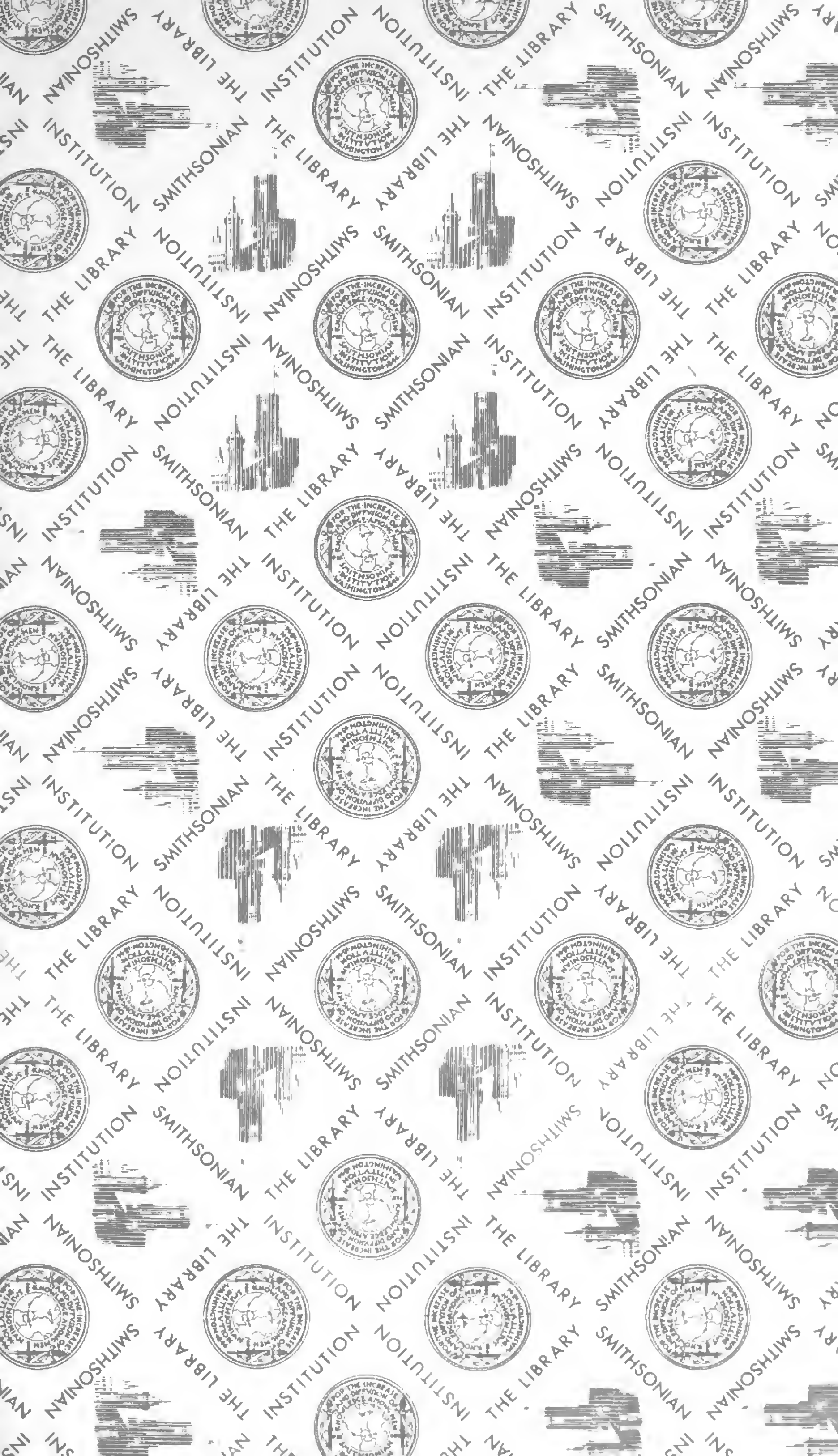
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ENTOMOLOGICAL NEWS

VOLUME LXXV, 1964

R. G. Schmieder, Editor

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1964

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ENTOMOLOGICAL NEWS

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A North American Phlebopenes (Hymenoptera, Eupelmidae)

B. D. Burks, Ent. Res. Div., Agric. Res. Serv., U. S. Department of Agriculture, Washington, D. C.

The genus *Phlebopenes* Perty has heretofore been considered to consist only of species occurring in South and Central America. Fourteen species and one variety have been described. All but one of these were described from Brazil, British Guiana, Venezuela, or Colombia; the remaining species was from Nicaragua. These species were revised in 1920 by Roman (*Archiv för Zoologi,* vol. 12, pt. 19, p. 24–30), and he gives a key to the species.

For nearly 50 years, however, there have been specimens of an undescribed *Phlebopenes* from Florida and Georgia in the U. S. National Museum collection. Just this year I received two more Florida specimens and a Maryland specimen of this species for identification, so it seems advisable to name it. This new species will greatly extend the range for the genus, and add another generic name to the North American catalog.

The species of *Phlebopenes* are very large indeed for chalcidoids; Roman (*loc. cit.*) remarked that *Phlebopenes* with its relatives is like an elephant among rabbits! Much of this apparent large size is due to the ovipositor being exserted and very long, always longer than the body, and often several times as long as the body. Even without this elongate ovipositor, however, the body in *Phlebopenes* is quite large for a chalcidoid, although surpassed by some brachymerine chalcidids.

Unfortunately nothing is known about the host relationships in *Phlebopenes*. A safe guess would be that they might parasitize woodboring larvae of Coleoptera, since specimens have been taken on standing tree trunks.

Phlebopenes hetricki, new species. (Fig. 1)

In Roman's key, this species will run out at couplet 7, which contains two South American species, *longicaudata* (Westwood) and *consors* (Walker). It differs from the first in having the ovipositor sheaths only 1½ times as long as the body, rather than 4 or 5 times as long as the body. It differs from *consors* by possessing a median, longitudinal, dorsal carina on the mesoscutum. The species *longifica* (Walker), *viridis* (Westwood), *consors* (Walker), *pilipes* Cameron, *abdominalis* Ashmead, and *pertyi* Ashmead are represented in the U.S.N.M. collection, and *hetricki* differs from all of them in having this longitudinal carina on the mesoscutum, in having a median, longitudinal groove on the scutellum, in having the path of the obsolete vein *M + Cu* of the forewing bare, and in having the propodeum extremely short on the meson. *P. hetricki* differs in details of its color pattern from the descriptions of the species that are not represented in the U.S.N.M. collection.

Female.—Length, head and body, 8.0–8.5 mm, ovipositor, 12–13 mm. Head and thorax dark metallic purple with iridescent blue-green highlights; gaster with dark, iridescent blue-green to purple shading at base above, apical segments purple, and intermediate segments tan to red-brown; antennal scape tan at base, distally black with iridescent blue-green sheen; pedicel and flagellum black; coxae iridescent purple, apices tan; femora, tibiae, and tarsi tan; wings clear hyaline, veins tan to dark brown; ovipositor sheaths black.

Head densely clothed with short, silvery hair, face and parascrobal areas with umbilicate punctation; scrobes vaguely indicated, not impressed, surface faintly sculptured, almost smooth; scape broadened and flattened mesally, apex greatly surpassing level of vertex; pedicel and ring segment subequal in length, the latter ¼ as long as first funicular segment; F-1 and F-2 equal in length, F-3 $\frac{7}{8}$ as long as F-2, F-4 $\frac{5}{8}$ as long as F-2, F-5 $\frac{1}{2}$ as long as F-2, F-6 and 7 subequal in length, each not quite $\frac{3}{8}$ as long as F-2; club $\frac{1}{2}$ as long as F-2, club segments oblique, appendiculate segment at apex of club clearly visible.

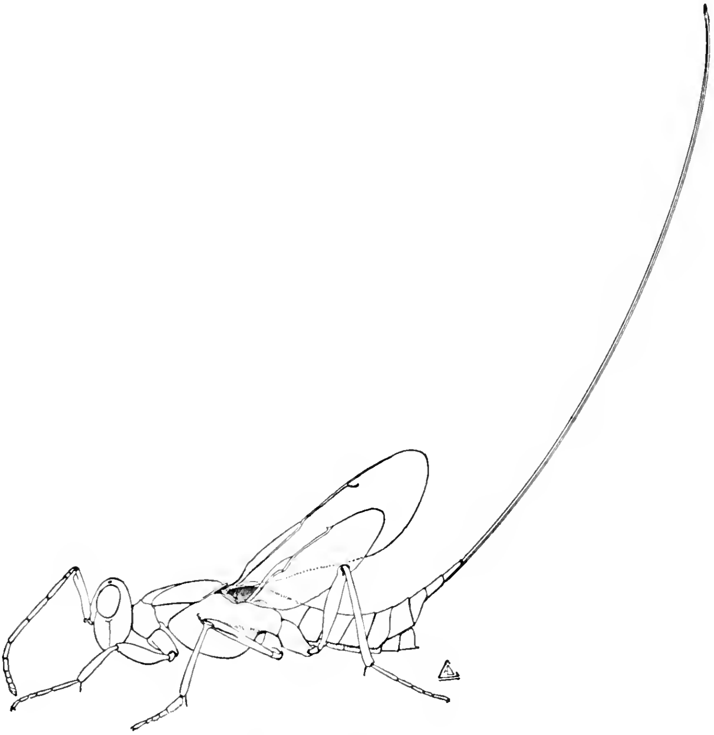

FIG. 1. *Phlebopenes hetricki,* lateral aspect.

Mesothorax, except for mesepimeron, closely covered with punctures and short, silvery hair, mesepimeron minutely roughened and lacking pubescence; a distinct median, longitudinal carina extending from apex of praescutum almost to base of scutellum; a median, longitudinal groove present in basal $\frac{2}{3}$ of scutellum. Prepectus wedge-shaped. Metepisternum and hind coxae densely covered with relatively long, silvery hair, this pubescence extending onto propodeum in area around spiracles. Forewing with marginal vein $\frac{3}{8}$, and postmarginal vein $\frac{1}{2}$, as long as submarginal vein, stigmal vein $\frac{1}{3}$ as long as marginal; area immediately behind submarginal vein with relatively sparse setae, basal cell otherwise glabrous, no setae present on path of obsolete vein $M + Cu$. Basal $\frac{1}{2}$ of ventral margin of hind femur carinate; basal hind tarsal segment twice as long as second segment.

Propodeum short on meson, only $\frac{1}{6}$ the length of the scutellum, median propodeal area with 1 or 2 fine, transverse carinulae, surface otherwise smooth; propodeal spiracle oval, large, length $1\frac{1}{4}$ times median length of propodeum. Second abdominal tergum minute, hardly visible, its length $\frac{1}{2}$ that of propodeum at meson. First gastral tergum (A–III) with a deep median incision in posterior margin, surface of tergum smooth, fine pubescence present laterally; tergum 2 with a slightly less deep median incision, surface faintly and minutely sculptured, fine pubescence present laterally; tergum 3 with sculpture and posterior incision same as on tergum 2, fine pubescence present anteriorly and laterally; tergum 4 with a shallow median incision, surface slightly more intensely sculptured, fine pubescence in anterior and lateral areas; tergum 5 with posterior margin entire, surface sculpture stronger than on tergum 4, fine pubescence anterior and lateral; tergum 6 with sculpture slightly coarser than on 5, entire tergum with fine pubescence, spiracles normally concealed beneath projecting margin of tergum 5; tergum 7 with dense, bristly pubescence over entire surface, cerci sessile, ventral, each cercus bearing 2 long and 2 short bristles. Ovipositor sheaths closely clothed with stout, minute bristles.

Male.—Unknown.

Type locality.—Olustee, FLORIDA.

Type.—U.S.N.M. No. 64991.

Described from 6 female specimens, as follows: *Type,* Olustee, Florida, June 27, 1963, collected on trunk of living longleaf pine tree, L. A. Hetrick; *paratypes,* 1 ♀, Pensacola, Florida, June 18, 1963, in Japanese beetle trap, T. W. Boyd; 1 ♀, Miami, Florida, April 12, J. N. Knull; 1 ♀, Paradise Key, Florida, C. A. Mosier; 1 ♀, Georgia [no further data]; 1 ♀, Hays Beach, Maryland, July 4, 1949, collected on standing pine tree, H. F. Howden. One paratype is deposited in the Canadian Department of Agriculture, Entomology Research Institute, Ottawa; 1 paratype is in the Florida State Plant Board, Gainesville; the other specimens are in the U. S. National Museum.

Description of the Male of Dialictus novascotiae Mitchell and of the Female of D. sandhouseae (Michener) (Hymenoptera, Halictidae) [1]

G. Knerer and C. E. Atwood [2]

During recent studies on the distribution of halictid and andrenid bees of Ontario, large numbers of small, metallic bees belonging to the genus *Dialictus* Robertson were captured by the authors. The occurrence of both males and females at the same time and place allowed the association of the dimorph sexes in several cases. During the determination of part of the material by Dr. T. B. Mitchell of North Carolina State University, two species were found to have been described from one sex only. The description of the previously unknown sexes is given below.

Dialictus novascotiae Mitchell. Fig. 1.

Dialictus novascotiae Mitchell, 1960. N. C. Agr. Exp. Sta. Tech. Bull. 141: 407. ♀.

Male.—Length 5.5–7.0 mm; wing length 4–5 mm; *head* and *thorax* dark bluish green, *abdomen* piceous; pubescence yellowish-white, rather thin, more copious on head, becoming sub-

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[1] The research on which this study is based was supported by a grant from the National Research Council, Ottawa.

[2] University of Toronto, Toronto, Ontario.

appressed and quite dense on lower part of face, thin and obscure on abdomen; length and breadth of head about equal; *clypeus* projecting about one-third below suborbital line; *lateral ocelli* nearer to eyes than to each other; *basal segment* of *flagellum* about as long as broad, slightly longer than *pedicel,* second and following segments much longer (ratio of length to breadth about 1.7 to 1.0), brownish-testaceous beneath, piceous above; *labrum* dark; *mandibles* simple, quite short, amber colored apically; *cheeks* slightly wider than eyes; *upper part* of *face* densely and contiguously punctate, punctures below becoming more widely separated, the distance between punctures not exceeding their diameter however; *supraclypeal area* with scattered, obscure punctures; *clypeus* uniformly and finely punctate, punctures separated by about twice their diameter; *vertex* somewhat shining, obscurely roughened medially, more distinctly punctate between eyes and ocelli, cheeks shining and striate, hypostomal carinae parallel, apical angle rather narrowly rounded; *scutum* somewhat shining and tesselate, median punctures shallow and well separated, becoming closer and somewhat deeper laterally, never crowded even between notaulices and tegulae, those on scutellum rather close along midline and on each side, rather shallow and indistinct; *pleura* rather coarsely reticulate; *dorsal area* of *propodeum* coarsely, regularly and quite completely striate, apical margin abrupt, lateral faces coarsely reticulate; *wings* hyaline, veins and pterostigma brownish, second submarginal cell much shorter than third, receiving first recurrent vein at apex; *tegulae* brownish-hyaline; *femora* and *tibiae* piceous, tibiae yellowish at tip; tarsi yellow; *abdominal* terga shining, punctures very fine, evenly distributed but not crowded, apical impressed areas entirely impunctute, brownish along rims; *apical margin* of *sternum* 5 slightly incurved; *sterna 7* and *8,* gonostylus as illustrated (FIG. 1); *retrorse lobe* of genital armature attenuated apically, minutely short setose.

Material examined: 46 ♂♂ Timiskaming Co., August 12, 1962 (on *Aster*); 19 ♂♂ Cochrane Co., August 13, 1962) on *Solidago*); 6 ♂♂ Thunder Bay Co., August 14 and 16, 1962 (on *Epilobium* and *Solidago*); 9 ♂♂ Kenora Co., August 14, 1962 (on *Solidago*); 1 ♂ Algoma Co., August 16, 1962 (on *Anaphalis*).

Dialictus sandhouseae (Michener)

Halictus occultus Sandhouse, 1924. U. S. Natl. Mus. Proc. 65 (19): 27. ♂ Preocc.

Lasioglossum (*Chloralictus*) *sandhouseae* Michener, 1951. In Muesebeck, et al. Hym. Amer., U.S.D.A., Agr. Monog. 2: 1117. (new name)

Dialictus sandhouseae Mitchell, 1960. N. C. Agr. Exp. Sta. Tech. Bull. 141: 418. ♂.

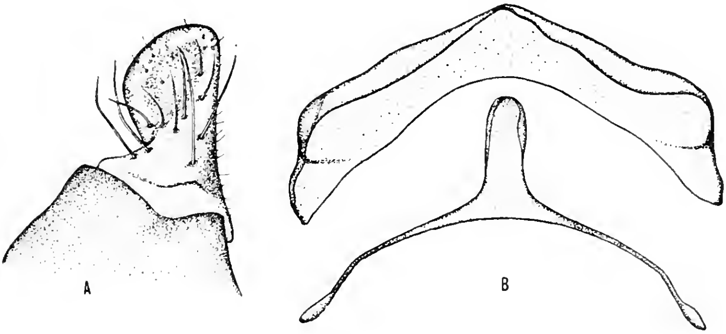


FIG. 1. *Dialictus novascotiae* Mitchell
A. gonostylus. B. sterna 7 (lower) and 8.

Female.—Length 5 mm; wing length 4.0–5.0 mm; *head* and *thorax* olive green, *abdomen* chestnut brown; pubescence short, thin, entirely whitish; *head* broader than long (ratio of breadth to length about 50 to 43); *clypeus* broadly convex, projecting nearly two-thirds below suborbital line; *supraclypeal area* nearly as long as broad and only very slightly shorter than clypeus; *eyes* convergent below; *lateral ocelli* somewhat nearer to eyes than to each other; *cheeks* subequal to eyes in width; *face* below ocelli rather dull, punctures rather coarse and deep, quite close and crowded, becoming fine, irregular and obscure on vertex; *cheeks* above rather dull, minutely and very closely punctate, punctures very obscure, cheeks becoming more striate posteriorly and towards ventral surface, but this shining and smooth; *hypostomal carinae* subparallel, apical angle rather broadly rounded; *lower half of face* rather dull and tesselate between shallow punctures, these well separated between antennae and eyes, deeper but still sparse on purple supraclypeal area, fine and rather close along upper margin of clypeus, becoming quite coarse, deep and more widely separated apically; *scutum* and *scutellum* microscopically tesselate and somewhat shining, punctures fine and shallow, more scattered in center of scutum, never becoming contiguous, even between notaulices and tegulae; *pleura* tesselate and shining with scattered punctures evident at certain angles; *dorsal area* of *propodeum* truncate posteriorly, subequal in length to combined scutellum and metanotum, dorsal surface somewhat shining between strongly divergent carinae; *wings* hyaline, veins and pterostigma yellowish; *tegulae* brownish hyaline; *legs* piceous basally, becoming more brownish apically, *tibiae* showing yellowish maculae at both ends; *abdominal* terga shining and impunctate, apical rims narrowly yellowish-hyaline; *terga 3* and *4* with sparse white pubescence not obscuring the surface.

Material examined: 39 ♀♀ Timiskaming Co., June 21 and 22, 1961 (on *Salix* and *Prunus*); 1 ♀ Cochrane Co., August 10, 1961 (on *Solidago*); 5 ♀♀ Thunder Bay Co., August 14, 1962 (on *Spiraea*); 33 ♀♀ Kenora Co., August 14, 1962 (on *Solidago*); 1 ♀ Témiscamingue, P. Q. May 15, 1962 (on *Salix*).

Both species share a boreal range which seems to extend from one end of the province to the other. No specimens have been collected south of the 47th parallel and large populations were found around the 51th parallel, the northernmost point at which the writers have collected. *D. novascotiae* was previously reported from Nova Scotia and *D. sandhouseae* was known to exist in Colorado, Minnesota and Ontario.

New Species and New State Records of Sialis (Neuroptera: Sialidae)

Oliver S. Flint, Jr., Smithsonian Institution,
Washington, D. C.

The genus *Sialis* is found throughout the Holarctic region, but related genera are reported from South America, South Africa, Madagascar, and Australia. The Nearctic species were monographed by Ross (1937), who figured and described 19 species. Since then only a single species has been described, *S. nina* Townsend (1939) from Kentucky. Three new species which have been discovered in material acquired over the last year are described herein, and new state records are presented for 8 other eastern species. The terminology proposed by Ross is used here.

Sialis dreisbachi Flint, new species (Figs. 1–4)

This species is most closely related to *S. hamata* Ross, which is recorded from western North America, but the male genitalia of the two species are quite different. The terminal plate (t) has a much longer and more slender apical neck and the genital plate (g) lacks the recurved apical hook in the male of *dreisbachi.* The female genitalia differ from those of any other described species in that they possess a lobed posterior margin on the seventh sternum and a mesal cleft and depression on the eighth sternum.

Male.—Length of forewing, 10 mm. Black, except for orange raised areas on posterior of head, between antennae, and around eyes. Ninth sternum bandlike, setae short. Lateral plates (l) ovoid, with many short setae. Genital plate (g) small, with hooks barely produced and without apical recurved portion. Terminal plate (t) in caudal view about half as wide as long, slightly produced into two low knobs subapically, apex developed into a long narrow neck which articulates with genital plate.

Female.—Length of forewing 12 mm. General structure and color as in male. Seventh sternum produced into a rounded lobe posteromesally. Eighth sternum with a broad U-shaped emargination posteromesally; mesally depressed and darkened. Ninth sternum membranous.

Holotype male, allotype female, paratype male: Michigan, Schoolcraft County, June 5, 1959, R. & K. Dreisbach. USNM 67067.

Sialis contigua Flint, new species (Figs. 5–8)

S. contigua is closely related to the eastern *S. aequalis* Banks. The two lobes of the terminal plate in *contigua* are almost touching rather than widely separated, the genital hook is very broad much as in *S. vagans* Ross, and the lateral processes from the genital plate have a darkened sclerite within them. The genital segments of the female do not show any differences from *aequalis* or *vagans*.

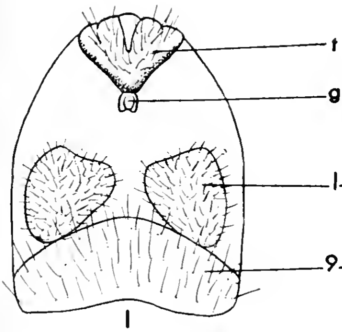
MALE.—Length of forewing 10 mm. Coloration as in *dreisbachi*. Ninth sternum produced into a large conical flap covering much of the genitalia ventrally. Lateral plates quadrate, with apicolateral angles slightly produced, with many short setae. Genital plate forming a narrow band beneath terminal plate; hooks wide in lateral aspect with tips produced into a small point; lateral margins produced into large membranous flaps with an internal darkened sclerotization. Terminal plate in caudal view broad apically, with a deep narrow cleft mesally, the two lateral lobes almost touching.

FEMALE.—Length of forewing 10–11 mm. General structure and color as in male. Seventh sternum with posterior margin almost straight. Eighth sternum with a broadly and shallowly emarginate posterior margin; mesally with a depressed area almost completely separating lateral lobes. Ninth sternum membranous.

EXPLANATION OF FIGURES

Sialis dreisbachi new species, Figs. 1–4; *Sialis contigua* new species, Figs. 5–8; *Sialis spangleri* new species, Figs. 9–11.

FIGS. 1, 5, and 11, ventral view of male genitalis; Figs. 2, 6, and 9, lateral view of terminal and genital plates of male; Figs. 3, 7, and 10 caudal view of terminal plate of male; Figs. 4 and 8, ventral view of genitalia of female. Abbreviations: g, genital plate; l, lateral plate; t, terminal plate; 7, 8, 9, abdominal sterna.



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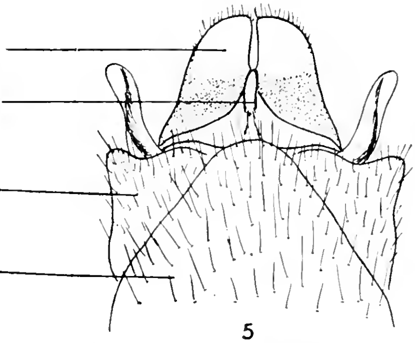

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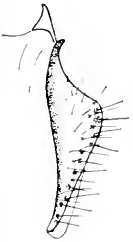

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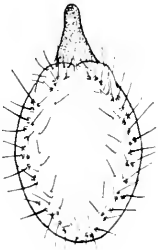

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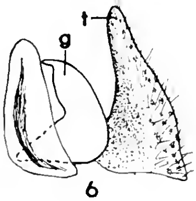

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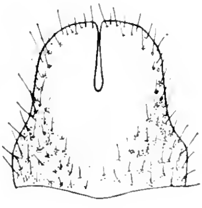

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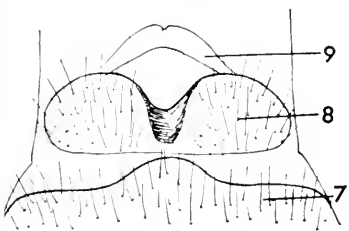

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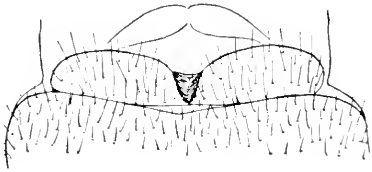

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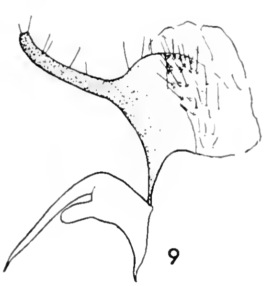

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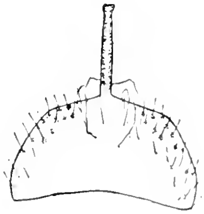

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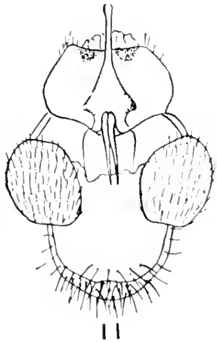

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Holotype male, allotype female, paratypes 1 ♂ 8 ♀: Virginia, Highland County, bridge on route 220 over East Branch Potomac River, May 19, 1963, O. S. Flint, Jr. & W. D. Field. USNM 67068.

Sialis spangleri Flint, new species (Figs. 9–11)

This species is most closely related to *S. mohri* Ross but differs in the undivided process of the terminal plate, the presence of a basal lobe on the genital hooks, and the much smaller lateral plates.

