus to vein 4 where the curve sharpens curving toward the middle of inner margin to vein 2 thence slightly outcurved or nearly straight to inner margin about 3 mm. from the tornus, in many specimens fading out at about vein 1. The area distad of this line is much more heavily speckled than the rest of the wing and there is a dark shading between veins 3 and 4 in many specimens, in some cases extending to the outer margin. Discal spot absent; fringe usually light tan, in some female specimens reddish and in many specimens with checkering, dark at ends of veins. Secondaries without maculation, the speckling thinner than on primaries, heavier near outer margin. Maculation of the under side sometimes showing dimly through.

Beneath rather variable, ground color ranging from light tan to brick red more heavily speckled than on upper surface, line of the upper side on forewings repeated but not reaching inner margin, dark shading between veins 3 and 4 usually well developed. Secondaries usually with a t.p. line present, curving gently from about three-fifths out on costa to about the middle of the inner margin, usually rather heavily shaded outwardly especially near the costa, very rarely broken near the middle and usually obsolete near the inner margin, sometimes entirely lacking. Discal spots small, distinct on all wings. Expanse, male 28–30 mm. female, 32–34 mm.

Holotype, male. Todd's Lodge, Oak Creek Canyon, Arizona, June 15, 1941, Grace H. & John L. Sperry, collectors, and in the Sperry collection. Allotype, female, same locality and collectors, June 14, 1942, and in the Sperry collection.

Paratypes, 66 males, 8 females, same locality and collectors, taken between June 12th and 25th from 1941 to 1946, and in the U. S. National Museum, Canadian National Museum, Museum of Comparative Zoology, Am. Museum of Natural History, Los Angeles County Museum, and collections Meadows and Sperry.

This species is readily separated from *juturnaria* and *viridirufaria* by its much smaller size, from *simularia* by the under side of the secondaries which lack the heavy black terminal area of the latter, from *argentata* by the lack of the silvery sheen on the under side of the wings and by *meadowsaria's* darker maculation and from *wilsonensis* by its darker color and by the lines on the under side of the secondaries. In nine specimens in every ten this line is broken in the center in *wilsonensis,* in one specimen in sixteen this line is broken in *meadowsaria.* The genitalia are closest to *argentata* but the long spines at the base of the aedeagus are shorter than in *argentata* and much longer than the weak set in *wilsonensis* (see Lepidopterist III, 152). The short spines on the vesica are shorter, fewer and farther removed from the cluster of long basal spines than those in *argentata* and there is a long curved spine at the apex of the organ as in *simularia* which is lacking in *argentata.*

It gives me great pleasure to name this fine species in honor of my friend Don Meadows, entomologist, educator and lover of the good out doors and with the happy faculty of passing on a part of his intellectual curiosity to those he teaches. May the call of the Spring nights again become too strong and add many new specimens to his already excellent Pyralid collection.

There has been for some time in the Sperry collection, a good series of a *Phengommataea* species which the author has hesitated to describe without more information concerning *P. duoangulata* Cassino & Swett. All other species listed in this genus are represented in the Sperry collection or have been examined by the author. This year an appeal to Dr. Banks for information and his kindness in comparing this species with the material in the Museum of Comparative Zoology has made this description possible.

In 1923 (Lepidopterist IV, 8) Cassino & Swett described *duoangulata* from a single male taken at Palmerlee, Ariz., without date. Dr. Banks writes that there is no specimen in the M.C.Z. collection labeled *duoangulata* but there is a specimen labeled, in Cassino's handwriting, *angulata,* Cassino & Swett, holotype, male, with a locality label reading Palmerlee, Ariz., without date. I believe we must accept this specimen as the type of *duoangulata.* Hence, with many thanks for the kindness of Dr. Banks, and of Dr. McDunnough and Hahn Capps, who have also examined this species, I venture to describe

Phengommataea mabelata, sp. n.

Palpi, creamy buff, tipped with brown; head, front and vertex chalk white; antennae white; legs cream, thorax beneath clothed with short white, woolly hairs. Thorax, abdomen and ground color of all wings creamy buff sometimes basally Colonial buff (Ridgway color).

Primaries: lines broad, irregular, chestnut-brown; in rubbed specimens cinnamon-brown. T.a. line starts at costa 1/3 out from base from a triangular spot $1\frac{1}{2}$ mm. wide at costa, runs narrowing rapidly, toward a point just above tornus, for about 3 mm. then angles back sharply and goes nearly straight to inner margin at 1/3 out. The line is less than 1 mm. broad and is weak or wanting in over half of the series. T.p. line starts at costa, 1/7 in from apex, goes straight in a direction perpendicular to inner margin, to line 5, bends slightly out to line 4 then slightly back to line 2, thence curves outward to inner margin at $\frac{1}{4}$ in from tornus. This line averages 1 mm. broad and in fresh specimens is minutely shaded outwardly with orange-brown. Discal spots small, an upright dash, present in half of the series.

Secondaries: Concolorous with the primaries, t.a. line absent, t.p. line a continuation of t.p. line of the primaries, from costa goes almost straight toward tornus to center of wing, thence bending slightly back and curving slightly outward to inner margin about 3 mm. from tornus. No discal dot present.

Beneath light cream with maculation of upper side reflected through. Expanse: male 34 mm., female 34–36 mm.

The genitalic slide which Mr. Capps kindly made for us from the only male, shows that the species is close to *olifata* Guedet, a species which I have been privileged to examine through the kindness of its author.

Mabelata differs from *edwardsata, lagunata, duoangulata, olifata,* and *spoliata* in its lack of the darker shading of the medial portion of the fore wings, in the shape of the lines and in its broader wings, and from the first four in the presence of a line on the secondaries. From *dissimilis* without maculation, and *sericeata* with its very light, regular lines (which species possibly do not belong in this genus), by its heavier maculation and broader wings, and Dr. Banks kindly adds it differs from *duoangulata* in color, maculation and shape of the wings.

Holotype, female, Todd's Lodge, Oak Creek Canyon, Ariz., Sept. 12, 1947, Grace H. and John L. Sperry, collectors and in the Sperry collection.

Allotype male, same data, Sept. 16, 1941, and in the Sperry collection.

Paratypes, 14 females, same data, June and September 1942 to 1946, in Canadian National Museum, Museum of Comparative Zoology, Science Museum of University of Massachusetts, Los Angeles County Museum, and Sperry collection.

There must be early spring and early fall broods of this species as many of the type series are somewhat worn.

It gives me great pleasure to name this interesting species in honor of our friend, Mrs. Charles P. Alexander of Amherst, Mass., with her husband, vagabond at heart and lover of the wilderness. Being myself married to an entomologist, I realize, none better, how much the entomological world owes to Mabel for the monumental works of Charles. May our paths cross often in the pleasant places and may we meet again and again and many times again, under canvas, at the "back of beyond" where the undescribed Tipulids fly.

From Todd's Lodge, in Oak Creek Canyon, south of Flagstaff, Ariz., a locality which has proved most productive of good things, we have yet another species which seems to be undescribed. I am indebted to Mr. Hahn W. Capps of the U. S. National Museum for the generic reference and for his kindness in comparing this species with National Museum material.

Antepione hewesata, sp. n.

Male and Female: The small, upturned palpi, head, vertex and front, legs, thorax, abdomen and ground color of all wings is paper white. The wings are very sparingly flecked with ochraceous-orange (Ridgway color), the male being more heavily sprinkled. Lines are sharply drawn, narrow (about $\frac{1}{4}$ mm. in width) and almost straight. T.a. line from the costa or just below it starting 1/3 out, has a minute outward, tooth-like angle, thence straight to line 1 in a direction perpendicular to inner margin, thence bending slightly inward to inner margin at 1/3 out. T.p. line starts at costa 1/6 in from apex, goes perpendicular to costa for ½ mm., thence nearly parallel to tornal portion of outer margin to inner margin at 1/3 in from tornus. The lines are ochraceous-orange and without shading. There is a minute, black, discal dot.

Secondaries: t.a. line absent, t.p. line a continuation of the same line of the primaries, obsolescent at costa, becoming clear 1 mm. below it and continuing almost straight across wing to inner margin at 7/10 out from the base. A minute discal dot in most specimens. There is a narrow line of ochraceous-orange passing through the base of the fringe on both wings, remainder of fringe concolorous with ground color of the wings.

Beneath, white on both wings with the maculation of the upper side showing faintly through. Expanse 28–33 mm.

Holotype, female, Todd's Lodge, Oak Creek Canyon, Ariz., June 15, 1942, Grace H. and John L. Sperry, collectors, and in the Sperry collection.

Allotype, male, same data, June 10, 1942, and in the Sperry collection.

Paratypes, 3 males, 7 females, same data, June 10–24, 1942 to 1946, and in U. S. National Museum, Canadian National Museum, Museum of Comparative Zoology and collections Hewes and Sperry.

The species belongs in the *arizonata* part of the genus and is separated from *thisoaria, comstocki, indiscretata* and *imitata* by the lack of the triangular spot on the costa near the apex; from *constans* by the sharply defined lines and by the ground color of the wings which, in *constans,* is dull clay; from *ochraceata* and *arizonata* by the color of the wings and the lack of dark blotches outside the t.p. lines and by the lack of shading on the lines. This is the only species as yet described in this genus in which the ground color of the wings is white.

It gives me great pleasure to name this fine species in honor of our friend Dr. Laurence I. Hewes of San Francisco, California, possessor of one of the finest collections of Rhopalocera on the West Coast, and of the entomological knowledge and enthusiasm to go with it. We look forward with keen anticipation to that day when the loss of the Chief to the highways of the west shall be the gain of the entomological world.

A NEW GENUS AND SPECIES OF FUNGUS-GNATS (MYCETOPHILIDAE).

By F. R. Shaw, University of Massachusetts,
Amherst, Mass.

In a large collection of fungus-gnats taken by K. M. Fender from McMinnville, Oregon, there occurred some specimens of unusual interest and structure. Superfically these insects resemble species of the genus *Macrocera*. They possess the long antennae typical of the Macrocerinae. An examination of the thorax revealed some differences in structure from typical members of the genus *Macrocera* as shown in *Macrocera formosa,* fig. 2. In addition the wing venation is not typical of that shown in other North American species of *Macrocera* known to me. On the basis of these differences I am erecting a new genus which I take pleasure in naming for K. M. Fender.

Fenderomyia n. g.

Resembles *Macrocera* in appearance but differs from that genus in thoracic structure and wing venation. In all species of North American *Macrocera* known to me, the petiole of media joins the base of R_s before the fusion of R_s and M. In the new genus, the petiole of media is distinct and appears to extend to what is ordinarily called the m-cu crossvein. In *Fenderomyia* the costa is produced far beyond the apex of the wing almost reaching to M. The thorax appears somewhat compressed. In other species of this subfamily that are known to me, the mesepimeron extends to the metapleurite. In *Fenderomyia,* the pleurotergite extends to the katepisternite so that the mesepimeron fails to reach the metapleurite. The genotype is *Fenderomyia smithi* n. sp. the description of which follows.

Fenderomyia smithi n. sp.

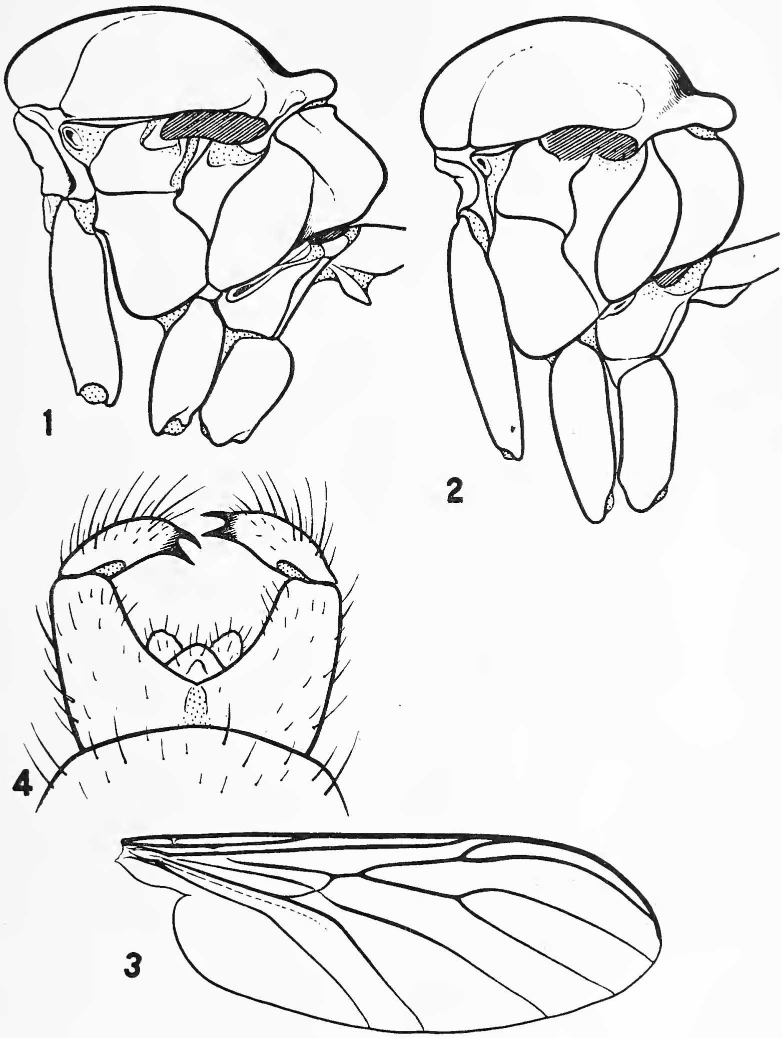
Male.—Length 4½–5 mm. General color brownish yellow.

Head: Yellow below, darker above. Antennae long, sixteen segmented, typically Macrocerine in appearance. First seg-

Explanation of Plate V.

Figure 1. Lateral view of *Fenderomyia smithi.*
Figure 2. Lateral view of *Macrocera formosa.*
Figure 3. Wing of *Fenderomyia smithi.*
Figure 4. Ventral view of hypopygium of *Fenderomyia smithi.*

BULL. B. E. S., VOL. XLIII PLATE V



ment with a brownish apex. Mouthparts yellowish brown. Palpi darker, four segmented. Ocelli three forming an elevated prominence triangular in outline on the vertex.

Thorax: General color brownish yellow but some variation does occur. One specimen is distinctly yellow with darker stripes on the mesonotum. Another specimen is darker and there is not as much contrast in the color of the mesonotum. In the paler specimens there is a darker stripe above each wing and a darker median stripe. Anepisternite with a conspicuous group of black setae just posterior to the spiracle. Mesothoracic epimeron not produced to the metapleurite. The pleurotergite is produced anteriorly to meet the katepisternite, see fig. 1. Mesepimeron with a brown mark. Metepisternite with a diagonal strip of dense black setae. Scutellum with eight marginal black setae. Postscutellum somewhat compressed and somewhat pointed at the tip. Halteres light yellow, knobs appear whitish. Legs yellow with fine black setulae. Tibia with one spur. Tarsi slightly darker than the rest of the leg.

Wing, fig. 3, 5 mm. in length. Hyaline, no crossbands. Veins yellowish. Costa strong, produced beyond apex of wing almost reaching M $1+2$. Subcosta long, Sc_2 lacking. R $1+2+3$ ends nearly opposite the fork of R $4+5$. Petiole of media not fused with R_s but distinct to the portion of the wing generally considered to be the m-cu crossvein thereby differing from all other Macrocerinae occurring in this country so far as I know. Cu_1 somewhat weak at the base. First anal weak, second anal strong reaching to the wing margin.

Abdomen: The first and last two segments are brown. The intermediate segments are light brownish yellow with the apex of each segment being slightly darker.

Hypopygium, fig. 4, brownish yellow. Claspers with two apical teeth which are dark brown.

This species is described from three specimens taken at station 3 A, Peavine Ridge, McMinnville, Oregon, on May 23, 1947 by K. M. Fender. Type and paratypes in my collection. The species is named for Elmer Smith who has aided me by preparing the drawings for this paper as well as for some other publications.

A FEW APHIDS ON PINE.

By George F. Knowlton, Logan, Utah.

The writer is indebted to Professor M. A. Palmer for most of the following identifications:

Essigella californica (Essig) on *Pinus murrayana* at Logan, June 5, 1942; on *Pinus ponderosa* at Flagstaff, Arizona, September 23, 1944; Verdi, Nevada, August 17, 1945.

E. fusca G.-P. on *Pinus ponderosa,* Beaver Canyon, July 12, 1945, and Amazon Mine, Logan Canyon, August 5, 1939, in Utah; Spirit Lake and Coeur d'Alene, Idaho, August 1938 (L. L. Hansen).

E. pini Wilson on *Pinus,* Grand Canyon of the Snake River, Wyoming, September 11, 1941; *Pinus ponderosa,* Marysvale Canyon, Utah, June 11, 1943; Cameron Pass and Gould, Colorado, August 1940.

Eulachnus rileyi (Williams) on Austrian pine, Logan, Utah, June 20, 1942, and Salt Lake City, July 1939; *Pinus sylvestris,* Plain City, Utah, October 9, 1939 (Knowlton—E. Wayment); *Pinus ponderosa,* Flagstaff, Arizona, September 23, 1944.

Cinara schwarzii (Wilson) on *Pinus ponderosa,* Mt. Nebo, Utah, August 14, 1943; Broadview, Montana, July 2, 1942 (H. F. Thornley).

C. sibiricae (G.-P.) on *Juniperus siberica,* Uintah Canyon, Utah, August 25, 1940; Mt. Timpanogas, July 26, 1945.

C. splendens (G.-P.) on *Pseudotsuga taxiifolia,* Puyallup, Washington, September 3, 1937 (H. C. Bennion). A species near *splendens,* Smithfield Canyon, Utah, July 15, 1937 (Knowlton –C. J. Davis).

C. apini (G.-P.) on *Pinus flexilis,* Beaver Creek, Idaho, August 13 and 29, 1937 (C. F. Smith).

C. gracilis (Wilson) on *Pinus virginiana,* Clarks Valley, Pa., May 4, 1930 (J. N. Knull).

C. lasiocarpae (G.-P.) on *Abies grandis,* Minersville, Oregon, May 23, 1939 (Det. P. W. Mason).

C. murrayanae (G.-P.) on *Pinus murrayana,* Logan, Utah, June 5, 1942; pine, Manassa, Colorado, June 11, 1943 (B. A. Haws).

C. palmerae (Gill.), on *Picea pungens,* Smithfield, Utah, July 31, 1939; Logan, Utah, July 12, 1939 (Knowlton–C. J. Davis).

C. pini (L.) on Scotch pine, Logan, Utah, July 19 and September 17, 1938, (Knowlton–W. P. Nye).

C. ponderosae (Wms.) on *Pinus ponderosa,* Beaver Creek Canyon of Logan Canyon, Utah, July 10, 1942; *P. contorta,* on north along Beaver Creek, in So. Idaho, July 23, 1937 (Knowlton–C. F. Smith).

Western Dolichopodidae Notes.—The following long-legged flies were collected during the latter part of July 1946, on a vacation trip to Waterton National Park, Alberta, Canada, to attend the International Great Plains Conference of Entomolgists, held from July 24 to 26, inclusive. Collecting area included Red Rock Canyon and Cameron Lake, as well as the general area of the town which included Cameron Falls. The writer is indebted to Lt. F. C. Harmston for checking upon the identity of the species listed below.

At Waterton National Park between July 23 and 26, the following species were taken: *Scellus amplus* Cur., *S. filiferus* Lw., and *S. vigil* O. S.; *Dolichopus amphericus* M.-B., *D. aldrichi* Whlr., *D. coloradensis* Aldr., *D. coquiletti* Aldr., *D. nigricoxa* Van D., *D. reindescens* M.-B., and *Tachytrechus bipunctatus* Gr.