The type was collected as a pupa on May 14, 1963, the adult emerging 2 days later. The pupa was found on top of the ground, probably pushed out of an adjacent crayfish burrow, close to the stream above Swallow Falls.

MALE.—Length of forewing 10 mm. Coloration as in *dreisbachi*. Ninth sternum very narrow with some short hair mesally, laterally curving posteriad and ending beneath lateral plates. Lateral plates small, ovoid, with many short setae. Genital plate consisting of a pair of whip-like apical blades about 3 times as long as rounded basal lobe. Terminal plate short and broad, with a single, long, slender process arising from venter near apex.

Holotype male: Maryland, Garrett County, Swallow Falls State Park near Oakland, May 14, 1963, P. J. Spangler. USNM 67076.

The following represent new state records and are based on material in the United States National Museum.

Sialis americana (Ramb.)

DISTRICT OF COLUMBIA.—Washington, June 25, 1921, H. S. Barber, 1 ♂. VIRGINIA.—Nansemond County, Dismal Swamp, July 6–7, 1962, O. S. Flint, 3 ♂ 4 ♀.

Sialis hasta Ross

ARKANSAS.—Garland County, creek on route 270, 2 miles east of Montgomery County boundary, April 7, 1963, B. C. Marshall, 1 ♂.

Sialis infumata Newman

Virginia.—Fauquier County, Broad Run at Thorofare Gap, April 29, 1962, O. S. Flint, 1 ♂.

Sialis iola Ross

Virginia.—Montgomery County, June 1, 1901, E. A. Smyth Collection, 1 ♂ 1 ♀.

Sialis itasca Ross

Georgia.—Atlanta, May 21, 1936, P. W. Fattig, 1 ♂. Maryland.—Plummers Island, June 12, 1919, Schwarz & Barber, 1 ♂. 7-locks (Montgomery County), June 2, 1919, H. S. Barber, 1 ♂. Minnesota.—Pine County, 3 miles east of Pine City, June 7, 1949, S. I. Parfin, 1 ♂.

Sialis joppa Ross

Maryland.—Silver Spring, May 1, 1954, L. Walkley, 1 ♂. Virginia.—Shenandoah National Park, Skyline Drive milepost 71.5, May 20, 1961, O. S. Flint, 1 ♂.

Sialis mohri Ross

Arkansas.—Montgomery County, Upper Lake Ouachita, near Washita, April 7, 1963, B. C. Marshall, 97 ♂♂ ♀♀ (swarming over lake by the thousands); same but May 5, 1963, 2 ♂ 2 ♀. Oklahoma.—Stillwater, April 2, 1950, 1 ♂.

Sialis vagans Ross

Connecticut.—Silver Mine, June 1, 1938, G. P. Englehardt, 1 ♂. Stamford, April, 1942, Bartlett Tree Research Laboratory Collection, 1 ♂. Georgia.—Newman, April 28, 1931, P. W. Fattig, 1 ♂. Virginia.—Lignum, beside stream, April 21, 1951, A. B. Gurney, 1 ♂.

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Some Tramp Ants of Old World Origin Collected in Tropical Brazil

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Of the numerous ant species that have been widely distributed over the earth by human commerce, most are Old World in origin. Notable exceptions are the fire ant, *Solenopsis geminata,* and the Argentine ant, *Iridomyrmex humilis,* both from the Neotropical Region originally.

Judging from the literature, one would suppose that tramp ants of Old World origin had gained little or no foothold on the mainland of tropical South America. However, a collecting trip made by the writer to Brazil in August and September, 1962, has incidentally furnished five records of Old World tramp ants from the tropical heartland of the South American continent. All of the collections were made in buildings of rather recent construction, a situation in which native ants of the Neotropical fauna were rarely found in the areas visited.

Tetramorium guineense, Monomorium pharaonis and *Paratrechina longicornis* were found in large numbers nesting and foraging in the top main (tenth) floor of the IAPETC Building in Manaus, Amazonas, where the *Monomorium* at least was a serious pest, being attracted to all foodstuffs, soap and to water in the washbasins. One morning, a large colony of *P. longicornis* was found to have occupied some damp, freshly laundered underclothing that had been spread overnight to dry on a windowsill; this colony had at least 10 dealate females and much brood.

Tapinoma melanocephalum was found foraging in files in the airport building at São Luis, Maranhão. (This small species occasionally becomes a pest even in temperate parts of North America. A case of infestation was drawn to my attention by a resident of Lexington, Massachusetts, U. S. A. The *T. melanocephalum* had been carried from Florida to Massachusetts in a souvenir comic head carved from a coconut still in its husk, and it became established in the house before its presence in the coconut was noticed. The *Tapinoma* apparently completely routed a resident population of *Tetramorium caespitum* from the house, and were themselves eradicated by the owner only with difficulty.)

Far up the Amazon (Solimões) River, where Brazil, Peru and Colombia all come together, *Monomorium floricola* was found nesting in the crevices of a wooden building on the grounds of the hospital at Benjamin Constant.

New Exotic Crane-Flies (Tipulidae: Diptera). Part VIII

Charles P. Alexander, Amherst, Massachusetts[1]

The preceding part under this general title was published in Entomological News, 74: 99–106, 1963. In this paper I am continuing the discussion of the Hexatomine crane-flies of India and Pakistan, based on the very extensive series of these flies taken chiefly in the Himalaya and in Manipur by Fernand Schmid, to whom I extend my deepest thanks.

Limnophila (Prionolabis) coracina, new species

General coloration black, subnitidous; antennae of male elongate; halteres yellow, apex of knob weakly infuscated; legs black, femoral bases very narrowly yellowed; wings brownish yellow, clearer yellow basally, with a restricted pale brown pattern; cell M_1 lacking; male hypopygium with both dististyles produced into slender rods; apex of gonapophysis expanded into a triangular pale blade.

♂. Length about 6.5–6.6 mm; wing 7.5–8 mm; antenna about 2.5–2.6 mm.

♀. Length about 6–6.5 mm; wing 7–8 mm.

Rostrum and palpi dull black. Antennae black throughout, elongate in male; flagellar segments oval, with a dense white

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[1] Contribution from the Entomological Laboratory, University of Massachusetts.

pubescence additional to the sparse short verticils. Head black, subnitidous; anterior vertex broad.

Thoracic notum black, surface subnitidous, pronotum more opaque. Pleura black, subopaque. Halteres yellow, apex of knob weakly infuscated. Legs black, the femoral bases very narrowly yellowed. Wings brownish yellow, base clearer yellow; a restricted pale brown pattern, including clouds at origin of *Rs,* cord, outer end of cell *1st* M_2 and, in cases, along basal section of vein Cu_1 on both sides of the vein; a smaller seam on Sc_2; veins brownish yellow, a trifle darker in the patterned areas, clear yellow in the basal region. Venation: Sc_1 ending opposite fork of *Rs,* Sc_2 near the tip; R_{2+3+4} from two to three times the basal section of R_5; cell M_1 lacking; *m-cu* before midlength of M_{3+4}.

Abdomen, including hypopygium, black. Ovipositor with valves elongate, horn-yellow. Male hypopygium with posterior border of tergite gently bilobed, the emargination very shallow; sternite produced into a broad lobe, apex truncate, surface with numerous setae and setulae. Both dististyles enlarged basally, the outer style produced into a slender rod that is provided with numerous delicate setae; inner style with prolongation shorter, nearly glabrous, with only a few scattered punctures. Apex of gonapophysis expanded into a triangular pale blade, the inner apical angle acute.

Habitat. INDIA (Sikkim). *Holotype:* ♂, Yedang, 10,600 feet, in *Rhododendron* association, June 9, 1959 (Fernand Schmid). *Allotopotype:* ♀, pinned with type. *Paratopotypes:* 6 ♀♀, with the type. *Paratypes:* ♂♂, Chachu, 9,500–9,950 feet, May 17–21, 1959 (Fernand Schmid).

The only other described regional member of the subgenus is *Limnophila* (*Prionolabis*) *fletcheri* Senior-White, which differs in the unpatterned wings and, especially, in the structure of the male hypopygium, particularly the dististyles, gonapophysis and aedeagus. Senior-White describes the antennae of his species as being short in both sexes but these are elongate in the male, as in the present species. Other generally similar Palaearctic species include *L.* (*P.*) *cognata* Lackschewitz of Europe and

L. (*P.*) *lictor* Alexander and *L.* (*P.*) *poliochroa* Alexander of western China.

Limnophila (Afrolimnophila) pterosticta, new species

Size medium (wing of male to 9 mm); general coloration of thorax brownish yellow, scarcely patterned; legs yellow; wings light yellow, all cells with abundant pale brown dots that form several broken ocelli; male hypopygium with outer dististyle entirely glabrous, inner style very stout; phallosome as in the subgenus, including narrow paddlelike gonapophyses and the slender aedeagus, its tip decurved.

♂. Length about 7–7.5 mm; wing 8–9 mm; antenna about 1.4–1.5 mm.

♀. Length about 8.5–9.5 mm; wing 8–10 mm.

Rostrum brownish gray; palpi dark brown. Antennae with scape and pedicel dark brown, flagellum pale brown or yellowish brown; proximal four flagellar segments enlarged beneath, as in the subgenus; outer segments oval, shorter than the verticils. Head brownish gray, moderately narrowed behind; anterior vertex broad, about four times the diameter of the scape.

Pronotal scutum yellowish brown, scutellum clearer yellow. Mesonotal praescutum and scutum light grayish brown to brownish yellow, scarcely patterned; postnotum and pleura slightly darker brown, dorsopleural region more yellowed. Halteres yellow, knobs light brown. Legs with coxae and trochanters yellow; remainder of legs yellow, terminal two tarsal segments dark brown, femoral tips not darkened; legs with long conspicuous yellow setae. Wings light yellow, prearcular and costal fields clear yellow; all cells with abundant pale brown dots that form more or less distinct broken ocelli at origin of *Rs*, over anterior cord, *m-cu*, outer end of cell *1st M*, outer fork of *M*, end of vein *2nd A*, and less evidently at ends of the other longitudinal veins; veins yellow, macrotrichia brown. Macrotrichia on R_{2+3}, about the outer half of R_4, most of R_5, M_1, M_2 and outer ends of M_3 and M_4, lacking on veins before cord excepting *R*. Venation: *h* not clearly apparent; *Rs* long; cell M_1 from about one and one-half to twice its petiole; *m-cu* at near midlength of M_{3+4}.

Abdominal tergites light brown, sternites more yellowed; hypopygium light brown. Male hypopygium with mesal face of basistyle provided with numerous long yellow setae. Dististyles terminal, the outer glabrous, slender, at apex bent at about a right angle into a slightly curved blackened spine; inner style very stout, subrectangular in outline, the rounded apex recurved. Phallosome including the elongate aedeagus, narrowed outwardly and strongly curved to the slender apex; apophyses appearing as narrow subtending pale glabrous paddles, as in the subgenus.

Habitat. INDIA (Manipur). *Holotype:* ♂, Sirhoi Kashong, 7,500 feet, July 11, 1960 (Fernand Schmid). *Allotopotype:* ♀. *Paratopotypes:* 9 ♂ ♀, with the types, June 9, July 12–13, 1960 (Fernand Schmid).

The present fly is one of numerous Oriental species that I now am referring to the subgenus *Afrolimnophila* Alexander (*Ruwenzori Expedition* 1934–35, 1, no. 7: 284–285; 1956), hitherto considered as being strictly Ethiopian in distribution. The Oriental species include *Limnophila* (*Afrolimnophila*) *manipurensis* Alexander, *L.* (*A.*) *bicoloripes* Alexander, *L.* (*A.*) *raoana* Alexander, and several further species defined in this paper, and very probably also *Limnophila multipunctipennis* Brunetti and *L. senior-whitei* Alexander, all distinguishable among themselves by the coloration of the body and legs and especially the pattern of the wings. Outside the Indian subregion, the Philippine *L.* (*A.*) *petulans* Alexander belongs here and also very probably certain species from Malaya and Borneo, as *Limnophila guttulata* Edwards, *L. murudensis* Edwards, and *L. pendleburyi* Edwards. All species of *Afrolimnophila* have the hypopygium with the outer dististyle entirely glabrous and the phallosome, including both the aedeagus and gonapophyses, of characteristic conformation. The typical subgenus *Limnophila* Macquart (*Poecilostola* Schiner) superficially resembles the present subgenus in its patterned wings and enlarged basal flagellar segments but has the male hypopygium of quite different structure, with the outer dististyle setiferous and the phallosome distinct.

Limnophila (Afrolimnophila) apicifusca, new species

General coloration gray; antennal scape black, gray pruinose, flagellar segments yellow; knobs of halteres darkened; legs yellow, tips of femora broadly brownish black; wings very pale yellow with dark brown costal spots that involve both cells *C* and *Sc*; very abundant paler brown dots in all cells, arranged as more or less complete ocelli at origin and fork of *Rs* and end of *2nd A*; vein *Sc* long, *Rs* square and short-spurred at origin; cell M_1 small, about one-half its petiole.

♀. Length about 8 mm; wing 8 mm.

Rostrum gray; palpi black. Antennae with the elongate scape black, gray pruinose, pedicel dark brown; flagellar segments obscure yellow, the outer ones a little darkened; flagellar verticils long and conspicuous. Head brownish gray.

Pronotum dark gray, a little infuscated mid-dorsally. Mesonotum dark, light gray pruinose, discolored in type, presumably with praescutal stripes. Pleura chiefly dark brown, sparsely pruinose; dorsopleural membrane dusky. Halteres with stem obscure yellow, knob weakly darkened. Legs with coxae brown; trochanters obscure yellow above, brown beneath; femora and tibiae yellow, tips of former conspicuously brownish black, of the latter very narrowly so; basitarsi yellow, tips very narrowly infuscated; remainder of tarsi broken. Wings with the ground very pale yellow, base and costal region not differentiated; a heavy brown spotted and dotted pattern that is about equal in area to the ground; three darker costal spots that include cell *Sc* behind, the second above origin of *Rs*, the third at tip of Sc_1; three further marginal spots, at R_{1+2}, R_3 and R_4, the second of these larger; a very narrow darkened seam over anterior cord; very abundant paler brown dots in all cells, those before cord chiefly confluent; areas at origin and fork of *Rs* and at end of *2nd A* forming more or less complete ocelli, the first complete; veins light brown, more yellowed in the ground areas, especially evident in the costal field. Venation: *Sc* long, Sc_1 ending shortly beyond fork of *Rs*, Sc_2 near its tip; *Rs* square and short-spurred at origin; R_2 longer than R_{1+2}; R_{2+3+4} a little longer than basal section of R_5; cell M_1 small, about one-half the petiole; *m-cu* at or just beyond midlength of M_{3+4}.

Abdomen dark brown; apex broken.

Habitat. PAKISTAN. *Holotype:* ♀, Kaghan, North West Frontier Province, 6,688 feet, June 27, 1953 (Fernand Schmid).

Allied regional species include *Limnophila* (*Afrolimnophila*) *pterosticta,* new species, *L.* (*A.*) *pusan,* new species, and *L.* (*A.*) *scabristyla,* new species, all distinguished among themselves by the coloration of the legs and wings. In the present fly, attention should be called to the fact that the costal darkenings of the wings involve both cells *C* and *Sc*.

Limnophila (Afrolimnophila) perdelecta, new species

General coloration of thorax gray; halteres light yellow; legs yellow, tips of femora vaguely more darkened; wings pale yellow with a scattered pale and darker brown spotted pattern that forms about three narrow broken crossbands; male hypopygium with outer dististyle glabrous.

♂. Length about 6.8–7 mm; wing 7.6–7.8 mm; antenna about 1.2–1.3 mm.

Rostrum and palpi brown. Antennae relatively short, dark brown; proximal five flagellar segments more enlarged, as in the subgenus, verticils of upper surface elongate, outer segments more elongate, the verticils shorter. Head brownish gray with a capillary darker brown vitta on vertex; anterior vertex broad, nearly four times the diameter of the scape; setae of vertex long, yellow, the posterior ones shorter and darker.

Prothorax gray. Mesonotum almost uniformly gray, the praescutum with two scarcely indicated more brownish intermediate stripes. Pleura clearer gray; dorsopleural membrane buffy. Halteres light yellow. Legs with coxae brownish gray; trochanters brown; remainder of legs yellow, tips of femora vaguely more darkened, of tibiae narrowly but more evidently infuscated, outer tarsal segments darkened; legs with long setae. Wings pale yellow, prearcular and costal regions more saturated yellow; a scattered pale brown spotted pattern, including about eight small darker brown spots along costal border; other narrow dark seams over cord and outer end of cell *1st* M_2; a series of somewhat paler brown marginal spots at ends of all longitudinal veins, including also one at midlength of cell *2nd A*; on disk a few still paler brown spots, the whole pattern tending to form narrow broken crossbands opposite origin of *Rs* and end of *2nd A*, cord, over the outer medial field and more brokenly nearer the wing base; veins yellow, light brown in the patterned areas. Venation: Sc_1 ending about opposite fork of *Rs*, Sc_2 near its tip; R_2 and R_{1+2} short, subequal; cell M_1 subequal to its petiole; *m-cu* beyond midlength of cell *1st* M_2.

Abdomen dark brown, hypopygium more yellowish brown. Male hypopygium with posterior tergal border convexly rounded, with both long and short setae and abundant microscopic setulae. Basistyle with very long setae, the longest exceeding the outer dististyle. Dististyles terminal; outer style glabrous, narrowed gradually to the acute tip, inner style with basal lobe stout, apex recurved. Gonapophyses appearing as simple pale paddlelike blades. Aedeagus narrowed to the slender decurved apex.

Habitat. INDIA (Sikkim). *Holotype:* ♂, Selep, 7,000 feet, July 27, 1959 (Fernand Schmid). *Paratypes:* 3 ♂♂, Chumtang, 5,120 feet, July 18, 1959; 1 ♂, Namnasa, 9,500 feet, July 13, 1959; 1 ♂, Tena, 4,600 feet, August 1, 1959 (Fernand Schmid).

Limnophila (*Afrolimnophila*) *perdelecta* is readily told from all other regional members of the subgenus by the nature of the wing pattern. *Limnophila asura* Alexander is generally similar but has the apex of the outer dististyle shallowly bifid and its strict subgeneric position is uncertain. It may be found to be desirable to slightly modify the subgeneric hypopygial characters so as to accommodate this species in *Afrolimnophila*.

Limnophila (Afrolimnophila) pusan, new species

General coloration of thorax light gray, praescutum with three obscure orange stripes; antennal flagellum yellow; legs yellow; wings light yellow with a conspicuous spotted and semiocellate brown pattern, the major ocelli with darkened centers; *Rs* long; ovipositor with cerci very long and slender.

♀. Length about 9 mm; wing 8.5 mm.

Rostrum light brown, palpi darker. Antennae with scape and pedicel light brown, flagellum yellow, the enlarged proximal four or five segments clear light yellow, outer segments slightly darker, elongate. Head light yellowish brown; anterior vertex broad.

Prothorax obscure yellow. Mesonotal praescutum light gray with three obscure orange stripes, scutal lobes similarly patterned; scutellum yellowish gray, a little darker medially; mediotergite gray. Pleura chiefly light yellow, more obscured dorsally. Halteres with stem obscure yellow, knob weakly darkened. Legs with coxae brownish yellow; remainder of legs light yellow, only the outer two tarsal segments a little darker; leg segments with abundant long coarse yellow setae. Wings light yellow, with a conspicuous spotted and semiocellate brown pattern, in area subequal to or exceeding the ground; larger brown markings at origin of *Rs*, fork of *Rs* and at midlength of outer radial field, these appearing as large vague ocelli with darkened centers; an open ocellus over outer end of cell *1st* M_2; cell *C* with about 18 transverse brown lines, narrower than the interspaces; over most of wing the smaller markings appear as subcircular spots or dots, in cell *M* and outer medial field more confluent; veins yellow, not darkened in the patterned areas. Longitudinal veins beyond cord with macrotrichia, lacking on R_{2+3+4}, M_{3+4} and Cu_1. Venation: *Sc* long, Sc_1 ending just before fork of R_{2+3+4}, Sc_2 near its tip; *Rs* long; cell M_1 about one-half longer than its petiole; *m-cu* at near one-third M_{3+4}.

Abdominal tergites light brown, sternites more yellowed. Ovipositor with cerci very long and slender, nearly straight.

Habitat. INDIA (Kumaon). *Holotype:* ♀, Khumyara, Pauri Gahrwal, 4,300–5,000 feet, May 3, 1958 (Fernand Schmid).

The most similar species is *Limnophila* (*Afrolimnophila*) *pterosticta*, new species, of Manipur, which has the coloration of the body and appendages much the same, differing evidently in the wing pattern, the spotted and dotted brown pattern being much more abundant, with the ocellate markings open.

Limnophila (Afrolimnophila) scabristyla, new species

Size medium (wing of male about 6.5 mm); general coloration of head and thorax brown, pleura darker; antennal flagellum yellowed; legs light yellow; wings very pale yellow with subequal pale and darker brown transverse areas, more extensive and confluent in outer radial field, wing tip narrowly pale yellow; male hypopygium with outer dististyle relatively short and stout, the outer fourth with numerous appressed spinulae; aedeagus relatively stout.

♂. Length about 6 mm; wing 6.4 mm; antenna about 1.3 mm. Rostrum and palpi brown. Antennae with scape and pedicel brown, flagellum yellowed; proximal flagellar segments as in the subgenus, lower face slightly produced, without verticils; outer segments progressively lengthened, the intermediate ones shorter than their verticils. Head dark brown.

Thorax of unique type partly destroyed by fungi; notum yellowish brown, posterior sclerites and pleura dark brown. Halteres dark brown. Legs with coxae dark brown; remaining segments light yellow, terminal tarsal segment darkened; vestiture long, subappressed. Wings with ground very pale yellow, subequal in area to the abundant small brown transversely spotted pattern, these areas larger and becoming confluent in outer radial field, the smaller paler brown lines transverse, occurring in all cells; narrow complete pale brown bands at origin of Rs and over cord, completely traversing the wing; darkened pattern not or scarcely ocelliform as in some related species; wing apex in cells R_4 and R_5 pale yellow; subcostal interspaces light yellow; veins light brown, a little darker in the patterned areas. Venation: Sc_1 ending about opposite the fork of Rs. Sc_2 near its tip; R_{2+3+4} subequal to basal section of R_5; cell M_1 about one-half longer than its petiole; *m-cu* at near one-third M_{3+4}.

Abdomen, including hypopygium, dark brown. Male hypopygium with the tergite transverse, posterior border gently convex, darkened by numerous microscopic black setulae, with many very long yellow setae interspersed. Dististyles terminal; outer style relatively short and stout, very gradully narrowed to the acute tip, before apex with numerous appressed spinulae to produce a scabrous appearance; inner style very short and broad, apex obtuse, surface with numerous long yellow setae. Gonapophyses appearing as slender pale blades, the tips narrowly obtuse. Aedeagus relatively stout.

Habitat. INDIA (Sikkim). *Holotype:* ♂, Manu, 4,920 feet, August 5, 1959 (Fernand Schmid).

In its general appearance the present fly is most similar to species such as *Limnophila* (*Afrolimnophila*) *pterosticta,* new species, which differs in coloration of the body, legs and wings, and especially in hypopygial structure, including the outer dististyle.

The W. H. Edwards Types of Hesperiidae Lost on the "S.S. Pomerania" in 1878.*

F. MARTIN BROWN, Fountain Valley School,
Colorado Springs, Colo.

In recent years attention has been called to the loss of certain type specimens of Hesperiidae described by William Henry Edwards at the time the "S.S. Pomerania" sank in the English Channel late in 1878. Remington (1947) quoted the Secretary's minutes of the meeting of the Cambridge (Massachusetts) Entomological Club for 13 December 1878. At that time Hagen reported that the shipment lost on the "Pomerania" included "the types of 70 rare species of Hesperia." Brown (1962) pointed out that Edwards had described only 58 species of Hesperiidae by the end of 1878 and that Hagen probably referred to typical rather than type specimens, since many of Edwards's early types of Skippers are known.

I recently had made a photo-copy of Edwards's manuscript "Entomological Journal." This consists of about 5,000 pages of notes in 24 bound volumes. Page 238 of volume H carries

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* My studies of the types established by W. H. Edwards is being supported by National Science Foundation grant GB-194.

Edward's memorandum of the loss of material on the "Pomerania." I quote it here verbatim:

> "1878 Oct. 25. Put up for Dr. Speyer to be returned to me a small box of uniques. viz. 1 Zampa, 1 Eos, 1 Nysa, 1 Comus, 1 Nessus, 1 Pirus, 1 Aenus and 1 Comma var. unknown, Oregon ♂: and one mashed ? Sylvanus Bois. 2539 of H. Edw. These go to Mr. Lintner next week with other things.
>
> "Dec. 2, 1878. I hear today from Mr. Litner that the above are on the bottom of the English Channel in the lost ship Pommerania [sic]. This is the 4th misadventure I have had in sending out uniques. One invoice to Scudder was burned in an express car. One to Behr never reached him and one to H. Edwards was smashed and the insects destroyed."

From these entries in Edwards' journals it is evident that the 7 lost specimens acquired a 0 in Hagen's report.

I have long suspected from reading several thousand letters written by Edwards to other entomologists that he used the words "unique" and "type" with different connotations than we use today. His use of "unique" is equivalent to our use of "type." His use of "type" is equivalent to our use of "typical." A check of the original descriptions of the Hesperiidae noted above showed me that in four cases the name was based upon two or more specimens. In the other three the types were unique. Edwards' *Hesperia eos* was based upon a male "in the collection of the Mus. Comp. Anat. Cambridge." His *nereus* and *zampa* each were based upon single specimens in his own collection.

Thus it seems that only two, possibly three, types of Hesperiidae were lost with the sinking of the "Pomerania." My studies of Edwards's' types have not yet reached the stage where I can say authoritatively that the others are extant or not.

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REMINGTON, C. 1947. The third item under "Miscellany" The Lepidopterists' News 1: 83.

A Note on Rygchium leucomelas (Saussure) in Trap-nests in Wisconsin (Hym.: Vespidae)

John T. Medler[1]

Six nests of *Rygchium leucomelas* were found in trap-nests in Wisconsin during 1952–62. All were obtained in 1954–56 from Ashland and Bayfield Counties in the northernmost part of the state, except one nest from Manitowoc County, which is east-central. These counties border either Lake Superior or Lake Michigan. The six nests represented 1.8 per cent of the 326 trap-nests utilized by eumenid wasps during 1954–56. The species was not found in numerous trap-nests placed in northern habitats during 1952–53, or in the central and southern parts of the state during 1957–62.

Five of the nests had been completed, as they were each plugged with clay at the orifice of the 6-inch hole bored in the soft pith of the sumac-stem trap. The sixth nest had been constructed in front of a 2-cell *Megachile* sp. nest, which had been plugged with 12 mm of leaf pieces 95 mm deep in the hole. The wasp nest had two cells, each with double partitions, but there was no orifice plug. Cell 1 contained a pigmented pupa when opened on August 14, and a female emerged on August 17. Cell 2 was empty.

The completed nests each showed the typical *Rygchium* architecture of linear cells, double clay partitions, and an empty vestibule next to the orifice plug, as described for *R. foraminatum* (Saussure) by Medler (1963). The measurements on cells and intercalary spaces of three nests are given in Table 1. Nest 3 was of special interest because it had the normal sequence of females in first-made cells, and was terminated by a male in the last cell. Cell 4 was parasitized by a female *Chrysis coerulans* Fab. Not included in the table was nest 4, which had

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two cells similar to nest 2; and nest 5, with only one cell from which a female wasp was reared.

TABLE 1. *Lengths of cells and spaces (mm) in nests of* Rygchium leucomelas, *with sex of reared wasps*

Construction	Nest 1	Nest 2	Nest 3
Diameter	6.25	6.25	7.8
Cell 1	20—empty	36—♀	17—♀
Space 1	5	6	8
Cell 2	18—not reared	13—not reared	15—♀
Space 2	12	6	7
Cell 3	16—♀	31—empty	16—not reared
Space 3	25		4
Cell 4			16—*Chrysis coerulans* ♀
Space 4			4
Cell 5			8—♂
Space 5			6
Vestibule	41	50	27
Plug	3	2	3

Life history data were fragmentary because of the small number of nests. All nests contained wasps of a summer generation, as adults were reared during the last of July or early August. Caterpillars were used for provisioning, and 9, 9 and 4 individuals were recorded in three cells. Fourteen days elapsed from the time a cocoon was started until the adult female emerged. Nest 3 was opened on July 15 and the cell contents incubated at 27° C. Cells 1 and 2 contained pupae from which adults emerged on July 26 and 28. Cells 3, 4 and 5 had fully developed larvae. The larva in cell 3 died, but those in 4 and 5 spun cocoons on July 17. The parasite and the male wasp emerged on July 28.

The mean head width of seven reared females was 3.19 ± .34, range 2.8–3.8 mm. The head width of the single male was 2.5 mm.

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MEDLER, J. T. 1963. Biology of *Rygchium foraminatum* (Saussure) in Trap-nests in Wisconsin. Ann. Ent. Soc. Amer. 56: (in press).

NOTICE. The December, 1963, issue of ENTOMOLOGICAL NEWS was mailed at the post-office at Lancaster, Pa., on December 5, 1963.

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Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

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FEBRUARY 1964

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ENTOMOLOGICAL NEWS

Vol. LXXV FEBRUARY, 1964 No. 2

A New Phaneropterine Genus from South America (Orthoptera: Tettigoniidae)[1]

Harold J. Grant, Jr., Department of Insects, The Academy of Natural Sciences of Philadelphia

In a forthcoming revision of the genus *Ceraia* (*Proc. Acad. Nat. Sci. Phila.* 116, in press) several species are removed to other genera. One of these, *C. zebrata* Brunner, requires recognition of a new genus which is described below.

The figures were competently executed by Mary Fuges.

Percyna new genus

Type-species.—*Ceraia zebrata* Brunner.

Relationship.—Among South American phaneropterines, *Percyna* is more similar to *Ectemna* and *Euthyrrhachis* than to any others. On this basis, a relationship is presumed. The form of the fastigium of the vertex, pronotum, and female ovipositor are the points of greatest similarity. *Percyna* differs strongly from these genera in form of the male external genitalia, female subgenital plate, and shape and venation of the anterior wings.

Diagnosis.—Fastigium of vertex laterally compressed, raised, anteriorly and dorsally sulcate. Pronotal disc with a broad, velvety-black band at posterior border. Anterior wings with alternating green and creamy-white bands.

Male. Tenth abdominal tergite extended in two long arms,

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[1] This work was supported by a grant from the National Science Foundation—GB-1374, which is here gratefully acknowledged.

each apically compressed, with minute teeth on apical border (Fig. 2).

Female. Subgenital plate thickened; apically emarginate; with a longitudinal, mid-ventral carina (Fig. 3).

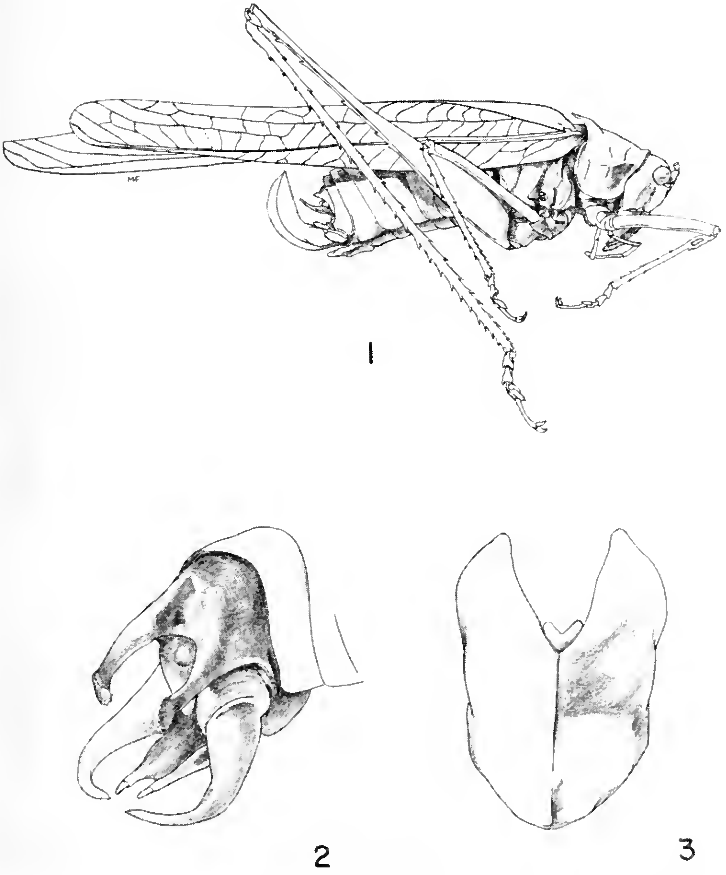
Description. Head.—Vertex weakly domed, higher than the dorsal surface of the eyes. Fastigium of vertex laterally compressed, somewhat elevated, distinctly sulcate dorsally and on anterior face. Fastigium of frons bluntly trigonal in frontal aspect, apex proximate to ventral base of fastigium of vertex. Facial profile markedly emarginate in region of clypeal-frontal suture. Eyes approximately spherical; protrusive.

Pronotum.—Surface uneven, without punctations. Disc about 1.3 times longer than wide (greatest proportions); somewhat sellate; with the lateral carinae displaced ventrad as a ridge across the upper face of the lateral lobes; surface of disc rounding off into lateral lobes; anterior border weakly concave; posterior border arcuate; greatest width of disc across anterior end. Lateral lobes longer (anterior to posterior) than deep; the displaced lateral carina of disc appearing as a blunt, longitudinal ridge in upper third; this carina interrupted at mid-point and in posterior third by sulci which run toward, but do not reach, the disc; ventral border pronouncedly flared ectad; outline as in Fig. 1.

Wings.—Anterior wings elongate, narrow, about 5.7 times longer than wide. With simple venation (Fig. 1); vein Rs arising well beyond the mid-point of R; vein Rs branching well beyond its own mid-point, not joining MA directly, the joining effected by a cross vein; apex rounded. Male stridulating field (left anterior wing) with Cu_2 thickened, extending across entire field.

Legs.—Anterior coxal spine present. Anterior femora slender; without spines along outer ventral border (except for minute, distal spinule normally present); with 2–3 small spines along inner ventral border. Median femora elongate, slender; with 2–3 spines along outer ventral border and 0–1 spine along inner ventral border. Posterior femora about 7.4–9.7 times longer than wide; with 4–7 spines along outer ventral border and 5–7 spines along inner ventral border. Posterior tibiae with two apical spurs on either side.

External genitalia.—Male. Tenth abdominal tergite projecting posteriorly, posterolaterally extending as two long processes each laterally compressed at the apex, the compressed



Figs. 1–3. *Percyna zebrata* (Brunner). Fig. 1, female; Fig. 2, tip of abdomen, male type, dorsoposterior view; Fig. 3, female subgenital plate, ventral view.

areas inturned and minutely toothed along their borders. Cerci simple, elongate, reducing in diameter distad and there incurved; apex a simple, acute, sclerotic tooth. Subgenital plate short; apically deeply emarginate; short styles present (Fig. 2).

Female. Tenth abdominal tergite projecting posteriorly; apically deeply emarginate. Ovipositor strongly upturned; apically acute; dorsal and ventral valves finely toothed as indicated in Fig. 1; outer face of dorsal valves with a few minute, spinate projections; base of dorsal valves conspicuously swollen. Subgenital plate thickened, fleshy in appearance; apex deeply and broadly emarginate; with a marked, mid-longitudinal ventral carina (Fig. 3).

Color.—Base color green. Lateral lobes of pronotum with the displaced lateral discal carina a light brown. Posterior border of pronotal disc velvet-black. Anterior wings with alternating green and creamy-white bands.

Distribution.—The genus is known only from the indefinite locality "Peru."

Percyna zebrata (Brunner), new combination

Ceraia zebrata Brunner, 1891, Verh. k-k. Zool.-Bot. Gesell. Wien 41:131. Type.—♂, "Peru." [Polish Academy of Sciences, Institute of Zoology, Warsaw.]

A single additional specimen, a female, from "Peru" has also been examined. This specimen may have been examined by Brunner, but it was never recorded by him. It is in the collections of the Polish Academy of Sciences.

Measurements (in mm), ♂ type first.—Total length (frons to wing tip), 39, 45.8; length of pronotum, 4.5, 4.9; width of pronotum, 3.4, 4; length of posterior femur, 21.1, 24.1; width of posterior femur, 2.2, 3.2; length of anterior wing, 30.7, 34.2; width of anterior wing, 5.7, —; length of ovipositor, 6.6.

On the True Nature of Schizotaenia, with Notes on Contingent Matters[1] (Chilopoda: Geophilomorpha: Chilenophilidae)

Ralph E. Crabill, Jr., Smithsonian Institution, U. S. National Museum, Washington, D. C.

In April, 1896 (p. 73) O. F. Cook proposed a new Liberian genus and species, *Schizotaenia prognatha,* but failed to characterize it in any manner; the new name was therefore a *nomen nudum.* His simultaneous designation of *prognatha* as type-species of *Schizotaenia* has no validity either, the names having been still-born. Sometime after July 21st of that year Fasicle VIII of *Brandtia* appeared, and in it he did describe *Schizotaenia* validly (p. 35, key), referring seven species to it (p. 38): *prognatha,* sp.n., *quadrisulcata* (Porath), *suppar,* sp.n., *vara,* sp.n., *aequalis* (Porath), *porosa* (Porath), *unguiculata* (Porath). Since he presented characterizations for the new genus and species, they must be considered to have been proposed validly in *Brandtia* and not in the earlier publication. In *Brandtia,* however, Cook failed to designate a type-species.

Subsequently, ignoring the original content of the genus, at different times Silvestri, Verhoeff, and Attems referred other species to *Schizotaenia.* Silvestri began this trend, most notably in his important work on the Chilean fauna in 1905, with his inclusion within *Schizotaenia* of *alacer* (Pocock) and *psilopa* (Attems); as we shall see, neither is congeneric with *prognatha.* In the 1905 publication Silvestri did not fix a type-species for *Schizotaenia.* Finally, he cited Attems' *magellanica* as a junior synonym of *alacer,* a synonymy which Attems declined to accept in his 1929 monograph of the Geophilomorpha. At that time Attems summarized the genus, listing the following as being

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[1] This study was undertaken with the aid of a grant from the National Science Foundation. I would like to express my thanks to my colleagues and the authorities of the following institutions, in which facilities and specimens were generously placed at my disposal for study: Museum of Comparative Zoology, Harvard University, Cambridge; British Museum (Natural History), London; Naturhistorisches Museum, Vienna; Zoologisches Staatsinstitut und Zoologisches Museum, Hamburg.

valid and congeneric species within it: *Scolioplanes magellanicus* Attems, 1897, *Geophilus alacer* Pocock, 1891, *Schendyla psilopa* Attems, 1897, *Geophilus schauinslandi* Attems, 1903, *Mesoleptodon laetus* Chamberlin, 1920, and *Philosogus oligus* Chamberlin 1920. In addition he stated that *Schizotaenia magellanica* was the type-species of the genus. Implicit in all of this was Attems' view that *Schizotaenia* was a member of the Pachymeriinae and morphologically very similar to *Eurytion* and *Pachymerinus*.

From the foregoing account it must be clear that *magellanica* was never available as a possible type-species of *Schizotaenia* because it was not among the species originally included in the genus. The type-species of a genus is a name on paper; it is not a material object. Furthermore, the type-species of a genus can only be one of the names referred to the genus at the time of its valid proposal. Therefore Attems' selection of *magellanica* as type-species of *Schizotaenia* is not admissible.

In his 1962 work on the Chilean Chilopoda Chamberlin legitimately fixed the type-species of *Schizotaenia;* by his subsequent designation (p. 4) it is *S. prognatha* Cook. His action is in accord with the expressed wishes of Dr. Cook, but in addition it clarifies the suprageneric position of the genus, locating it within the Chilenophilinae [2] and removing it from the Pachymeriinae, where it was clearly misplaced. *Schizotaneia* is closely similar to the chilenophilines *Ribautia* and *Polygonarea* but not at all similar to *Eurytion* and *Pachymerinus*, which are good representative pachymeriines.

Chamberlin's action in 1962 seemed to him to leave the species previously referred by Attems to *Schizotaenia* without a generic name. Accordingly he proposed a new one, *Cryotion*, and designated *magellanicus* as its type-species. At the same time he excluded two other available and supposedly suitable generic names, *Philosogus* Chamberlin, 1920, and *Mesoleptodon* Chamberlin, 1920, by attempting to show that they are generically different from *Cryotion* and *Eurytion*. Their type-species are

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[2] I am following Chamberlin and not Attems here. Attems' Chilenophilinae + Pachymerinae = Chamberlin's Chilenophilidae, with two subfamilies, Chilenophilinae and Pachymeriinae.

indeed not congeneric with *magellanicus.* In 1936 (p. 58) Archey showed that *laetus,* the type-species of *Mesoleptodon,* properly belongs to *Maoriella* Attems, 1903, a distinct and valid generic entity. I have examined the types and concur with Archey. I have also examined the type of *Philosogus oligus* Chamberlin, 1920, type-species of its genus, and find it to be conspecific with *Zelanion antipodus* (Hutton, 1877), whose type I have seen in the British Museum (New Synonymy). It follows that *Philosogus* Chamberlin, 1920, is the junior subjective synonym of *Zelanion* Chamberlin, 1920.

When Chamberlin proposed *Cryotion* for the reception of *magellanicus* and congeners, he overlooked an earlier available generic name, *Schendyloides* Attems, 1897, whose type-species is *Schendyla (Schendyloides) psilopa* Attems, 1897 (monobasic). I have examined the types of *magellanicus* at Hamburg, of *psiolap* at Vienna, and of *alacer* at London, from which I conclude the following: (1) *alacer* is the senior synonym of *magellanicus,* as Silvestri correctly guessed. (2) My lectotype of *psilopa* is congeneric but not conspecific with *alacer.* (3) Therefore, since *magellanicus* (= *alacer*) is the type-species of *Cryotion,* and since *psilopa* (lectotype) is the type-species of *Schendyloides,* and since the two type-species are congeneric, then it follows that *Schendyloides* Attems, 1897, is the subjective senior synonym of *Cryotion* Chamberlin, 1962 (New Synonymy). The fact that *Schendyloides* is valid, being founded upon *Schendyla,* the type-genus of an entirely different family, is unfortunate, but it has of course no bearing upon the selection or rejection of *Schendyloides* as a generic name within Chilenophilidae.

This, then, clarifies the suprageneric positions, type-species, and to an extent the zoological contents of *Schizotaenia* and *Schendyloides.* Although contributing to the resolution of these problems, the Chamberlin paper of 1962 inadvertently lent a new element of confusion to our understanding of the zoological content of *Schizotaenia* because, as I shall attempt to show now, his redescription of *prognatha,* type-species of *Schizotaenia,* is in error.

Chamberlin's new description of *prognatha* was based upon certain figures sent to him by Cook: he explains this on page 4. He reproduced some of the Cook figures (Fig. 42–45, Plate VII) but deleted two showing the most posterior body segments.

As Chamberlin supposed, the Cook figures must have been prepared from microscopical preparations, which now cannot be found among the other Cook slides in the collection of the United States National Museum. None the less, we do have 13 complete and 3 fragmentary syntypes in alcohol, all clearly labelled *Schizotaenia prognatha* in Cook's own handwriting. Therefore his composite description (p. 38) must have been made from these as well as from the missing specimen on the slide.

According to Chamberlin's characterization of *prognatha,* the critical generic features are supposed to be as follows (p. 1, key, couplet 3): "Three coxal pores, two large and one small on each side; median piece of labrum with teeth numerous and very fine; both penult and last legs lacking true claws and both with well developed setose pretarsi. . . ." And yet in every one of the Cook syntypes I find the following to be true: (1) Each coxopleuron has only two pores. (2) The ultimate pretarsus is tuberculate and setose. (3) The penult pretarsus is strictly claw-like, not in the slightest tuberculate and setose. It seems clear that in such cases the court of ultimate appeal must always be the type specimens themselves, so that we can only be guided by what Cook's type series shows and not by what he wrote or, in this instance, may have figured in error.

The Cook figures that Chamberlin published agree with the Cook syntypes before me, but in no syntype are there more than two pores per coxopleuron, and in none is the penultimate pretarsus tuberculate. The Cook description was composite; there was no holotype. Therefore, any member of the syntypical series is available as a lectotype, which means that we are not bound to accept as definitive the information recently published by Chamberlin. My firm suspicion is that Cook erred somehow, inadvertently figuring parts of two different species. It seems quite probable that the figure showing a coxopleuron with three pores was made, not from a specimen of *prognatha,* rather from a specimen of *Ribautia vara* or *unguiculata,* or even of some other species of *Ribautia,* a genus close to *Schizotaenia* and well-represented in West Africa.

With respect to the reportedly tuberculate penult pretarsus, only two explanations come to mind. The character is erroneous and does not exist: Possibly there was some mistake in the labelling of figures. If that is not the case, then it is the hallmark of some as yet unknown genus and species. Whatever the explanation is, the original syntypes of Cook do not exhibit this feature.

Consequently I am unable to agree with Chamberlin in his contention that the western African *Schizotaenia* Cook, 1896, is generically different from the Brazilian *Schizonampa* Chamberlin, 1914. The type-species of the two are quite clearly congeneric, and therefore *Schizotaenia* is the senior subjective synonym of *Schizonampa* (New Synonymy). Furthermore, on the basis of the original description of *manni* Chamberlin, 1914 (p. 214), it seems impossible to distinguish between it and *prognatha* at the species level. However, the holotype of *manni* cannot be located, and in this case I would not venture to synonymize the two species on the basis of the original description alone.

The presence of this genus in western Africa and eastern South America is not surprising. It is known now that a number of chilopod genera inhabit western Africa and the Neotropics. A few probably represent the persisting ends of an ancient continuum, but most, I feel, are to be explained on the basis of rafting across the Atlantic. For a more detailed discussion the reader is referred to Crabill, 1960, pp. 167–170, and Darlington, 1957, pp. 14–20.

Diagnosis of *Schizotaenia*

The following diagnostic features taken together will distinguish the genus from all other chilenophilids. First maxillary coxosternal lappets absent; telopodite lappets present. Second maxillae: Coxosternites seperated by membranous isthmus, prominent statuminia with concursive sutures present; second and third telopodite articles each with a prominent distoectal process. Prosternum: Pleuroprosternal sutures strictly lateral and complete; pleurograms present, nearly complete. Ventral porefields absent. Each coxopleuron with two homogenous pores. Ultimate leg with two tarsal articles; pretarsus a prominent, setose tubercle.

Redescription of *Schizotaenia prognatha* Cook

Lectotype

Male. Africa, Liberia, Mt. Coffee (ca. 17 miles N.E. of Monrovia, 6° 01′ N. Lat., 10° 42′ W. Long.); June 1892. U.S.N.M. Myriapod Catalogue: 2934. Myriapod Collection: C-6.

INTRODUCTION. About 9 mm long. With 43 pedal segments. Shape: Uniformly wide over anterior two-thirds of body, thereafter slightly attenuate. Color: Faded in alcohol, sordid brown; in original description Cook says "body whitish, head brown." ANTENNA. Length (in balsam), 1.4 mm. Filiform, only very slightly attenuate distally; articles 2–9 longer than wide, the ultimate equalling the preceding two in length. Articles 1–8 or 9 with longer, sparse setae than those following. Ultimate article on outside half distally with a few robust, inflated setae. CEPHALIC PLATE. Length, 0.46 mm, greatest width, 0.32 mm; width to length = 1:1.42. Shape: Nearly rectangular but sides very slightly excurved, rear and front margins nearly straight. Frontal suture extremely weak, nearly invisible. Prebasal plate entirely covered. CLYPEUS. Paraclypeal complete, strong, over posterior $\frac{9}{10}$ of their course nearly straight. Clypeus as bounded by these sutures wider than long (= 1:1.6). Clypeal fenestra on anterior edge of plate, very small, vaguely distinguished by finer, more irregular areolation, with 4 inclusive short setae; clypeus otherwise with large areolate figures. Without prelabral plagulae. Setae posterior to fenestra, 1 + 1, 1 + 1; prelabral setal pair absent. LABRUM. Midpiece large, separating sidepieces, not at all overlapped by them, with a few robust, dark teeth. Sidepieces with long hyaline filaments. Fulcra long and very robust. FIRST MAXILLAE. Coxosternum without lappets; each telopodite with a long, scabrous lappet.

SECOND MAXILLAE. The two coxosternites joined centrally only by a non-areolate, membranous isthmus, hence, in effect, "separated"; each coxosternite very long; pore aperture open mesally; statumen long and strongly sclerotized, laterally concursive with its full length a prominent suture;[3] without processes at base of telopodite mesally. Telopodite: Each article short and robust, especially the first and third; first article without ventral condyle, dorsal condyle vestigial, with a long, sharp process at distoectal corner; second article with long, sharp process at distoectal corner; pretarsus unguiform, very long and robust, without serrulations. PROSTERNUM. Anterocentrally with two distinct denticles. Pleuroprosternal sutures passing forward on lateral margin and reaching anterior margin. Pleurograms present, fine, very strongly digressive from pleuroprosternal sutures, nearly reaching condyles.[4] PREHENSOR. Very long and thin. When flexed, surpassing end of 1st antennal article. Trochanteroprefemur: With two prominent, long denticles, the distal one deeply pigmented and triangular; proximal denticles somewhat shorter than the distal, unpigmented. Second and third articles without denticles. Tarsungula: Basally with a long, slightly recurved, deeply pigmented denticle; ungular blade with dorsal and ventral edges perfectly smooth, not serrulate. Poison calyx very small, subcircular in outline, the appendices long and pendent. Poison gland entirely contained within the trochanteroprefemur. TERGITES. Basal plate apparently without sulci. Remaining tergites (except the

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[3] This suture, which I here term the parastatuminial suture, has been overlooked heretofore. It is a most valuable diagnostic criterion at the generic and even suprageneric levels. It is never present unless a statumen is present, but more significantly, when the statumen is present, the suture may or may not be present, depending upon the genus. For example, *Arctogeophilus* has a statumen but no statuminial suture. This is also the case in *Gnathoribautia* and *Lestophilus*. By contrast, both the statumen and its suture are present in *Ribautia, Polygonarea,* and *Schizotaenia.*

[4] In his key to the Chilenophilinae Attems (1929, p. 280) is in error when he ascribes pleurograms ("Chitinlinien") to *Ribautia* but not to *Polygonarea* (see couplet 5). They are prominent in both genera and, indeed, are among their chief distinguishing characteristics.

ultimate) bisulcate. LEGS. Sparsely clothed with long, robust setae. Pretarsi: Ungues long, thin, curved on distal half; parungues acicular, very short, approximately equal in length. STERNITES. On anterior two-thirds of body each sternite with a very deep and long midlongitudinal sulcus. Porefields absent; no subsurface glandular formations visible. Carpophagus-structures absent. Subcoxae with distinct subsurface glandular formations discernible, but pores evidently absent. ULTIMATE PEDAL SEGMENT: Pretergite transversely very wide; bilaterally not fissate. Tergite: Anterior width greater than length; sides slightly convergent posteriorly; rear margin truncate. Sternite: Very wide, the width taken at midlength far exceeding length; posterior margin with numerous minute setae, these overlying a densely glandular mass. Coxopleuron: Ventroposteriorly swollen, this area densely setose and housing a densely glandular mass; with two large, concealed pore openings, each supplied by a single, discrete, homogeneous, glandular mass. Leg. Moderately inflated; about $\frac{1}{4}$ longer than penult; the two tarsal articles equal in length; pretarsus conspicuously tuberculate, long, with adventive filaments. POSTPEDAL SEGMENTS. Male gonopods long and narrow, very weakly bipartite. Anal pores absent.

The Paralectotypes

The entire syntypical series was collected (we do not know by whom) at Mt. Coffee, or the Muhlenberg Mission in the vicinity of Mt. Coffee, at various times between December, 1891, and March, 1895.

EXPLANATION OF FIGURES

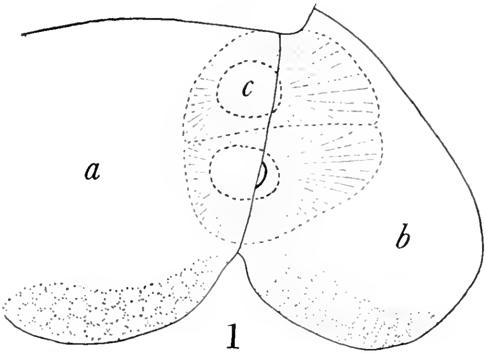
Schizotaenia prognatha Cook (Lectotype)

FIG. 1. Ultimate pedal segment; ventral aspect; setae deleted. a = sternite. b = left coxopleuron. c = concealed pore-opening.