Outside the National Park and along the highway to Pincher Creek, in Alberta, *Scellus amplus* Cur., *S. filiferus* Lw., *Dolichopus bifractus* Lw., *D. coloradensis* Aldr., and *D. procerus* Van D. were collected, on July 26, 1946.

Scellus monstrosus O. S. was taken on July 21, 1946, in Yellowstone National Park, Wyoming. At Pine Creek Pass, Idaho, on July 20, *Dolichopus sufflavus* Van D., *Diaphorus palpiger* Whlr. and *Sympycnus cuprinus* Whlr. were taken. At Victor, Idaho, July 20, *Dilichopus plumipes* Scop. was collected.—George F. Knowlton, Logan, Utah.

TOTALITARIANISM IN SCIENCE.

The other night I heard a recital by an eminent American concert singer. At the bottom of the programme, in capital letters it read *somewhat* like this: "CITIZENS ARTIST SERVICE, Inc.—Q. Q. Schmidlapp, President"; below "Through Courtesy of Cosmic Recital and Performers Corporation," with an address. (All the names are purely fictitious; the facts are real.)

The singer was real—a person and an artist in his own right, to whom the appendages were of no importance, and to whose song they added *nothing*.

What has this to do with entomology? Just this: Institutions to which writers on the subject are attached appear to have an itch to get in the limelight along with the author, and so want to see their own names in print. For the writer of this, whose opinions here expressed are purely personal and individual and who is in no way speaking officially for any group whatsoever, all entomological articles wherever published, depend for their force on the man who writes them; not at all on the institution with which he is connected. If he knows what he is writing about, that is all that is required. He adorns the institution, and the institution adds nothing to his individual worth.

A diamond alone and unset is still a precious jewel; an ass, no matter how gorgeously covered with gold and trappings, still has long ears.

These words are called forth by a stream of thought obvious in its workings. Often an author's name is followed by some such blurb as this "High Dissector of the Institute of Profound Learning of the Republic of Andorra, Andorra, Andorra" (this name is purely fictitious). If the blurb is omitted, the Director of the Institute will have something to say. The control extends even to grammar, spelling and punctuation.

We seem to be coming to a condition in which the institution swallows the man; in other words, to a scientific totalitarianism; a system in which the individual is nothing but a submerged atom in the whole.

Such a system lays the hand of death on free science. An institution of whatever kind shackles the free spirit. But science of all kinds has progressed through the free acts of free spirits. If such a condition and trend is not checked, no one not in an institution will be allowed to do any scientific work. We will eventually come to a black market in science, served by secret printing presses, and secretly passed around in fear and trembling.

Is there anyone so foolish as not to realize that a condition of government-controlled science is in force in the totalitarian state, by whatever name we may call it? Is there anyone so foolish as not to know that institutional control of thought is death?

The remedy lies in resistance. But how many are so placed that they can fight their own bread-and-butter?

This is not a polished, complete, final statement. It is meant to arouse thought before free thought perishes.

J. R. de la Torre-Bueno,
for himself only.

BOOK NOTES.

The Mosquitoes of Illinois, by Herbert H. Ross. Bulletin of the Illinois Natural History Survey, vol. 24, no. 1, pp. 1–96, figs. 1–184.

Here we have a handbook of the mosquitoes of a given area of the central part of the United States. It lists 10 genera and 52 species, which naturally include the disease vectors. Of the latter, *Aedes aegyptii* is found sporadically only. The monograph gives the biology, seasonal and geographical distribution, economic importance, methods of control, collecting and preserving, and technique for study. The section on classification keys out all the genera and species, both as larvae and adults, with adequate descriptions of both for each species. Whatever deficiencies the work may have are possibly discernible to the specialist. Certainly, the 175 line drawings of adults, larvae and structures are all they should be and really illustrate the text. The press work also is excellent and clear. Both the Survey and the author are to be congratulated on this excellent and highly useful work.

J. R. T.-B.

NOTICE

Mr. J. R. de la Torre-Bueno, editor of this Bulletin for more than thirty years, died on May 3, 1948. Until a new editor is appointed all communications should be addressed to George S. Tulloch, 22 East Garfield Street, Merrick, New York.

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BULLETIN

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Vol. XLIII OCTOBER, 1948 No. 4

SOME REMARKS ON THE TROMBICULINAE EWING, 1929, IN DAS TIERREICH, TROMBIDIIDAE, BY SIG THOR AND WILLMANN.*

A Critical Review

By Henry S. Fuller, M.D., The Bowman Gray School of Medicine, Winston-Salem, North Carolina

The mites of the subfamily Trombiculinae (Family Trombiculidae Ewing, 1944) are of particular interest to the parasitologist and to the medical entomologist. As larvae, they parasitize a wide variety of hosts, including mammals, birds, reptiles and amphibia. Man is an accidental host, and several of the species which attack human beings cause annoyance by virtue of the local inflammatory reaction at the site of attachment. During World War II, many men of Allied land forces were exposed to the hazard of scrub typhus (tsutsugamushi disease) in South-east Asia and the Pacific Islands. Since the vectors of this disease are mite larvae of this subfamily, the past few years have been marked by intensive studies of the group. At the beginning of the War, the most recent world treatise on the species known as larvae was that of Oudemans

* **Thor, Sig, and Willmann, Carl**
Trombidiidae.
Das Tierreich. Eine Zusammenstellung und Kennzeichnung der rezenten Tierformen. Acarina 3. Lieferung 71 b. pp. XXIX-XXXVI, 187–541, text-figures 253–599. Berlin, 1947. Walter de Gruyter & Co. Large octavo, paper covers.

The writer wishes to express his appreciation to Dr. George W. Wharton, of Duke University, for the loan of his copy of this treatise.

(1912). For this and other reasons, it has been exceedingly difficult to make the precise identifications which are so essential to critical work in medical entomology.

The manuscript of the present work was first written by the Norwegian acarologist, Dr. Sig Thor, who died October 18, 1937. It was completed before his death and was brought up to date, as of May 30, 1941, by Dr. Carl Willmann of Bremen, Germany. Since that time there have been numerous descriptions of new species, and several new genera have been proposed. Also the subfamily Trombiculinae Ewing, 1929, has been raised to full familial rank by Ewing (1944), and several subfamilies have been recognized within it. The classification is still in a fluid state, even at the generic level. The writer has been compiling a catalogue of Trombiculinae (Trombiculidae), and he has thought it useful to discuss the treatment of this group by Sig Thor and Willmann, in the light of the work of subsequent investigators.

The authors recognize eleven subfamilies within the family Trombidiidae, of which the Trombiculinae is the seventh. The species known as larvae are treated separately from those known as adults. A key is given to eighteen genera based on larval characters, including those treated by Ewing (1938) in his key to genera. *Trombicula,* as applied to larvae, is divided into the subgenera *Trombicula* s. str., and *Eutrombicula* Ewing, 1938. It is pointed out that the larva of the genotype, *T. minor* Berlese, 1905, is unknown, and that the application of the generic name to larvae is tentative. The authors state (p. 261) that the type of the larval group is *T. akamushi* (Brumpt). Fifty-six larval forms are treated in the genus *Trombicula,* divided between the two subgenera mentioned above. The key to these species is not entirely workable, owing mainly to mistakes in original descriptions, on which the authors were forced to rely in many cases.

T. (*T.*) *autumnalis* var. *japonica* is regarded as a variety of the well-known European species. It is dated from Tanaka (1916), who published in Japanese, and who apparently failed to render the scientific name in Latin characters. According to Philip (1947, Amer. J. Hyg., *46,* no. 1, pp. 60–65), valid publication of the name dates from Tanaka, Kaiwa, Teramura and Kagaya (1930).

T. (*T.*) *russica* (Oudemans, 1902). *Allothrombium muscae* Oudemans, 1906, is treated as a synonym of this species, following Oudemans (1912). However, his synonymy was based on insufficiently cleared specimens. The writer's studies of the same specimens, after proper clearing, have shown that the two species are abundantly distinct, and that *muscae* is entitled to full specific standing in the genus *Trombicula.* Also the writer regards *T. myotis* Ewing, 1929, as a subspecies or variety of *T. russica.*

T. (*T.*) *akamushi* (Brumpt, 1910). As a synonym of this species, the authors have listed *Trombicula intermedia* Nagayo, *et al.,* 1920, a species which is regarded by other workers as a distinct entity. They also list *T. deliensis* Walch "1923," as a synonym, but it is subsequently given full specific standing in the subgenus *Eutrombicula.* In the writer's opinion, based on studies of topotypic material from Japan and Sumatra, it is no more than a morphological variety of *T. akamushi.*

The fifth species is treated as *T.* (*T.*) *pseudoakamushi* Tanaka, 1916, with *Microtrombidium akamushi* Hirst, 1915, *Trombicula pallida* Nagayo, 1919, and *Trombicula akamushi* Gater, 1932, listed as questionable synonyms. Tanaka's usage of the name in 1916 was published in Japanese, not in Latin characters. The correct name is *T. pallida* Nagayo, Miyagawa, Mitamura and Tamiya, 1919; and *pallada* (sic) is a lapsus, published by Ewing (1925), Vitzthum (1929), and André (1930). The species referred to by Hirst (1915) and Gater (1932) is considered by present workers to be the true *T. akamushi* (Brumpt, 1910), not a synonym of *T. pallida.*

As species no. 5a, the authors treat *T.* (*T.*) *pseudoakamushi* var. *palparis* Nagayo, 1919, citing an article in the American Journal of Hygiene which was actually published in 1921. The correct name is *T. palpalis* Nagayo, Miyagawa, Mitamura and Tamiya, 1919, of which *palparis* (sic) is a lapsus, published by Tanaka, Kaiwa, Teramura and Kagaya (1930).

On pages 259 (key) and 268, *T.* (*T.*) *keukenschriveri* (sic) is a lapsus for *T.* (*T.*) *keukenschrijveri* Walch, 1924.

T. (*T.*) *microti* Ewing, 1928. *Trombicula parkeri* Radford, 1942, is now considered to be a synonym of this species, as a result of studies by Brennan and the writer.

T. (*T.*) *cervulicola* Ewing, *T.* (*T.*) *blarinae* Ewing, and *T.* (*T.*) *piercei* Ewing date from 1931, not "1932." *T. blarinae* should be referred to *Euschöngastia* Ewing, 1938, according to the writer's study of type material.

T. (*T.*) *setosa* Ewing, 1937. The writer has examined the slides in the U. S. National Museum, no. 1256, bearing cotypes labelled as this species. Unless there was confusion in labelling, it is apparent that this species belongs in *Euschöngastia.* Certain of the specimens have clavate pseudostigmatic organs, despite the fact that Ewing described them, "each with a few minute barbs."

Under *T.* (*E.*) *batatas* (Linnaeus, 1758), the authors have listed *Microthrombidium helleri* Oudemans, 1911, as a synonym, on the authority of Oudemans (1927), and their figure pertains to the latter species. The work of Van Thiel and others has shown that the larva commonly attacking man in Surinam, and described by Linnaeus, is not the species described by Oudemans. Michener (1946) has reported detailed studies which show that the larvae are abundantly distinct, and that *helleri* is entitled to full specific standing in *Eutrombicula.*

T. (*E.*) *tlalsahuate* (Murray, 1877). It is generally accepted that the correct name for this species is *Eutrombicula alfreddugèsi* (Oudemans, 1910). Murray applied his name to a specimen which he never saw, taken in France, and reported by Lemaire (1867). The assumption that this was an imported Mexican larva was unsound. Since the species commonly attacking man in France is *T. autumnalis* (Shaw, 1790), Murray's name should probably be regarded as a synonym of it, despite the fact that he thought he was naming a Mexican species. This matter has been discussed by Ewing (1938).

T. (*E.*) *wichmanni* (Oudemans, 1905). The authors do not cite other specific names as synonyms. They treat *T. pseudoakamushi* var. *deliensis* Walch, 1922, as a distinct species (p. 282, figs. 339a, and 339b), applying to it the name *T.* (*E.*) *pallida* Nagayo, which is incorrect. They also regard *T.* (*E.*) *hirsti* Sambon, 1927, as distinct (p. 285, fig. 342a, b, and c). On the basis of comparisons of topotypic specimens, Walch's and Sambon's species are regarded by the writer as synonymous with *T.* (*E.*) *wichmanni* (Oudemans, 1905).

T. (*E.*) *thomasi* (Oudemans, 1910). This species has a simple palpal claw, and it shares other characters with *T. desdentata* Boshell and Kerr, 1942, which was made the type of a new genus by Ewing (1944). It should be referred to *Crotiscus* Ewing, 1944. It is possible that *Crotiscus* may eventually be regarded as a subgenus of *Trombicula.*

T. (*E.*) *bruyanti* (Oudemans, 1910). This species was erroneously described and figured by Oudemans (1912) as having a bifurcate palpal claw. In collaboration with Dr. Marc André, the writer examined the cotypes in the Muséum National d'Histoire Naturelle, Paris. The palpal claw is trifurcate, and there is no long, nude, whip-like seta on tarsus III. This species is not a *Eutrombicula,* and it is probably best classified tentatively in *Trombicula.*

T. (*E.*) *minutissima* (Oudemans, 1910). Although the palpal claw is bifurcate, the scutum and pseudostigmatic organs are unlike those of any other described larva of *Trombicula* or *Eutrombicula,* and there is no long, nude, whip-like seta on tarsus III. The generic assignment is problematical, and this species may merit a subgenus or genus of its own.

T. (*E.*) *guineensis* (Bruyant and Joyeux, 1913). The original spelling of the specific name was *guineense.* The figure of the scutum is similar to that of *T. autumnalis* (Shaw, 1790). The writer is unable to discern the number of prongs of the palpal claw in the figure given by Bruyant and Joyeux. It is possible that Sig Thor and Willmann assumed this structure to be bifurcate. The subgeneric assignment seems questionable to the writer.

T. (*E.*) *gliricolens* (Hirst, 1915). This species was assigned by Wharton (1945) to *Acariscus* Ewing, 1943, a synonym of *Eutrombicula.* It was based on a single specimen which the writer was unable to locate in the British Museum (Natural History). The present subgeneric assignment is regarded as tentative by the writer.

As species no. 34, the authors have treated "*T.* (*E.*) *pallida* Nagayo," citing an article in the American Journal of Hygiene, which was actually published in 1921. They also cite as synonyms *T. pseudoakamushi* Tanaka, 1916 (not validly published); and *T. pseudoakamushi* Hatori, 1919 (virtually a nomen nudum); and *T. pseudoakamushi* var. *deliensis* Walch, 1922, 1924, and 1927. This amounts to a lumping of two distinct species, and *T. pallida* has been discussed above. The writer has compared some of Walch's topotypic specimens with Oudemans' original New Guinea specimens of *T.* (*E.*) *wichmanni,* and they are indistinguishable for practical purposes. Thus figures 339a and 339b, taken from Walch, are incorrectly labelled, and they refer not to the species of Nagayo, *et al.,* but to *T.* (*E.*) *wichmanni* (Oudemans, 1905).

As species no. 35, the authors have treated "*T.* (*E.*) *deliensis*" Walch, 1922. Synonyms are *T. vanderghinstei* Gunther, 1940, and *T. walchi* Womersley and Heaslip, 1943. The writer and certain other workers regard this as a morphological variety of *T. akamushi* (Brumpt, 1910). Although one encounters variants with bifurcate palpal claw, these forms are not close to *Eutrombicula.*

As species no. 40, the authors treat *T.* (*E.*) *hirsti* Sambon, 1927. The writer compared Oudemans' original New Guinea specimens of *T.* (*E.*) *wichmanni* (Oudemans, 1905) with Sambon's type in the British Museum (Natural History). On this basis he regards Sambon's species as a synonym. Thus figures 342a, b, and c refer to *wichmanni.*

As species no. 41, the authors treat *T.* (*E.*) *harperi* Ewing, 1928. This species was incorrectly described with a bifurcate palpal claw. According to the writer's examination of type material, this structure is actually trifurcate. This species is related to *T. microti* Ewing, 1928, and it does not belong in *Eutrombicula.*

As species no. 42, the authors treat *T.* (*E.*) *oregonensis* Ewing, 1929. The writer has examined the type material, and contrary to Ewing's statement, it is apparent that this species is not related to *T. bruyanti* (Oudemans, 1910). The palpal claw is composed of at least five prongs, the pseudostigmatic organs are clavate, and consequently this species should be assigned to *Euschöngastia* Ewing, 1938.

T. (*E.*) *myotis* Ewing, 1929, is a species with trifurcate palpal claw, as pointed out by Wharton (1947). According to the writer's studies of authentic specimens, it is very close to *T.* (*T.*) *russica* (Oudemans, 1902).

T. (*E.*) *flui* Van Thiel, 1930, is a typical *Eutrombicula.* As shown by Michener (1946), it is a synonym of *T.* (*E.*) *batatas* (Linnaeus, 1758).

T. (*E.*) *cavicola* Ewing, and *T.* (*E.*) *dunni* Ewing date from 1931, not "1932."

T. (*E.*) *ewingi* Fonseca, 1932, is the genotype of *Fonsecia* Radford, 1942, and *T.* (*E.*) *travassosi* Fonseca, 1935, also belongs to *Fonsecia.*

T. (*E.*) *hominis* Ewing dates from 1933, not "1934." It is a synonym of *T.* (*E.*) *batatas* (Linnaeus, 1758), as shown by Michener (1946).

Two species are listed as "Unsichere *T.*-Arten:" *T. papuana* (Canestrini, 1884); and *T. lahillei* Sig Thor, proposed (presumably first in this treatise) as a new name for *Microtrombidium brumpti* Lahille, 1927, preoccupied by Hirst, 1915.

Pentagonella Sig Thor, 1936, is treated as a separate genus, accompanied by a footnote stating that perhaps it might better be placed as a subgenus of *Trombicula.* Eight species are referred to this genus, of which the present writer has studied all except *P. fahrenholzi* (Oudemans, 1910). *P. yorkei* (Sambon, 1928) is not related to the genotype, and its scutum (fig. 353) was incorrectly figured in Sambon's original publication. Of the other species, *P. acuscutellaris* (Walch, 1922) is nearest to the genotype.

Riedlinia Oudemans, 1914, requires no comment, except that in the generic key (p. 254) it keys out on the basis of pseudostigmatic organs, and the form of these structures is unknown, since they were missing from all specimens of the original series.

In the genus *Schöngastia* Oudemans, 1910, the authors treat 19 established species and one uncertain species. Since the time when Oudemans proposed this genus, it has undergone considerable splitting. Of the nineteen species under consideration, only four can now be assigned with certainty to *Schöngastia: S. vandersandei* (Oudemans, 1905), the genotype; *S. schüffneri* (Walch, 1922); *S. pseudoschüffneri* (Walch, 1927), not "1924;" and *S. vieta* Gater, 1932. Two species should be assigned to *Endotrombicula* Ewing, 1931: *S. pillersi* Sambon, 1928; and *S. madagascariensis* Sambon, 1928. Two should be assigned to *Neoschöngastia* Ewing, 1929, as restricted by Ewing (1946): *S. gallinarum* (Hatori, 1920), not "1919;" and *S. salmi* Oudemans, 1922. (Hatori's description was published in Taiwan Igakkai Zasshi, no. 209, pp. 317–352, March 28, 1920). *S. aethiopica* Hirst, 1926, should be assigned to *Ascoschöngastia* Ewing, 1946. *S. oudemansi* (Walch, 1922) is being made the type of a new genus to be described by the present writer in a forthcoming paper. *S. berlesei* (Oudemans, 1903) was so inadequately described that the writer cannot decide to what genus it belongs. The following species should be assigned to *Euschöngastia* Ewing, 1938: *S. cercopitheci* (Trägårdh, 1904), not "1905," but 1904, according to Oudemans (1912, p. 62); *S. indica* Hirst, 1915; *S. coorongensis* Hirst, 1929, emendation; *S. globularis* (Walch, 1927), emendation; *S. dasycerci* Hirst, 1929; *S. antipodiana* Hirst, 1929, emendation; *S. westraliensis* Womersley, 1934, emendation; and *S. petrogalis* Womersley, 1934, emendation. Finally, the authors have treated *Trombidium bottegi* Parona, 1895, as an uncertain species of *Schöngastia;* but because of the inadequacy of the original description, the writer cannot decide to what genus it belongs.