FIG. 2. Right prehensor and part of prosternum; ventral aspect; setae deleted. a = pleurogram. b = pleuroprosternal suture.

FIG. 3. First and second maxillae; ventral aspect; setae deleted; membranous, non-areolate areas stippled. a = statumen. b = parastatuminial suture.

FIG. 4. Labrum and left fulcrum.



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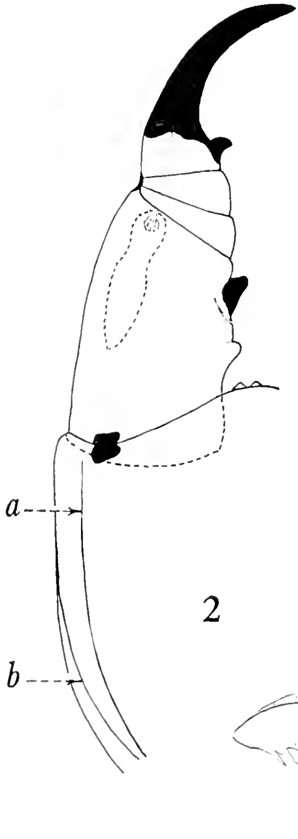

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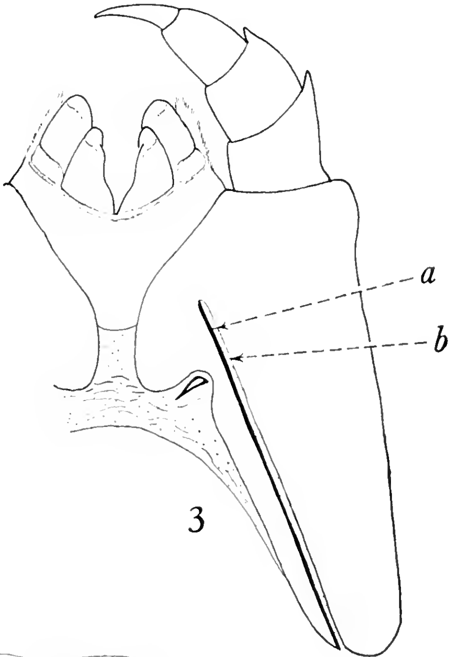

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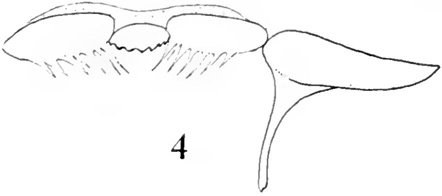

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The paralectotypes agree in all important particulars with the lectotype described. In the females the ultimate legs are swollen nearly as much as those of the males. The female gonopods are flat and leaf-like, centrally united, and unipartite. Pedal segments: Males, 43 in 7 exx., 41 in 4 exx; Female, 43 in 1 ex. In three specimens the rear of the body is detached or missing. The longest of the specimens is about 11 mm. long. All are in poor, some in very bad, condition.

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Vidia cooremani, a New Species of Saproglyphidae from a Crabronine Wasp (Acarina)

Edward W. Baker, Entomology Research Division, Agr. Res. Serv., U. S. D. A., Washington, D. C.

In his studies on the biology of solitary bees and wasps, Dr. K. V. Krombein, of the Entomology Research Division of the U. S. Department of Agriculture, has found many mites associated with these insects (Baker and Cunliffe, 1960; Baker, 1962a; 1962b; Krombein, 1961; 1962a; 1962b, in press). His recent studies on the wasp *Ectemnius* (*Hypocrabro*) *paucimaculatus* (Packard) from Plummers Island, Maryland, have disclosed another mite and wasp association.

The genus *Vidia* Oudemans, 1905, is little known. Zachvatkin (1941) gave the first comprehensive review. Cooreman (1948) described the larva, protonymph, hypopial nymph, and female of *Vidia concellaria,* and discussed the genus. The new species here described is named for Dr. Jean Cooreman who has pioneered in the study of some of these mites and their relation to bees and wasps.

Vidia cooremani, new species. (Figs. 1–5)

The hypopus of this species is similar to that of *Vidia concellaria* Cooreman, 1948, but differs in that the solenidion of tarsus I is of equal size throughout and not strongly thickened distally. The suctorial plate is broader than long rather than longer than broad. This mite is known only from the hypopial nymph and protonymph.

Hypopus. Body dorsally with typical striation pattern for genus, transverse on propodosoma and longitudinal on hysterosoma. Gnathosoma represented by two tubercles supporting a pair of strong setae; lateral gnathosomal setae short and fine. Sternum straight, short, free posteriorly; apodemes of coxae II also short and free posteriorly. Apodemes of coxae III and IV united medially, posterior sternum long, straight. Apodemes of suctorial plate rounded. Ventral body setae short, those an-

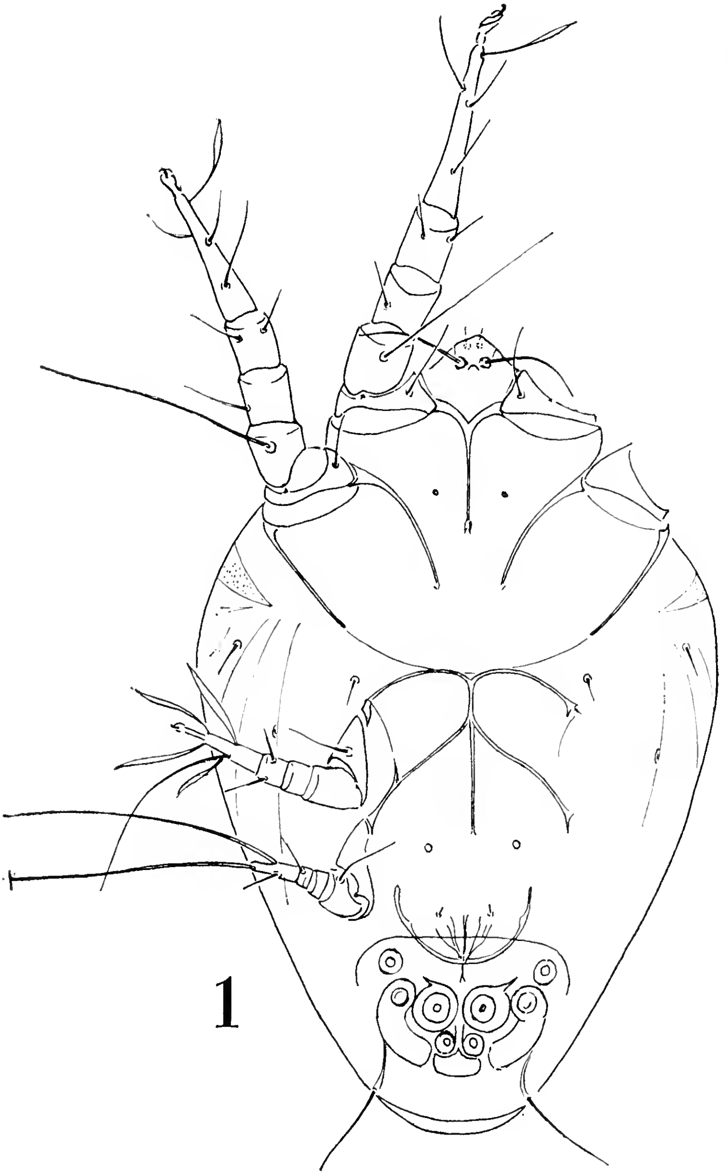
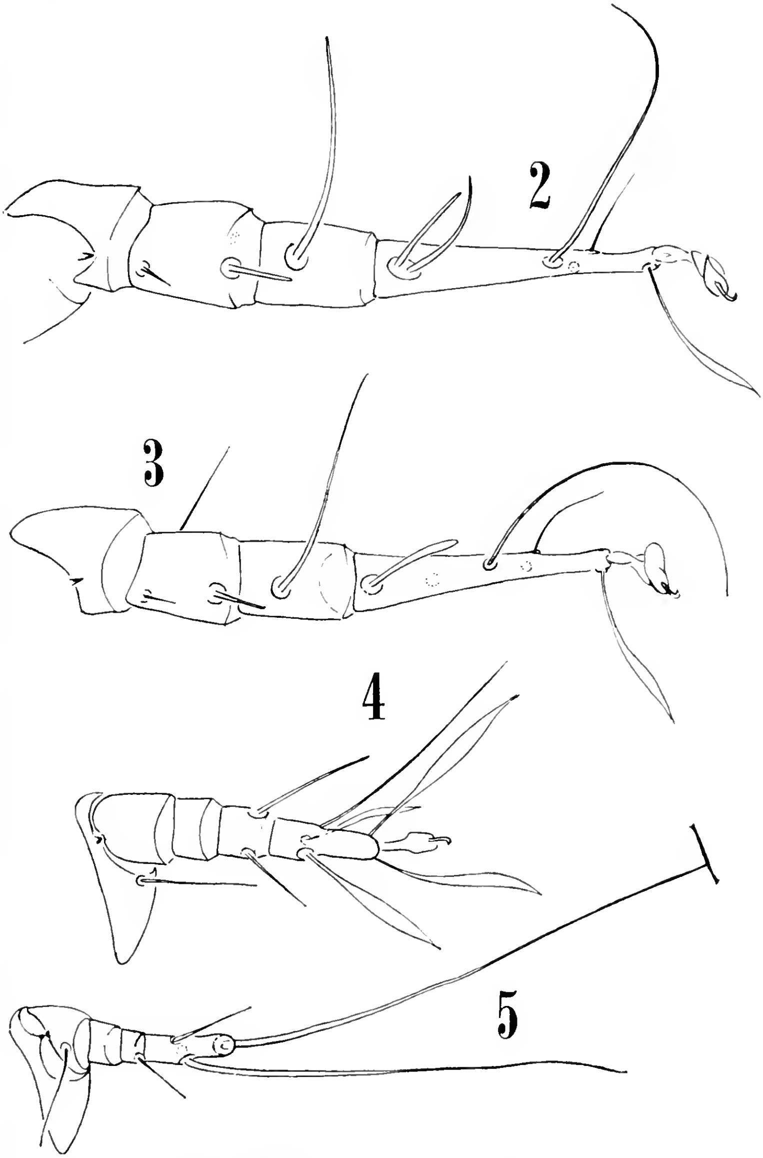


Fig. 1. *Vidia cooremani* sp. n., hypopus, ventral view.



Figs. 2–5. *Vidia cooreman* sp. n. 2, leg I; 3, leg II; 4, leg III; 5 leg IV.

terior to suctorial plate very short. Sclerotized portion of dorsum bends ventrally between coxae II and III. Leg setae as figured. Solenidion I rodlike; solenidion II clublike, broader distally than at base. With a single lanceolate setae on tarsus I and II respectively; with four such setae on tarsus III; none on tarsus IV. Length of setae as figured. Length of body 248 μ; width 167 μ.

Holotype. U. S. National Museum No. 2958, hypopus, *ex* nest (61663X-2) of *Ectemnius paucimaculatus* (Packard) in hibiscus stem, Plummers Island, Maryland, July 1, 1963, K. V. Krombein. *Paratypes.* Eight hypopi with the above data.

Also studied was a series of hypopi taken from abdomen of a male of the above wasp collected on Plummers Island, May 26, 1963, by K. V. Krombein.

Protonymphs were also collected in the nest material, but are not described.

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The Collembola of New Mexico. XII. Neelinae and Sminthuridinae [1, 2]

HAROLD GEORGE SCOTT [3]

None of the nine species reported herein have previously been recorded from New Mexico. Specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Suborder SYMPHYPLEONA Borner, 1901

Body subglobose; segmentation of thorax and abdomen indistinct, although Abd V–VI may be clearly demarked as an anal papilla; collophore sacs usually long and filamentous; anal spines absent.

Family SMINTHURIDAE Lubbock, 1862

Gisin (1960) and Maynard (1951) are followed in designating a single family in the suborder.

KEY TO WORLD SUBFAMILIES OF SMINTHURIDAE

1. Antenna shorter than head......**Neelinae** Handlirsch, 1929
   Antenna longer than head...............................2
2. Ant IV shorter than III.......**Dicyrtominae** Borner, 1906
   Ant IV not shorter than III............................3
3. Thoracic segmentation indefinite; collophore warty.........
   ....**Sminthurinae** Borner, 1906
   Thoracic segmentation evident; collophore usually smooth...
   ....**Sminthuridinae** Borner, 1906

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[1] A portion of a dissertation submitted to the Graduate Faculty of the University of New Mexico in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

[2] Part XI appeared in ENT. NEWS 74(9): 243–251.

[3] Training Branch, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta 22, Georgia.

Subfamily NEELINAE Handlirsch, 1929

No Neelinae have been recorded from New Mexico, but the subfamily has been reported from a number of the United States and from Mexico.

KEY TO WORLD SPECIES OF NEELINAE

1. Ant III and IV fused (*Megalothorax* Willem, 1900)......2
   Ant III and IV separate......6
2. Mucro with anterior longitudinal ridge......3
   Mucro without anterior longitudinal ridge......4
3. Mucro with 7 teeth (Australasian)......**Megalothorax novae-zealandiae** Salmon, 1944
   Mucro without teeth (Australasian)......**Megalothorax rubidus** Salmon, 1946
4. Mucro serrate......5
   Mucro not serrate (Holarctic, Neotropical)......**Megalothorax minimus** Willem, 1900
5. Tubercle at base of unguiculus protruding (Nearctic, Neotropical)......**Megalothorax tristani** Denis, 1933
   Tubercle at base of unguiculus not protruding (Holarctic, Neotropical, Australasian)......**Megalothorax incertus** Borner, 1903
6. Ant III longer than IV (*Neelides* Caroli, 1912)......7
   Ant III shorter than IV (*Neelus Folsom,* 1896) (Holarctic, Neotropical, Australasian)......**Neelus murinus** Folsom, 1896
7. Unguis with ventral tooth (Holarctic, Neotropical)......**Neelides minutus** (Folsom, 1901)
   Unguis without ventral tooth (Palearctic)......**Neelides folsomi** Caroli, 1912

Subfamily SMINTHURIDINAE Borner, 1906

KEY TO GENERA OF NEARCTIC SMINTHURIDINAE

1. Abd V and VI ankylosed......**Sminthurides** Borner, 1900
   Abd V and VI separate......2
2. Ant IV subsegmented......3
   Ant IV not subsegmented......**Sminthurinus** Borner, 1901
3. Tenent hairs present......4
   Tenent hairs absent......**Arrhopalites** Borner, 1906
4. Bothriotricha present......**Katiannina** Maynard and Downs, 1951
   Bothriotricha absent......**Metakatianna** Denis, 1933

Genus **SMINTHURIDES** Borner, 1900

KEY TO SPECIES OF NEARCTIC SMINTHURIDES (FEMALES)

NOTE: Males of *Sminthurides* have Ant III–IV modified into a clasping organ. Female antennae are not so modified.

1. Apex of unguiculus branched........**bifidus** (Mills, 1934)
   Apex of unguiculus simple............................2
2. Ant IV simple..3
   Ant IV subdivided....................................9
3. Tibiotarsal organ absent.............................4
   Tibiotarsal organ present............................6
4. Mucronal bristle present........**ramosus** (Folsom, 1932)
   Mucronal bristle absent..............................5
5. Tibiotarsus III with serrate bristles.......................................**serratus** (Folsom and Mills, 1938)
   Tibiotarsus III without serrate bristles...**pumilis** (Krausbauer, 1901)
6. Guard hair of tibiotarsal organ bifid................7
   Guard hair of tibiotarsal organ simple...............8
7. Antenna subequal to head..**ludovicianus** Folsom and Mills, 1938
   Antenna longer than head...**globocerus** Folsom and Mills, 1938
8. Mucro not more than 2 × as long as wide...**aquaticus** (Bourlet, 1842)
   Mucro about 3 × as long as wide...**malmgreni** (Tullberg, 1876)
9. Ant IV with 3 subsegments.......**aureolus** Maynard, 1951
   Ant IV with 4 subsegments...........................10
   Ant IV with 5 subsegments...........................12
   Ant IV with 7 subsegments....**annulicornis** Axelson, 1905
   Ant IV with 12 subsegments.....**pseudoviolaceus** sp. nov.
10. Basal subsegment of Ant IV about 2 × apical segment...............................**pseudassimilis** Stach, 1956
    Basal subsegment of Ant IV more than 2 × apical segment...11
    Basal subsegment of Ant IV subequal to apical segment..14
11. Claw tunicate......................**occultus** Mills, 1934
    Claw not tunicate.....**macnamarai** Folsom and Mills, 1938
12. Mucro straight......................................13
    Mucro curved.................**terrestris** Maynard, 1951
13. Mucro apically bulbous................**lepus** Mills, 1934
    Mucro not apically bulbous.......**plicatus** (Schott, 1891)

14. Abdomen patterned dorsally. . **assimilis** (Krausbauer, 1898)
    Abdomen not patterned dorsally. . . . .
    . . . .**krausbaueri** Folsom and Mills, 1938
    var. **distinctus** Linnaniemi, 1912

Sminthurides bifidus Mills, 1938

New Mexico Record. Beneath bark of fir log, 11,000 ft, Taos Co.; Sep. 1953.

Distribution. Fla., Iowa, La., Minn., N. M., N. Y.; Ontario (Canada).

Sminthurides malmgreni (Tullberg, 1876)

New Mexico Record. Berlese sample of pine log, 7,400 ft, Torrance Co., Jul. 1952.

Distribution. Ill., Iowa, La., Mass., Mont., N. M., N. Y., Texas, Utah, Wash., Wyo.; Ontario (Canada); Europe.

Sminthurides pseudoviolaceus sp. nov. Fig. 1.

Type Locality. Holotype and 4 paratypes from Abo Monument, W of Mountainair, Torrance Co., New Mexico; from under dung in open juniper area, 6,100 ft, 15–ix–1954. Type specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Description. Body subglobose, fused; color light purple with dark purple antennae; clothed with short to medium setae; integument smooth to granular; head hypognathous; antenna to head as 9:4; antennal segments as 5:6:9:23; Ant IV of female with about 12 indistinct subsegments, Ant IV of male modified into clasping organ; eyes 8 and 8 on dark eye patches; mouthparts chewing; thoracic segmentation evident; tibiotarsal organ present; claws tunicate; apex of female unguiculus simple; collophore smooth; furcula reaching collophore; manubrium to dens to mucro as 5:15:6; mucro untoothed, non-lamellate; Abd V–VI fused; abdominal papilla absent; anus terminal; length 0.3 mm.

Distribution. N. M.

Sminthurides pumilis (Krausbauer, 1898)

New Mexico Record. Berlese sample of walnut litter 6,900 ft, Socorro Co., Jul. 1954.

Distribution. Iowa, La., N. M., N. Y., Utah; Manitoba (Canada); Europe; Australasia.

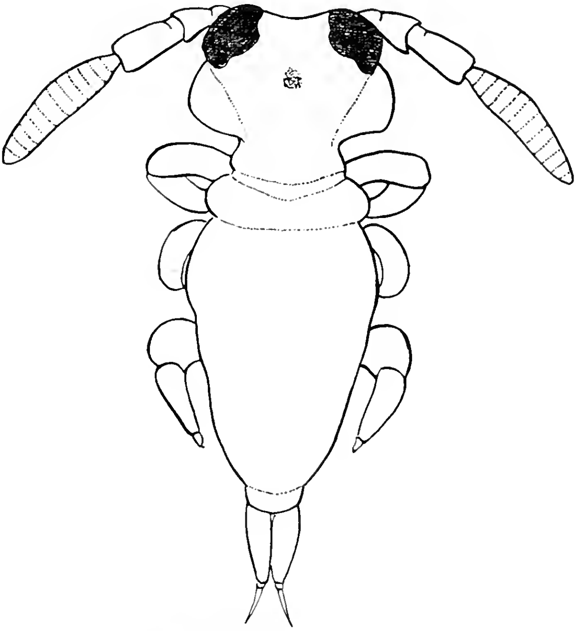

Fig. 1. *Sminthurides pseudoviolaceus* sp. nov.

Genus **SMINTHURINUS** Borner, 1901

1. Both edges of mucro smooth 2
   One edge of mucro serrate 3
   Both edges of mucro serrate 7
2. Antenna about 1.5 × head ...... **radiculus** Maynard, 1951
   Antenna about 1.2 × head .... **remotus** Folsom, 1896
3. Ventral edge of mucro curved . . **similitortus** Maynard, 1951
   Ventral edge of mucro straight 4
4. Larger part of abdomen patterned . . . **elegans** (Fitch, 1863)
   Larger part of abdomen unicolorous 5

5. General color white to yellow........................6
General color black........**minutus** (MacGillivray, 1894)
6. Dens about 3 × mucro.......**megoculatus** Maynard, 1951
Dens 2.2–2.5 × mucro..........**aureus** (Lubbock, 1862)
Dens about 2 × mucro......**latimaculosus** Maynard, 1951
7. Mucro serrate its full length..........................8
Mucro serrate on basal half only....**downsi** Maynard, 1951
8. Unguis serrate laterally..**quadrimaculatus** (Ryder, 1879)
Unguis not serrate.................................9
9. Unguis III with 3 inner teeth........................
....**niger** (Lubbock, 1868) f. **concolor** (Meinert, 1896)
Unguis III with 1–2 inner teeth......................10
10. Brown......................**brunneus** Maynard, 1951
Black......................**niger** f.p. (Lubbock, 1868)

Sminthurinus elegans (Fitch, 1863) (may = *S. bourleti* (Gervais, 1844))

New Mexico Record. Beneath bark of aspen log, 10,000 ft, Bernalillo Co., Sep. 1951.

Distribution. Ill., Iowa, Me., Mass., N. M., N. Y., Tenn., Wash.; Ontario (Canada); Europe.

Sminthurinus brunneus Maynard, 1951

New Mexico Record. Berlese sample of pine log, 7,400 ft, Torrance Co., Jul. 1952.

Distribution. N. M., N. Y.

Sminthurinus quadrimaculatus (Ryder, 1879)

New Mexico Record. Beneath bark of yellow pine stump, 6,500 ft, Catron Co., Jun. 1952.

Distribution. Fla., Ill., Iowa, Me., Mass., N. M., N. Y., Pa.

Genus **ARRHOPALITES** Borner, 1906

Key to Species of Nearctic Arrhopalites

1. Ant IV simple.....................**diversus** Mills, 1934
Ant IV subsegmented..................................**2**

2. Anal valve with minute spines.....**caecus** (Tullberg, 1871)
   Anal valve without minute spines........................3
3. Subanal appendage simple......**pygmaeus** (Wankel, 1860)
   Subanal appendage branched.....**principalis** (Stach, 1945)

Arrhopalites caecus (Tullberg, 1871)

New Mexico Record. Berlese sample of log in spruce-fir forest, 10,300 ft, Taos Co., Sep. 1953.

Distribution. Ill., Minn., N. M., N. Y., N. C., Pa.; Europe; Australasia.

Genus **KATIANNINA** Maynard and Downs, 1951

Only one species of *Katiannina* is recorded from North America.

Katiannina macgillivrayi (Banks, 1897)

New Mexico Record. Berlese sample of juniper litter, 6,700 ft, Rio Arriba Co., Sep. 1952.

Distribution. N. M., N. Y.

Summary

Nine species of Sminthuridinae (4 *Sminthurides,* 3 *Sminthurinus,* 1 *Arrhopalites,* 1 *Katiannina*) including *Sminthurides pseudoviolaceus* sp. nov., are recorded from New Mexico for the first time. No Neelinae are known from the state. Keys are presented to world subfamilies of Sminthuridae, world species of Neelinae, genera of Nearctic Sminthuridinae, and species of Nearctic *Sminthurides, Sminthurinus,* and *Arrhopalites.*

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A New Distributional Record from Idaho for Poecilotettix sanguineus Scudder. (Orthoptera)

George B. Hewitt, University of Idaho

The recorded distribution of the uncommon spurt throat grasshopper *Poecilotettix sanguineus* Scudder is of a discontinuous nature. It is known from several locations in southern and western Arizona, southern California and western Nevada. LaRivers (1948) mentions having taken this species on the northeast edge of Walker Lake in Mineral County, Nevada. This has been the northern most record of distribution.

On September 4, 1962, I collected a pair of these grasshoppers in copulation in a sandy area 13 miles southeast of Murphy, Owyhee County, Idaho (approximately 2990 feet). They were on *Chrysothamnus viscidiflorus* (Hook) Nutt which with *Tetradymia glabrata* Gray constitute the dominant plant species of the area. This collection adds another species to the list of Crytacanthacridinae for Idaho and extends its distribution northward at least 325 miles.

Notes and News in Entomology

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

Winter Stoneflies. Dr. Herbert H. Ross wishes additional records of winter stoneflies in order to correlate more securely their distribution pattern with dispersal patterns suggested by the more recent glacial ice lobes and solve problems on the ecological conditions south of the ice sheet. These stoneflies are $\frac{1}{4}$ inch in length, small, black, winged or wingless, and most frequently found running about on railings of concrete bridges over small, usually rocky, streams during the winter (January into March). Several species may occur together. Collect in alcohol and send to Dr. Ross at Illinois Natural History Survey, Urbana, Ill.

J. C. Chamberlin (1892–1962). The February, 1963, *Journal of Economic Entomology* carried the sad news of the death of Dr. Joseph Conrad Chamberlin at the age of 69. Besides his work on the Chelonethida Dr. Chamberlin was greatly interested in scale insects. One very valuable contribution, not mentioned in that obituary, is his work on the taxonomy of the lac insects. It was he who created the subfamilies Lacciferinae and Tachardininae for the true and the pseudo lac insects, and his monograph and supplement in *Bull. Ent. Res.* for 1923 and 1925 is still the best treatise on these unique insects. He also created four new genera, eight species and two forms and critically reviewed all work on the group in studies carried out during two years under the worthy guidance of Prof. G. F. Ferris at Stanford University and published by the Citrus Experiment Station of the University of California.

His name in lac entomology will be long remembered. May his soul rest in peace.—R. K. VARSHNEY, Indian Lac Research Institute, Namkum, Ranchi, (Bihar), India.