Neoschöngastia Ewing, 1929. This genus was restricted by Ewing (1946), and by Wharton and Hardcastle (1946), to include species with clavate pseudostigmatic organs, in which the chelicerae are not serrate, and in which the scutum is at least partially submerged beneath the dorsal integument. *Paraschöngastia* Womersley, 1939, has been shown to be a synonym. Of the fourteen species treated by Sig Thor and Willmann, only two should be retained in *Neoschöngastia: N. americana* (Hirst, 1921), the genotype; and *N. scleropori* Ewing, 1931, not "1932." The genotype of *Ascoschöngastia* Ewing, 1946, is *N. malayensis* Gater, 1932. The writer would restrict this genus to species in which the posterior lateral setae are off the scutum. If this is done, then the following species will fall into *Euschöngastia* Ewing, 1938: *N. trouessarti* (Oudemans, 1910); *N. sciuricola* (Ewing, 1925); *N. californica* (Ewing, 1925); *N. peromysci* (Ewing, 1929); *N. signator* Ewing, 1931, not "1932;" *N. brevipes* Ewing, 1931, not "1932;" *N. lacunosa* Gater, 1932; *N. mutabilis* Gater, 1932; *N. debilis* Gater, 1932; *N. brasiliensis* Fonseca, 1935, not "1937;" and *N. dasyproctae* Ewing, 1937.

Euschöngastia Ewing, 1938, is treated as containing only the genotype, but the writer and others have found that the number of prongs of the palpal claw can vary on two sides of an individual specimen. According to the writer's concept, this genus includes most of the species formerly assigned to *Ascoschöngastia* Ewing, 1946, but this is a controversial matter.

Doloisia Oudemans, 1910, requires no comment. According to the writer's interpretation, it also includes *Neoschöngastia manipurensis* Radford, 1946.

Odontacarus Ewing, 1929, is made to contain three species: *O. dentatus* (Ewing, 1925); *O. australis* (Ewing, 1929); and *O. gymnodactyli* (Ewing, 1925), the inclusion of this last species being problematical from the writer's standpoint.

Endotrombicula Ewing dates from 1931, not "1932." In addition to the genotype, *E. penetrans* Ewing, 1931, not "1932," this genus should include *Schöngastia pillersi* Sambon, 1928, and *S. madagascariensis* Sambon, 1928. This statement is based on the writer's comparisons of type material of all three species.

Leeuwenhoekia Oudemans, 1911, is made to include four species: *L. verduni* (Oudemans, 1910), the genotype; *L. jaegerskioeldi* Oudemans, 1911; *L. polydiscum* (Oudemans, 1910); and *L. australiensis* Hirst, 1925. With the exception of the genotype, these species have been referred by other authors to *Acomatacarus* Ewing, 1942. The writer is not clear as to the line of demarcation between *Leeuwenhoekia* and *Acomatacarus,* and Ewing's published criteria for distinction have not been helpful when type material has been restudied by the present writer. The generic assignment of these species seems problematical.

Hannemania Oudemans, 1911. The authors should cite as a synonym *Hannemannia* (sic) Oudemans, 1912, proposed as an emendation. Fourteen species are treated as established, and one species is treated as having uncertain status. Certain of these require comment.

Hannemania argentina Lahille, 1927. On page 326, fig. 387 is incorrectly labelled as this species, for it is actually Sambon's figure of *H. samboni* Ewing, 1931 (= *H. argentina* Sambon, 1928, preoccupied). *H. samboni* Ewing, *H. hirsuta* Ewing, and *H. penetrans* Ewing date from 1931, not "1932." *H. hepatica* Fonseca dates from 1935, not "1937," and it is so close to *H. argentina* Lahille, 1927, that the possibility of synonymy might well have been considered. *H. hirsuta* is more closely allied to the genotype of *Comatacarus* Ewing, 1942, than it is to any other species of *Hannemania.*

In treating *Hannemania rouxi* Oudemans, 1917, as "Unsichere Art," the authors failed to cite two important references: Oudemans, 1917, Ent. Ber., *4,* no. 93, pp. 342–343 (original description); and Oudemans, 1923, Nova Caledonia, *3,* Livr. I, pp. 127–131, figs. 1–10. Oudemans' description and figures are adequate for recognition, and this species should be regarded as distinct and well established.

Finally, it should be noted that Sig Thor and Willmann have figured the scutum of several species of *Hannemania* after Sambon. The writer has examined Sambon's original specimens in the British Museum (Natural History), and in every case it is apparent that he failed to depict the anterior median projection which is present on the anterior margin of the scutum. Thus these figures are misleading.

Hemitrombicula Ewing, 1938, is treated as a member of the subfamily Trombiculinae. This genus contains one species, *H. simplex* Ewing, 1938. The writer has examined the type material, and he agrees with Wharton (1947) that it is not a member of the Trombiculidae.

Gahrliepia Oudemans, 1912, is treated as containing two species: *G. nanus* (Oudemans, 1910), the genotype; and *G. cetrata* Gater, 1932. It should be noted that Gater (1932) considered *Schön-*

gastiella Hirst, 1915 to be a synonym of *Gahrliepia*. Womersley and Heaslip (1943) have given excellent reasons for synonymizing this genus and also *Gateria* Ewing, 1938, under *Gahrliepia*. However, Sig Thor and Willmann have maintained them as distinct genera, and the matter is a controversial one.

Schöngastiella Hirst, 1915, is treated as containing *S. bengalensis* Hirst, 1915, the genotype; and *S. disparunguis* Oudemans, 1929. The writer has studied type material of both species. Because of its scutal characters, *S. disparunguis* should be referred to *Walchia* Ewing, 1931.

Walchia Ewing dates from 1931, not "1932." It is treated as containing six species: *W. glabra* (sic, emendation) (Walch, 1927), the genotype; *W. lewthwaitei* Gater, 1932; *W. rustica* (Gater, 1932); *W. turmalis* (Gater, 1932); *W. enode* Gater, 1932; and *W. pinguis* (sic, emendation) Gater, 1932, which is a synonym of the genotype.

Gateria Ewing, 1938, is treated as containing three species: *G. fletcheri* (Gater, 1932), the genotype; *G. ciliata* (Gater, 1932); and *G. rutila* (Gater, 1932). These require no comment.

Two genera based on larval characters, each containing a single species, are also treated as members of the Trombiculinae: *Heterotrombidium* Verdun, 1909, and *Polydiscia* Methlagl, 1928. A footnote under the former states that it may not belong to this subfamily, and that the scutum is reminiscent of *Podothrombium* as figured by Oudemans (1930). In the writer's opinion, neither genus belongs to the Trombiculinae.

A key is given to three genera of Trombiculinae, based on adult characters: *Trombicula* Berlese, 1905; *Tragardhula* Berlese, 1912; and *Trombiculoides* Jacot, 1938. Twenty-one species of *Trombicula,* known as adults, are keyed and discussed.

As adult no. 11, the authors treat *Trombicula pallida,* referring also to *T. pseudoakamushi* var. *pallida*. This is not *T. pallida* of Nagayo, *et al.,* but is actually *T.* (*E.*) *wichmanni* (Oudemans, 1905).

Trombicula alleei Ewing, 1926, was recently made the type of a new subgenus, *Megatrombicula* Michener, 1946, and Michener also included *T. peruviana* Ewing, 1926.

Sig. Thor and Willmann have raised *T. canestrinii* var. *moesica* Andre, 1932, to full specific rank.

Trombicula cavernarum Ewing and *T. trifurca* Ewing date from 1933, not "1934." *T. trifurca* was recently made the type of a new genus, *Speotrombicula* Ewing, 1946.

Tragardhula Berlese, 1912, is monotypic for *Trombidium niloticum* Trägårdh, 1904, based on an adult. (The larvae described under this name are discussed subsequently.) The authors date this species from 1905, but Oudemans (1912) dates it from 1904.

Trombiculoides Jacot, 1938, is monotypic for *Trombidium scabrum* Say, 1821, emended to *scaber* by Jacot (1938).

In a section of the paper devoted to Trombidiidae described only as larvae, Sig Thor and Willmann treat two genera which require discussion. *Blankaartia* Oudemans, 1911, was proposed for the larva which Trägårdh had named *Trombidium niloticum,* and which he had found parasitic upon the adult mite bearing the same name. Sig Thor and Willmann point out that it is improbable that a larva would parasitize an adult of its own species; that the larva does not correspond to any known larva of the *Trombicula* type; and that it does not fulfill Ewing's criterion that the larvae of this subfamily are parasitic upon vertebrates. The writer believes that this larva is not conspecific with the adult known as *Tragardhula nilotica,* and that the larva therefore requires a new specific name in the genus *Blankaartia.*

Otonissus Kolenati, 1856 (= *Otonyssus* Kolenati, 1858, emendation) was used by Oudemans (1937) to replace *Trombicula.* Sig Thor and Willmann point out that Kolenati's genus and the nine uncertain species assigned to it are not recognizable from the descriptions and figures, and that an adequate understanding of *Otonissus* must await the collection and study of topotypic material. They state that *O. aurantiacus* Kolenati, 1856, should be taken as the type species. Kolenati did not designate a genotype.

In conclusion, the present writer regards this work as a worthwhile contribution, as it brings together a mass of not easily accessible material. Its general usefulness is diminished by the numerous changes that have occurred during the years between the closing of the manuscript and its publication. Among these changes are the raising of the subfamily to familial rank, and the recognition of four subfamilies within it, as reviewed by Wharton (1947); and the descriptions of new genera and species by several workers. This critical review is an attempt to evaluate the work of Sig Thor and Willmann in the light of our present knowledge. To bring it up to date will require considerable cataloguing of literature, and restudy of type material.

CANNIBALISM IN LEPTOCORIS TRIVITTATUS SAY.

By Cyril E. Abbott, Salt Lake City, Utah.

It has been my experience that cannibalism appears spontaneously in many insects which ordinarily do not exhibit this tendency, when a situation arises which deprives the species of its usual source of food. Apparently there are two factors involved in such cases: the lack of usual food material and the fact that the insects involved are chemically similar to the normal food materials. This is well illustrated by the following observations on the Boxelder Bug, *Leptocoris trivittatus* Say.

During the summer of 1947 I confined for study a number of these insects in various stages of development, and found that during ecdysis there appeared to be an abnormally high mortality in cases where the insects had not been regularly fed. Moreover, the non-molting specimens gathered about the dead insects, which they were probing with their proboscides. This situation made the insects appear to be cannibals, and in order to test this possibility the following experiment was tried.

Thirty bugs were placed in each of two cages, with only this difference between them: that whereas one contained bugs in various stages of growth, the other contained specimens of approximately the same stage, i.e., about 5 mm. in length. The insects in the first cage molted over a period of three weeks; all but five or six of those in the second cage within a period of 48 hours. In the first cage sixteen bugs—about 53% of the total—died or were killed during ecdysis; in the second cage only *six* of the molting bugs —20% succumbed. This experiment was repeated again with similar results. In other words, the rate of mortality in bugs molting at various periods was nearly four times as great as that among bugs which molted at about the same time. This gives strong presumptive evidence of cannibalism, since bugs of about the same size and strength molting at the same time cannot successfully attack one another. Only when a non-molting bug encounters a smaller, molting bug, can cannibalism occur. Incidentally, in all of these experiments, the insects were given no food but were plentifully supplied with water.

The chemical material which induces attack appears to be water-soluble. This is evident from the following tests. Thirty adult bugs were soaked in sulfuric ether overnight. The ether extract was then concentrated by evaporation on a piece of filter paper of about 32 sq. cm. This filter paper, dried and folded was placed in a cage containing bugs in various stages of development. The insects gave no response. The paper was then moistened. Two or three bugs, encountering the paper, extended their proboscides for a few seconds, but soon walked away. Observations repeated at intervals of an hour for twelve hours revealed no greater response than this. In the meantime, the bugs from which the ether extract had been made were soaked in *water* overnight, and this extract concentrated on filter paper. This paper was damp when placed in the cage. In less than ten minutes the paper was piled high with bugs, probing it with their proboscides. The paper was then removed and *dried,* care being taken to see that the bugs were supplied with water until the paper was replaced. The dried paper produced less effect, although bugs did gather about it, and attempt to feed on it. Usually ten or twelve bugs were at this at one time, but individual bugs wandered away after two or three minutes, probably because they could imbibe no liquid.

It appears, therefore, that the insects contain some water-soluble, chemical substance attractive to others of their species, and sufficiently like boxelder sap to initiate a feeding reaction.

In this connection, it is interesting that the red coloring in Leptocoris appears to consist of carotinoids derived from the sap of the boxelder and concentrated in the body of the insect. This material is present in the internal organs as well as the exoskeleton. It is not, of course, water-soluble. Of what use, if any, it is to the bug is problematical.

NOTICE

Mr. J. R. de la Torre-Bueno, editor of this bulletin for more than thirty years, died on May 3, 1948. Until a new editor is appointed all communications should be addressed to George S. Tulloch, 22 East Garfield Street, Merrick, New York.

WORD MADNESS.

By J. C. Bradley, Ithaca, New York.

Language exists to convey ideas. To a scientist it is a tool that must operate with precision; therefore he finds it necessary to refine definitions and to coin technical terms. Yet to use the latter needlessly, familiar words in unfamiliar senses, and unfamiliar words where a common one would suffice is pedantry. It is not always merely a cloak behind which a writer can hide a paucity of ideas and still hope to appear learned; sometimes truly brilliant minds, yes, even taxonomists, appear to suffer a type of word-hunger, and yearn to bury their thoughts and satisfy their craving by more and more erudite phraseology.

A learned entomologist has been so gracious as to give the writer a copy of one of his recent papers, a really important revision of a genus. I quote some of its amazing phraseology: "its close relative, the *eurythermal, mesophilic, ubiquist*[1] Euplilis", which is elsewhere described as a "complex of *hygrophilous* to *mesic* forms" contrasted to the "*xerophilous stenothermal* Moniaecera", one of two "fossorial, *terricolous* assemblages", each of which "has congeries of morphological features". We read of the "*nominate*[2] complex", of a subgenus with a "polite[3], *perfulgid* habitus", of a "polite, transverse zone of carinules", of a "*non-callate* post-temporal region", "*subfulgid* thorax", "*perfulgid* head", a "fulgid[4] abdomen", an "*efoveate* carina", and of "*eburneous*[5] sclerites".

I was about to ask whether my readers agree that a taxonomist ought to be able to understand a taxonomic paper without continual reference to an unabridged dictionary; but on second thought, I wonder to what unabridged dictionary?

I have italicized words that do not appear in my unabridged

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[1] According to Webster, one of a school of Lutheran divines.

[2] In Webster appears only as a verb.

[3] Webster gives "polished" as an obsolete meaning of polite.

[4] Webster gives Pope as authority for fulgid as a rare word meaning shining.

[5] Apparently an anglicizing of the Latin "eburneus" for which Webster gives the already existing English equivalent, "eburnian", meaning like ivory.

edition of Webster, although several have been made familiar by ecologists. But then my Webster and I have been getting old together, and perhaps if we were to come alive a century from now, we would find taxonomists using a still more marvelous jargon, and no one understanding anything, particularly not himself.

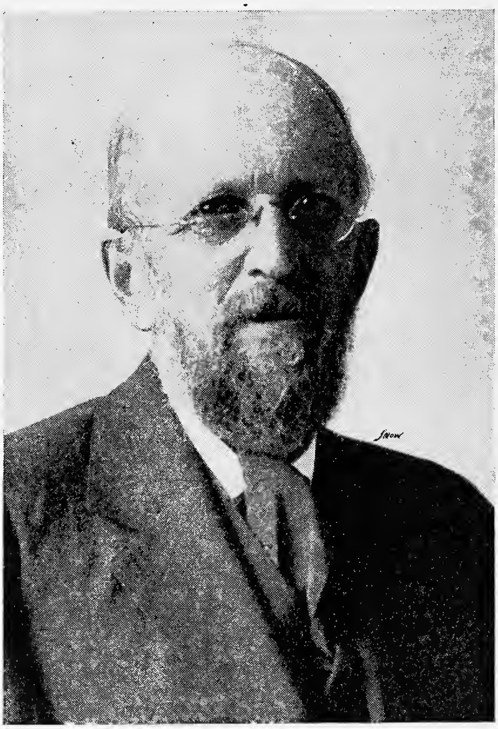
Esperanza Texana in Florida (Hemiptera, Coriscidae).—One female of this little-known species was taken by me at light in Lakeland, Florida, on July 16, 1948. *Esperanza texana* was originally described by Barber in 1906 (Sci. Bull. Bklyn, Inst. 1: 270) from a single male with the scutellum imperfect, taken near Brownsville, Texas. In 1927 Johnston (Bull. Bklyn. Ent. Soc. 22: 221) recorded a single male from Delta Point, Louisiana, and described the scutellum as having the apex curved upward to form a conspicuous spine. Johnston's paper was overlooked by Torre-Bueno in preparing his "Synopsis" and the genus is incorrectly characterized by him (1941, Ent. Amer. 21: 78) as having the scutellum unarmed.

In my female specimen the apical spine of the scutellum is oblique and short, its length being only three-fourths the diameter of the hind femur. The basal segment of the rostrum barely surpasses the base of the head, and is thus slightly longer than described by Barber.—Roland F. Hussey, Lakeland, Florida.

THEODORE D. A. COCKERELL.

By E. Gorton Linsley, Berkeley, California.

On January 26, 1948, the field of biology lost one of its most prodigious workers. It is doubtful if any man of his generation made so many original contributions to the taxonomy of so many different fields as did T. D. A. Cockerell.



Theodore Dru Alison Cockerell was born in Norwood, England, on August 22, 1866. He has recalled that as a child he was not strong ("I remember some one saying, be kind to the little boy, he will never grow up"). However, he did not allow his lack of physical vigor, nor the occasional recurrence of a chronic ailment, to discourage him. Rather he rose above these handicaps and turned them into important elements which helped to shape his career, determine his methods, and to a great extent his varied fields of interest. His bibliography is so great and so diverse that it would be a herculean task to assemble it in one list. The number of species of plants and animals, living and fossil, which he has named must be in the vicinity of seven or eight thousand!

Cockerell's interest in natural history began when he was a very young child. It was fostered by friends and family, natural history books, and a visit to the British Museum. However, he was also concerned with the arts and there was a period in his youth when some consideration was given to the possibility of devoting his major effort to an artistic career. Although he rarely turned his pen to strictly scientific drawing, throughout his life he pleased or entertained friends and correspondents with his sketches and frequently indulged in his unusual gift for poetry.