"Journal of Medical Entomology" is the name of a new journal to be published quarterly, beginning early in 1964. Its format will resemble that of the Annals of the Entomological Society of America, and annual volumes will total about 500 pages. It will publish on all phases of medical entomology and acarology, including systematics, and will welcome especially comprehensive articles up to 50 pages. Subscriptions are $10 per volume for institutions, and $7 for individuals; in Japan, 3500 Yen and 2500 Yen (payment to Bishop Museum). Office: Entomology Department, Bishop Museum, Honolulu, Hawaii, 96819, U. S. A.. It will be edited by J. L. Gressitt and a committee including J. R. Audy, D. S. Bertram, H. Hoogstraal, I. M. Mackerras, L. W. Quate, L. Rozeboom, M. Sasa, and R. Traub.

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Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (Citronella ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) **urgently required.** Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus **Ceroglossus** wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Curculionidae of the genus **Curculio** (formerly **Balaninus**) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

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Number 18

THE GENUS BUCCULATRIX IN AMERICA NORTH OF MEXICO (MICROLEPIDOPTERA)

By Annette F. Braun

208 pages of text, 45 plates, table of contents and index

This revision of the genus Bucculatrix treats all 99 species found in the area under consideration. Of this number 50 are here described as new and eight names are placed in synonymy. Three keys are provided to the species: one based upon coloration and markings, the others on male and female genital characters. Excellent illustrations of each of the species appear in the 45 plates. These not only depict morphological characteristics, but frequently the leaf mines made by various species. An outstanding feature of the monograph is the treatment of the biology of species where this is known. Included in this category are food plants, larval mines, cocoon characteristics, and period of appearance. The distribution of each species is given in full as well as a record of the material examined.

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Insects

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ENTOMOLOGICAL NEWS

VOL. LXXV MARCH, 1964 No. 3

New Exotic Crane-Flies (Tipulidae: Diptera). Part IX

CHARLES P. ALEXANDER, Amherst, Massachusetts [1]

The preceding part under this general title was published in ENTOMOLOGICAL NEWS, Vol. 75(1): 15–24. In the present paper I am continuing the study of the large and varied series of crane-flies that were taken by Dr. Fernand Schmid in various parts of India, discussing chiefly various species of the Hexatomine genus *Limnophila* Macquart that were taken in Assam and Sikkim. The types of the species are preserved in my personal collection.

Limnophila (Prionolabis) mecocera, new species.

Size medium (wing of male about 7 mm); general coloration of the entire body intensely black, subnitidous; antennae of male of unusual length, approximately two-thirds the wing, flagellar segments long-cylindrical, with abundant erect dark setae; knobs of halteres weakly infuscated; legs relatively long and slender, brownish black to black; wings brownish yellow, base clear yellow, disk with an inconspicuous pale brown pattern chiefly over the cord and outer end of cell *1st* M_2; cell M_1 lacking; male hypopygium with basal lobe of outer dististyle relatively small.

♂. Length about 5.5–6 mm; wing 7–7.5 mm; antenna about 4–4.8 mm.

Rostrum and palpi black. Antennae of male unusually long, about two-thirds the wing, black throughout; flagellar segments

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[1] Contribution from the Entomological Laboratory, University of Massachusetts.

long-cylindrical, with abundant erect dark colored setae throughout the length, the single verticil only a little longer. Head black, subnitidous; anterior vertex broad.

Thorax uniformly black, pronotum and pleura slightly more pruinose than the subnitidous mesonotum; praescutal vestiture sparse but long and conspicuous. Halteres with stem yellow, apex of knob weakly darkened. Legs relatively long and slender; coxae and trochanters black, the remainder brownish black to black. Wings brownish yellow, base light yellow; vague narrow pale brown seams at Sc_2, origin of Rs, R_2, cord and outer end of cell *1st* M_2; veins light brown, a trifle darker in the patterned areas, light yellow in the brightened parts. Venation: Sc_1 ending nearly opposite the fork of Rs, Sc_2 near its tip; R_{1+2} and R_2 subequal; cell M_1 lacking; outer medial and cubital veins gently decurved to margin; *m-cu* at or before midlength of M_{3+4}; vein *2nd A* gently sinuous.

Abdomen, including hypopygium, black. Male hypopygium with posterior border of tergite subtruncate, at midregion with two small lobes that are separated by a subequal emargination. Ninth sternite very strongly produced, margin convex, with several very long pale marginal setae. Outer dististyle slender, setiferous, at base with the usual suboval lobe that is provided with abundant setae of different sizes and a supplementary yellowed flange; inner style with the outer free portion unusually short and stout, the length about three or four times the diameter, near apex with a microscopic blackened tooth or tubercle. Gonapophysis appearing as a yellow blade, the apex triangularly dilated. Aedeagus relatively narrow, sinuous, apex beyond the subtending flange more or less decurved.

Habitat. INDIA (Sikkim). *Holotype:* ♂, Bakkim, 6,890 feet, April 12, 1959 (Fernand Schmid). *Paratopotypes:* 16 ♂♂, with the type.

Limnophila (*Prionolabis*) *mecocera* is generally similar to other regional species, including *L.* (*P.*) *coracina* Alexander and *L.* (*P.*) *fletcheri* Senior-White, differing evidently in the unusually long antennae of the male and in slight differences in the hypopygium.

Limnophila pectinifera, new species.

Size medium (wing of female about 9 mm); general coloration of mesonotum brownish yellow, praescutal stripes slightly darker, pleura dark brown; antennae with scape dark brown, pedicel and flagellum light yellow; prothorax very small, mesonotal praescutum projecting cephalad; wings strongly infuscated, prearcular and costal fields more yellowed; a restricted dark brown pattern that includes the elongate stigma; medial branches pectinate, basal section of vein M_3 lacking.

♀. Length about 10–11 mm; wing 8–9 mm.

Rostrum and palpi brownish black. Antennae with scape dark brown, pedicel and flagellum light yellow, only the outer three or four segments more infuscated. First flagellar segment narrowed at base, dilated outwardly, succeeding segments lengthened, the outer ones more elongate, exceeding their verticils; terminal segment longer than the penultimate. Head brown, darker medially above; anterior vertex more than three times the diameter of scape.

Prothorax very small, dark brown. Mesonotal praescutum projecting cephalad to approach the posterior border of head, brownish yellow, with four slightly darker brown stripes; posterior sclerites of notum dark brown, sparsely yellow pollinose, more distinct on anterior mediotergite and posterior border of scutellum. Pleura and postnotum dark brown. Halteres dark brown, knobs more yellowed. Legs with coxae and trochanters dark brown, the former elongate; femora obscure yellow, the outer third infuscated; tibiae and tarsi brownish black; tibial spurs small. Wings strongly infuscated, the prearcular and costal fields more yellowed, this color continued outwardly to the wing tip; a restricted dark brown pattern, including the small elongate stigma and a smaller darkening at origin of *Rs;* further darkenings include the cord, arculus, both outer medial forks and as tiny spots at ends of outer medial veins; veins yellow, brownish black in the patterned areas. Longitudinal veins of outer four-fifth of wing with trichia, including all of *1st A* and the outer fifth or sixth of *2nd A*. Venation: Sc_1 ending opposite fork of *Rs*, Sc_2 near its tip; R_{1+2} and R_2

subequal, *Rs* elongate; outer medial branches appearing pectinate, cell M_2 being open by the atrophy of basal section of M_3; *m-cu* at or just beyond the fork of *M*. In the holotype the left wing has an adventitious crossvein at basal fourth of cell R_4 and a very weak remnant of the basal section of M_3, the remaining wings of both available specimens normal.

Abdomen medium brown. Ovipositor with basal half of cerci darkened, the apices light yellow.

Habitat. INDIA (Assam). *Holotype:* ♀, Tairenpokpi, Manipur, 4,000 feet, May 31, 1960 (Fernand Schmid). *Paratopotype:* ♀.

The venation of this fly suggests that of certain species in the subgenus *Phylidorea,* such as the European *Limnophila* (*Phylidorea*) *aperta* Verrall, but the body structure indicates that actually the two flies are quite distinct. Attention is called to the anteriorly projecting mesonotal praescutum, suggesting the condition found in the genus *Conosia* van der Wulp.

Limnophila iota, new species.

Size very small (wing of male 4.2 mm); mesonotal praescutum brownish yellow, patterned with dark brown, the posterior sclerites and pleura dark brown; outer flagellar segments of antennae with long verticils; femora yellow, the tips narrowly brownish black; wings whitish with a conspicuous spotted and dotted brown pattern; vein R_{2+3+4} greatly reduced to lacking; male hypopygium with the outer dististyle setiferous, at apex extended into a slender spine; gonapophysis appearing as a slender curved rod, the outer margin with two or three small appressed spinules.

♂. Length about 5 mm; wing 4.2 mm; antenna about 0.7 mm.

Rostrum and palpi black, the latter short. Antennae with scape black, pedicel brown, flagellum light brown; flagellar segments suboval, verticils conspicuous, those of outer segments very long, nearly three times the segments; terminal segment elongate, with about four very long subapical setae. Head light brown with a broad darker brown central stripe; setae porrect, their punctures blackened; anterior vertex broad, about five times the diameter of scape; eyes large, ommatidia conspicuous.

Pronotum large, obscure brownish yellow, scutum with three brown spots. Mesonotal praescutum brownish yellow, patterned with dark brown, including two narrow intermediate and broader sublateral stripes, lateral margin darkened; pseudosutural foveae large and conspicuous, broadly oval, black; scutum brownish yellow, lobes patterned with dark brown; scutellum and postnotum darker brown, pleurotergite darker. Pleura dark brown to brownish black, dorsopleural region paler. Halteres weakly darkened, base of stem narrowly obscure yellow. Legs with coxae brownish black; trochanters testaceous yellow, with a darkened spot beneath; femora yellow, tips narrowly but conspicuously brownish black; tibiae and tarsi entirely light yellow; vestiture of legs relatively short, on femora slightly exceeding the diameter of the segment, the outer ones longer. Wings whitened, with a conspicuous brown spotted and dotted pattern; larger areas at origin of *Rs* and on anterior cord, the latter expanded cephalad over the forks of *Sc* and R_{2+3+4} to costa; areas at arculus, R_3 and R_4 relatively large; elsewhere with still smaller areas in all cells, including marginal spots, cell *C* with about a dozen such marks; veins yellow, very slightly darker in the patterned areas. Longitudinal veins beyond cord with small macrotrichia. Venation: Sc_1 ending just before fork of *Rs*, Sc_2 near its tip; *Rs* long, angulated at origin; R_{2+3+4} punctiform to virtually lacking, R_2 not apparent; cell M_1 subequal to or shorter than its petiole; *m-cu* at near two-thirds M_{3+4}.

Abdomen, including hypopygium, dark brown. Male hypopygium with the tergal lobes broadly obtuse. Basistyle simple. Dististyles terminal, distal fourth of outer style narrowed into a slender spine, surface with a few strong setae; inner style narrowed to the pale obtuse tip. Phallosome with gonapophyses appearing as slender curved rods, narrowed to the acute tips, outer margin with a few small appressed spinules; aedeagus relatively short, straight.

Habitat. INDIA (Assam). *Holotype:* ♂, Telca, Cachar District, 62 feet, May 15, 1960 (Fernand Schmid).

Limnophila iota is the smallest member of a group of Oriental species that is most nearly allied to *Limnophila adicia,* new species, from which it is told most readily by the size, all details of coloration of the body and wings, and the hypopygial structure, particularly the dististyles and phallosome.

Limnophila adicia, new species.

Size medium (wing of male 7 mm); general coloration of mesonotal praescutum brownish yellow, with darker brown stripes; antennae with scape and pedicel intensely black, flagellum obscure yellow, basal segments very short and crowded; legs yellow, femoral tips abruptly black; wings light yellow with a conspicuous brown spotted and dotted brown pattern; *Rs* very long, R_{2+3+4} about two-thirds the basal section of R_5, cell M_1 approximately one-half its petiole; male hypopygium with outer dististyle narrowed gradually to the acute tip; tergal lobes pointed, tips narrowly obtuse.

♂. Length about 8 mm; wing 7 mm; antenna about 1 mm. Rostrum and palpi black, the former small. Antennae with scape and pedicel intensely black, flagellum obscure yellow; proximal five flagellar segments very short, subglobular, succeeding segments longer, with increasingly elongate verticils. Head brown, with a sparse yellow pollen, most evident on the orbits; vertex with a conspicuous darker brown central stripe that is expanded on anterior vertex, with an anterior spur, on posterior vertex more narrowed.

Pronotum large, brown, sparsely pollinose, with conspicuous erect setae. Mesonotal praescutum brownish yellow with four dark brown stripes, the intermediate pair widely separated in front, confluent behind, with indications of a further median vitta, the sublateral stripes and margins brown; pseudosutural foveae black; scutum brownish yellow, each lobe with two dark brown areas; scutellum gray with a central brown line that extends cephalad on the scutum; postnotum dark brown. Pleura dark brown with a longitudinal black stripe on ventral anepisternum and pteropleurite. Halteres yellow, apex of knob weakly darkened. Legs with coxae and trochanters brownish black; femora yellow, tips abruptly and conspicuously black; tibiae yellow, the tips very narrowly brown; tarsi yellow, apices of individual segments darkened, terminal one uniformly brown; claws very long and slender. Wings light yellow, somewhat more saturated at base; a conspicuous dark brown pattern, including sparse spots and very abundant brown dots in all cells, including *Sc;* the larger spots are at origin of *Rs,* anterior cord, and tips of veins R_3 and R_4; smaller brown marginal spots on veins, largest on *2nd A;* brown dots paler brown, generally subcircular in outline; veins yellow, darker in the patterned areas, including costa. Costal fringe relatively long; longitudinal veins beyond general level of cord with macrotrichia, lacking on *Sc* and all veins basad of cord. Venation: *Rs* very long, subequal to R_4; R_{2+3+4} about two-thirds the basal section of R_5; cell M_1 approximately one-half its petiole; *m-cu* at two-thirds M_{3+4}.

Abdomen, including hypopygium, brownish black. Male hypopygium with posterior border of tergite broadly emarginate, the lobes pointed with narrowly obtuse tips. Basistyle with the interbase a flattened dark blade that is expanded outwardly. Outer dististyle gently curved, narrowed gradually to the acute tip, the surface with long setae; inner style nearly as long, narrowed to the obtuse tip. Aedeagus slender, longer than the simple curved gonapophyses, the latter acute at tips, outer third with coarse appressed teeth.

Habitat. INDIA (Assam). *Holotype:* ♂, Leimatak, Manipur, 1,300 feet, May 30, 1960 (Fernand Schmid).

The most similar regional species is *Limnophila iota,* new species, which differs in the small size, coloration of the body, legs and wings, the venation, and especially in the details of structure of the male hypopygium.

Limnophila (Afrolimnophila) bicoloripes, new species.

General coloration of praescutum medium brown, the posterior notal sclerites and the pleura darker brown; legs conspicuously hairy, femora medium brown, tips narrowly yellowed, tibiae and tarsi yellow; wings whitened, heavily patterned with dark brown, cell *C* yellow with a few narrow transverse dark brown dashes that are much narrower than the ground interspaces, cell *Sc* uniformly yellow.

♀. Length about 8 mm; wing 7 mm.

Rostrum, palpi and antennae black; scape elongate; flagellar segments long, subequal to their verticils, with additional dense white pubescence (terminal segments broken). Head dark brown, sparsely pruinose; anterior vertex broad, nearly five times the diameter of scape.

Pronotum and pretergites testaceous yellow, darkened beneath. Mesonotal praescutum almost uniformly medium brown, the interspaces very poorly differentiated as slightly darker lines; posterior sclerites of notum darker brown. Pleura dark brown, the dorsopleural membrane slightly paler brown. Halteres short, stem dusky, knob large, dark brown. Legs with coxae dark brown; trochanters obscure yellow; femora medium brown, tips narrowly yellowed, tibiae and tarsi light yellow (hind legs broken); femora with long black setae, tibiae and basitarsi with similar yellow bristles. Wings with the restricted ground whitened, cells *C* and *Sc* light yellow, including the veins; cell *Sc* unmarked; remainder of disk with a very heavy brown pattern, heavily concentrated to virtually solid in outer radial field, elsewhere subequal in extent to the ground interspaces, with larger spots at origin of *Rs,* cord, tip of *2nd A* and at near two-thirds the length of cell *M;* the smaller areas more transverse in the cells before cord, small and dotlike in cell R_1 and beyond cord; veins obscure yellow, darkened in the patterned areas, costa beyond the stigma alternately yellow and dark brown. Longitudinal veins beyond cord with abundant macrotrichia, lacking on *Sc* and the veins basad of cord, small and inconspicuous on *R.* Venation: *Sc* long, Sc_1 ending about opposite one-third R_{2+3+4}, Sc_2 near its tip; *Rs* long; R_{2+3+4} subequal to R_{2+3}, the latter feebly angulated at origin; R_{1+2} and R_2 subequal; cell M_1 about twice its petiole; *m-cu* at near one-fourth to one-fifth M_{3+4}.

Abdomen dark brown. Ovipositor with cerci very slender, horn yellow, the outer half gently upcurved to the acute tip; hypovalvae long and slender.

Habitat. INDIA (Assam). *Holotype:* ♀, Mapum, Manipur, 5,000 feet, June 12, 1960 (Fernand Schmid).

The most similar species is *Limnophila* (*Afrolimnophila*) *raoana* Alexander, of western peninsular India (Bombay Presidency to the Nilgiri Hills), readily told by the wing pattern. It should be noted that in this latter species only the fore and middle femora are blackened, the posterior legs being uniformly yellow. It appears probable that a comparable condition will be found in the present fly. Also the wings of the male presumably will be found to be much broader than in the female as figured, such a condition being found in *raoana*.

Elephantomyia (Elephantomyia) carbo sikkimensis, new subspecies.

Elephantomyia (*Elephantomyia*) *carbo* Alexander; Philippine Jour. Sci., 66: 326–327; 1938.

The specimens of typical *carbo* were from Mount Omei, Szechwan, China, taken at 9,000 feet, June 12, 1937, by Tsen.

♂. Length, excluding rostrum, 6.5–8 mm; wing 8–9.5 mm; rostrum about 5–6.2 mm.

General coloration black; head dark gray; halteres pale yellow; legs black, femoral bases broadly yellow, tarsi paling to yellow; wings yellow, heavily patterned with brown, including a broad seam at cord.

I am placing the present fly as a subspecies of *carbo* but it may well prove to represent a valid species. It differs from *carbo* in the larger size and conspicuously longer rostrum. Thorax dull brownish black. Abdomen brownish yellow, with a subterminal blackened ring, involving segments six to nine, the remainder of hypopygium yellow.

♂. Length, excluding rostrum, 6.5–10 mm; wing 8.5–11 mm; rostrum about 8.5–10 mm.

♀. Length, excluding rostrum, 8.5–11 mm; wing 8.5–11 mm; rostrum about 8–9 mm.

Habitat. INDIA (Sikkim). *Holotype:* ♂, Yedang, 10,600 feet, in *Rhododendron* association, June 9, 1959 (Fernand Schmid). *Allotopotype:* ♀, with the type. *Paratopotypes:* ♂♀, June 9–10, 1959. *Paratypes:* ♂♀, Bichu, 8,000–8,500 feet, July 14, 1959; ♂♀, Chachu, 11,500 feet, June 28–29, 1959; ♂♀, Chumzomoi Choka, 11,800 feet, in *Rhododendron* association, July 8, 1959; ♂♀, Kalep, 12,100 feet, in *Rhododendron* association, June 18, 1959; Phune Kongma, 11,150 feet, June 30, 1959; ♂♀, Shingba, 10,400 feet, June 30, 1959; ♂♀, Tsomgo, 12,500 feet, in *Rhododendron* association, August 26, 1959; ♂♀, Yagtang, 11,650 feet, in *Rhododendron* association, June 17, 1959; ♂♀, Zema, 8,900–9,100 feet, June 11–14, 1959 (all Fernand Schmid).

A New American Genus in the Chilopod Family Himantariidae

RALPH V. CHAMBERLIN

A beautiful geophilid from Chiapas, Mexico, kindly presented to me by Dr. Nell B. Causey, represents a new genus and species in the Himantariidae. In this family it falls in the tribe Himantariini of Attems. From the other genera of this group it is widely distinct in the possession of the following combination of characters: ventral pores not in definitely limited areas; no coxal pores on last legs; telopodite of anal legs consisting of only five articles.

CAUSERIUM, new genus

Head much wider than long. Antennae thick, subcontiguous at base.

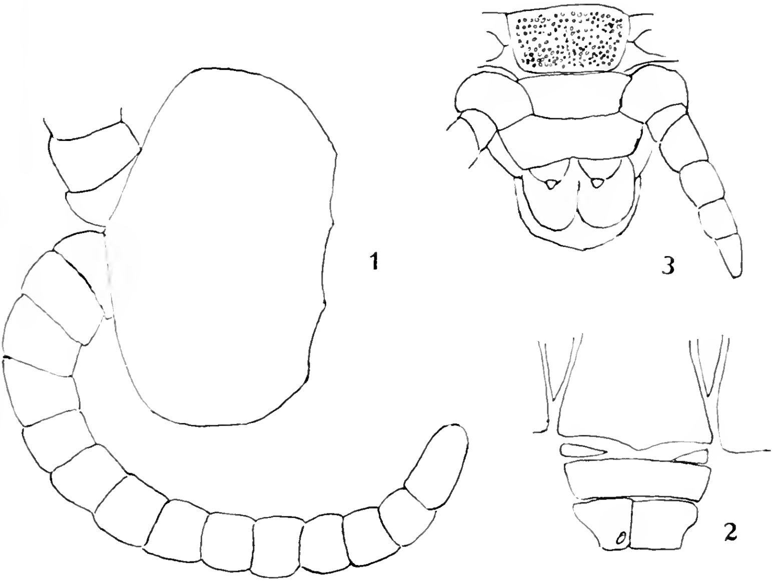
Labrum moderately incurved, its free margin finely denticulate throughout. Mandibles stout, typically bearing five stout, conical teeth. First maxillae with syncoxite divided by a longitudinal median line; telopodite with a stout lappet on ectal side. Second maxillae with anterior border of coxosternum showing the usual v-shaped median excision; claw of telopodite short and smooth.

Prehensors with claw and other joints of telopodite edentate.

Prosternum with anterior margin smooth, bearing neither nodules nor teeth; postcondylic sclerotic line or raphe present and complete, or very nearly so.

Tergites smooth, not bisulcate. The intertergites very short, each pointed at each lateral end. Paratergites in most segments in two series, the lower or principal tergite large, typically as long as the corresponding tergite and completely separating off the united spiracular and prescuttelar sclerites; above this large paratergite typically two others, one between each end of the principal plate and the tergite. Preparatergites proper apparently absent.

Sternites from first to penult bearing numerous ventral pores which are distributed rather loosely over the entire surface not in definite or clearly defined areas.



Causerium tuxtlanum sp. n.

FIG. 1. Dorsal view of head. FIG. 2. Paratergites and adjacent sclerites. FIG. 3. Caudal end, ventral view.

Spiracles all elliptic.

The last ventral plate broad; the adjacent coxae of last legs lacking glands and pores. Between the coxae and the last intertergite no definite pleurite. Telopodite of last legs composed of five articles, the last of which bears no claw.

Type species - - *Causerium tuxtlanum*, new species

Causerium tuxtlanum, new species

Head much broader than long (4:3) anterior margin obtusely angular, the posterior margin weakly arcuate. Antennae moderately long, thick, the basal joints much swollen, contiguous at base.

Labrum widely and moderately concave, the free margin finely denticulate, mandible and first maxillae as given in the generic diagnosis; the coxosternum of the second maxillae completely fused posteriorly, acutely notched in middle anteriorly; the claw of the palpus somewhat spoon-shaped, the article proximad of the claw bearing numerous setae.

Prosternum of prehensors unarmed, the post-condylic sclerotic line (raphe) strongly developed, ending at or a little caudolaterad of the condyle.

Ventral pores numerous; present on all sternites from the first to the penult inclusive. The pores not in any sharply defined submedian area as usual in related genera. Pores on first sternite, however, relatively few but becoming rapidly more numerous on the following sternites and these distributed over the entire sternite, and sometimes somewhat more condensed at the corners and posteriorly.

Tergites in part finely granular, not definitely bisulcate. The intertergites narrow, acutely pointed at each lateral end. Paratergites and adjacent sclerites as shown in FIG 2.

Last ventral plate much wider than long, its anterior margin longer than the posterior. Adjacent coxae without evident glands or pores. Anal legs composed of fine articles distad of the coxa; clawless. See further FIG. 3.

Pairs of legs, circa 95.

Length, 92 mm.

Locality—MEXICO: Chiapas, vicinity of Tuxtla. One specimen collected by Miguel Alvarez del Toro in 1955.

A New Species of Mallophaga from the Black-billed Cuckoo

K. C. Emerson

The genus *Cuculicola* Clay and Meinertzhagen, 1938, is found only on genera of Cuculidae. *Cuculicola splendidus* (Kellogg, 1899) found on *Geococcyx californianus* (Lesson), the Roadrunner, is fairly common in collections. Recently, a series from the Black-billed Cuckoo was examined, which apparently represent a second species of the genus to be found in North America. This species is herewith described and illustrated.

Cuculicola erythropthalmus n. sp.