One of the early experiences which apparently had an important influence in shaping Cockerell's scientific career was a three year period spend in Colorado between 1887 and 1890. Here he began a catalogue of the fanua and flora of Colorado, both recent and fossil. This involved a search of the literature as well as correspondence and contacts with workers in various fields and undoubtedly laid the foundation for his broad interests in biology. At this time he was most concerned with the Mollusca, Macrolepidoptera, and the flowering plants.

After a brief stay in England he accepted a position as curator of the Public Museum at Kingston, Jamaica. It was here that he inaugurated his studies of the Coccidae. However, in 1893 his health appeared to require a less humid climate and he exchanged positions with his friend C. H. T. Townsend at the New Mexico Agricultural College. It was in New Mexico that he first turned serious attention to the Hymenoptera developing an interest which shortly centered in the bees and ultimately resulted in the description of more than five thousand species from all parts of the world! It is Cockerell's work on the bees that is undoubtedly his greatest contribution to entomology. This work was initiated with studies of the extremely interesting and highly oligolectic genus *Perdita* and continued until his death when he was working on the bees of Honduras. New Mexico was momentous in Cockerell's life in another way. It was there that he met his wife, Willmatte Porter. Through the years Mrs. Cockerell was a constant companion and strong support, accompanying him on expeditions and field trips, sharing his interests and collaborating in many of his projects.

There is little doubt that she had a most profound influence in increasing the effectiveness of his scientific career.

In 1903, Cockerell returned to Colorado and accepted a position in the Museum at Colorado College, Colorado Springs. He shortly moved to the University of Colorado at Boulder where he remained until his retirement in 1934. During this period he not only continued his prolific work on bees, but the nearness of the Florissant and Green River shales turned his interests to Paleoentomology and Paleobotany. He also found time to study fish scales, color variation in sunflowers, anatomy of rodents and various other subjects.

Following his retirement Cockerell shared much of his time between Colorado and southern California, spending winters in Santa Barbara, Riverside and Palm Springs. It was during this period that the writer had most of his personal contact with him. Ever ready to lend encouragement to a new comer in the study of bees, he sent specimens and literature, loaned types and unpublished manuscript notes, placed me in contact with other workers in the field, shared his home when I went to study his collection and, in short, did everything possible to assist me. The same encouragement was offered throughout his career to anyone who would accept it. Although it is impossible at this date to estimate the magnitude of Cockerell's direct contribution to the field of biology in general and to entomology in particular, his indirect contribution as a teacher, correspondent, and friend of other biologists has also been most significant.

Dr. Cockerell died at the age of 82 years in San Diego, California. He is survived by his wife, Wilmatte P. Cockerell. He was a member of a great many scientific societies, including the American Philosophical Society, Zoological Society of London, Royal Entomological Society of London, Entomolgical Society of America, American Association of Economic Entomologists, Entomological Society of Washington, etc. His publications have appeared in most of the major scientific periodicals of the world.

DESCRIPTIONS OF EIGHT NEW SPECIES OF TRICHOPTERA.

By D. G. Denning, Laramie, Wyoming.

Collections of Trichoptera recently examined by the writer have disclosed a number of new species eight of which are described herein. In addition new and interesting distributional records of several related species are included. Unless otherwise designated types of the new species are in the writer's collection at the University of Wyoming.

Neureclipsis timesis, n. sp.

This species is most closely related to *crepuscularis* (Walker) but differs markedly from it and other described species in the elongate cercus, the bifid tenth tergite, the structure of the aedeagus and several other details of the genitalia.

Male.—Length 6.5 mm. Color of wings and appendages luteus. General characteristic typical for genus. Genitalia as in fig. 1. Base of ninth sternite wide, gradually narrowed dorsally to an acutely triangular projection. Tenth tergite semimembraneous, directed dorso-caudad, divided into a pair of lateral lobes when seen from dorsal or ventral aspect, apices bearing several long setae; ventral corner projected caudad, directly above aedeagus, as an acute, very lightly sclerotized acuminate process, bearing several long setae along margin. Cerci directed ventrad, narrow, elongate, undulating margin, apex broadly rounded; apices convergent when seen from ventral or dorsal view. Clasper with ventral margin straight for about one-half its length, then rather abruptly turned dorsad, apex with a narrow blunt point; mesal surface of ventral margin closely studded with thick dark brown setae. Aedeagus tubular, basal portion broad, apical part curved slightly ventrad; apex with a pair of lateral caudad curved hooks, and between them a slender tubular process which is directed caudo-ventrad.

Holotype. Male.—Amherst, Massachusetts, June 22, 1941, Light trap.

Allomyia stylata, n. sp.

This species, the third described in the genus, is much larger than *tripunctata* (Banks) (10 mm.) or *renoa* Milne (7.5–8 mm.), its length being 13 mm. Spurs 1–3–4. General color of forewings brown, setae sparse, a large distally rounded white spot near fork of M, a white spot where Anals join margin, a narrow white spot along r-m, and a series of small white spots in vicinity of R and Sc. Body, antennae and palpi dark brown, tibia and tarsus luteus as in *tripunctata.* Also, as in *tripunctata,* the underside of the inner margin of the forewings with a series of long slender black setae which reach to Anal veins. Veination essentially similar to that illustrated by Betten (1934).

Genitalia as in fig. 2. Ninth segment annular, practically same width throughout; ninth tergum gives rise to a single long, stout, caudad directed style; directly beneath this arises a narrow bifid projection, seen from dorsal aspect, fig. 2A. Basal segment of clasper tubular, directed dorso-caudad, ventral corner with a group of dense setae; apical segment divided into a long dorsal branch whose ventral surface is flattened, and a ventral branch about one-half the length of the upper and whose dorsal surface is flattened. The dorsal branch of the apical segment of the clasper is directed dorso-caudad, the ventral surface densely covered with short stout teeth, viewed dorsally, fig. 2, about the same width throughout and apically rounded; the ventral branch is directed caudad, its apical margin and the apical portion of its dorsal face with dense short teeth. Base of clasper, from ventral aspect, fig. 2C, bears a long stout arcuate, apically acute style which arises from its mesal corner. Cerci relatively short, leaf-like from dorsal view, fig. 2D. Tenth tergite distally bifid, apically subacute, fig. 2D, extending caudad beyond lower branch of clasper. Aedeagus tubular at base, distally narrowed and acute, directed caudad almost to lower branch of clasper; apex bifid from ventral view; about midway a pair of stout acuminate spines arise from dorso-lateral part of aedeagus and extend caudad for one-half remaining length, fig. 2B.

Holotype. Male.—Albany County, Wyoming, University Summer Camp, Snowy Range Mountains, July 10, 1941, Light trap, elevation 9600 feet, (W. B. Owen).

Allomyia tripunctata (Banks)

For purposes of comparison the genitalia of this species is figured from a male collected at Glacier, British Columbia, July 20, 1901, (R. C. Osburn). The lateral aspect of the genitalia, the fused tenth tergite, the ventral aspect of the basal segment of the clasper with its prominent mesal spine and the peculiar aedeagus with its pair of large dorsal spines is shown in figs. 3, 3A, 3B. The female has not been described.

Chyranda parvula, n. sp.

This is the second species described in the genus, the previously described species, *centralis* (Banks) being known only from the Rocky Mountain area of the United States. This species can be differentiated from *centralis* by its much smaller size and lighter color, and in several details of the genitalia.

Male.—Length 11 mm., as compared to 15 mm. in *centralis.* Forewings light luteus, body, legs, palpi luteus; in general considerably lighter colored than *centralis.*

Genitalia as in fig. 4. Since the genitalia of the two species are similar corresponding portions of each are illustrated for comparison. From lateral view cerci sub-ovate, setae sparse. Tenth tergite, from lateral view, plate-like, gradually narrowed distally, apex blunt, while in *centralis* the apices are narrowed much more acutely. Viewed dorsally, figs. 4, 4A, the processes of the tenth tergite are widely separated and gradually divergent, the structure between their base having a short apical incision, while in *centralis,* figs. 5, 5A, the processes are close together, only the apices are divergent and the structure between their base is subacute. Claspers with mesal margins convergent and appressed along caudal aspect of segment, seen from caudo-lateral view, fig. 4B, claspers nearly rectangular, more so than in *centralis,* fig. 5B. Aedeagus and lateral arms very similar in each species.

Holotype. Male.—Brandy Brook, Gaspe, Quebec, August 6, 1937, 1500 feet elevation, (C. P. Alexander).

Neophylax splendens, n. sp.

This handsome species is closely related to *rickeri* Milne, from which it can be distinguished by the shorter tenth tergite, the longer claspers and several other details in the male genitalia. This species is also considerably smaller than *rickeri,* the latter species having a length of 15.5 mm., while *splendens* varies from 12 to 14 mm.

Male.—Head, body, antennae and palpi light brown, legs yellowish, inner spur of hind legs with a modification very similar to *rickeri,*—a thin, wide plate distally divided into two parts, each acuminate. Wings dark brown with a pronounced irrorate pattern. Seventh sternite with a broad, apically rounded mesal process, fig. 6A; very similar to *rickeri.* Genitalia as in fig. 6. Ninth segment narrow, produced on meson into a triangular projection which is directed caudo-dorsad, each margin gives rise to a dense brush of yellowish setae, fig. 6B; the structure dorsad to this sternite, the probable cerci, is triangular, bluntly acute from lateral aspect, fig. 6, from dorsal aspect the apical half is curved mesad. Tenth tergite from lateral aspect wide, dorsal margin arcuate, lightly sclerotized, divided entire length. Claspers approximately triangular, projecting caudad beyond any other part of genitalia, apex blunt, directed slightly ventrad; from dorsal aspect base broad, apical portion curved mesad, fig. 6C. From caudal view the portion of segment between claspers and ninth sternite presents a very irregular roughened surface, as in *rickeri,* this surface appears minutely serrate from lateral aspect.

Female.—Very similar to male in general appearance. Subgenital plate with a mesal pair of slender, sub-acute lobes and a pair of long slender lateral lobes, apices slightly convergent and lightly sclerotized, fig. 6D. Dorsally tenth tergite with a narrow emargination.

Holotype. Male.—Mountain stream south of Sheridan, Wyoming, September 17, 1947, (R. E. Pfadt).

Allotype. Female.—Same data as for Holotype.

Paratypes.—Same data as for Holotype, except collected by D. G. Denning, 2 males 1 female. Medicine Bow Nat. Forest, South Brush Picnic Grounds, Carbon County, Wyoming, September 23, 1947, (R. E. Pfadt), 1 female.

One male Paratype deposited in the Illinois Natural History Survey Collection.

Neophylax rickeri Milne

For purposes of comparison the male genitalia of a specimen from the type lot, kindly presented to the writer by Dr. H. H. Ross, is shown in figs. 7, 7A. Additional records as follows:

Idaho: Wallace, September 27, 1935, (Otto Huelleman), 1 male; Wallace, October 24, 1937, (Otto Huellemann), 1 male.

Neophylax aniqua Ross

This recently described species was previously known only from Quebec.

New Hampshire: Ammonoosuc Ravine, White Mountains, elevation 4700 feet, July 2, 1944, (J. F. Hanson), 1 male; Tuckerman's Ravine Trail, White Mountains, elevation 2100 feet, September 4, 1940, (J. F. Hanson), 1 male.

Neophylax autumnus Vorhies

Known from Illinois, Michigan, New York, Ontario and Wisconsin, according to Ross (1944).

Minnesota: Cass County, September 12, 1935, light trap, (R. H. Nagel), 1 male.

Pennsylvania: Camphill, November 15, 1916, (E. Daecke), 2 males.

Quebec: June, 1 male.

Neophylax consimilis Betten

Previously known only from New York, from which it was originally described.

Massachusetts: Conway, September 9, 1938, (J. F. Hanson), 1 male.

Neophylax fuscus Banks

In addition to the states recorded by Ross (Missouri, Michigan, New Hampshire, and Virginia) the following record is added.

Minnesota: Savage, Credit River, reared, September 20, 1935, (D. G. Denning), 1 male.

Neophylax nacatus Denning

This species has not been recorded in the literature since it was originally described from Vermont and New Hampshire.

Massachusetts: Paradise Brook, Mt. Toby, October 21, 1938, (J. F. Hanson), 1 male.

Neophylax oligius Ross

This species was originally described from Michigan and Wisconsin.

Minnesota: Rutledge, Pine County, September 4, 1936, (R. H. Daggy), 1 male; Lake County, Baptism Creek, August 21, 1920, (H. H. Knight), 1 female.

New York: Tuxedo, September 6, 8, 12, 15, 16, 1928, (F. E. Watson), 5 males, 5 females.

Psilotreta hansoni, n. sp.

This species is closely related to *indecisa* (Walker) and *frontalis* Banks; it also bears some resemblance to *labida* Ross. From all those species it can be differentiated by the shape of the tenth tergite and in the number and positions of the spines on the apical segment of the clasper.

Male.—Length 12mm. Color of wings uniformly brownish, body a trifle darker and appendages a trifle lighter. Second segment of maxillary palpi with a long mesal brush extending the length of the third segment, fifth segment with a dense mass of black hair closely appressed to it its entire length. Male genitalia as in fig. 8. Dorsal portion of ninth segment long and narrow, acute distally, fused with tenth. Base of tenth tergite with a pair of heavily sclerotized curved, ventrad directed hooks; a short distance beyond the tergite has a narrow deep incision, fig. 8, and at this point the tergite is divided into a pair of thin pointed plates, their apices divergent from dorsal view, fig. 8A. Cerci rather long, gradually narrowed from base. Clasper with basal segment cylindrical and narrowed apically; apical segment short, bearing 4 black heavily sclerotized teeth, from lateral view a dorsal and ventral tooth of nearly equal size; from ventral view, fig. 8, mesal tooth short, only slightly longer than others. Basal half of aedeagus narrow, tubular; distal half suddenly and greatly enlarged, curved ventrad.

Holotype. Male.—Amethyst Brook, Pelham, Massachusetts, June 19, 1938, (J. F. Hanson).

This species is named in honor of Mr. J. F. Hanson who, through his extensive collecting of the Trichoptera, has made so many contributions to our knowledge of the group.

Explanation of Plate VI

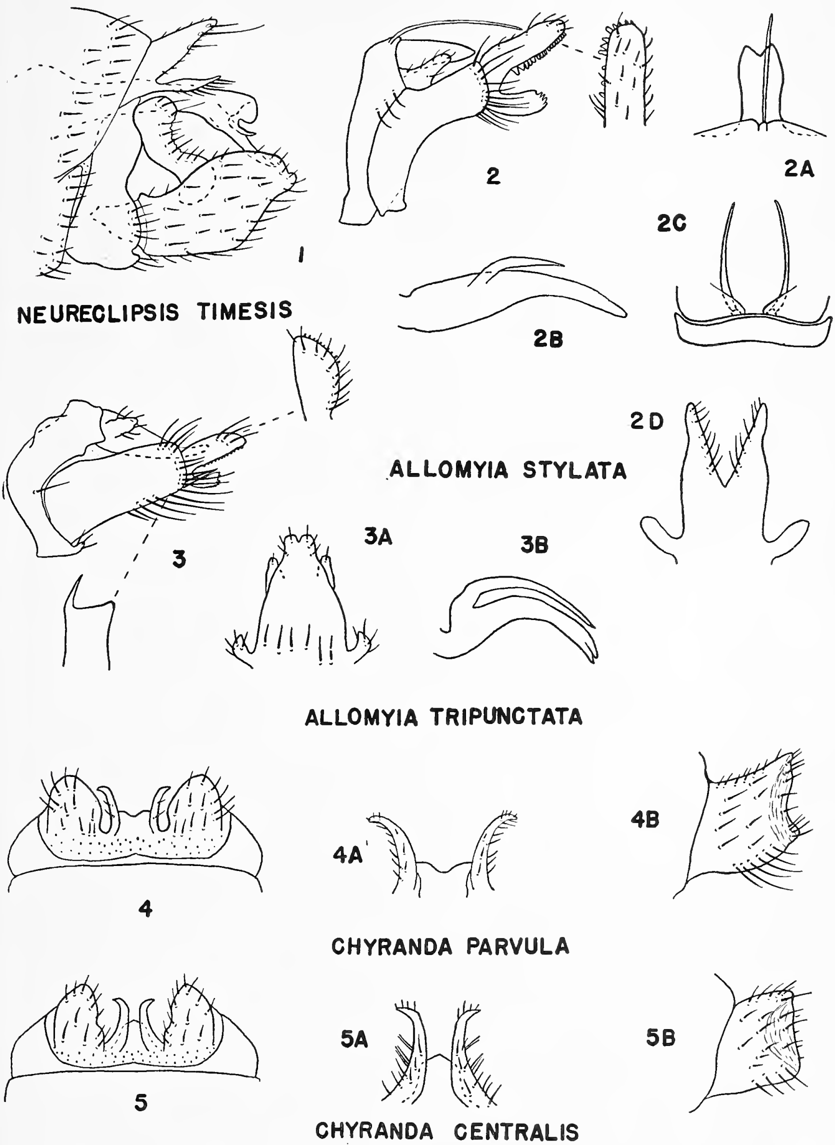
Fig. 1. *Neureclipsis timesis,* male genitalia, lateral aspect.

Fig. 2. *Allomyia stylata,* male genitalia, lateral aspect; 2A, dorsal aspect ninth segment; 2B, aedeagus; 2C, ventral aspect ninth segment, base of claspers; 2D, dorsal aspect of tenth tergite and cerci.

Fig. 3. *Allomyia tripunctata,* male genitalia, lateral aspect; 3A, dorsal aspect of tenth tergite; 3B, aedeagus.

Fig. 4. *Chyranda parvula,* dorsal aspect of tenth segment; 4A, dorsal aspect of tenth tergite; 4B, caudo-lateral aspect of clasper.

Fig. 5. *Chyranda centralis,* dorsal aspect of tenth segment; 5A, dorsal aspect of tenth tergite; 5B, caudo-lateral aspect of clasper.



1
NEURECLIPSIS TIMESIS
2
2A
2B
2C
2D
ALLOMYIA STYLATA
3
3A
3B
ALLOMYIA TRIPUNCTATA
4
4A
4B
CHYRANDA PARVULA
5
5A
5B
CHYRANDA CENTRALIS

Oecetis pratelia, n. sp.

This species is closely related to *inconspicua* (Walker) from which it can be readily distinguished by the elongate, prominent tenth tergite, the lateral aspect of the ninth segment and minor differences in the cerci and claspers. Length 8.5 mm. Color of wings uniformly light brown, appendages slightly lighter in color. General appearance of adult closely resembles *inconspicua.* Genitalia as in fig. 9. Basal portion of ninth segment narrow, dorsal part slightly wider, apical margin produced into a sub-acute angulation, reaching caudad approximately one-half length of cercus. Cerci, from dorsal aspect, closely appressed most of length, ovate in appearance, covered with short setae. Tenth tergite large and prominent, viewed laterally the ventral corner is produced into a large rounded lobe; from dorsal aspect, fig. 9A, lateral lobes divergent, the mesal portion nearly truncate and bearing a group of small setae at each corner. Clasper with the base wide, giving rise to a short dorsal lobe, the structure continues as a narrowed, sub-acute, dorso-caudad directed apex; from ventral view apices gradually convergent; base of claspers separated by a small truncate process. Aedeagus very similar in appearance to *porteri* Ross and *inconspicua* (Walker); ventral margin produced into two hook-like processes; internal sclerotized rod with basal part tubular, apical part acuminate, basal portion directed caudad, then sharply curved mesad and finally ventrad to the ventral margin.

Holotype. Male.—La Belle, Florida, July 16, 1939, (R. H. Beamer).

Explanation of Plate VII

Fig. 6. *Neophylax splendens,* male genitalia, lateral aspect; 6A, mesal process of seventh sternite; 6B, ventral aspect of ninth sternite; 6C, dorsal aspect of claspers; 6D, female genitalia, ventral aspect.

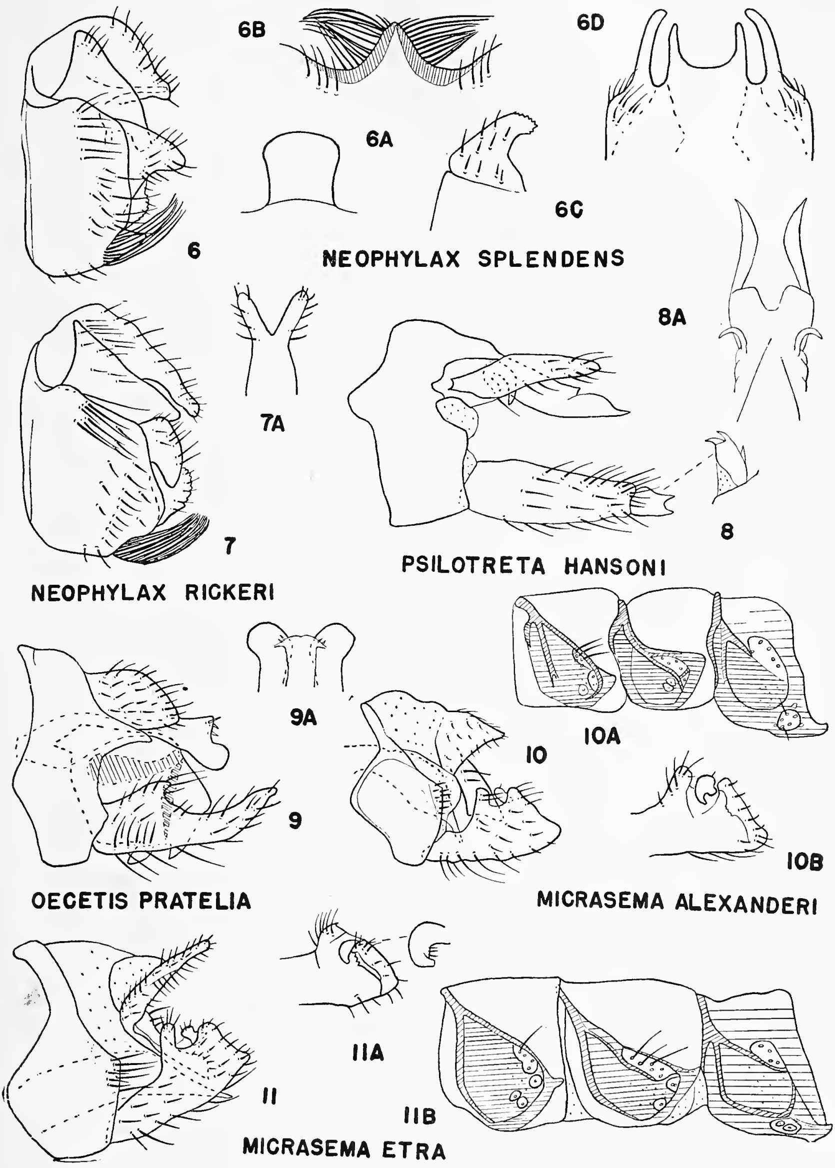
Fig. 7. *Neophylax rickeri,* male genitalia, lateral aspect; 7A, dorsal aspect of tenth tergite.

Fig. 8. *Psilotreta hansoni,* male genitalia, lateral aspect; 8A, dorsal aspect of ninth and tenth tergites.

Fig. 9. *Oecetis pratelia,* male genitalia, lateral aspect; 9A, dorsal aspect of tenth tergite.

Fig. 10. *Micrasema alexanderi,* male genitalia, lateral aspect; 10A, sixth, seventh and eighth abdominal tergites; 10B, mesal aspect of clasper.

Fig. 11. *Micrasema etra,* male genitalia, lateral aspect; 11A, mesal aspect of clasper; 11B, sixth, seventh and eighth abdominal tergites.


6B
6D
6A
6C
6
NEOPHYLAX SPLENDENS
7A
8A
7
NEOPHYLAX RICKERI
8
PSILOTRETA HANSONI
9A
10A
10
9
OECETIS PRATELIA
10B
MICRASEMA ALEXANDERI
11A
11
11B
MICRASEMA ETRA

Micrasema alexanderi, n. sp.

This species is most closely related to *bactro* Ross. In the recent key by Ross (1947) to the Nearctic Micrasema this species keys to *bactro* from which it can be easily separated by the configuration of the sixth, seventh and eighth adbominal tergites, the shape of the tenth tergite, the widely separated cerci and the three distinct processes which arise from the dorso-mesal margin of the clasper.

Male.—Length 5 mm. General color black, appendages practically the same color. Genitalia as in fig. 10. Abdominal tergites, sixth, seventh and eighth as in fig. 10A, each with a sclerotized crescentric thickening which reduces the dorsal half of each tergite to a narrow strip, similar to that described for *diteris* Ross and *bactro* Ross. Ninth segment reduced dorsally to a narrow sclerotized edge. Cerci with their base widely separated, projected directly caudad, ventral surface slightly concave. Between and ventrad to base of cerci appears a triangular protuberance which bears four large setae, at its base arises a prominent spine set on a long slender tubercle. Tenth tergite fused on meson, along line of fusion sclerotization very light; apex emarginate, each lateral lobe with four dorso-cephalad directed setae. Claspers with base narrow, apical part fully twice as wide as base; meso-dorsal margin with three lobes, the center one being in the form of an acute ventrally curved hook, best seen from mesal aspect, fig. 10B, or from dorsal view; apex broad and truncate with the ventral corner produced into a sub-triangular lobe; mesal face of clasper concave; viewed ventrally apices convergent. Aedeagus tubular, apical portion flattened and spatula-like, apex rounded.

Holotype. Male.—Yellowstone National Park, Wyoming, Emerald Pool, July 12, 1942, (C. P. Alexander).

I take pleasure in naming this species in honor of the collector, Dr. C. P. Alexander.

Micrasema etra, n. sp.

This species is closest to *bactro* Ross but differs from it in the sclerotized thickenings of the abdominal tergites, six, seven and eight, and also in differences in the cerci, tenth tergite and the clasper. Length 6 mm. Wings, body and appendages dark brown. Each lateral portion of the sixth to eighth abdominal tergites enclosed by a series of sclerotized thickenings, fig. 11B, similar to but markedly different from *bactro* Ross; sixth sternite with a small mesal projection. Dorsal portion of ninth segment reduced to a narrow quite heavily sclerotized strap; seen from either dorsal or ventral view the apical margin, at point where reduction of segment commences, is produced into a short tubercle bearing several long setae. Cerci widely separated at base, directed dorso-caudad, only the lateral margin discernible from lateral aspect; ventral surface slightly concave. Base of tenth tergite wide at base, flared dorsad into a ridge bearing a number of setae, only slightly narrowed distally, apical margin emarginate, each lateral lobe slightly upturned and bearing five setae. Clasper widened and truncate at apex, the apico-dorsal margin subdivided into three lobes, the most cephalad about the same width throughout, the center one curved mesad and then ventrad as a heavily sclerotized hook, the blunt apex turned caudad, fig. 11, the most caudad lobe curved mesad and slightly ventrad; seen from mesal aspect as in fig. 11A; the inner surface strongly concave. Aedeagus with apical portion flattened, apex sub-triangular, basal part tubular.

Holotype. Male.—Yellowstone National Park, Wyoming, Emerald Pool, July 12, 1942, (C. P. Alexander).

Micrasema aspilus (Ross)

This species has not yet been recorded from Colorado.

Colorado: Walden, August 10, 1947, (D. G. Denning), 1 male: Poudre River, 15 miles west of Ted's Place, August 17, 1947, (D. G. Denning), 1 male.

Micrasema charonis Banks

This species was originally described from North Carolina.

Tennessee: Greenbriar Cove, Great Smoky Mountains, May 15, 1938, (I. Williams), 1 male.

Micrasema rusticum (Hagen)

This fairly common species has not yet been recorded from Minnesota, Manitoba, and Massachusetts.

Minnesota: collected from widely scattered localities in the northern and central part of the state, only during May.

Manitoba: Pigeon River, Sturgeon Falls, June 6, 1942, (Ferris Neave), 1 male.

Massachusetts: N. Amherst, June 9, 1938, (J. F. Hanson), 1 male.

Micrasema wataga Ross

This species was originally described from Tennessee, New York and North Carolina.

North Carolina: Ela, May 30, 1941, (S. S. Easter) 1 male.

Minnesota: Cloquet, July 14, 1938, (D. G. Denning), 1 male.

A NOTE ON THE IDENTITY OF *COLPOCEPHALUM AJAJAE* EWING.

By K. C. Emerson, Stillwater, Oklahoma.

Ewing described this species of Mallophaga taken from *Ajaia ajaja* (Linnaeus), the Roseate Spoonbill, in 1930 (Proc. Biol. Soc. Wash., XLIII, p. 126). His paper, being without illustrations and with only a description of the male, resulted in many workers questioning the validity of the species.

Specimens from the type host were received through the kindness of Dr. L. E. Rozeboom, Johns Hopkins University, which he collected at LaVaca, Panama. This series apparently represents the first collection of this form since the original record, so opportunity is here taken to present illustrations (Figs. 1–6) and notes concerning both sexes.

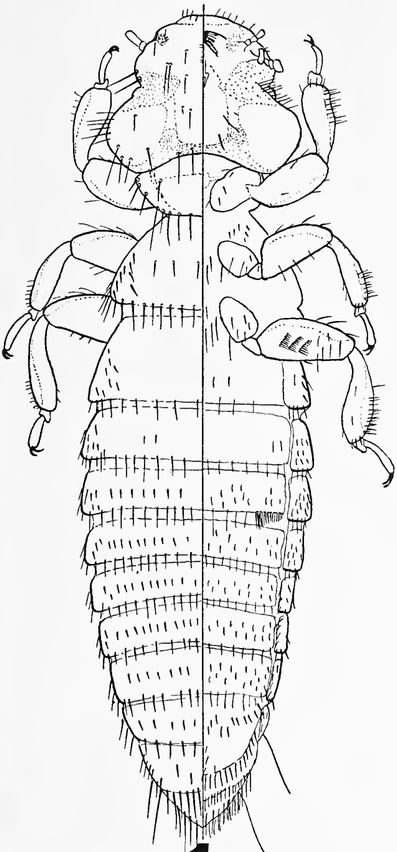
A pair of heavy spines on each preocular lobe of the male separate it from other forms. The frontal head margin of the female is very distinctive. In both sexes, the third sternite has one comb of setae on each posterolateral angle and each posterior femur has three combs on the venter.

EXPLANATION OF PLATE VIII

All figures refer to *Colpocephalum ajajae*.

Fig. 1. Dorsal-ventral view of female.
Fig. 2. Dorsal-ventral view of male.
Fig. 3. Dorsal-ventral view of female genital region.
Fig. 4. Male genitalia.
Fig. 5. Antenna of female.
Fig. 6. Combs on venter of posterior femur of female.

BULL. B. E. S., VOL. XLIII PLATE VIII



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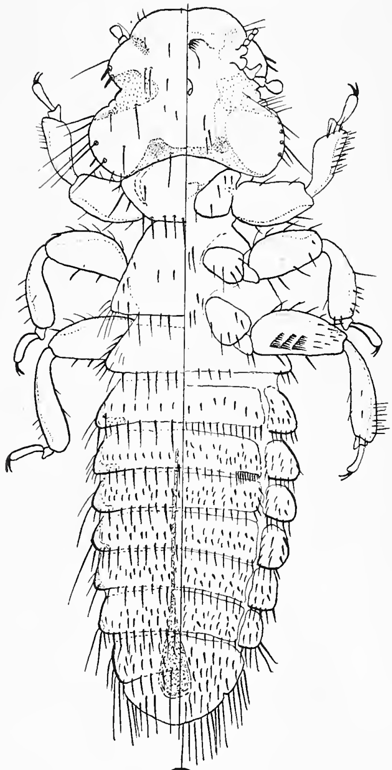

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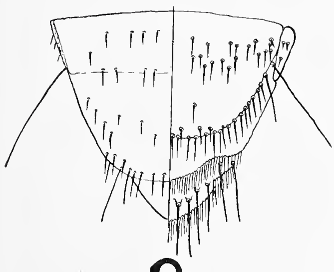

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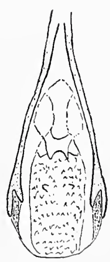

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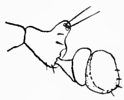

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WHY NOT CHECK THE LITERATURE MORE CAREFULLY?

By Osmond P. Breland, Austin, Texas.

The writer has recently noticed an increasing tendency for authors to overlook or disregard publications that are directly correlated with their own articles. This practice has resulted in the publication of identical or similar results, and in many instances readers receive the impression that no related work has previously been done. Such a paper may be looked upon as simply an incidental isolated observation, whereas if the author had correlated his work with previously published data, the article may have been one of lasting value.

There are probably two main reasons for this fault in scientific writing. Present day research workers are frequently under so much pressure to publish that they are likely to rush into print without properly checking the literature. Another reason, of course, it that papers published in obscure journals, or those to which the writer does not have access, may remain unnoticed until it is abstracted in some publication with a wider circulation.

The present short paper is in the nature of a plea for a more careful study of the literature before publication, and for the inclusion in scientific articles of related material that has been previously reported. The examples cited below illustrate the type of article which the writer has in mind. Most readers can doubtless recall similar publications in their own fields.

Wilson, Barnes and Fellton (1946) published a list of the mosquitoes known to occur in Pennsylvania with biological and collecting notes relative to each species. In June, 1947, the writer (Breland 1947) published a short article on Pennsylvania mosquitoes, and reported the collection of *Megarhinus septentrionalis* D. & K. in the state for the first time. In November, 1947 this same species was reported to have been collected for the first time in Pennsylvania (Stabler 1947). In this case the latter paper may well have been submitted for publication before the writer's article appeared, but a footnote could have been added when the proof was received for correction.

Additional notes on Pennsylvania mosquitoes were published in 1948 (Stabler 1948). One stated objective of this paper was to modify certain conclusions that had been reached by Wilson, Barnes and Fellton (1946). However, some of the statements are somewhat misleading since cognizance is not taken of a later paper. Stabler states that Wilson, Barnes and Fellton have recorded *Orthopodomyia signifera* (Coq.) from only two localities. This is true, but why disregard a third record (Breland 1947)? *Psorophora ferox* (Humboldt) is considered by Wilson, Barnes and Fellton to be "extremely rare," while Stabler points out that in Delaware County the species is probably not as rare as formerly thought. The writer in 1947 suggested that this was probably true for *P. ferox* in Cumberland County. It seems unlikely that this is a case of inaccessibility to the literature, since the writer's paper was published in the same journal as that of Wilson, Barnes and Fellton.

Bick and Penn (1946) reported some experiments in which pupae of mosquitoes placed on moist filter paper later emerged as adults. They referred to earlier observations in which similar results were obtained, thereby coordinating several sets of data and causing the paper to have considerably more value for the reader. Masters (1948) reported similar results for another species of mosquito, but no reference was made to previous related work. Observations of this type should certainly be recorded, but such a paper would be much better if the data were correlated with similar publications. This particular paper, by the way, would have been more understandable if the author had used the generally recognized scientific name of the mosquito under discussion. *Culex fatigans* Wiedemann was the name he used, although most American workers at least, consider this name to be a synonym of *C. quinquefasciatus* Say.

It is quite obvious that the quality of entomological writing could be greatly improved by a little extra work on the part of authors. Specific suggestions include the following.

Before a worker publishes a paper he should carefully review the literature for related publications. This is especially important for anyone planning to publish on some subject outside the field of his usual research interest. Entomological literature is so extensive today that it is almost impossible for a person to be thoroughly familiar with all publications in several fields. The easiest method of making a quick literature survey is, of course, by the use of abstracting journals such as Biological Abstracts. Even the most careful worker may occasionally overlook important articles in obscure journals, but abstracting journals of one type or another are available to most workers, and for this reason there is small excuse for such papers to be overlooked indefinitely. If related work has been published, it is quite helpful to interested readers for the author to correlate briefly his findings with those of other men; or at least to refer to these previous publications.

Recent changes in scientific names should always be indicated in entomological writing; or if there is disagreement as to which of two names should be used for a certain species, both scientific names should be noted. Unless this is done, many readers will not recognize the species under discussion. Writers who are careful in this respect will be doing their readers a real service.

In conclusion the writer wishes to make it clear that he does not consider himself entirely free of the faults that have been discussed, but he at least is trying to correct them.

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MEMORIES OF EARLY VISITS TO J. R. DE LA TORRE-BUENO AND HIS BUG SANCTUARY.

By Chris E. Olsen, West Nyack, N. Y.

A penalty we often suffer, those of us who are privileged a normal length of life and do not pass away in the early years of our earthly existence, is the dreadful grief of having many of our dear and most beloved pass on one by one.

On May 3rd this year, we suffered another such shock when word reached us from Tucson, Arizona, that our dearly beloved veteran entomologist, member of the Brooklyn Entomological Society, Editor of the Society's publications and, may I add, one of my dearest entomological friends, J. R. de la Torre-Bueno passed away.

It is with considerable sadness of heart that I am prevailed on to write these few lines. In contacting his friends here in the East, and his friends here are many, all agree that any tribute that may be extended to the memory of this worthy person would be but a small token for his arduous and active life-long service to entomology. Even should a tribute be written by a master's pen, he would have richly earned and well deserved it.

It is many years ago, although it seems only as if it were a short time back, that I first made the acquaintance of Bueno. It was when Bueno resided at number 14 Duzenbury Place, White Plains, New York. It was at the time when his children, now grown up men and women, were babies and our own girls were mere tots in rompers. The picture that most strongly comes to mind from those early days is that of Mr. Bueno, youthful, alert, generally mild-mannered, very courteous and attentive, surrounded by a growing family of children, all of whom he adored and felt proud of . . . Mrs. Bueno, his charming wife, patient and of the splendid motherly and companiable type . . . she, with Mr. Bueno, taking great pride and delight in being perfect hosts to their guests who had traveled from Maspeth, Long Island, for a Sunday visit with them at White Plains.

Sunday visits to the Buenos in those early days were frequent, with or without my family, but always for a definite purpose. Needless to say, this definite purpose was Entomology—to be more specific, it concerned the "True Bugs". It was during those early years that I commenced seriously collecting and studying the Hemiptera.

On such visits, when the family accompanied me, while the children romped together in the garden, and the ladies exchanged their various views on family and home, the bug enthusiasts would repair to the entomological "Inner Sanctum" and there discuss the whys and wherefores of bugs. Usually a box of recently collected Hemiptera came along for discussion and identification. Bueno's assistance in determining insects was immeasurable. He had an uncanny faculty for pointing out the determining characteristics instantly. An afternoon at the Bueno's insect study saved months of hard work and, to boot, one would always come away with a few new things to add to the collection at home from his magnificent, well-stocked and well-kept collection, or a few duplicate short papers on Hemiptera from his library, more often with both.

At that time, Bueno, an outstanding authority on aquatic and other Hemiptera, was a most enthusiastic source of inspiration to a young upstart in this branch of Science. His ever-ready advice, assistance and guidance was of immense value to a beginner. It was given unselfishly, genuinely and with a certain amount of pride and pleasure. His love for and interest in Entomology were boundless.

Contacts with a person such as Bueno, a vibrant enthusiast, cannot be minimized, and they certainly cannot be described in words. Such kindness and cordiality can only be measured by one's innermost feelings, and one is truly fortunate to have lived such moments.