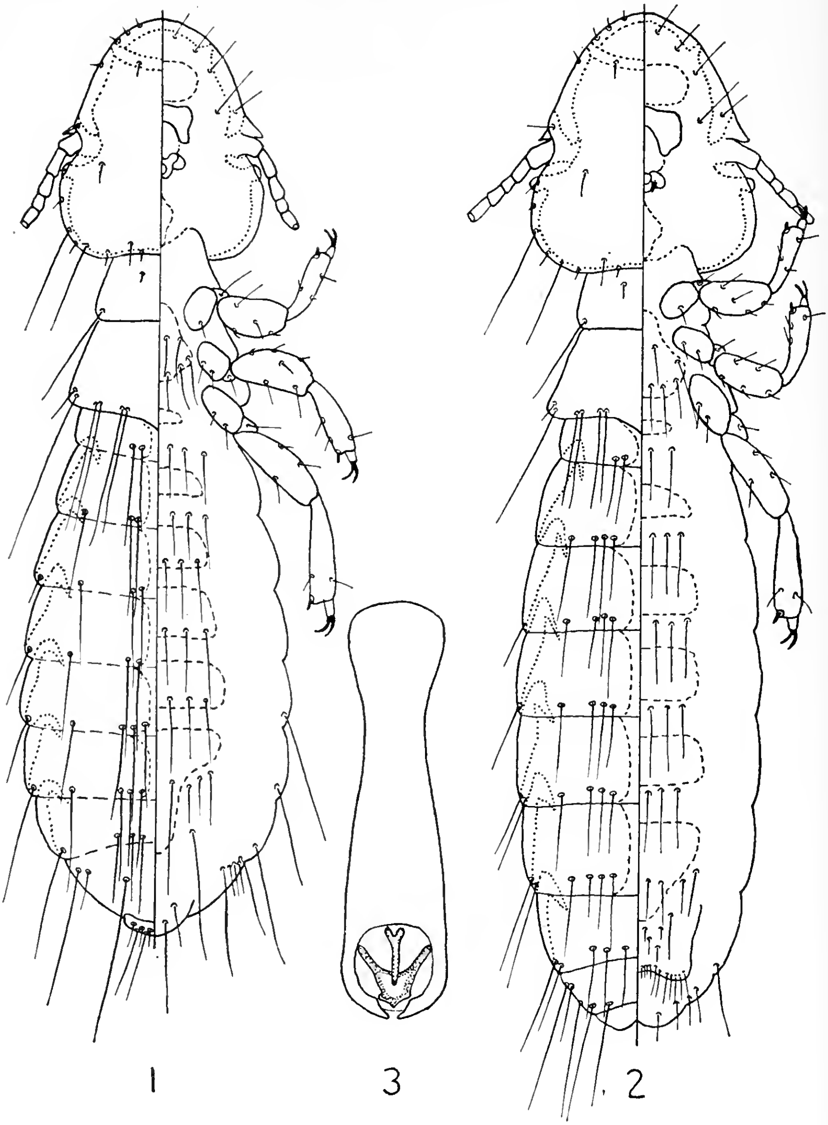
Holotype male. General shape as shown in Figure 1. Head circumfasciate. Forehead with a preantennal dorsal curved transverse suture. Abdomen narrow and elongate. Abdominal tergites weakly pigmented, with segments II–VII divided medianly. Abdominal sternites weakly pigmented and undivided. Thoracic sternal plate prominent. Pleurites narrow with reentrant heads. Chaetotaxy as shown in Figure 1. Genitalia as shown in Figure 3. Total length 1.74 mm.

Allotype female. General shape as shown in Figure 2. Chaetotaxy, shown in Figure 2, is essentially the same as in the male except for the terminal abdominal segments. Abdominal tergites II–VII divided and pigmented as in the male. Abdominal sternites and pleurites essentially as in the male. Total length 2.02 mm.

Type host. *Coccyzus erythropthalmus* (Wilson). Black-billed Cuckoo.

Type material. Holotype male, allotype female and seven paratypes collected on May 20, 1928 at Miami, FLORIDA. Holotype and allotype have been deposited in the U. S. N. M. Paratypes in collections of the author, and the University of Minnesota.

Discussion. *Cuculicola splendidus* is large, robust, and with ovate abdomen. *C. erythropthalmus* is slender and elongate. Abdominal tergites II–VIII divided medianly, and the heavily



Figs. 1–3. *Cuculicola erythropthalmus* n. sp. 1. Dorsal-ventral view of the male. 2. Dorsal-ventral view of the female. 3. Male genitalia. Figs. 1 and 2 drawn to the same scale.

pigmented portions are narrow in *C. splendidus*. In *C. erythropthalmus* abdominal tergites II–VII are divided medianly; due to light pigmentation and width of the lateral portions, the tergites appear almost entire.

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A New Species of Folsomides (Collembola: Entomobryidae.) from Louisiana

H. RANDOLPH HEPBURN and J. PORTER WOODRING*

Folsomides anophthalamis sp. nov. FIGURE 1

TYPE LOCALITY. *Holotype* and *7 paratypes* were collected from the bole of a Live Oak (*Quercus virginiana* Mill.) on the campus of Louisiana State University, Baton Rouge, East Baton Rouge Parish, LOUISIANA, on August 10, 1963. The type specimens will be deposited with the United States National Museum, Washington, D. C.

DESCRIPTION. Body white; elongate, subcylindrical. Ankylosis absent. Prothorax well-developed, dorsally asetate. Abd IV slightly longer than Abd III. Anus caudal, not ventral. Head prognathous; mandibular molar surface present and well-developed. Eyes absent. Post-antennal organ typically isotomine; thickened, subelliptical, as long as width of Ant I; 3 posterio-marginal setae. Antennae inserted cephalad; the relative length of the antennameres 2 : 3 : 3 : 5. Sense organ of Ant III composed of a pair of papillae. Unguiculus present but reduced; setiform. Tenent hairs absent. Collophore apically divided hemispherically. Furcula present but small; the mucrodens 2/3 the manubrium; mucro bidentate, confluent with the

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dens. Anal spines absent. Clothing of short, simple setae. Bothiotricha absent. Total length approximately 1 mm.

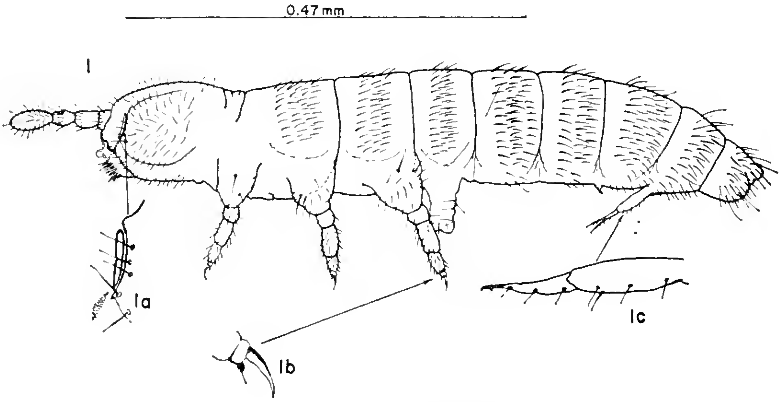

Fig. 1. *Folsomides anophthalamis* sp. nov.

Discussion. The relationship of this species to other *Folsomides* is uncertain because of the absence of eyes; however, the general morphology most closely approximates that of *F. parvus* Folsom. This species may be distinguished from all other members of *Folsomides* by (1) the absence of eyes; (2) the absence of any cephalic pigmentation; (3) the presence of 3 posterio-marginal setae on the post-antennal organ, Fig. 1a; (4) the slender setiform nature of the unguiculus, Fig. 1b. This new species has not been included in the recent checklist of the Collembola of Louisiana by Hepburn & Woodring, 1963.

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The Bee Genus Xenopanurgus (Hymenoptera, Andrenidae)[1]

ALVIN F. SHINN

The only known species of *Xenopanurgus*, *X. readioi* Michener, was described from a unique male taken in the Huachuca Mountains of Arizona (Michener, 1952). The collection of six additional males and two females by University of Kansas Mexican Entomological Expeditions in 1954 and 1962 permits amplification of our knowledge of the genus. I am grateful to Dr. Charles D. Michener for the loan of and permission to describe these specimens.

Measurements given in ocular micrometer units were made at 45× magnification with a Bausch & Lomb StereoZoom microscope: each unit is equal to 0.017 mm. Certain measurements were made as follows: *eye width,* between sides of an eye at their junctions with head capsule; *interantennal,* between inner rims of antennal sockets; *ocellocular,* shortest distance posterior ocellus to eye margin; *interocellar,* rim to rim between posterior ocelli; *clypeocellar,* ventral rim median ocellus to frontoclypeal suture; *antennocellar,* ventral rim median ocellus to ventral rim antennal socket; *antennoclypeal,* between a line joining ventral rims of antennal sockets and a parallel line through uppermost point of frontoclypeal suture. The word "distance" is omitted after the above terms to save space. Measurements are the average of all specimens; holotype measurements are within parentheses.

XENOPANURGUS Michener

The female runs directly to *Perdita* in the artificial key to genera of bees (Michener, 1944) and to the vicinity of *Calliopsis* and *Hypomacrotera* in the key to North American Panurgini (*op. cit.*). It differs from these genera in the long marginal and second submarginal cells and the combination of metallic colora-

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[1] Contribution Number 1190 from the Department of Entomology of the University of Kansas, Lawrence, Kansas.

tion with lack of yellow or lighter colored areas on thorax and metasoma.

The female agrees with the generic diagnosis based upon the male except as noted below: Body black and metallic green and brassy tints, especially on face, disc of thorax, and metasomal terga. Clypeus without deep emargination of male, paraocular areas not tumid, and outer surface of antennal scape almost normal. First labial palpomere distinctly longer than remaining ones taken together, 39:30. Distance from base of vein *r* of forewing to base of pterostigma considerably less than twice length of prestigma 29:18. Distinct labral and pygidial plates present though absent in the male.

Xenopanurgus readioi Michener

Female: Length 9.3 mm; forewing length including tegula 7.67 mm; widths head, thorax, abdomen, 2.38, 2.71, 2.65 mm; ratio head length to head width 0.79, 121:153.

HEAD. Color black with brassy and metallic greenish tints except clypeus, labrum, facial foveae, antennae, mouthparts, and genal areas which lack such metallic luster. Punctation absent on labral plate, facial foveae, hypostoma. Punctures small, densest on vertex and separated by less than a puncture width with interspaces roughened and dull. Paraocular areas between antennal sockets and facial foveae and below with punctures generally larger than those of lower subantennal areas, but with a line of very fine punctures along the outer subantennal suture. Clypeal punctation less dense than previous areas, punctures shallow, large, and sparse on the median area becoming deeper, smaller, and closer along frontoclypeal suture and on lateral areas. Paraocular areas differ from male in not being tumid and in lacking the dorsoventral furrow which arises on outer subantennal suture of male. Head dimensions and ratios: eye length slightly less than twice width, 83:44, and less than minimum interocular, 83:96; inner orbits parallel; interantennal twice width median ocellus, 21:10.5; interocellar, antennoclypeal, length inner subantennal suture, maximum width subantennal plate, all subequal, 19; maximum distance between outer subantennal sutures three times length inner subantennal suture, less than three times minimum distance between inner subantennal sutures, and subequal to clypeocellar, 61:19:60; antennocellar one-third longer than ocellocular, one-half longer than antennocular, 43:32:28; clypeal width 2.5 times length, 102:41; clypeal apex 9 units below line joining ventral margins of orbits. Lengths of paraglossae, first labial palpomere, remaining palpomeres as 32:39:30. Galeae in repose extend more than half way to base of prementum. Scape, pedicel, first four flagellomeres black, others brown. Lengths scape, first, second, and last flagellomeres as 35:21:9:23. Length pedicel 1.6 times width, 12:9. Frontal line a narrow, shallow sulcus.

MESOSOMA. Strong brassy-green coloration on pronotal collar and mesoscutum; faint metallic bluish-green on mesoscutellum; faint metallic green elsewhere. Legs non-metallic, brownish-black. Ratio of mesoscutum: mesoscutellum as 94:39. Horizontal portion of propodeum and pronotal lobes as in male. Punctation of mesoscutum, mesoscutellum, and metanotum as in male, but mesoscutellar and metanotal punctures more distinct on a duller ground, and metanotal punctures much shallower than those of mesoscutellum. Remainder of propodeum and sides of thorax as in male, but punctures more distinct on a duller ground. Front and middle basitarsi each shorter than their own remaining tarsomeres, but hind basitarsus about one-third longer than its remaining tarsomeres. Front and middle distitarsi equal in length, shorter than hind distitarsus. Basitibial plate with appressed, stiff black setae on all but its apical fifth. Tibial spurs pale amber. Mesotibial spur long, subequal to length of middle basitarsus with setae becoming heavier and more widely spaced towards apex. Claws brown, much lighter than the brownish-black distitarsi. Forewing veins basal to stigma dark brown, stigma light brown, veins apical to basal vein and prestigma lighter brown. Hind wing with 9 hamuli, veins tan. Wings smoky apically as in male. Length of marginal cell subequal to distance from its tip to tip of wing. Length hind wing, 5.70 mm.

METASOMA. Metasomal terga 1 to 4 with posterior margins broadly depressed, impunctate, minutely tesselate, similar to male. Terga 1 to 4 with very sparse white hairs, tergum 5 with prepygidial fimbria of long decumbent dark brown hairs. Tergum 6 with dull, clearly defined pygidial plate bearing a longitudinal, rounded ridge. Pygidial fimbria of tergum 6 with hairs similar to prepygidial fimbria, but shorter. Punctation of terga as in male, with minute roughening of terga 2 to 4 more distinct basally. Lateral foveae of tergum 2 dull black, impunctate, ovoid. Terga without the dorsal arching of male, but tergum 3 with some bowing dorsally.

Male: Length 9.8 mm; forewing length including tegula 7.60 mm; widths head, thorax, abdomen, 2.80, 2.53, 2.53 mm (2.75, 2.36, 2.33); ratio head length to head width 0.71, 118:166.

The Mexican specimens are essentially the same size as the type specimen and agree closely with the description given for the type specimen, but differ in pattern of yellow coloration of face as well as a few other items described below: Each paraocular area may have two separate patches of yellow, lower one ending in an irregular border at level of middle of subantennal area, upper one about half the area of lower one, beginning slightly below level of antennal sockets and extending to lower borders of facial foveae. Thoracic and metasomal widths greater than type. Facial foveae black, much duller than surrounding shiny areas, with a few fine punctures bearing suberect hairs. Ocellocular less than twice interocellar, 36:21 (37:18). Roughening of interspaces between punctures of mesoscutum most distinct on areas anterior, lateral, and posterior to parapsidal lines, disk of mesoscutum showing only faintest roughening at 60× magnification. Punctures of metasomal tergum 1 extend only from anterior edge of brownish depressed posterior margin to edge of anterior declivity, which is impunctate, shiny, and minutely roughened. Tibial spurs yellowish white. Male genitalia with gonocoxal apodemes not strongly inflexed or narrowing the genital foramen as in the type, and with foramen larger but similarly rectangular.

Added description which will aid in distinguishing the male of this species follows.

HEAD. Paraocular area at level of ventral margin of antennal sclerites not a smooth curve between latter position and orbit, a short, vertical furrow arising at a point three-quarters of way up on outer subantennal suture (side illumination!). Frontal line a carina. Supraclypeal elevation made by a trihedral angle with a smoothly rounded apex. Head dimensions and ratios: eye length less than twice width, 91:50, and less than minimum interocular, 91:96; inner orbits diverging below; interantennal twice width median ocellus, 22:11; interocellar greater than maximum width subantennal plate, which is greater than antennoclypeal, which equals length of inner subantennal suture, 21:18.5:15:15; maximum distance between outer subantennal sutures four times length inner subantennal suture, less than three times minimum distance between inner subantennal sutures, and subequal to clypeocellar, 61:15:58; antennocellar one-sixth longer than ocellocular, one-half longer than antennocular, 43:36:29; clypeal width more than four times length, 125:30; clypeal apex four units above line joining ventral margins of orbits; paraglossae reach to or beyond tip of galea; length first labial palpomere to remaining ones as 40:31. Labral plate absent. Antennal color as in female except a patch of yellow may occur in the cavity of dorsal surface of scape. Lengths scape, first, second, and last flagellomere as 38:25:11:21. Flagellomere 1 equal to or longer than 2 + 3. Length pedicel three-fourths width, 12:16.

MESOSOMA. Ratio mesoscutum: mesoscutellum as 79:35. Mesoscutum proportionately shorter in male than female, about one-sixth to one-fifth shorter. Hind margin of hind tibia wavy with transparent lamellae forming some of the waves. Basitibial plate shiny black. Front and middle basitarsi three-quarters as long as their respective remaining tarsomeres, hind basitarsus slightly less than one-fifth longer than remaining tarsomeres and more than half again longer than front basitarsus. Front and middle basitarsus less than half tarsal length, but hind basitarsus more than half tarsal length. Front distitarsus longer than the middle and hind distitarsi, which are subequal in length.

Hind wing with 10 hamuli. Length marginal cell less than distance from its tip to tip of wing. Length hind wing, 5.60 mm.

METASOMA. Lateral foveae of metasomal tergum 2 distinct.

Specimens are in the Snow Entomological Museum at the University of Kansas. One male, one female, 20 miles east of Toluca, Mexico, Mexico, July 31, 1954, 8,900 feet altitude, University of Kansas Mexican Expedition; five males, one female, same data except July 31, 1962. No altitudinal datum was with the male holotype, but it was taken in mountainous terrain, too. It seems safe to predict that *Xenopanurgus* occurs from the mountains of the south central border of Arizona along the eastern slope of the Sierra Madre Occidental at suitable elevations all the way to Mexico City.

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Notes on Brechmorhoga mendax (Hagen): Odonata[1]

Robert William Cruden, Department of Botany,
University of California, Berkeley

The literature pertaining to *Brechmorhoga mendax* (Hagen) gives the impression that, in the United States, this species is restricted to desert regions of the southwest. Although distributional data are sketchy, the theme is the same throughout. Hagen (1877) gives "Pecos River, Western Texas; St. Antonio, Texas." Calvert (1899) adds Baja California. Needham and Heywood (1929) say ". . . a single Sonoran species enters our southwestern border . . . Tex., Calif. . . . " Needham and Westfall (1955) reiterate the idea ". . . a genus of . . . Neotropical species . . . one of which enters our southwestern border." They add Oklahoma to the list of reported localities. Thus Smith and Pritchard (in Usinger, 1956) can state, "This large grayish species is found in desert regions from California to Texas and Oklahoma. . . ." And Musser (1961) can claim "The other southern species for which Utah now represents the northernmost limit is *Brechmorhoga mendax* Hagen." However, the above impression is at best misleading.

Kennedy (1917, p. 604–5) gives the following collection data. "Chico River, Chico, Butte County, California. On June 14 and 15 I collected on the Chico River between the city of Chico and the mouth of the canyon 5 miles east of the city. The river was shallow because of much irrigating water withdrawn. . . . The bottom was gravelly and the banks heavily shaded by brush and trees." *B. mendax* was one of the 17 species collected at this location. Kennedy gives a second site for *Brechmorhoga* (*ibid.* p. 626) "Friant, Fresno County, California." He describes the locale as ". . . a village on the San

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[1] I would like to thank the California State Division of Beaches and Parks, the personnel of Humboldt Redwoods State Park and my associates studying the ecology of the coast redwood, especially Dr. H. G. Baker, for providing the opportunity and encouragement to do the necessary collecting and observing.

Joaquin where the latter emerges from the great canyon through which it descends from the high Sierra. Here for a few miles before it reaches the level valley floor it is a swift stream 300 feet wide, from 1 to 5 feet deep, flowing over a bed of gravel."

In the summer of 1962 I collected imagoes of *B. mendax* from July 17 to August 27 at three locations on the South Fork of the Eel River near Weott, in Humboldt Redwoods State Park, Humboldt County, California. The vegetation of the area is dominated by the coast redwood, *Sequoia sempervirens* (D. Don) Endl.

The stream at the collection sites had a rocky bottom, varied from 20 to 60 feet in width and a few inches to three feet in depth. (The stream depth and width varies greatly with the season.) Although the coast redwood dominates the flora of the area, the stream, at those points where collections were made, is bordered by wide rocky beaches or sandy banks covered with a secondary growth of ash, willow, alder and herbaceous perennials.

Males were observed over the stream during the afternoon and evening. The only imagoes observed during the forenoon were hawking insects over cleared areas some distance from the stream. Over the stream the males exhibited two distinct flight patterns. The first was repeated time and again. The insect would fly slowly along the stream, turn and fly quickly to the point of origin, turn, and repeat the maneuver. Infrequently, the insect would dart away to capture a small insect, which was eaten on the wing. Except for these breaks in the pattern, the males were rarely seen more than a foot above the surface of the stream.

A second pattern was observed late in the day. The insects moved rapidly and apparently at random over the surface of the water, infrequently resting on rocks close to the water's edge. Chases and sham battles were frequent. As in the first pattern, the flight was close to the surface of the water. At all times the insects were observed over rapidly moving water.

Females were observed over the stream only while ovipositing. They flew rapidly and erratically above the stream, touching their abdomens to the water every 10 to 15 feet. Several times males were seen chasing females as the latter attempted to oviposit. No tandem or copulatory activity resulted from such encounters, as far as I could determine. One pair *in copula* was taken in the morning in a small tree a few hundred yards from the river. Ovipositing was observed both in the late forenoon and afternoon.

Several nymphal exuviae were collected. The first on a rock in the stream about two inches above the surface and the second on a branch about two and a half feet from the surface of the water.

Musser (1961) notes the occurrence of naiads of *B. mendax*, *Progomphus borealis* McLachlan and *Erptogomphus compositus* Hagen in the same stream in southwestern Utah. Kennedy (1917) reports imagoes of the first two at Chico and I have collected imagoes of the same two species near Weott. Kennedy also reports imagoes of *B. mendax* and *E. compositus* at Friant. The stream in each case is shallow with a rocky or gravelly bottom, and in California, rapidly flowing.

The "redwood population" of *B. mendax* is significant for several reasons. Firstly, it represents a northward extension of the known range of this species. Secondly, it is only the second record of this species from a habitat other than a "desert" one. Kennedy's "Chico population" can not be considered a desert population and except for the "redwood population" it represents the northernmost known limit for this species. Thirdly, knowledge of these two "populations" reveals the need for careful reevaluation of previous work and much additional study so that a better understanding of the ecology and distribution of western North American odonates may be gained.

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Review

Introduction to Comparative Entomology. **Richard M. and Jean Fox.** 1964. Reinhold Publishing Company, New York. 450 pp., many text figures. Price, $9.50.

At last a text has been written which does not treat those "non-insects," the myriapods and acrachnoids, as "inquilines in the nest of entomology." The authors of *Comparative Entomology* are to be congratulated on writing a book which integrates so well the zoological aspects of the three great classes that need to be studied together.

This book is a zoology text and it presupposes that the student has had an introductory course in biology or zoology. Treating entomology as a zoological discipline—rather than as a separated specialty—should be highly advantageous to him. Between the covers of one work he is permitted to see the zoological perspectives which are so often lost in introductory entomology courses. Insects are viewed as part of a phylum rather than as an isolated, and distantly removed group. The absence of keys and other trappings of taxonomic procedure permit the inclusion of subjects ordinarily missing from beginning entomology texts. This is not to say that taxonomy is ignored; thirteen pages are devoted to a succinct discussion of it under the heading "classification."

Comparative Entomology is primarily a comparative anatomy of the insects, myriapods, and arachnoids. This subject is treated in depth as is developmental anatomy. Important consideration is given to the evolution of each group as well as a review of its fossil history.

Approximately the first 200 pages are devoted to the morphology of the three classes being discussed. This is a good, balanced treatment and it includes some functional aspects of the structures and organ systems treated. There follows a seventy-five page treatment of early and postovarian embryogenesis which is clearly presented. The section dealing with life cycles is very well done and presents in a direct fashion material which is usually found confusing by students. A brief chapter on the principles of taxonomy is followed by more than one hundred pages devoted to a treatment of the Arthropoda. This section of the book first presents the classes making up the Phylum and their characters, a brief treatment of its origin, and the intraphyletic relationship of the classes. There follows a classification of the Arachnida with a description and discussion (ecology, distribution, size, fossil history) of each of its orders. A similar treatment of Myriapoda then is given, but the discussion does not go below subclasses. The final part of this section is devoted to the Class Insecta, with discussions down to the level of orders. In some of the larger orders (e.g., Orthoptera, Coleoptera, Lepidoptera, etc.) classification and discussion are carried to suborders and even families.

Selected topical references (to broad, general works), a list of the references cited, and an Index complete the work.

Not the least of this book's appeal is its straight forward approach to nomenclatural problems. Thus the authors have not been guilty of a too rigid use of priority in the names of higher categories, but they have used it in the majority of cases.

All-in-all, *Comparative Entomology* is a welcome addition to the academic scene.—H. J. G.

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Cockroaches (Blattoidea) of Japan, Okinawa, Formosa (Taiwan), and the Philippines are being studied in cooperation with Dr. K. Princis. Loans of specimens from that area are desired. A. B. Gurney, U. S. National Museum, Washington 25, D. C.

Orthoptera. Gryllinae (except domestic sp.) and **Pyrgomorphinae** of the world wanted in any quantity for work in morphology, taxonomy, cytology, and experimental biology; dry, or in fluid, or living. Write D. K. Kevan and R. S. Bigelow, Dept. of Entomology, McGill University, Macdonald College, Quebec, Canada.

Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (Citronella ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) **urgently required.** Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus **Ceroglossus** wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Curculionidae of the genus **Curculio** (formerly **Balaninus**) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

Membracidae wanted. Purchase or exchange. T. L. Stringfellow, Military Reservation, Box 11-A, Hudson, Massachusetts.

Insects

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A Preliminary Review of Maoriella, with Description of a New Species from the Chatham Islands.[1] (Chilopoda: Geophilomorpha: Chilenophilidae)

R. E. Crabill, Jr., Smithsonian Institution,
U. S. National Museum, Washington, D. C.

The aberrant pachymeriine genus *Maoriella* occurs in New Zealand and adjacent islands where one species is fairly common. Only two species are known outside this area, one from southeastern Australia, of questionable identity, and a probably distinct and valid one from Tahiti. *Maoriella* is basically unlike any chilenophilid genus known from any other part of the world including southern South America, which shares with Australia and New Zealand some of the same or closely similar chilenophilid genera.

The present study attempts a preliminary review of the genus. A new species from the Chatham Islands is described. Utilizing a number of new characters and based upon my recent study of the types, a new key to all but one of the known species is proposed. I have also presented what I believe to be important generic characters as well as some thoughts about the systematic position of *Maoriella*, and, finally, I have summarized the known distributions of the species. Eventually it is my plan

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[1] This study was undertaken with the aid of a grant from the National Science Foundation. I should like to express my gratitude to the following persons who have lent me specimens or welcomed me as a guest in their institutions to study the collections in their charge: Dr. H. W. Levi, Museum of Comparative Zoology, Harvard University, Cambridge; Professor Dr. Hans Strouhal, Director, and Dr. Gerhard Pretzmann, Naturhistorisches Museum, Vienna; Mr. Peter M. Johns, University of Canterbury, Christchurch, New Zealand.

to present a very detailed review of the genus, with a full description of each species and full distributional citations based upon large numbers of specimens currently being received from several sources in New Zealand.