In the field, Bueno was a thorough collector. He was quick to point out to young students the fact that many bugs feed close to the roots of plants and, therefore, sweeping for bugs should be done close to the ground. For this reason, he had constructed a net of his own design, a very substantial net, to withstand the hard use of deep sweeping.

Our visits and collecting trips went on for many years. In between, we would have delightful correspondence. Bueno was a linguist of reputation and an excellent writer. His letters were a pleasure. He was always prompt in his reply and always to the point.

I feel it quite worthy of mention that, aside from all his other abilities, Bueno had a beautiful speaking voice, with a rare, clear and bell-like tone. That, together with his perfect diction, accompanied with a slight Spanish accent, made his talks interesting, convincing and unforgettable.

Later on, when I decided to give up the Heteroptera part of the Hemiptera and concentrate on Homoptera, particularly the family of Cicadillidae, friend Bueno very kindly turned over his entire library of Homopterous papers and books to me with his blessing. It was indeed a blessing to me. It gave me an excellent start in the study I was pursuing. Even to this day, the great bulk of my Homopterous library is from Bueno.

On one of his visits to my home, he became interested in an undersea coral reef painting, on which I was working at the time, and promptly described it in poetic fashion:

"The Coral Lanes"

"Deep in calm depths of tropic seas
Glide slender lanes of golden sands
Between high-branching coral trees,
In filtered sunglow, silver-tipped;
Living, vivid, changing mauves and scarlets,
Hedge glowing paths for rainbow fishes
Whose variant hues flash through
Cobalt waters slowly fading
Into distant soft celestial blues
Down straight upon the sand
Like sheets of aureate summer rain
Rare tapestries in wrought gold folds
Falls soft the radiant sunshines.
Prismatic tones in marching vistas
Grow dim among the distant antlered corals
To lose themselves in far-off nimbused haze.
Silence felt, light shattered in a thousand tints,
Peace, rest, infuse the waters calm and clear."

Bueno was, as mentioned, mild-mannered, but, at the same time he was a fearless fellow. He stood firm for what he considered righteousness and fair play. He never yielded the slightest to anyone who, in his opinion, was scheming unfairly for selfish interests, no matter what this person's authority might be. He would rather fall out of grace with such an unscrupulous individual and remain independent. To those who knew Bueno and understood him, there can be nothing but admiration for the splendid character he possessed. Those that did not know him or did not understand him, and I am sorry to say that there were such, missed the chance of knowing and associating with a very splendid entomological friend and person.

PROCEEDINGS OF THE SOCIETY.

Meeting of January 15, 1948.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on January 15, 1948.

The meeting was called to order at 8:00 P.M. by President R. R. McElvare. Members in attendance were Messrs. Teale, Naumann, Buchholz, McElvare and Tulloch. Messers. Crystal and Kellner were present as guests of the Society.

The minutes of the meetings of November 13 and December 11 were read and accepted.

The Treasurer submitted a report for the period October 1–December 31, 1947, as well as an annual report for the year 1947. Both of these reports were accepted. Appreciation was expressed to the Treasurer for his fine services.

The report of the publication committee for the year 1947 was read and accepted. A vote of thanks was extended to the editor for his excellent accomplishments during the year.

The Secretary read a letter from Dr. Joseph Bequaert of the Museum of Comparative Zoology thanking the Society for its action in selecting him for honorary membership.

The following were nominated for membership in the Society, Mr. Bruce Crystal and Mr. John Kellner, both of Brooklyn and Mr. Sidney Hessel of Woodmere. Mr. Buchholz moved that the by-laws be suspended to permit the election of the nominees at this meeting. This motion was seconded by Mr. Naumann and passed and Messrs. Crystal, Kellner and Hessel were declared elected to membership in the society.

The nominating committee submitted the following slate of officers and committee members for 1948:

President—G. S. Tulloch
Vice President and Secretary—A. S. Nicolay
Treasurer—R. R. McElvare

Publication Committee
J. R. de la Torre-Bueno, *Editor*
A. S. Nicolay
E. W. Teale

Executive Committee
O. Buchholz
F. T. Naumann
J. M. Sheridan

Delegate to N. Y. Academy of Science
E. W. Teale

The report of the nominating committee was accepted and the Secretary was instructed to cast one ballot to certify the election of the nominees.

The meeting adjourned at 9: 30 P.M.

Respectfully submitted,
George S. Tulloch.

Meeting of February 11, 1948.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on February 11, 1948. The meeting was called to order at 8: 10 P.M. by President Tulloch. The following members were present: Messers McElvare, Teale, Tulloch, Buchholz, Kellner, Crystal and Gaul. The minutes of the meeting of January 15, 1948 were read and approved. After a discussion by members of a proposed change in meeting place and a report of the forthcoming collecting trip by Otto Buchholz to Texas and New Mexico, the speaker of the evening, Albro T. Gaul, presented a paper on "Growth of Yellowjackets and Hornets." In connection with the growth of Vespine wasps, he found that Dyar's rule—that the width of the head increases at each molt by a ratio that is constant for a given species—held true. However, Przibram's rule—that the weight is doubled at each instar—did not hold true for growing yellowjackets and hornets. After considerable discussion by members of the Society, the meeting adjourned at 9: 30 P.M.

Respectfully submitted,
Edwin Way Teale,
Secretary pro tem

Meeting of March 11, 1948.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on March 11, 1948. The meeting was called to order at 8: 05 P.M. by President Tulloch. Members present were: Messers McElvare, Tulloch, Teale, Kellner, Naumann and Nicolay. The meeting was devoted to a symposium on collecting, with members exhibiting various insects taken in the field. Dr. Tulloch showed a number of specimens of ticks and discussed the appearance of Rocky Mountain spotted fever in the East. He also exhibited three examples of fossil insects preserved in amber. Mr. McElvare showed a series of Heliothid moths taken in the Mojave Desert. An abnormal *Automeris io* moth, the right side female, the left side male, with the dividing line, sharply defined, running the length of the body, was exhibited by Mr. Kellner. A collection of insect eggs together with a large number of photographs of insect eggs were shown by Mr. Teale. Several of the unusual aids developed in recent years for the teaching of entomology were exhibited and discussed. The meeting adjourned at 9:55 P.M.

EDWIN WAY TEALE,
Secretary pro tem

NOTICE.

The Brooklyn Entomological Society is pleased to announce that Dr. J. Bequaert of the Museum of Comparative Zoology, Harvard University has accepted the editorship of **ENTOMOLOGICA AMERICANA.** All communications concerning this journal should be addressed to Dr. J. Bequaert, Museum of Comparative Zoology, Cambridge 38, Massachusetts.

Vol. XLIII DECEMBER, 1948 No. 5

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES

PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO, Editor

GEORGE S. TULLOCH EDWIN W. TEALE

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The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to May, inclusive, at the Brooklyn Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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Bulletin of the Brooklyn Entomological Society

Published in

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Subscription price, domestic, $3.50 per year; foreign, $3.75 in advance; single copies, 75 cents. Advertising rates on application. Short articles. notes and observations of interest to entomologists are solicited. Authors will receive 25 reprints free if ordered in advance of publication. Address subscriptions and all communications to

J. R. de la TORRE-BUENO, Editor,

# BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XLIII DECEMBER, 1948 No. 5

ENTOMOLOGY IN THE UNITED STATES

By J. R. de la Torre-Bueno, Tucson, Arizona.*

In its early days, entomology in the United States had not reached its full stature as a respected and remunerative profession, peopled by graduates from great institutions. Even its outstanding men of true scientific worth were only high-class amateurs, some of whom in time became our great economic entomologists and founders of this branch of applied biology.. In order to be an entomologist, one had to have an independent mind, a mind verging on, and sometimes going into, eccentricity, a mind proof against the sneers and ridicule of the vulgar and the unlearned. For, why should any man in his sane senses chase nasty bugs when there was no money in it, was the question of the *practical* mind. And many an insect collector harbored mental quirks.

There was, for instance, Hans Strecker, who collected the great tropical showy butterflies. Gainfully, he carved grave-stones and monuments. To satisfy himself, he described these gorgeous butterflies and gave them names from the mythologies of other days, as Jupiter, Minerva, and so on. He even went to the Bible and on one he clapped the name Jehovah to the horror of all good religious people.

Then there was the great collector and describer of beetles, Colonel Thomas Casey, of the U. S. Engineers and a graduate of West Point. He produced in the course of a long, busy life in his profession, numerous ponderous tomes in which he described minutely to the last little hair floods of beetles into the most abstruse refinements of categories. And all this intense productive scientific

* Mr. Bueno died on May 3, 1948. This article written in 1944 was found among his papers.

work was done in his moments of leisure in a most exacting branch of army service!

Then there were the LeContes, father and son; Dr. John Eatton LeConte, the father, was a U. S. Army surgeon, and on the side an enthusiastic collector of beetles and a highly skilled taxonomist. In fact, he and his son, Dr. John LeConte, laid down the broad bases for the classification, most of which are in vogue today. As these remarks are not a formal history, here is one of the traditional episodes of collecting. One day the mail brought to one of the LeContes a little parcel, which being opened revealed a very rare beetle, out of his collection—or so it seemed—and it was found to be so when the proper box was opened, and the singleton was not in it. A little later, the mail brought a letter from a repentant fellow-collector, which explained everything. In substance, so the story goes, the letter stated that its writer when he was being shown the LeConte collection, had seen the specimen, which he really needed to complete his own. And while LeConte was looking aside, the temptation had been too much for him, so he had removed the specimen and pinned it inside his tall hat and thus hidden had taken it away. But his conscience had troubled him for a year and more, until he could no longer stand it; so the missing beetle was returned very contritely. Dr. LeConte had in the meantime had no occasion to look at the box containing the treasure, so he had never missed it!

Incidentally, in the more primitive days of insect collecting, the inside or the outside of a hard hat was made the repository of such insects as were put on pins in the field. So, after a good summer day, with plenty of insects on the wing, the primitive entomologist could be seen returning with a hat bristling with bugs.

Of current entomologists of my own day, whom I knew in person, here are a few of the most striking ones.

There was Robert P. Dow, one-time secretary of the Brooklyn Entomological Society, and a good secretary, too. His flowing handle-bar reddish mustache, his tousled hair, his bright blue eager eyes, were features at meetings. He also was active editor of the Bulletin of the Brooklyn Entomological Society, when it was revived after several years of dormancy.

Dow was a nephew or grandnephew of the noted early prohibitionist Neal Dow of Maine. Withal, he did not share his relative's views in the matter—far from it. In business, he was a dealer in obsolete securities, at which he made a very good living. His procedure was very simple. He would bid in at auctions of unmarketable securities for estates bundles of unspecified cats and dogs, for a song. Then he would hold them; and some day, sooner or later, some one would want the elegantly printed certificates for some financial reason, and then he cashed in, sometimes very lucratively, but never at a loss.

His long suit was archaeological and historical entomology. The Bulletin published these very interesting articles of his, which brought to life and made real so many of these founders of the science, in their more human and less desiccated moments. For instance, there was the great French entomologist, the founder of the scientific study of the classification of beetles, Count de Jean, one of Napoleon's generals. It was told of him that at one of the battles he spied a very rare and desirable beetle perched on a bush. He got off his horse, battle or no battle, and popped the beetle into his killing bottle, which he always carried in his saddle-holster. A stray bullet struck the holster, and scattered fragments of holster and bottle, *and* the beetle. DeJean was not discouraged. He got off his horse and searched for the beetle to the whistling of passing bullets until he had retrieved the valuable specimen and put it in the other holster!

Dow also wrote of Lillith of legend, the alternate and devlish wife of our father Adam; and of Baal-Zebub, the Father of Flies and/or of Lies, known to us as Beelzebub, the devil. In his opus "The Testimony of the Tombs" he delved into the entomological lore of Egypt and figured insects from designs on sarcophagi and in tombs.

He attained his entomological peak when, with ineffable complacency he gave his own name to a genus he described—not crudely but quite effectively. He made a sort of anagram of his initials, R. P. D., and invented the name *Arpidius,* thus embalming himself unto entomological posterity.

One time, he and I were collecting about Todd's Pond, close by White Plains, and now a real estate development. And this is a dramatization of one of the happenings.

The Caterpillar and the Collector (more politely, *Entomologist*).
Scene—The sloping, grassy, weedy north shore of the pond, in what is now Westminster Ridge, White Plains, N. Y.
Time—A late spring afternoon.
Actors—The Collector on his own two feet, eyes roving hither and yon, mustachios fluttering in the breeze; the Caterpillar, name unknown, calm, collected (and uncollected) on a leaf atop a bushy weed.

Chorus—Me.

'Twas a balmy, sunshiny day—birds a-twitter, flowers a-bloom. The Collector (and the Chorus) strolling along finding treasures and more or less basking in the warm sun.

The Collector spies the Caterpillar and deftly picks it off its place of rest, rolls it tenderly between thumb and fingers and after inspection, remarks meditatively: "I wonder what it tastes like?"

The Chorus—"Would you like to know?"

The Collector—"Yes".

Chorus—"Why don't you bite it and find out?"

Collector—"Why not?"

Chorus—"Do you mean to say you would eat it?"

Collector—"Yes. I know the taste of 300 kinds of caterpillars!"

He did; and went on to say at length how every caterpillar has a distinct flavor—the taste of the plant it fed on.

Scientific ardor, which leads us up strange by-ways of inquisitiveness, could attain no greater heights!

Eventually, Dow gave up entomology and moved to California, where he dealt in real estate. His entomological activities were at an end.

Still another eccentric. He was a keen observer of insects. He was also a rapacious collector. One of the founders of the Brooklyn Entomological Society, he seldom missed its meetings; in later years, during the proceedings, he could be seen assiduously curry-combing his finger nails to remove the accumulated earth acquired in digging insects out of their hiding places in the ground with his fingers. Those of us who knew him in person, do not need his name; to the outside world, he shall be nameless.

He was the collector of fiction and legend personified. While scrupulously clean in his person, his clothes always were on the edge of disintegration and frightfully in need of cleaning and pressing. I have seen him running a cultivator on his Long Island farm in topless hat and bottomless pants. Yet, he was a gentleman of education and breeding and learning, an early Cornell graduate, descended from a Colonial family of standing and wealth, original Royal Patentees of extensive lands on Long Island. His face showed breed, even though over-breeding leading to eccentricity and even psychosis in his advanced years.

Now and again, before the outlying country about New York City and Brooklyn was built up, the entomological societies would have field days, when a number of collectors would go afield in company. These outings usually took place in the spring or autumn, faring forth to the Palisades in New Jersey or to the beaches on Long Island.

Our protagonist's performances at one trip to Rockaway Beach are worth recording. He always carried with him on such trips—and on other occasions also—a genuine pre-Civil War carpet-bag or grip-sack to hold his takings. In its recesses lay hidden from a scoffing world the usual assortment of collecting bottles for killing insects and other oddments for collecting, and always a lunch of sorts wrapped in a greasy piece of newspaper which had distinctly seen better days and which also had held other lunches aforetime. Anything of value to an ant was a treasure to him. His collecting started at the end of the elevated railroad line, when he raced through the car picking up and stowing away discarded newspapers—any date and any frowziness. One time he had an actual dispute with a train guard who had the daring to lay his unholy and (necessarily) unclean hands on a coveted second hand paper—and got away with it! Each newspaper was carefully smoothed out, and into the belly of the grip it went!

Once the sea-beach was reached, the really serious collecting began. There was the tide line strewn with juicy treasures of flotsam and jetsam—mostly the latter, including the ship's garbage and slops. What finds! Champagne and wine corks, fishing net floats, empty bottles, crates (sadly abandoned by him to destruction by the waves and the winds, or perhaps destined to be kindlings for some one more able to carry them away), skeletonized sea-horses, sand-fleas, earwigs and beetles under boards and chips, drowned insects of all sorts in windrows on the tide-line and mingled with uprooted eel-grass and sea-weeds—all enticed our collector. Among this wreckage he found a battered flour-barrel. After a careful inspection of his trove, said our collector: "The hoops are good"; and gathered they were and draped over his neck and shoulders. At the end of the trip, the party arrived eventually at the New York City garbage dump heaps on Barren Island.

And here was the crowning point of a well-spent day! Perched on top of a mound of trash was an obsolete pair of pants, all crumpled, rumpled and filthy. These were secured, shaken out and measured for length against himself by their finder. With the remark "They are as good as those I have on", into the bag they went, more or less neatly folded.

All these treasures were carefully sorted out and stowed away in his quarters. At the Long Island family place he had a small shed close by the railroad tracks; on one side, piled to the ceiling were newspapers, on the opposite side, bottles of all descriptions. This shed unfortunately was burned down in a brush fire, set, so he said, by sparks from the Long Island Railroad locomotives. Later, he built himself a capacious barn on the property, for a treasure house removed from danger of incineration.

A choice episode was the sip of beer. After the close of the meetings, the members adjourned to a German biergarten nearby the place of meeting, going into the back room by the Family Entrance, where they were served sauer-fleisch and other hearty Teutonic food and delicacies, washed down with foaming steins of "echt bier"—none of the feeble latter-day imitations or "ersatz". The cost of the supper was equally apportioned among the eaters, but the beer was individually paid for according to consumption. Our hero never joined in the general feast—he'd dive into his omnipresent carpet-bag and take from its dark recesses his newspaper-wrapped refection and consume it solo—and no costly beer for him, at a nickel a shot. But, one time, thirst was too strong for him. Tapping one of the convivials on the shoulder, he murmured "Mr. G., do you mind if I take a sip of your beer?" To which the addressee replied by ordering for him a flowing tankard for his private delectation!

As the years went by—he was in his middle seventies by this time—he took up nudism in a big way and practised it in his own back-yard to the horror of the neighbors, who had him summoned before the court to explain his unseemliness. But the case never came to trial, because the cold winds of early Fall gave him a pneumonia, which took him off. A sad end for a fine mind gone astray!

All his collectings, including many fine insects, were junked by his heirs. His excellent collection of pamphlets went for waste-paper to the junkman, a real scientific loss!

In person he was strongly built. His stooped shoulders took away from his height, which must have been some six feet in youth. He had a clean-cut face, always scrupulously shaven. But his attire was always slovenly, to be conservative in statement.

On one occasion, he spoke before the Society about broad-shouldered beetles, scientifically known as buprestids. He began quite formally, telling of their habit of boring in dead trees in their grub stage. By imperceptible degrees he went from dead pines killed by forest fires on Long Island, kindled by the burning sparks from the Long Island trains, to wind up in a blaze of glory on the iniquities of this transportation system. Another talk on mosquitoes took him directly to the nefarious doings of the city administration, whch had filched his ideas for mosquito control and then would not listen to him at hearings on the subject. As a cold fact, he was one of the two originators of the primary methods of destroying mosquitoes in their breeding places.

At any meeting, anywhere and on any subject, he could be counted on to inject some irrelevant remarks at length, *somehow* hanging on something said.

The Brooklyn Entomological Society, at the time I became a member, about 1902, used to meet at the establishment of the American Entomological Company, which was George Franck, then at 1040 DeKalb Avenue, Brooklyn. Dr. John B. Smith, head of the Department of Entomology at Rutgers and State Entomologist of New Jersey was president at that time; and Mr. Archibald C. Weeks secretary. Both were of the early incorporators and founders of the Society.

John B. Smith (nee Schmidt) was one of our great economic entomologists, and had the distinction of having cleared the Jersey marshes of mosquitoes (pro .tem.). His father, an old time German, was a cabinet maker and collector of insects, and he devised and made the justly famous Schmidt insect boxes. As I remember it, his son was to be a lawyer, in fact, was a lawyer; but the insect urge was too strong for him, and he became a great entomologist, his specialty being the night-flying moths. He had a great sense of humor, and had a truly Teutonic fondness for beer. He was short and rotund; his face was of the shape and color of the sun in full effulgence, and was surrounded with rather thin whiskers, his hair rather thin on top.

George Franck also was German, and had one of the finest flows of vituperation in entomological circles. He also had the biggest stock of insects for sale at that time, as well as all the requirements for collectors. One time he showed me a $500 moth—an insignificant-looking little brown thing from Cuba, which was the only other known specimen taken. He sold it by cablegram to Lord Rothschild, of Tring, England; and he showed me the reply to ship the moth at 100 pounds sterling. But he had another not so profitable transaction, which he narrated to me with a splendid flow of objurgation. It was a locust year, it seems; and seventeen-year locusts have always been in demand for study in entomological courses. A then young man—this was all of forty years ago now—came to him and asked if Franck wanted 17-years locusts. Which he did. And how many? All you can bring. Ten thousand? Ten thousand, if he got them, at a stipulated price. Franck thought the young man would have difficulty in getting them. But the young man knew where there was a big brood, so he showed up with 10,000 in alcohol, and demanded payment. Both being German, they fought over this, and the young man did not make the sale. I heard the final sputterings of the fire-works, and they were colossal! Franck always had a quid in his cheek, and had a fine range and excellent aim for the superfluous juice. When he got mad, it flowed and spurted.

NOTICE

The Torre-Bueno Collection of Hemiptera. Hemipterists will be interested in knowing that the University of Kansas purchased the J. R. de la Torre-Bueno collection of Hemiptera and title to the Kirkaldy collection shortly before the death of Mr. Bueno on May 3, 1948. This large collection was the accumulation of forty-seven years of active interest in the Hemiptera and contains much exotic material. It is especially rich in aquatic Hemiptera. The collection is being incorporated in the Francis Huntington Snow Entomological Collections and each specimen will bear a "J. R. de la Torre-Bueno Collection" label.

At the time of the delivery of the collection to the University of Kansas, May 2, 1948, Mr. Bueno retained some Arizona material upon which he proposed to work and some boxes of borrowed material. Unfortunately he died just a few days after the collections left his home and the retained material was later sent by Mrs. Bueno to the University of Kansas. The borrowed material will be returned to the owners as Mr. Bueno intended.—H. B. HUNGERFORD, Lawrence, Kansas.

A RESOLUTION OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.*

The Brooklyn Entomological Society mourns the loss of J. R. de la Torre-Bueno.

Mr. Bueno occupied a unique position in the Society. He was the last survivor of that group, including the late George P. Engelhardt and William T. Davis, which guided the affairs of the Society for a generation. Until he retired from business and moved to Tucson, Arizona, he participated actively in its meetings and field excursions.

For thirty years he was a member of the Publication Committee and for a quarter of a century a most successful Editor of the Society's Journals, to which he was also a notable contributor.

His revised and enlarged edition of Dr. J. B. Smith's Glossary of Entomology is the standard publication in its field throughout the English speaking world and its publication brought new luster to the reputation of the Society.

An authority on the Hemiptera-Heteroptera, his Synopsis of that order was published serially over the years in Entomologica Americana.

In appreciation of his important contributions to the prestige and welfare of the Society and in recognition of his eminence in the entomological world, the Society elected him Honorary Vice-President and subsequently Honorary President.

Those who had the privilege of knowing him well will long remember his keen wit and his kindly interest in all engaged in the study of entomology.

To his wife and family, the Society extends its deepest sympathy.

R. R. McElvare
Chairman, Resolution Committee

George S. Tulloch
President

* Resolution adopted by the Brooklyn Entomological Society at a regular meeting held Thursday, October 14, 1948, at the Brooklyn Museum.

SOME MORE ENTOMOLOGISTS.*

By J. R. de la Torre-Bueno, Tucson, Arizona

Foremost among American entomologists of my passing generation stands Dr. Leland Ossian Howard, who has honored me with his friendship these forty years and more. Wit, raconteur, diplomat, and the leading economic entomologist world-wide, as successor to Dr. C. V. Riley, to whom he was assistant, Dr. Howard recreated the U. S. Bureau of Entomology into one of the great and most useful elements of the Department of Agriculture, during his 50 years of service, most of them as Chief of the Bureau. He always stood a friend even to the most recalcitrant of his subordinates, some of them even unfriends. He was liberal and just to all his subordinates and even blind to departmental pecadillos—anyone can violate the book of rules for the proper conduct of government employees, in some minute detail. Dr. Howard always encouraged independent work and publication among his staff; and did not sign his own name to other people's work. Many of his tales of entomology and entomologists are told in his three books of reminiscences. But the real enjoyment of these stories is in listening to him telling them with joy and a dry wit. Personally, he is rather short with quite a bald head and a charming crooked smile. There were other entomologists of great attainments during his active service, but none had so powerful an impact on world-wide study of harmful insects, not alone in this country but likewise in Europe, perhaps to a greater degree than here.

As I think back, I have known personally all, or nearly all, the great figures of American entomology in my day—the great Dr. John Henry Comstock of Cornell and his most charming wife, Anna Botsford Comstock; Dr. James G. Needham, Drs. Matheson, Johannsen, Bradley, and a host of others in Dr. Comstock's department; Dr. Herbert Osborn, of Ohio State, kindly and fine; sweet Charles W. Leng, who in the passing years arose to be one of our greatest American students of beetles; William T. Davis, world authority on Cicadas, sweet singers of the groves, and, in my mind, one of our great field naturalists and interpreters of nature; Edward P. Van Duzee, at the time of his death the outstanding hemipterist of the world, both in his studies and in their high quality. A host of other names comes to my mind as I write: Alexander and

* Mr. Bueno died in May 3, 1948. This article written in 1944 was found among his papers.

Crampton of Massachusetts College at Amherst; Hungerford of Lawrence, Kans.; Drake and Knight of Iowa State; Funkhouser of Lexington, Ky., entomologist and archaeologist; Grafe, Grote, Doll, Schaeffer, Beutenmuller, Blatchley, Tale, Engelhardt, Barber, Lutz, John B. Smith of New Jersey, E. D. Ball of Arizona—each remarkable in his chosen field. And I must not forget that other great naturalist Raymond L. Ditmars who started as an entomologist and became our great American authority on reptiles.

Of the great foreign entomologists, my acquaintance is naturally among hemipterists (by interperetation, students of the sucking bugs). Two of them I knew personally and maintained a long correspondence with them—Dr. Geza Horvath, of Budapest, and Dr. Evald Bergroth of Finland. By correspondence I knew the greatest of them all, the late Dr. Odo Morannal Reuter, of Helsingfors, Finland; and (lacuna) of London, who wrote the one great book on Biology of the Hemiptera; Dr. W. L. Distant, curator of Hemiptera in the British Museum, and his present successor, Mr. W. E. China. Dr. Reuter, beyond being a student of insects had another and wider claim to greatness—he was the great modern epic poet of Finland.

Dr. Horvath was Director of the Hungarian National Museum and one of the four great in the study of the Hemiptera. It was my privilege to know him personally in 1907, when he was in the United States in attendance at the great International Zoological Congress in Boston. Because of my correspondence with him and because of my pioneer work in neglected fields, he came to visit me for a day in White Plains (at 96 Central Avenue). White Plains then was the largest incorporated village in the United States (6,000 people). Nearby the town there were pleasant bosky woods, rich lush meadows, clear ponds among the trees, hillsides gay with flowers in spring, and dark little cattail and rush swamps, with clear rills running through the tussocks, and brawling brooks and quiet streams across the meadows. And all these were certainly full of the most fascinating insects (to an entomologist). But within a few years allwas changed, and the pleasant face of nature was altered. Everywhere there were real estate developments; great parkways were laid out and landscaped and everything wild and lovely was abolished. Nature was refined and smoothed away; swamps were drained, and the songs of the red-winged blackbirds were stilled. Briar clumps where cotton-tail bunnies lay hid were dug up and smooth lawns installed, to be curry-combed the live-long day by sweaty laborers. In a word, White Plains is now a city, wears a white collar and its hair is trimmed and slicked smooth.

Dr. Horvath at that time was short and you might almost say chubby, a man in his sixties. His face was round and faintly Asiatic; his hair iron-grey and cut more or less en brosse; and his suit had not been to the presser. But his manners were impeccable, with now and again unconscious lapses when something surprising and new showed up. He spoke Hungarian, German, French, Latin and other languages; I spoke only English, Spanish and some French; so our conversations were in the last, the one language common to us both. He spent a day or so at home with us; and he was in continuous excitement. It began at our home lunch-table; and my wife's art as confectioner of American food was the object of praise and questions. The high point of our simple meal came when an alligator pear (avocado, aguacate—not one of those California nubbins, but the big Cuban fruit) appeared on the table. Never in his life had Dr. Horvath seen one. He whipped out a small note book and a pencil and *very* apologetically asked if he might see it before it was cut. The green, smooth skin was examined carefully, and a note was made. It was cut; and the yellow-green buttery meat was likewise scrutinized and noted. Then the round big seed called for more notes; and finally, the seed was carefully wrapped up to be taken to Hungary, where it doubtless reposes in the museum collections. After lunch came the entrancing collecting in a close-by meadow, sunken and damp, with a streamlet in it. Whatever was not new to him, he had never before seen alive in nature. Swinging a big sweeping net—a heavy cotton cloth bag on a steel ring and with a big handle—he would fill it with meadow grasshoppers, spiders, beetles, caterpillars, bees of many kinds, wasps and bugs, everyone of which was either popped into a killing bottle or into a vial of alcohol, eventually to land in the collections of the Hungarian National Museum, where they may be seen labelled "White Plains, N. Y." Dr. Horvath lived to be 95, busy, productive and famous to the every last. His passing was a great loss to scientific entomology. But he is happy not to have lived to see the enslavement of his proud land and the downfall of that European culture and science he had spent a life-time in helping to erect into a splendid edifice.

Dr. Evald Bergroth, whom also I met personally, and with whom I corresponded for many years until his untimely death, was the great student of flies and a practising physician as well, at Ekenas, Finland. It was coincidental with the failure of the abortive uprising against the Czar in Finland about 1908 that I was surprised to receive letters from him from Oregon. Not much later, other came from Duluth, Minn., and finally from Fitchburg, Mass. And suddenly, he showed up in White Plains, to spend one, or a part of one, day with me to see my collection. By the end of the day he had been able to examine in detail only about eight out of some hundred or more boxes full of bugs. He had to go, because his ship for Europe left that night or in the very early hours of the following morning. On leaving, he gave a deep regretful sigh, with a remark: "I had no idea you had such an important collection, Mr. Bueno". With him went to Abo some of my choice specimens; and by this time, in all the turmoil and destruction of wars and rebellions, they are lost to science. Dr. Bergroth was a sharp-set, decisive man who wore an imposing pince nez. He could be very acid indeed in characterizing the ineptitudes of his entomological fellows, in German, French and English, and I suppose in his native Finnish and possibly Russian, not to mention Latin, which he wrote.

A Necessary Change of Name (Hemiptera, Saldidae).—One of our common northern Saldids has long been known as *Salda coriacea* Uhler, 1872. This name, however, had earlier been used by Fabricius (1803, Syst. Rhyng., p. 115. 8) for a species originally described by himself in 1794 under the generic name Acanthia, and later transferred by Stal (1868, Hem. Fabr. I, p. 88) to the Mirid genus Orthocephalus.

It is not necessary to propose a new name for Uhler's species, as it was again described as new by Provancher in 1872, and may therefore be known as *Salda bouchervilleï* (Provancher).—Roland F. Hussey, Lakeland, Florida.

J. R. DE LA TORRE-BUENO

Jose Rollin de la Torre-Bueno was born in Lima, Peru October 6th, 1871. He came with his parents and the family to the United States when 14 years old, fully acquainted with our language having studied under English tutors in Peru.

In Columbia University (School of Mines) in the class of 1894, he was the intimate friend of the late William H. Nichols Jr., who after graduation became President of The General Chemical Company. Mr. Nichols was very much interested in the news bulletins and similar publications of his company and delegated to Jose various editorial duties and matters which kept him busy for several years. (The writer of these lines was also one of this famous Columbia class of 1894—but in the far less rigorous School of Arts.)

On June 25th, 1901, Jose, then living in New York City, married Miss Lillian Reinhardt of Brooklyn and to them were born four fine sons and three talented and charming daughters. Jose was a devoted husband and very fond and justly proud of these children. For several years the family lived in White Plains, New York but in September 1934 moved to Tucson, Arizona and Jose died there May 3rd, 1948.

The entomological activities of Jose de la Torre-Bueno were closely connected with The Brooklyn Entomological Society and its publications. His fine "Glossary of Entomology" was published by the Society in 1937. It is THE Glossary of Entomology!

He was the prime mover in the revival, after 27 years, of the Bulletin of the Society in 1912 (New Series, Vol. 8) and in 1926 of the New Series, (Vol. 7) of *Entomologica Americana* of which the final volume 6 of the First Series was published in 1890. He was the editor of both series until he died.

In 1945 he was elected Honorary President of the Society, having served in various capacities besides that of editor—a post for which he was eminently well qualified after his apprenticeship with Nichols.

Torre-Bueno as an entomologist was primarily interested in the Heteropterous Hemiptera and especially in the aquatic species. Of his "Synopsis of the North American Hemiptera Heteroptera" three initial parts were published in 1939, 1941, and the last, on Lygaeidae, in 1946—amounting together to 387 pages.

Besides these larger works he published many shorter papers: 112 titles which appeared from 1902 to 1924 are listed by Dr. Parshley in his "Bibliography of North American Heteroptera" published by Smith College in 1925. He was also an assiduous collector and interested not only in taxonomy but in biological studies as well.

The new genus *Buenoa* was so named in his honor by Kirkaldy in 1904.

Great damage to his collection and Library was done by the great flood in Tucson in September 1939 but Jose patiently made all possible repairs and his interest in entomology did not abate at all. Fortunately the contents of the "Smith" boxes were little damaged and although the *bindings* of many books were ruined, the contents in several cases remained legible for actual *use* even if not *beautiful* to the eye. The Bueno collection has gone to The University of Kansas where it will receive the best of care from Dr. Hungerford and his associates.

We shall sorely miss this enthusiastic, energetic and gifted entomologist and editor. Many of us will remember him best for his understanding friendship, his interest in *our* affairs, hobbies —and peculiarities too, as well as in his own; and for his very wonderful intimate letters covering in detail a great many family and personal topics besides the entomological matters.

The Shermans and the Engelhardts, in particular, were fortunate and happy indeed to enjoy in the years gone by the friendly and informal hospitality of the Bueno home in White Plains, and to share there the very popular Sunday night suppers and other gatherings with this most interesting family and their many friends.

Mrs. Sherman and the writer were welcomed in Tucson in February 1944 with the same unchanged old time hospitality by Jose and his wife, "Torre" in his sombrero meeting us and taking care of our luggage, and introducing me at the University, while his wife took Mrs. Sherman to the meetings of her societies—and we were left in charge of their home when they went to Phoenix to visit their daughter, Myra, now Mrs. Charles A. Rollins, who was most helpful to us in former years at her responsible post with the McGraw-Hill Book Company in New York City.

Once more we salute a good friend. It was a joy to have known him so well, and we are sorry he is no longer with us.—JOHN D. SHERMAN, JR., Mt. Vernon, N. Y.

Additional Records of Bird Ticks for the Northeastern United States. A small collection of ticks obtained during the past summer by Mr. Roy Latham, was recently received for naming. It consisted mostly of larvae of *Haemaphysalis leporis-palustris* (Packard) taken from birds at Orient, Long Island, N. Y. Among them were specimens from three hosts new for this tick in our territory: Gray-cheecked thrush, *Hylocichla m. minima* (Baird); Rose-breasted Grosbeak, *Hedymeles ludovicianus* (Linné); and Palm Warbler, *Dendroica p. palmarum* (Gmelin). —J. BEQUAERT, Museum of Comparative Zoology, Cambridge, Mass.

OBSERVATIONS ON THE BIOLOGY OF SOME MUTILLID WASPS (HYM.: MUTILLIDAE)—II, WITH NEW DISTRIBUTIONAL RECORDS

By David G. Shappirio, Washington, D. C.

The following new information on mutillid wasps in the District of Columbia and vicinity has been obtained while collecting there during 1943–1948, in connection with a projected general survey of the Aculeate Hymenoptera of that area.

Particularly with respect to hosts of Mutillidae, these notes are not intended to be conclusive. Published records on this phase of the activity of other mutillids have shown that individual species of the family are not specific in regard to hosts, but seem to live at the expense of related species in other families of Aculeate Hymenoptera. For this reason, it is likely that additional hosts will be found for the mutillids discussed below, and that further hosts will be related to those mentioned here.

Dasymutilla obscura (Bl.)

Recently, (Shappirio, 1947), observations were made which led to the belief that *Dasymutilla obscura* (Bl.) is parasitic on *Cerceris clypeata* Dahlb. (Hym. : Sphecidae). More recent evidence substantiates this belief considerably, in addition to extending it to at least one other species of *Cerceris*.

On July 19, 1948, at 1:30 P.M., a visit was made to the area at which the 1947 observations were made. The *Cerceris clypeata* colony was still present, but with fewer nests than in 1947. Three *D. obscura* females were seen slowly patrolling the ground among *C. clypeata* nests. Their manner of walking seemed to indicate that they were not merely accidentally present near the nests of the other wasps. Their abdomens were contracted and held high, while they continuously emitted their characteristic squeaking noise. One *C. clypeata* left her nest and sealed it. When she had flown away, a *D. obscura* female that had apparently been watching her opened the burrow and entered it. The mutillid spent about three minutes inside and then emerged, finally resealing it.

Later the same afternoon, a visit was made to another area where the burrows of a very small species of *Cerceris, C. finitima* Cr.,[1] were common. An unusually small female specimen of *D. obscura*

[1] Identified by Dr. K. V. Krombein.

was seen to emerge from one of the burrows. Later, a small male *D. obscura* was taken as it flew over the area.

From published records concerning other mutillids, we may expect that variance in size of *D. obscura* specimens is due to variation in size of the host. There is an example by Mickel (1928) which finds that the size of *Dasymutilla bioculata* (Cr.) is larger or smaller, depending on whether *Bembix* or *Microbembex*, respectively, is the host. Fattig (1943) found the same to be true with *D. occidentalis* (L.) in Georgia, the size depending on whether the host was a large or small species of *Bombus*. The great variability in size of *D. obscura* specimens was noted by Mickel (1928); but at that time it was not possible to link it to any specific hosts.

Dasymutilla nigripes (Fab.)

D. nigripes, the commonest species of *Dasymutilla* in the District of Columbia, is particularly numerous in areas where the common sphecid wasp, *Philanthus gibbosus* (Fab.), nests. During July, 1948, several *D. nigripes* females were seen to enter these nests. From this observation, it seems likely that *P. gibbosus* is its usual host. The abundance of both species in the District of Columbia and throughout their extensive ranges supports such a conjecture.

Dasymutilla gibbosa (Say) & **D. cariniceps** (Fox)

Two males of the former species, the only black male *Dasymutilla* in this country, have been captured in Washington, D. C. on July 20, 1947 and July 10, 1948. Previously published records state that this species had not been taken further south than New York (Long Island). Thus the known range is somewhat extended.