Maoriella is of particular interest in that, although fundamentally a chilenophilid, certain of its features seem more reminiscent of the Geophilidae than of the Chilenophilidae.[2] Whether this implies evolutionary convergency or the preservation in *Maoriella* of certain stem features of the Geophilidae, from which chilenophilids appear to have been derived, cannot be determined with confidence, given existing evidence. None the less, I suspect that the evidence seems to favor the first, evolutionary convergency.

Quite clearly the cephalic plate, clypeus, phehensors, and second maxillary coxosternites with their connecting isthmus all bespeak the Chilenophilidae. The head, although not strongly elongate, is still more suggestive of the dolichocephalic chilenophilids than the brachycephalic geophilids. The clypeus has a very typical and conspicuous fenestra.[3] The prehensors, although not so massive and long as those of more typical chilenophilids, still extend far beyond the frontal margin of the head. The second maxillary isthmus is very shallow and either membranous or suturate.

On the other hand, the following features, while not entirely excluded from the Chilenophilidae, still seem more reminiscent

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[2] I depart here from the higher categorical arrangement employed by Attems in his 1929 monograph of the order (p. 157). At that time he envisaged the Geophilidae to be divisible into a number of subfamilies, among them Pachymerinae and Chilenophilinae. My present interpretation allies the latter two groups in a separate family, Chilenophilidae, which is tentatively divisible into two subfamilies, Chilenophilinae and Pachymeriinae. When Attems proposed Pachymerinae, he did not make it clear upon which genus it was based, *Pachymerium* C. L. Koch, or *Pachymerinus* Silvestri, hence the confusion in the suffixes, -iinae *versus* -inae. My suspicion is that he must have had *Pachymerium* Koch in mind, and that Pachymerinae represents a *lapsus calami.*

[3] Fenestra, a term proposed recently by R. V. Chamberlin to replace the more confusing and ambiguous "clypeal area" of authors. Objectively speaking, a number of clypeal structures could accurately be called a clypeal area.

of the Geophilidae. The pleurograms,[4] although foreshortened, are prominent and arch strongly lateroanteriorly. Furthermore, they are distinctly digressive from the obliquely arching pleuroprosternal sutures. The sternites are deeply foveate anterocentrally. The posterior porefield (or porefields) of each sternite are massively developed. The ultimate sternite is much wider than long. The coxopleural pores do not open freely; instead they are aggregated, opening into concealed subsurface cavities.

In his first important synthesis of the Geophilomorpha, Attems included *Maoriella* among the geophiline genera (1926, p. 359), but in his monograph of 1929 he relocated the genus within the Pachymerinae (p. 279). In 1936 Archey, not having seen the 1929 monograph of Attems, independently came to the same conclusion (p. 62).

MAORIELLA Attems

Maoriella Attems, 1903, p. 284.
Mesoleotodon Chamberlin, 1920, p. 47. Archey, 1936, p. 58.
Philogeonus Chamberlin, 1920, p. 48. Archey, 1936, p. 58.
Novaralius Attems, 1947, p. 59. (New Synonymy).

Type-species: *Maoriella aucklandica* Attems, 1903. (Subsequent designation of Attems, 1929, p. 279. In 1936, p. 58, Archey designed *macrostigma* as type-species, but the Attems' selection has priority).

GENERIC DIAGNOSIS

The following features taken together will distinguish the genus from all other known chilenophilid genera. Second maxillary statuminia absent. Ultimate tarsus consisting of two

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[4] Pleurogram, a new term proposed here to replace "chitin line," "Chitinleiste," and other terms of authors. Through ambiguity and imprecision of use the older terms have too often led to confusion and error. Neither do they have the advantage of linguistic neutrality conferred by classical derivation, which explains in large part why no one of them has ever been adopted universally. The pleurogram is not to be confused with the pleuroprosternal suture, the latter always coursing laterad of the former.

articles; an unguiform pretarsus present. Ventral porefields of the more anterior sternite massively developed. Ultimate pedal sternite much wider than long. Coxopleural pores opening into concealed subsurface cavities.

The following is an extended diagnostic characterization of the genus as it is now known.

CEPHALIC PLATE. Always longer than wide. CLYPEUS. Much wider than long, i.e., distance between paraclypeal sutures much greater than greatest anteroposterior distance. Anteromedially with a prominent fenestra. Prelabral plagulae absent. Paraclypeal sutures prominent and complete. LABRUM. Distinctly tripartite; the sidepieces anteriorly overlapping the small triangular midpiece and nearly contiguous. Midpiece without distinct teeth or filaments. Sidepieces with long hyaline filaments. FIRST MAXILLAE. Coxosternum without midlongitudinal division or infolding; without lappets. Each telopodite distinctly bipartite, with a robust lappet. SECOND MAXILLAE. Isthmus very shallow anteroposteriorly; midlongitudinally narrowly infolded and membranous, or membranous but not infolded, or apparently suturate, the two coxosternites thus said to be separated medially. Postmaxillary sclerites absent. Pore openings open mesally, without raised thickenings or statuminia. Telopodite: ventral condyle of first article well-developed, the dorsal condyle vestigial or essentially absent; terminal claw without filaments or serrulations, extremely long and thin. PROSTERNUM. Anterior denticles present, these vestigial and small to very long and prominent. Pleuroprosternal sutures arching lateroanteriorly and meeting or nearly meeting anterior margin. Pleurograms present but relatively short, digressive from their pleuroprosternal sutures. PREHENSOR. Anteriorly extending far beyond forward margin of head. Tarsungula and trochanteroprefemur each with a prominent denticle; intermedial articles without denticles. LEGS. Each pretarsal claw with two parungues, these short and not hypertrophied. STERNITES. Without carpophagus-structures. On anterior part of body each sternite with a deep anterocentral fovea. Anterolateral porefields present but very small and vague. Posterior porefields: On anterior part of body each sternite either with a single, uninterrupted, essentially elliptical band of pores, or this band midlongitudinally divided by a narrow sulcus to form, in effect, two pore fields; on middle and posterior parts of body each sternite (except ultimate pedal sternite) with two distinctly separated porefields. ULTIMATE PEDAL SEGMENT. Pretergite bilaterally non-fissate. Greatest width of sternite always exceeding greatest length. Coxopleuron: Not greatly inflated; without freely-opening pores, ventrally with two pore cavities, the more posterior homogenous or heterogenous, the more anterior heterogenous, anteroventrally with a third pore cavity, this heterogenous. Ultimate leg: Not inflated in females, slightly inflated in males; with two tarsal articles; pretarsus strongly unguiform. POSTPEDAL SEGMENTS. Female gonopods fused at midline, flat, low, each unipartite. Male gonopods widely separated, conical, each apparently unipartite. Anal pores prominent, lateral.

KEY TO KNOWN SPECIES OF MAORIELLA [5]

1a Clypeal setae very few in number, confined to anterocentral portion of clypeus, none lateral (FIG. 2). Prosternal denticles very long and sharply pointed or else blunt and abortive (FIG. 4) 2

1b Clypeal setae very numerous, extending across full width of anterior clypeus between paraclypeal sutures (FIG. 1). Prosternal denticles essentially absent or blunt and abortive (FIG. 3) 3

2a Prosternal denticles very long and sharply pointed. On anterior part of body each sternite with one continuous, posterior porefield. Denticle of trochanteroprefemur long, essentially as long as denticle of tarsungula. Pedal segments ca. 53–57 .... **ecdema**, sp.n.

2b Prosternal denticles short, blunt, abortive. On anterior part of body each sternite with the posterior porous area midlongitudinally divided by a narrow sulcus. Denticle of trochanteroprefemur short, much shorter than tarsungular denticle. Pedal segments ca. 41–49 .. **zelanica** (Chamberlin)

3a Pedal segments 91 (in holotype, only known specimen). On anterior part of body each sternital posterior porous area divided by a midlongitudinal sulcus .... **aucklandica** Attems

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[5] Does not include *australis* Archey, q.v.

3b Pedal segments ca. 61–65. Sternital porous areas single or double 4

4a Denticle of trochanteroprefemur very short, much shorter than that of the tarsungula. On anterior part of body each sternital porous area midlongitudinally divided by a narrow sulcus .... **macrostigma** Attems

4b Denticle of trochanteroprefemur essentially as long as that of tarsungula, both (relative to those of other species) short and blunt. On anterior part of body each sternital porous area single, without midlongitudinal sulcus .... **edentatus** (Attems)

Maoriella zelanica (Chamberlin)

Philogeonus zelanicus Chamberlin, 1920, p. 48. Archey, 1936, p. 61.

Type Locality: New Zealand, Lake Takopema (Chamberlin) = Lake Takapuna (Archey), near Auckland.

Type Deposition: Museum of Comparative Zoology, Harvard University.

Distribution: Known only from North Island, New Zealand.

Maoriella aucklandica Attems

Maoriella aucklandica Attems, 1903, p. 285.

Type Locality: New Zealand, Auckland, Bay of Islands.

Type Deposition: Naturhistorisches Museum, Vienna.

Distribution: Known only from the type-locality.

Maoriella macrostigma Attems

Maoriella macrostigma Attems, 1903, p. 284.
Mesolcotodon laetus Chamberlin, 1920, p. 47. Archey, 1936, p. 60.

Type Locality: New Zealand, North Island. Neither the original description nor Attems' specimen labels gives a more precise locality citation.

Type Deposition: Naturhistorisches Museum, Vienna.

Distribution: New Zealand, North and South Islands. "Although this species is found in hilly country inland, it is commoner near the coast, and sometimes occurs on the beaches below high water. It is the common garden centipede of Auckland." (Archey, 1936, p. 61).

Remarks: The original description was based upon four syntypes, three of which I have been able to locate in the Attems Collection at Vienna. All are clearly conspecific. One of these had been dissected by Attems, but the microscopical preparation of its mouthparts has not been found. I hereby designate the female with 63 pedal segments as the lectotype; it has been labelled accordingly.

Although the species was legitimately described as *macrostigma* originally, the specimen labels in Attems' handwriting give the name as *microstigma,* but it is clear that these are indeed the true types of *macrostigma,* and that he altered the name prior to publication.

In 1929 (p. 279) Attems distinguished between *macrostigma* and *aucklandica* as follows: "91 Beinpaare. Hinterrand des Kopfschildes eingebuchtet. Stigmen sehr klein: 1. *M. aucklandica;* 63–65 Beinpaare. Hinterrand des Kopfschildes gerade. Stigmen sehr gross: 2. *M. macrostigma.*" I have found the last two characters to be untrustworthy. The first of them seems very subtle and is in addition probably intraspecifically variable. The second is too subjective; a study of the types does not recommend its utility.

Maoriella edentatus (Attems) (New Combination)

Norvaralius edentatus Attems, 1947, p. 59.

Type Locality: Tahiti (Novara Expedition). No more specific locality than this is given in the original description or on the specimen labels.

Type Deposition: Naturhistorisches Museum, Vienna.

Distribution: Known only from the type locality.

Remarks: There is no question that the holotype is a *Maoriella.* Dr. Attems' original description of the genus and species is in error in regard to a number of important characters, which doubtless led him to create a new genus for the reception of the species.

The specimen is in very poor condition and was obviously advanced in age at the time of its capture. The prehensorial denticles, for example, seem worn, so that the very short tarsungular denticle could simply represent wear rather than the natural condition, but without other specimens for study this cannot be established confidently. I feel, however, that this represents the original condition. Apart from the very small aforementioned denticle and the undivided porefields of the anterior part of the body, *edentatus* is very similar to *macrostigma*. We cannot exclude the possibility that this specimen, though aberrant, is conspecific with *macrostigma*.

The presence of a *Maoriella* in Tahiti, separated by a vast expanse of ocean from New Zealand, is of zoogeographical and ethnological interest because of the likelihood of its having been brought there, if it is actually a *macrostigma*, by early Polynesians in their astonishing voyages of exploration and settlement. In both Tahiti and New Zealand oral traditions describe voyages made between Central Polynesia and New Zealand. It is known that these early voyagers carried vegetation and other produce in their canoes, so that the possibility of chance introduction of small arthropods in this manner by man can by no means be ruled out.

Maoriella australis Archey

Maoriella australis Archey, 1936, p. 63.

Type Locality: Australia, Victoria, Chillingollah.

Type Deposition: Australian National Museum, Melbourne.

Distribution: Known only from the type locality.

Remarks: In presenting *australis* as new, Dr. Archey compared it with *macrostigma;* however, his diagnosis is not sufficiently detailed to permit his species' being included in the present key. His species may indeed be a distinct entity, or it could be a *macrostigma*. Several other chilopod species—doubtless through introduction by man—inhabit both southeastern Australia and New Zealand.

Maoriella ecdema, sp. n.

The new species differs from the known members of the genus in its possession of very long, pointed, dark prosternal denticles, and in its very long trochanteroprefemoral denticle, which is as long as the denticle of the tarsungula. The new form seems most like *zelanica,* differing from it in a number of characters, perhaps most notably in the following:

M. ecdema: (1) Prosternal denticles very long and sharply pointed. (2) Trochanteroprefemoral denticle as long as that of tarsungula. (3) On anterior part of body each sternite with a posterior porous area that is strictly undivided. (4) Paramedial sulci of head-plate and tergites present and prominent. (5) Pedal segments ca. 53–57.

M. zelanica: (1) Prosternal denticles abortive and blunt. (2) Trochanteroprefemoral denticle much shorter than that of tarsungula. (3) On anterior part of body each sternite with posterior porous area midlongitudinally divided by a sulcus. (4) Paramedial sulci of head-plate absent or essentially so. (5) Pedal segments ca. 41–49.

Description

Holotype, female. New Zealand, Chatham Island, Port Hutt, "Under stones, high water mark"; E. W. Dawson, leg.; 8 February 1954. Deposited in the University of Canterbury Museum, Christchurch, New Zealand.

Introduction. Length, 36 mm. Pedal segments, 57. Color: Antennae and head light yellowish-brown; tergites and legs pale sordid yellow. Shape: Very slightly attenuate anteriorly and posteriorly, the rear 5–6 segments strongly attenuate.

Antennae. Length (extended in Hoyer's mountant), 5 mm. Shape: Not flattened; articles filiform; the more proximal ones very long, thereafter decreasing gradually in length. Setae gradually increasing in number and decreasing in length from first through ultimate article. Ultimate article with special hyaline short robust setae on lateral, mesal and anterior surfaces. Cephalic Plate. Length, 1.38 mm, greatest width (on anterior third) 1.08 mm. Anterior and rear margins essentially straight, sides slightly excurved, corners broadly rounded. Setae few but very long. Frontal sulcus present, joining the prominent paramedian longitudinal sulci. Prebasal plate entirely covered. CLYPEUS. Much broader than long. Paraclypeal sutures straight, wide, complete, meeting outer ends of fulcra. Anterocentrally with a prominent elliptical fenestra, this minutely punctate, not areolate. Prelabral setae absent; remaining setae occupying anterocentral part of clypeus, none lateral. LABRUM. Midpiece essentially triangular, anteriorly overlapped by the nearly contiguous medial ends of the sidepieces. Each sidepiece with long hyaline filaments, each filament basally broad and narrowing distally to a shart point. Sidepieces and fulcra separated from clypeus by a distinct suture. FIRST MAXILLAE. Coxosternum continuous centrally, without setae or lappets. Telopodite distinctly bipartite, the apical article very blunt, with a prominent lappet. SECOND MAXILLAE. Isthmus membranous centrally, i.e., in effect the two coxosternites separated. Postmaxillary sclerites and statuminia absent. Pore openings mesially open. Telopodite: First article with well-developed ventral condyle, the dorsal condyle vestigial, virtually absent; apical claw extremely long and thin. PROSTERNUM. Anterior denticles triangular, very long, sharply pointed, deeply pigmented. Pleuroprosternal sutures arching obliquely laterally, complete to anterolateral margin. Pleurograms digressive from pleuroprosternal sutures, short, not passing toward condyles. PREHENSOR. When flexed, far exceeding anterior head margin. Dorsal and ventral blade edges smooth, not serrulate. Denticles: Absent on intermedial articles; that of trochanteroprefemur essentially thumb-shaped and as long as that of ungula which is triangular and sharply pointed. Poison calyx short, with long digitiform appendices, in intermedial articles. Poison gland short, terminating in trochanteroprefemur. TERGITES. Basal plate: Anteriorly as wide as rear of headplate, posteriorly slightly narrower than first tergite; on each side of midline with a large unpigmented area. First through penult pedal tergites each bisulcate, clothed with few but long setae. SPIRACIES. The first very slightly elliptical, those remaining circular. LEGS. Relatively long and thin, with long setae. Pretarsi: Extremely long and thin, the distal half of each curved ventrad; anterior parungues much longer and more robust than posterior parun-

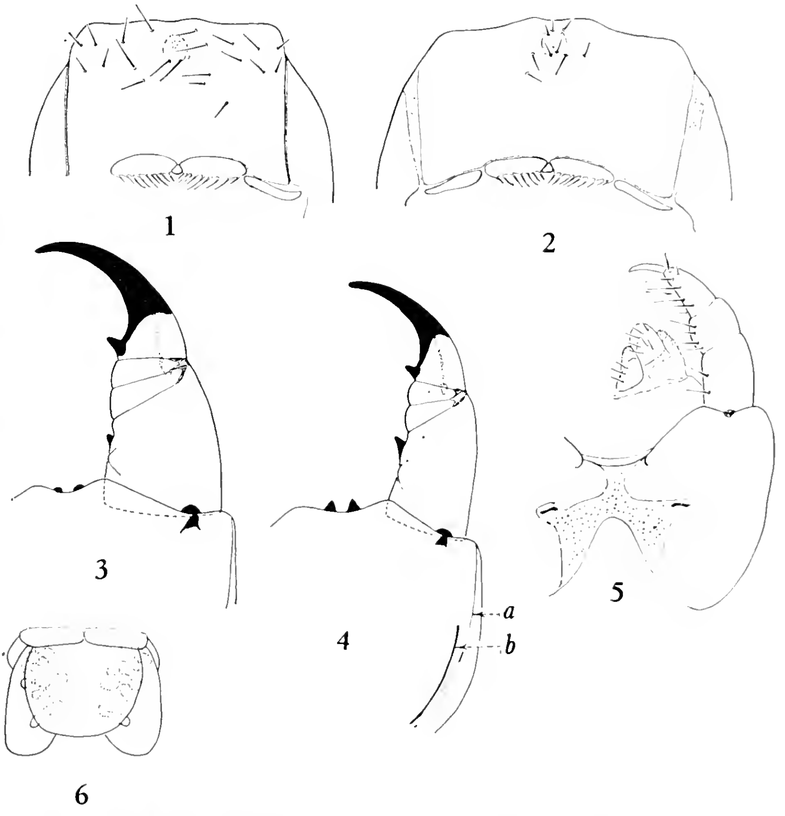

FIG. 1. *M. macrostigma* (not holotype). Clypeus and labrum; all setae shown. FIG. 2. *M. ecdema* (holotype). Clypeus and labrum; all setae shown. FIG. 3. *M. macrostigma.* Left prehensor and part of prosternum; setae deleted. FIG. 4. *M. ecdema* (holotype). Left prehensor and part of prosternum; setae deleted. a = pleuroprosternal suture. b = pleurogram. FIG. 5. *M. ecdema* (holotype). First and second maxillae; membranous, non-areolate areas stippled. FIG. 6. *M. ecdema* (holotype). Ultimate pedal segment; ventral aspect; setae deleted; concealed glandular apparatus in broken lines.

gues, the former about $\frac{1}{4}$ as long as their claws proper. STERNITES. Carpophagus-structures absent. Sternites of about anterior quarter of body each with a deep anterocentral fovea. Subcoxal porefields present on all pedal segments but the last. Anterolateral porefields represented by very few, minute pores on all but the final segments. Posterior porefields: Present on all pedal segments except the ultimate; those of segments 1–18 each single, forming a wide elliptical band, from 19 through penult each porefield divided in two, the two parts gradually becoming smaller and more separated on successive sternite posteriorly. ULTIMATE PEDAL SEGMENT. Pretergite bilaterally not fissate, i.e., fused with its pleurites. Greatest width slightly in excess of length; sides slightly excurved, posteriorly convergent; rear margin straight. Presternite centrally divided. Sternite: Greatest width greatly in excess of length; sides and rear corners rounded. Coxopleuron: Laterally not swollen; anteriorly not extending forward of rear margin of penult segment; setae very sparse; with three pore-cavities, the most posterior ventral, simple, homogeneous, the middle one ventral, with aggregated pores, heterogeneous, the anterior one ventroanterior, extending forward dorsad along margin of coxopleuron, with aggregated pores, heterogeneous. Leg: Not at all inflated; setae sparse but very long; tarsus bipartite; pretarsus strongly unguiform. POSTPEDAL SEGMENTS. Female gonopods fused at midline, each unipartite, very low and broad. Anal pores prominent, lateral, homogeneous.

PARATYPES

The two female paratypes have 55 and 57 pedal segments. All three male paratypes have 53 pedal segments. Size range of the whole series, 31–36 mm. In general the paratypes agree closely with the holotype in all significant particulars. The males differ sexually dimorphically from the females as follows: Ultimate legs very slightly inflated, their ventral setae extremely numerous and short; gonopods widely separated, each long but apparently only unipartite.

The holotype and four of the paratypes are deposited in the University of Canterbury Museum. The fifth paratype is deposited in the myriapod collection of the U. S. National Museum.

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Distribution of the Bagworm in Pennsylvania [1]

WINAND K. HOCK and ROBERT SNETSINGER, Department of Entomology, The Pennsylvania State University, University Park, Pennsylvania

The bagworm, *Thyridopteryx ephemeraeformis* (Haworth), Psychidae, is frequently a serious pest of ornamental plantings, i.e., arbovitae, juniper, and honey locust. The spread of this moth is considerably inhibited, because the adult females are flightless and the larvae can only swing to nearby trees on their silken threads, be carried a few miles by wind currents, or crawl a few hundred yards to a nearby tree. Probably the most important factor in the dissemination of the bagworm is the transportation of infested nursery stock into bagworm-free areas.

During the past several years, records of the distribution of the bagworm were obtained: by searching the files of the Exten-

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[1] Authorized for publication on October 10, 1963, as paper No. 2833 in the journal series of the Pennsylvania Agricultural Experiment Station.

sion Entomologists of the Pennsylvania State University; checking the collections of the Academy of Natural Sciences of Philadelphia, the Carnegie Museum in Pittsburgh, the Pennsylvania Department of Agriculture in Harrisburg, and the Department of Entomology of the Pennsylvania State University; from Tietz;[2] and by two years of collecting. Dr. J. A. Cox, Erie County Research Laboratory of the Pennsylvania State University, also made several years observations on overwintering.

The data on distribution are shown in Fig. 1. As may be seen, the bagworm is restricted to the southern half of Pennsylvania. It appears to be more abundant in the southeastern, the southwestern, and the Susquehanna Valley regions and appears to be lacking at the higher elevations in the mountains of Central Pennsylvania. The occurrence of the bagworm coincides rather closely to the Austral Faunal Zone.

During the months of July and August in 1960, 1961, and 1962, bagworms were introduced on ornamental plantings of arbovitae and juniper at State College, Centre County, and in Erie County, and an infestation of bagworms was observed at Kennett Square, Chester County. No bagworms survived in any of the three years at State College; bagworms survived during one year out of three in Erie County and during three years out of three in Chester County. Evidently the shortness of the season and the severity of the overwintering conditions associated with the northern part of the state and the higher elevations in the mountain areas prevent the bagworm from maturing and thus restrict its distribution.

Since Pennsylvania is at a northern extremity of the bagworm's range and because of the limited means of dissemination available to the bagworm, cold winters, appropriate chemical control, and rigid quarantine measurements on in-state and out-of-state shipments of nursery stock could be made use of to eradicate this pest in Pennsylvania.

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[2] TIETZ, H. M. (Undated). The Lepidoptera of Pennsylvania. The Pennsylvania State University, University Park, Pennsylvania. 1–194.

Pennsylvania Records [3]

Adams Co.: Gettysburg, VIII-62, (Pepper*); VIII-9-63, (Hewetson*); East Berlin, VIII-62, (Pepper*); Idaville, VIII-62, (Pepper*); near Heidlersburg, VI-21-63, (Hock and Lonie). Allegheny Co.: Pittsburgh, (Chermock*); near Pittsburgh, VII-7-63, (Udine*). Armstrong Co.: VIII-48, (Menusan*); IX-13-56, (Adams*). Beaver Co.: IX-13-56, (Adams*); Freedom, VIII-10-61. Bedford Co.: Everett, VII-30-63, (Hock and Lonie*). Berks Co.: Morgantown, VI-5-30, VI-10-30, VII-8-30, (Long); near Reading, VII-19-62, (Snetsinger and Hock*); Kutztown, (Gruber). Bucks Co.: Tullytown, IX-4-22, IX-6-22, IX-9-22, IX-11-22, (Haimbach); Langhorn (Haimbach); Warrington, VII-8-63, (Hock*); Neshaminy, VII-9-63, (Lonie*). Carbon Co.: Palmerton, VIII-22-63, (Hock and Lonie*). Centre Co.: Spring Mills, VI-4-17, (Trimble). Chester Co.: West Chester, X-23-16, (Thomas*): Kennett Square, VII-60-61-62, (Snetsinger*): West Chester, VII-18-62, (Snetsinger and Hock*); Phoenixville, VII-19-62, (Snetsinger and Hock*); Spring City, VII-19-62, (Snetsinger and Hock*); Toughkenamon, VII-19-62, (Snetsinger and Hock*); Kennett Square, VIII-5-63, (Hock and Lonie*).

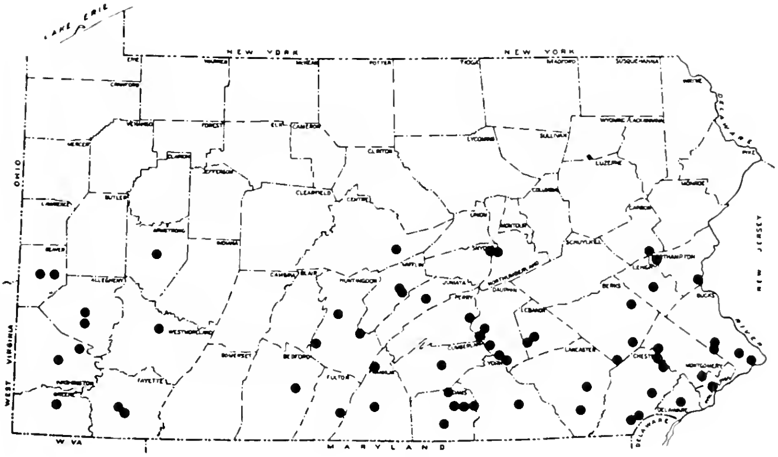

Fig. 1. Distribution of the bagworm in Pennsylvania.