Bradley (1916) and Mickel (1928) strongly suggested that *D. gibbosa* (unassociated with any female) was the male of *D. cariniceps* (unassociated with any male). These had never been classified under one name, however, due to the fact that they had never been taken in copula. These suggestions were made on the basis of distribution. Fattig (1943) reported two *D. cariniceps* from Georgia; and during 1944–1948 twenty-five females have been taken in and around Washington, D. C. The previous furthest southeastern records were from Delaware Water Gap, Pa.–N. J., so that the known range of this species is also extended.

In Washington, all the captures of *D. cariniceps* have been made in or at least very close to upland deciduous woods.[2] Both the

[2] More detailed information on the habitats of this and other species of uncommon Mutillidae is to appear in a forthcoming paper in this series.

specimens of *D. gibbosa* taken there also came from similar areas. This is additional evidence in favor of correlating the two species.

Timulla vagans rufinota (Mick.)

Mr. Morton Vogel captured one male of *Timulla vagans rufinota* (Mick.) in Washington, D. C., on July 2, 1943. This record greatly extends the known range of this subspecies, since by previous records, its distribution was limited to Florida and southern Georgia. Its capture in Washington, D. C. indicates that it probably occurs throughout the southeastern coastal states.

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BOOK NOTES

The Naturalists' Directory, 35th Edition. Published by the Cassino Press, Salem, Mass. (Price, $3.00)

A new edition of this directory has recently been published. It contains names, addresses and special subjects of study of professional and amateur naturalists of North and South America and some foreign countries.—George S. Tulloch

ADDITIONS TO VESPINE BIOLOGY VI: NOTES ON VESPULA RUFA VAR. CONSOBRINA SAUSSURE

By Albro T. Gaul, Brooklyn, New York

During the last ten years I have occasionally observed the nests and habits of *Vespula rufa* var. *consobrina* Sauss. in Connecticut and Massachusetts. Since this variety of *V. rufa* is seldom discussed in the entomological literature, it seems worth while to record my observations on its nesting habits and life history.

Bequaert writes (1), "The var. *consobrina* extends across the American continent, being mainly an insect of the Canadian zone. In the Transition zone it is still fairly common, but it is much rarer in the Upper Austral". The abundance of colonies of this species shows a sharp change with a very small change in latitude. In four summers of fairly intensive collecting in Lakeville, Conn. (41°58′ N.Lat., altitude 700 to 1800 feet) I have observed only one colony of var. *consobrina.* In two summers of equally intensive collecting in West Cummington, Mass. (42°30′ N.Lat., altitude 1200 to 2000 feet) I have collected or encountered 14 colonies of var. *consobrina.* In Lakeville, the dominant ground dwelling Vespine is *V. maculifrons* Buy. In West Cummington, during the summer of 1947 the number of colonies of *maculifrons* and *rufa* var. *consobrina* was approximately equal, while the summer of 1948 (after a hard winter and a wet spring)revealed that *consobrina* colonies outnumbered *maculifrons* colonies by more than two to one. Thus at fairly comparable altitudes, a difference of only 0°32′ of latitude seems to result in an apparent reversal of species dominance.

R. P. Dow (2) has described a nest of *V. rufa* var. *consobrina* from Huntington, Mass. (about 18 miles south of West Cummington) which was located beneath the roots of mountain laurel. This nest was not attached to any supporting root or stone. My observations indicate that *consobrina* is almost exclusively a dweller of the forest floor, usually situated in old rodent burrows. The nests may or may not be protected by roots of trees or shrubs. In no instance have I seen the nest suspended or supported by a paper petiole.

It is not uncommon to find the comb and paper envelope of the nest buttressed against stones or roots near the bottom of the nest cavity. These steadying buttresses may extend from the earth halfway to the top of the nest. They are built of fairly heavy gauge paper which projects outward and downward as a sheet, usually at right angles to the tangent of the curve of the nest.

A more or less typical colony was captured at West Cummington on August 23, 1948. It was located in the forest just off a little used dirt road. It was almost spherical in shape, located in a nest cavity whose lowest point was 20 cm. below the surface of the soil. The nest was 7.5 cm. in diameter. Unlike many other Vespines, the nest entrance was very large; an entrance 5 cm. in diameter was available at the bottom of the nest, where the envelope had never been completed. There were two tiers of worker brood comb, both 6 cm. in diameter. The nest envelope comprised six layers of paper. The envelope was made from horizontal strips of gray pulp, like the envelope of *Dolichovespula maculata* L. and quite unlike the envelope of *V. maculifrons.* Colonies of *V. maculifrons* within 100 meters of this nest built their envelopes of the typical yellowish pulp in the "clam shell" pattern, indicating that the two species actually select different raw materials for their paper. From the entrance to the nest cavity there extended a tunnel. This tunnel led 21 cm. along a gentle down slope, where it abruptly turned at right angles and extended another 29 cm where it entered the nest cavity. The tunnel was unlined, having no paper tunnel built within, as is common among colonies of *V. squamosa* Drury. The colony contained 52 workers and the queen.

This colony was established in an outdoor cage near the laboratory where the wasps were allowed their freedom. They rebuilt the nest envelope in two days, but it was rebuilt from the periphery of the uppermost comb toward the center. The colony season terminated on October 8, 1948 when the population comprised 56 new queens, 8 males and 27 workers. Many queens had been leaving the nest on their mating flight during the previous week. No brood was left in the combs. The nest had been enlarged to 5 combs since August 23, it was 11 cm. tall, and the largest comb was 12 cm. in diameter. It is interesting that a colony of *V. maculifrons* from the same area closed its colony season during the same week.

Not all colonies of *consobrina* are founded underground in the woods. A healthy colony was seen in West Cummington located inside the wall of a house, about 12 feet from the ground. Access to the nest was gained through a loose clapboard. This was the only instance I have noted in which this species was not nested under the forest floor.

Among the 15 colonies of this species which I have seen, none have exceeded a population of an estimated 200 individuals, which is fairly small compared with the usual colony population of other species of the genus.

All of the colonies of this species which I have kept in semi-captivity have been assiduous excavators. Ergates frequently remove lumps of earth and pebbles up to 2/3 their own weight. When these colonies have been first placed in cages, they have all prepared two or more subterranean approaches to facilitate the removal of earth. When caged, they do not attempt to build a long tunnel, but make a short tunneled entrance in juxtaposition to the periphery of the nest. This indicates that the foundress queen selects her nest site in a remote corner of a rodent burrow. All the colonies which I have captured in the wild state have been located at the end of tunnels ranging from 30 to 60 cm. long.

This species is comparatively mild tempered. I have never been stung by it, even when intruding into its nest during daylight hours. On one occasion, a friend who was assisting in the capture of a colony was stung by an ergate who had escaped the effects of the anaesthetic, with the resulting normal symptoms of any Vespid sting.

In conclusion, *V. rufa* var. *consobrina* usually nests in the forest floor of the Canadian zone. Small differences in latitude may have a drastic effect on its relative abundance. Its nests are fairly small, located in old rodent burrows, and communicate with the outside by rather lengthy tunnels. The length of the colony season may be about equal to the colony season of other species of Vespula s. str.

Bibliography

1. **Bequaert, J.** A Tentative Synopsis of the Hornets and Yellowjackets of America. Entomologica Americana Vol. XII. No. 2 pp. 104–5 Sept. 1931.
2. **Dow, R. P.** The Nests of New England Wasps. Bull. Boston Soc. Nat. Hist. No. 56 p. 12. 1930.

BOOK NOTES

A Textbook of Entomology. By Herbert H. Ross. ix—532 pp., 434 illustrations, 5 tables. 6×9 ins., cloth bound. 1948. John Wiley & Sons, Inc., New York, N. Y. (Price, $6.00)

The author states in the preface that, "It seems to me that there has been an increasing need for an introductory textbook that would bring under one cover the fundamental aspects of entomology, organized so as to give students a general idea of the entire field. This book has been written with this aim in mind." Very simply and very directly Dr. Ross explains (1) why he wrote this book and (2) what kind of a book he intended it to be.

The material is presented in ten chapters which are listed below along with a tabulation of the actual and relative amounts of space devoted to each.

Title of chapter	Actual space (pages)	Relative space (%)
1. Growth of North American Entomology	25	4.85
2. Arthropoda: Insects and their allies	31	6.12
3. External Anatomy	41	7.96
4. Internal Anatomy	18	3.49
5. Physiology	52	10.09
6. The Life Cycles	45	8.73
7. The Orders of Insects	215	41.72
8. Geological History of Insects	20	3.88
9. Ecological Considerations	36	6.99
10. Control Considerations	32	6.21

There are 434 illustrations of which 43 are original and 391 are credited to other sources. Sixteen pages are devoted to an index. The text is printed on paper of good quality and has a substantial cloth binding.

The first thought in reviewing this book was to ascertain if the fundamental aspects of entomology are included. The chapter headings indicate the broad areas of entomological knowledge which are considered but in the absence of a detailed table of contents or a complete index one must make a page by page survey to determine exactly what the book includes.

Generally speaking, the fundamental aspects of entomology are covered and the information presented has been carefully selected and excellently organized. The chapters on external anatomy and physiology are outstanding in their clarity. The chapter on the geological history of insects is a comprehensive account of a subject which, heretofore, has received scanty treatment by writers of entomological textbooks. The chapter on ecological considerations is a skillful presentation of pertinent information.

It is inevitable that there will be some slight disagreement concerning the relative emphases on certain topics. For example, one might argue that the role of insects in the pollination of plants is of sufficient importance to warrant a separate little section somewhere in the text rather than a few incidental references. The ways in which insects are beneficial to man over and above the role that they play in pollination might be given a more complete treatment to balance, in part, the extended account of the ways in which insects harm man. However, these items are matters of opinion and cannot constitute a valid basis for criticism.

The second interest in examining this book was to check such technical details as (1) the accuracy of the subject matter, (2) the usefulness of the index and (3) the editorial arrangement of the text. Some of the inaccuracies noted are given below.

a. The inclusion of mites under insects on pages 497, 498.
b. The immature stages of dragonflies are called 'larvae', page 461.
c. The implication that the male of *Tunga* burrows into the skin, page 424.

No attempt was made to completely check the text against the index or vice versa but a sampling revealed the following.

a. Pollination is not included in the index but there are at least three references to this phenomenon in the text.
b. Competition is not in the index yet a separate section of the chapter dealing with ecological considerations is devoted to this topic.
c. The index includes a reference to typhus on page 418 which does not exist.

There are some editorial errors insofar as the layout of the text is concerned. For example, on page 118 under the general topic of Specialized Tissues three subtopics of equal rank are discussed. The first one is flush with the left margin, the second is indented five spaces and the third seven spaces. George S. Tulloch, Merrick, New York

PROCEEDINGS OF THE SOCIETY

Meeting of April 15, 1948

On Thursday, April 15, 1948, a regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum. President Tulloch called the meeting to order at 8:10 p.m. Six visitors and the following members were present: Messers McElvare, Gaul, Tulloch, Teale, Sheridan and Naumann. After a discussion of the possibility of finding a new meeting place and of problems in connection with the society's publications due to the rising costs of printing, the paper of the evening, "The Language of the Bees," was presented by Edwin Way Teale. The speaker discussed at length the experiments of Prof. K. von Frisch and his discoveries in connection with the methods of communication used by honeybees. His original studies, as recorded in the *Annual Report of the Smithsonian Institution*, for 1938, were first presented. This work was supplemented by the results of further investigations carried on during the past decade. Discussion followed with Dr. Tulloch reporting on a visit made by von Frisch to Harvard in 1928. The meeting adjourned at 9:50 p.m.

Edwin Way Teale,
Secretary pro tem

Meeting of May 13, 1948

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on May 13, 1948. President Tulloch called the meeting to order at 8:00 P.M. Nine members and six visitors were present.

Since a quorum was present, Mr. McElvare moved for the ratification of the election of officers, which was unanimously passed.

The position of secretary of the society being vacant, Mr. Gaul was elected to this place.

Mr. McElvare presented a brief treasurer's report.

Mr. McElvare reported the death of our editor, Mr. J. R. de la Torre-Bueno. Dr. Ruckes read a tribute to Mr. Torre-Bueno which he had written.

Messrs. Naumann, Gaul and McElvare were requested by the chair to act on a set of resolutions on Mr. Torre-Bueno's death.

Dr. Ruckes suggested that a biographical article be prepared for our Bulletin on the life of Mr. Torre-Bueno. The president appointed Messrs. Teale, Sherman and Ruckes to prepare this article.

Mr. McElvare moved that the executive committee be empowered to act upon the vacant editorship of the Bulletin and the Entomologica Americana.

Mr. McElvare read a letter from Dr. Krombein proposing Mr. John G. Franclemont of the U. S. National Museum to membership. Since this was the last meeting of the season, Mr. McElvare moved that the by-laws be suspended and that Mr. Franclemont be immediately elected to membership. This motion was carried by unanimous ballot.

Dr. Tulloch discussed the possibility of moving our meeting place and storehouse for our publications to a more satisfactory location. Mr. McElvare made a motion that the executive committee be empowered to seek a meeting place and housing for our publications provided the expense of such a place not exceed $200.00 per year. This was favorably acted upon by the society.

Dr. Risch kindly invited members to visit his house and to examine his collections.

Dr. Tulloch, as speaker of the evening discussed Caste Determination in Ants. Castes appear only among the females in the Hymenoptera. There are two schools of thought regarding caste determination, the trophic theory in which castes are determined from like egg cells on the basis of selective feeding and the blastogenic theory in which castes are determined by genetic or chromosome differences among the egg cells.

In the bees and the wasps the trophic theory appears to satisfactorily explain the production of castes. In the ants there is considerable controversy and the speaker reviewed the evidence which both sides have presented in the discussions concerning this phenomenon.

The meeting adjourned at 9: 45 P.M.

Respectfully submitted,
A. T. Gaul.

Meeting of October 14, 1948

Regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on October 14, 1948. President G. S. Tulloch called the meeting to order at 8: 00 P.M. Nine members and ten visitors were present.

The minutes of the previous meeting were approved as read. The treasurer reported for the second and third quarters of the year, and his report was accepted.

It was moved and passed that the society send a five dollar contribution to the Zoological Record.

Dr. Tulloch announced that Dr. Joseph Bequaert had accepted the editorship of Entomologica Americana. Dr. Bequaert reported on the condition of the Entomologica Americana, and discussed the possibility of publishing it by volumes rather than by years.

Mr. McElvare read the resolutions prepared on the death of Mr. Torre-Bueno.

Dr. Tulloch read a letter from Dr. K. V. Krombein who proposed Mr. Shappirio to membership. Mr. McElvare proposed Major Sam O. Hill and Dr. Irving Fox as members. It was moved and passed that these gentlemen be immediately elected through suspension of the by-laws.

Mr. Naumann proposed that a committee be established to work out the problem of our policy when people unknown to the members desire to join the society.

Dr. Joseph Bequaert, speaker of the evening, discussed "Arthropods as Ectoparasites of Vertebrates".

Three families of pupiparous diptera, the Nycteribiidae, Streblidae and Hippoboscidae are external parasites of some mammals and birds.

The Nycteribiidae, or spider flies, are restricted to bats as hosts. They have no halteres, are mainly tropical in distribution and are apterous.

The Streblidae, or bat flies, are also restricted to bats as hosts. The wings are present, reduced, or may be lost after the fly has found its hosts. This family is mainly tropical in distribution. It contains 21 genera and 80 species.

The Hippoboscidae, or louse flies, parasitize mammals and birds but not bats. The head is typically horizontally, dorsally flattened.

The wings are functional in some species and functionless in others. They are practically world wide in distribution, although commonest in the warmer latitudes. The family comprises 22 genera and 150 species. The Sheep Ked, or sheep 'tick' (there is a true sheep tick also) is representative of this family. The Hippoboscid egg hatches in the uterus of the female, glands in the walls of the uterus supply food for the larva. The larva does not hatch, or leave the female until full grown and ready to pupate. The reproductive rate is slow, as only one larva at a time can live in the uterus of the female. The average female may total only 18 to 20 offspring. With such maternal care, few young ever die.

The meeting adjourned at 9: 50 P.M.

Respectfully submitted,
A. T. Gaul

PUBLICATIONS OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

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All orders for all publications MUST be sent DIRECT to Brooklyn Entomological Society, R. R. McElvare, Treasurer, 76 Ivy Way, Port Washington, L. I., N. Y.

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SMALLER ORDERS AND OTHER ANIMALS

NOTICE.

The Brooklyn Entomological Society is pleased to announce that Dr. J. Bequaert of the Museum of Comparative Zoology, Harvard University has accepted the editorship of **ENTOMOLOGICA AMERICANA.** All communications concerning this journal should be addressed to Dr. J. Bequaert, Museum of Comparative Zoology, Cambridge 38, Massachusetts.

INDEX TO VOLUME XLIII

Arranged alphabetically throughout; valid species in Roman type, synonyms in *italics,* new species **bold face.** ø indicates other animals; * plants. Not included in this index: extensive list of fleas and other animals, pp. 1–17; Synonymical notes on North American Sphecoid Wasps, pp. 18–21; aphids on pine, pp. 97–98; extensive list of mites, pp. 101–111.

Number of New Genera in this Index, 1.
Number of New Species and other forms in this index, 28.

NOTICE

Mr. J. R. de la Torre-Bueno, editor of this bulletin for more than thirty years, died on May 3, 1948. Until a new editor is appointed all communications should be addressed to George S. Tulloch, 22 East Garfield Street, Merrick, New York.

EXCHANGES AND FOR SALE.

This page is limited to exchange notices and to small For Sale advertisements from members of the Society and from actual paid subscribers to the Bulletin exclusively. *Exchange notices* from members of the Society and from subscribers are limited to *three (3) lines each,* including address; beyond 3 lines, there will be a charge of $1.00 for each 3 lines or less additional. *For Sale* ads will be charged at $1.25 for each 3 lines or part of 3 lines. *Commercial or business* advertisements will not be carried in this page, but will go in our regular advertising pages at our regular advertising rates to *everybody.*

PENTATOMIDAE: Want to buy or exchange Pentatomidae from the United States and Mexico. Herbert Ruckes, College of the City of New York, 17 Lexington Ave. N.Y.C.

ACALYPTRATE DIPTERA OF THE WORLD wanted for determination or in exchange for other insects. Geo. Steyskal, 23341 Puritan Ave., Detroit, Mich.

WANTED.—MANTID EGG CASES from West of the Mississippi River. If interested in collecting, write: Osmond P. Breland, The University of Texas, Austin, Texas.

WILL PURCHASE complete sets of the BULLETIN, Old Series, Vols. 1–7, 1878–1885. Brooklyn Entomological Society, Ivy Way, Port Washington, L. I., N. Y.

LEPIDOPTERA AND ORTHOPTERA from Florida in papers and local specimens mounted to exchange for other Lepidoptera. —Alex K. Wyatt, 5842 N. Kirby Avenue, Chicago (30), Ill.

"LEPIDOPTERISTS! Drawer front labels 2 7/8″ × 1 6/16″ on white-faced board at cost! Non-profit! Don't delay, write today! Kent H. Wilson, 430 Ridgewood Rd., Fort Worth 7, Texas."

WANTED—Geometrid moths, for cash or exchange. John L. Sperry, 3260 Redwood Drive, Riverside, Calif.

CERAMBYCIDAE AND CHRYSOMELIDAE from Asia and Pacific desired for determination; purchase; exchange.—J. Linsley Gressitt, Lignan University, Canton, China.

FOR COLEOPTERA OF THE WEST INDIES and Chrysomelidae of the world, will collect entomological material from Cuba, by previous arrangement. Am interested in buying literature in the above-mentioned classes, and would be glad to be advised by individuals or institutions of such articles; or to send them to me. Manuel Barro, Calle 12, no. 220, altos, apto. 3, Vedado, Habana, Cuba.