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[3] All Collections after 1900.

CUMBERLAND Co.: IV-18-62 (Udine*). DAUPHIN Co.: Harrisburg, VIII-30-21, IX-15-21, IX-25-23, (Anderson); XI-22-44, (Udine*); Water Gap, VII-18-62, (Snetsinger and Hock*); High Spire, VII-18-62, (Snetsinger and Hock*); VIII-5-63, (Hock and Lonie*); Middletown, VII-18-62, (Snetsinger and Hock*); Water Gap, VII-5-63, (Hock and Lonie*). DELAWARE Co.: VI-30-35, (Pepper*). FAYETTE Co.: VII-7-63 (Udine*); Uniontown, VII-16-63, (Hock and Lonie*). FRANKLIN Co.: VII-25-39, VII-2-62, (Pepper*); Spring Run, VI-22-63, (Snetsinger*). FULTON Co.: near McConnellsburg, VII-31-63, (Hock and Lonie*). GREENE Co.: Waynesburg, VII-15-63, (Hock and Lonie*). HUNTINGTON Co.: Mt. Union, VII-31-63, (Hock and Lonie*); near Sky Beaver, VII-19-63, (Hock and Lonie*); McConnellstown, VIII-19-63, (Hock and Lonie*). JUNIATA Co.: VII-23-40, (Richmond*); Mifflintown, VII-28-62, (Snetsinger*). LANCASTER Co.: near Intercourse, VII-18-62, (Snetsinger and Hock*); Quarryville, (Hopkins). LEBANON Co.: Palmyra, VII-10-17, (Thomas*); Annville, VII-19-62, (Snetsinger and Hock*). LEHIGH Co.: VIII-2-38, (Pepper*). MIFFLIN Co.: Yeagertown, VII-18-62, (Snetsinger and Hock*); Lewistown, VIII-21-63, (Hock and Lonie*). MONTGOMERY Co.: Linfield, III-3-17, (Fry); VI-12-62, (Sleesman*). NORTHAMPTON Co.: Berlinsville, VIII-22-63, (Hock and Lonie*); Raubsville, VIII-22-63, (Hock and Lonie*). NORTHUMBERLAND Co.: Sunbury, VIII-22-63, (Hock and Lonie*). PERRY Co.: near Amity Hall, VII-18-62, (Snetsinger and Hock*); Marysville, VII-28-62, VII-8-63, (Snetsinger*). PHILADELPHIA Co.: Philadelphia, IX-15-01, IX-7-06; Philadelphia, VII-19-62, (Snetsinger and Hock*). SNYDER Co.: Shanokin Dam, VII-8-63, (Hock and Lonie*). WASHINGTON Co.: X-31, (Long); VII-18-62, (Keeler*); Finleyville; Washington, VII-17-63, (Hock and Lonie*). WESTMORELAND Co.: V-18-62, (Yackley*); New Alexandria, VII-17-63, (Hock and Lonie*). YORK Co.: York, VIII-22-17, (Thomas*); V-18-55, (Pepper*).

* Field Records.

Further Notes on the American Taxa of Campsomeris (Hymenoptera: Scoliidae)

J. Chester Bradley *

Seven years ago I initiated a revisionary study of the subgeneric division of the American species of *Campsomeris* (Bradley, 1957). At that time the division of that genus was not in a satisfactory state so far as the fauna of any part of the world was concerned, and my paper was a preliminary attempt to bring some order into the classification of the American species; also to point out apparent relationships with Indo-Australasian groups that Dr. J. G. Betrem had previously established. These Old World taxa needed much more discriminating study than had then been given them.

In the intervening years Dr. Betrem has completed a much more intensive study of the generic and subgeneric classification of the Indo-Australasian species of *Campsomeris*, employing structural characters that had previously escaped attention. It is expected that this will be published during 1964 in the Tijdschrift voor Entomologie. Since July, 1961, Dr. Betrem, working with me here at Cornell University, has been extending his studies of these genera to the Ethiopian fauna, and now is beginning to fit the American taxa into his classification.

The results show that typical *Campsomeris* is the only subgenus represented in both hemispheres; it is represented in the Old World only by the section *Sericocampsomeris* Betrem, 1941, from China, the Philippines, Eastern India, and the East Indies. *Dielis* occurs only in America, the fact now having been discovered that its type-species, instead of being Australian, is the North American *C. plumipes* (Drury).

In my 1957 paper I listed the species and subspecies belonging to each taxon. By mistake I included two manuscript names for forms that I am now describing, in order to establish the *nomina nuda*.

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* This work was completed under a grant from the National Science Foundation of the United States of America.

It was not my intention to include all the synonymous nominal species, but only those that were not already well-known, to which I wished to draw attention, or of which I wished to confirm the synonymy. I have now added a few more; but neither publication lists all synonymized names.

This paper follows along, page by page, with my 1957 paper, indicating in sequence the changes, additions, and corrections that should now be made.

P. 69 Eliminate "Subgenus CAMPSOMERIELLA Betrem" and its species groups. Substitute in its place:

Subgenus DIELIS Saussure and Sichel, 1864

Type-species: *Scolia radula* Fabr., 1775 [= *Sphex plumipes* Drury, 1770] = *Campsomeris plumipes* (Drury) Viereck, 1916.

Dr. Betrem (1962) has shown that the type of *Dielis* is the American *Scolia radula* Fabr., not the Australian *Tiphia radula* Fabr. as had been thought. The species listed below therefore belong to *Dielis*. He regards *Campsomeriella* as a different, wholly Old-World subgenus.

I. Group of *C. plumipes* (Drury)

Replace the list of species with the following:

1. *C. chilensis* (Sauss.) Bradley [= *similaris* Rohwer] (should have been marked "new synonymy"). 2. *C. dorsata* (Fabr.) Bradley [= *Sc. haematogastra* Perty = *Colpa rubida* Lep. = *Elis pygmaea* Schrottky = *Sc. reversa* Schulz.], 3. *C. plumipes* (Drury) Viereck [= *Sc. radula* Fabr. = *Sc. quadricincta* Klug] with subspecies: *fossulana* (Fabr.) Bradley, confluenta (Say) Bradley, 4. *C. tolteca* (Sauss.) Bradley, with var. *dives* Provancher, 5. *C. trifasciata* (Fabr.) Bradley [= *Colpa alexandri* Lep.] with its subspecies *nassauensis* Bradley, 6. *C. whitelyi* Kirby (should not have been marked "new combination").

P. 70 *Campsomeris pilipes* (Saussure)

Dr. Betrem advises me that this species must form a new subgenus of its own, which will be described in due course.

Groups I and II of *Dielis* as listed on p. 70 will become endemic Indo-Australasian subgenera. True *Dielis* is limited to the New World. Its second species group is:

II. Group of *C. pseudonyma* (Schulz)

Distribution: Bahamas, Brazil, and Paraguay.

List of Species

1. *C. auripilis* (Fox) Bradley, 2. *C. bahamensis* n. sp., 3. *C. pseudonyma* (Schulz) Bradley [= *smithii* (Fox)].

Campsomeris (Dielis) bahamensis n. sp.

♀. Head and thorax black, immaculate, except for an indistinct yellowish fleck on each side of the pronotum and, in the holotype and some others, the metanotum with a median yellow spot; legs piceous, the hind tarsi reddish; abdomen orange-yellow, the following black: vertical surface of t. 2(1), basal band (about $\frac{1}{3}$) on t. 3(2) and 4(3), each produced medially, flecks on 4(3); last t. darker; st. 3(2) and 4(3) piceous, except the apex of each side yellow. All vestiture dark orange to coppery except coppery brown on last t. and the abdominal fringes light golden yellow; no tomentum on thorax. Vestiture of front, occiput, and anterior part of the dorsum dense and erect. Tibial spurs ferruginous. Wings yellowish, somewhat smoky beyond the cells.

Disc of clyp. finely p. around its margins; sp. fr. closely, finely p.; v. coarse p., only a few p. behind the oc.

Mesosc. coarsely p., imp. and shining medially; disc of scut. p. around its lateral anterior edges, imp. and shining medially; metan. p. but not densely. Ar. h. m. tufted, densely p., sharply margined behind, acute medially; a.h.l. densely p., tufted; ar. p. narrowly, densely, p. above and laterally; a.l. punctate and setose except for a small median area on the anterolateral margin; the longer hind tibial spur long and slender, blunt but not spatulate.

Length 17 mm.

Holotype: Bahama Islands: Crooked Island, 20 Febr. (Greenway—Museum of Comparative Zoology).

Paratypes: Bahama Islands: Crooked Island, 8 ♀ (Greenway—Museum of Comparative Zoology); 2 ♀, Mar. '34 (Utowana Expedition—M. C. Z.); Fortune Island, 7 ♀, 21 Febr. '33 (Greenway—M. C. Z.); Inagua Island, 1 ♀, July '38 (McLean and Shreve—M. C. Z.), 1 ♀, 27 Febr. '33 (M. C. Z.); Long Island, Simmon's, 3 ♀, July (M. C. Z.); Acklin's Island, Gold Rock, 1 ♀, 6 Mar. '09 (W. W. Worthington—Carnegie Museum).

P. 71 XANTHOCAMPSOMERIS Bradley

Dr. Betrem, not surprisingly, finds that our American species of *Xanthocampsomeris* are subgenerically different from the Indo-Australasian forms. He has placed the latter in the typical section of a new subgenus. Therefore eliminate "1. Group of *C. aurulenta* (Smith)" and the discussion that follows it.

At present we will not divide *Xanthocampsomeris* into species groups, although distinctions exist that will eventually require division.

In the list of species, the only change is to indicate *yucatanensis* as a nomen nudum, instead of with Rohwer as author.

Campsomeris completa yucatanensis subsp. n.

1957 *Campsomeris completa yucatanensis* Bradley, nomen nudum. Trans. Amer. Ent. Soc. 83: 71.

♀. The female differs from the female of *completa* Rohwer in that t. 3(2) and usually t. 2(1), sometimes t. 4(3) have separated triangular yellow spots, rarely barely attingent. It differs from the females of *tricincta* Fabr. and *fulvohirta* Cresson in having st. 3(2) and 4(3) entirely black.

A. p. sloping gradually into the a. h., which is evenly p. throughout, without tomentum. T. 4(3) with an apical yellow band, usually narrowly interrupted medially. L. 15–16 m.

The paratypes are like the type except that one has the spots on t. 4(3) and two have those on t. 2(1) slightly fused.

Yucatan. 6 ♀, holotype and 5 paratypes (Gaumer—British Museum) Holotype, labelled with my red holotype label, and 4 paratypes, labelled with my blue paratype labels, all in the British Museum. One paratype retained in Cornell University.

P. 72 The first group of *Pygodasis* should be group of *C. quadrimaculata* (Fabr.).

P. 73 List of Species

It should have been noted that it was new synonymy to list *C. fossor* (Sauss.) and *C. talpa* (Sauss.) as synonyms of *C. bistrimacula* (not *bistrimaculata*) (Lep.); species No. 3, *quadrinotata* should be listed as a synonym of No. 2, *C. quadrimaculata*, of which it is an infrasubspecific form; species No. 5, *vittata* had already been placed in *Campsomeris* by me in 1945.

The footnote requires modification: Bradley (in press) has shown that "Jamaica" surely refers to Jamaica, Long Island, and that *quadrinotata* is an infrasubspecific form of *quadrimaculata*, the older name.

II. Group of *C. ephippium* (Say)

Scolia bisignata Packard, 1st Report Peabody Academy of Sciences, 1869, p. 81, ♀, from Quito, Ecuador, is a junior synonym of *Campsomeris* (*Pygodasis*) *ephippium wagneriana* (Sauss.), *new synonymy*. I have seen the holotype, a unique ♀, in the Museum of Comparative Zoology at Harvard University. It bears a mss. label (probably Packard's) "*Scolia bisignata* Pack. Quito, Orton" and a red printed label "Type 500." By a *lapsus calami* Dalla Torre credited this nominal species to Smith instead of Packard. The subspecies *wagneriana* was described only from the male sex, so that Packard's holotype of *bisignata* is also the female allotype of *wagneriana*.

Scolia petitii Guérin in Duperry, Voy. Coquille, Zool. 1838, v. 2, p. 249, is a synonym of *Campsomeris* (*Pygodasis*) *ephippium ephippium* (Say) as noted long ago by Saussure and Sichel and by me (1945, p. 18) where I referred to its types. The male in the Paris Museum, the male in the Genoa Museum, and the female in the Munich Museum, each labelled "type" and

"Mex" are syntypes. I hereby designate the male in Paris "lectotype."

According to van der Vecht (1957, p. 25) there are two more syntypes of *petitii* in the Leiden Museum.

P. 74 Subgenus AELOCAMPSOMERIS Bradley

P. 74 In the list of species of the subgenus *Aelocampsomeris,* No. 3 should read "*C. variegata* (Fabr.) Bradley."

Section CAMPSOMERIS Guérin *

P. 75 List of Species

1. *C. atrata* (Fabr.) Bequaert, 2. *peregrina* (Lep.) Betrem [= *regina* (Sauss.), = *regalis* (Sichel)], 3. *regifica* Bradley, 4. *vitripennis* (Smith) Bradley [= *infuscata* (Lep.) Bradley, = *subobscura* (Smith) Bradley, = *luciflua* Bradley, all syn. novae].

Campsomeris (Campsomeris) vitripennis (Smith)

1845 *Colpa infuscata* Lep. ♂, but described as ♀. Hist. nat. ins. Hymen. v. 3, p. 537, *syn. nova;* nec *Scolia infuscata* Klug, 1832.
1855 *Scolia subobscura* Smith, Cat. hymen. ins. in Brit. mus., p. 102, new name for *Colpa infuscata* Lep., nec *Scolia infuscata* Klug, 1832, *syn. nova.*
1855 *Scolia vitripennis* Smith, ♂, *loc. cit.*, p. 108.
1864 *Elis (Dielis) infuscata* Sauss. and Sich., incorrectly redescribed as a ♀. Cat. esp. ancien gen. Scolia, p. 215. (Species unknown to those authors.)
1864 *Elis (Dielis) vitripennis* Sauss. and Sich., ♂. *Loc. cit.*, p. 216.
1927 *Campsomeris lucida* Bradley, ♀. An. Soc. cient. Argent. 103: 168 (a misidentification).
1940 *Campsomeris luciflua* Bradley, ♀. *Loc. cit.*, 130: 10. *Syn. nova.*
1957 *Campsomeris (Campsomeris) vitripennis* Bradley. Trans. Amer. Ent. Soc. 83: 75.

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* Guérin described *Campsomeris* as a subgenus of *Scolia*, therefore retained *atrata* in *Scolia*.

Lepeletier gave this species the name *Colpa infuscata* in the year 1845. He thought that he was describing a female, but his holotype is a male. This led Saussure and Sichel, who naturally had never seen any such female, to retain it as a species apart from *vitripennis,* although placing it in adjacent position. Smith regarded *infuscata* Lep. as a secondary homonym of *Scolia infuscata* Klug, and changed the name to *subobscura,* but Saussure and Sichel did not adopt that change, because they did not accept the secondary synonymy.

Smith, never having seen Lepeletier's type of *infuscata,* was also misled in regard to its sex. He redescribed the true male as a new species, *vitripennis,* in the same publication in which he had proposed the name *subobscura* to replace *infuscata.*

There are two reasons why we may and must continue to use the name *vitripennis:* In the first place, since *subobscura* and *vitripennis* are of the same date, and no reviser has selected between them, I, now, as first reviser, choose *vitripennis.* The second reason is that since the synonymy of *subobscura* and *vitripennis* is new synonymy, and *subobscura* has not been used as a valid name for more than a century, the Code now forbids its resurrection.

P. 75 LISSOCAMPSOMERIS Bradley

P. 76 In listing *brasiliana* (Sauss.) and *gerstaeckeri* (Sauss.) as synonyms of *argentea* (Hal.), I should have noted that this was new synonymy.

TENEBROMERIS Betrem

Dr. Betrem (1963) finds that the resemblance between his Indo-Australasian subgenus *Laevicampsomeris* and the rare Brazilian species *tenebrica* (not *tenebricus*) are due to convergence, and has erected a new subgenus *Tenebromeris* for the latter species.

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A New Species of Mexican Ancylocera with Records of Others (Coleoptera: Cerambycidae)

John A. Chemsak, University of California, Berkeley

In the synopsis of the genus *Ancylocera* in Mexico (Chemsak, 1963, *Jour. Kansas Ent. Soc.* 36: 104–109), seven species are listed for that country. Specimens are rare enough in collections to warrant the following description of a very distinctive new species and the reporting of new records of other previously described species.

Ancylocera parkeri Chemsak, new species

Male: Form narrow, elongate; shining, elytra red, abdomen reddish, pronotum red with black, longitudinal dorsal and ventral stripes, head, appendages, and meso- and metasternum black. Head coarsely, confluently punctate, pubescence sparse, short, erect, depression between antennal tubercles deep; antennae slender, shorter than the body, basal segments slightly broadened, not prominently produced apically, eleventh segment elongate, appendiculate, longer than tenth segment, segments almost impunctate, pubescence obsolete, segments carinate from apex of fourth segment to appendiculation of eleventh. Pronotum less than 1½ times as long as broad, apex and base slightly constricted, sides sinuate; disk slightly inflated dorsally near apex, shallowly concave longitudinally at middle, punctures at middle coarse, subconfluent, not at all rugose transversely; pubescence short, pale, erect, fairly dense; prosternum coarsely, separately punctate longitudinally at middle, opaque at sides; meso- and metasternum moderately coarsely, separately punctate, episternum of metathorax opaque, clothed with very fine short appressed pubescence; scutellum small, black, medially impressed. Elytra over three times as long as broad; punctures at base very coarse, deep, linearly arranged, becoming finer and disarranged apically; pubescence moderately long, pale, erect; apices rounded, angles not produced. Legs slender, femora not clavate, almost impunctate, pubescence sparse, femora falling far short of elytral apices, internal apical tooth small. Abdomen moderately densely punctate and pubescent; apex of last sternite emarginate-truncate. Length, 14 mm.

Holotype male (California Academy of Sciences) from 23 miles S. Matias Romero, Oaxaca, Mexico, VIII–14–63 (F. D. Parker, L. A. Stange).

This species can be compared with *cribricollis* Bates but differs by the more densely punctate pronotum, slightly inflated pronotum at the apex, more coarsely, densely punctate elytra, reddish pronotum, by the denser longer pubescence, and numerous other characters.

This species is named for F. D. Parker whose collecting efforts have produced many fine specimens.

Ancylocera cribricollis Bates

Ancylocera cribricollis Bates, 1885, Biologia Centrali-Americana, Coleoptera, 5: 314; Chemsak, 1963. Jour. Kansas Ent. Soc., 36: 105.

In the redescription of this species by Chemsak (1963) the eleventh antennal segment is listed as being less than half as long as the tenth instead of less than twice as long.

Additional records include: 1 ♂, Cuernavaca-Acapulco Road, Mexico, 310 K, VIII–23–36 (Ball and Stone); 1 ♀, Acapulco, Guerrero, VIII–19–63 (F. D. Parker, L. A. Stange).

Ancylocera macrotela Bates

Ancylocera rugicollis, Bates (nec Fabricius), 1872, Trans. Ent Soc. London, 1872: 91.

Ancylocera macrotela Bates, 1880, Biologia Centrali-Americana. Coleoptera, 5: 68; ibid. 1885: 314 (record); Chemsak, 1963, Jour. Kansas Ent. Soc., 36: 106.

Additional records: 1 ♀, 4 miles N. Quezaltepeque, El Salvador, VII–18–61 (M. E. Irwin); 1 ♀, Yautepec, Morelos, Mexico, VII–13–63 (F. D. Parker, L. A. Stange).

This work was conducted during the course of a National Science Foundation sponsored study on North American Cerambycidae (Grant G-19959). The author is grateful to A. T. McClay, University of California, Davis and C. A. Triplehorn, Ohio State University for the loan of material.

Review

Paul R. Ehrlich and **Richard W. Holm**: The Process of Evolution. 347 pp., illustrations, New York (McGraw-Hill Book Co.). 1963. Price: $8.95.

During the past quarter century, biologists have shown an increasing interest in organic evolution, not only because of the current discoveries and application of hitherto unknown facts, but also because of the major advances that have been made in evolution theory. New data are appearing in an ever increasing quantity, and in such numbers that our wealth of newer information is becoming somewhat embarrassing. We shall have to organize these newer discoveries with care and judgment if we are not to be submerged by their sheer mass. These newer discoveries present some very pressing problems to all who teach evolution.

Fortunately, a number of new and excellent textbooks are now on the market and the teacher is now offered aid by a number of publishers. Which aid to choose is a very real problem, because (1) no text of a usable size can cover the entire field, but (2) each of the current texts has its own individual virtue. Almost any teacher can now find a book that emphasizes that aspect of evolution that most appeals to him. The few teachers, who cannot, probably write their own books.

Thus we have a great many carefully tailored works on evolution. We are perhaps justified in designating the majority of the newer books as "custom built."

The Process of Evolution is clearly written, well organized and contains a great deal of up-to-the-minute information. It may be a trifle advanced for an elementary class but it would certainly be of value to all advanced students of biology. Its thirteen chapters are arranged under four headings that indicate both its coverage and the aspects of evolution that it emphasizes: Part I, Organisms: origin and function; II, Populations: properties; III, Populations: differentiation; IV, Human evolution: physical and cultural.

The first three parts can be described adequately as being "up-to-date." The fourth part emphasizes an aspect of evolution that has long needed emphasis. The reviewer is of the opinion that *The Process of Evolution* handles this aspect of the subject better than any other text that he has seen. In this part, the complex interaction between our cultural and our biological evolution is described in some detail. Fortunately we are now beginning to realize how important this interaction is. Human culture seems to have been one of the major selecting agents that has determined the course of our past evolution, but it was by no means a *deus ex machina.* Human culture has always passed into the custody of those it selected, and its own evolution was conditioned primarily by the biological abilities and limitations of its custodians. Cultural and biological evolution constitute a positive feedback system, and each of the evolutions was a major factor in determining the course and speed of the other. It is this interaction that gives us our first valid explanation of both the rate and extent of human evolution.

Part IV should be read carefully and very critically by anyone who teaches evolution to undergraduates. It should also be required reading for anthropologists and sociologists.

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Beetles of the world wanted, all species in exchange for American beetles, moths and butterflies. James K. Lawton (age 18), 7118 Grand Parkway, Wauwatosa 13, Wisconsin.

Acanthomyops (Citronella ants) wanted for revisionary study. Will sort from yellow *Lasius*. M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) **urgently required.** Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus **Ceroglossus** wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Curculionidae of the genus **Curculio** (formerly **Balaninus**) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

Membracidae wanted. Purchase or exchange. T. L. Stringfellow, Military Reservation, Box 11-A, Hudson, Massachusetts.

Buprestidae, Scarabaeidae, and **butterflies** wanted in exchanges for beetles and butterflies. Mr. W. van der Starre, 25 Crawley St., Warrnambool, Victoria, Australia.

Insects

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CONTENTS

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ENTOMOLOGICAL NEWS

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A Review of the Neotropical Nirvaninae (Homoptera: Cicadellidae)

James P. Kramer, Ent. Res. Div., Agric. Res. Serv., U. S. Dept. of Agriculture, Washington 25, D. C.

The leafhopper subfamily Nirvaninae (= Nirvanidae of Metcalf 1963) is primarily an Old World assemblage with the greatest diversity of genera and species in tropical Asia. According to Metcalf's recent catalogue (1963), only two species are recorded from the Neotropics, *Carchariacephalus smithii* Baker and *Neonirvana hyalina* Oman. A third Neotropical species, *Columbonirvana aurea* Linnavuori, was described since the completion of Metcalf's catalogue. A study of both the described and undescribed Neotropical species reveals seven valid genera (five new) and seven valid species (four new). All specimens treated, unless stated otherwise, are in the collection of the United States National Museum.

Diagnosis of the Neotropical Nirvaninae. The following combination of characters will separate the members of this subfamily from all others: Form depressed; crown marginally carinate, at least apically, and strongly produced beyond eyes with median length at least as long as, but usually much longer than, distance between eyes (except *Columbonirvana*); ocelli on crown in front of eyes near lateral margins or rarely in anterior margin of crown.

Key to the Neotropical Genera of Nirvaninae

1. Upper portion of clypeus with a distinct but short median longitudinal carina (Figs. 1, 16, 24) 3
   Upper portion of clypeus without such a carina 2

2. Forewing with one closed preapical cell (Linnavuori 1959: Fig. 13E); ocelli on crown near lateral margins and clearly visible from above (Fig. 20) . . . . **Neonirvana** Oman
   Forewing without closed preapical cells (Linnavuori 1959: Fig. 13C); ocelli on anterior margin of crown and not visible from above (Linnavuori 1959: Fig. 13D) . . . . **Columbonirvana** Linnavuori
3. Crown at least twice as long as distance between eyes (Figs. 2, 7, 12) 5
   Crown less than twice as long as distance between eyes (Figs. 18, 26) 4
4. Crown subpentagonal in outline and with a short distinctly elevated carina at apex (Fig. 18); veins of forewings uniformly distinct . . . . **Pentoffia,** new genus
   Crown not pentagonal in outline and without a distinctly elevated carina at apex (Fig. 26); veins of forewings only apically distinct . . . . **Jassosqualus,** new genus
5. Lateral margins of crown parallel (Fig. 2): clypellus sharply constricted at middle (Fig. 1) . . . . . . **Krocodona,** new genus
   Lateral margins of crown converging distally (Figs. 7, 12); clypellus not constricted at middle (Figs. 6, 11) 6
6. Oblique ledge above antennal pit present (Fig. 13); third apical cell of forewing triangular (Fig. 14) . . . . **Krocobella,** new genus
   Oblique ledge above antennal pit absent (Fig. 8); third apical cell of forewing quadrangular (Fig. 9) . . . . **Krocozzota,** new genus

KROCODONA, new genus

Type-species: *Krocodona sauridion,* new species.

Form elongate, narrow, and parallel-sided; crown strongly produced beyond eyes, median length three times longer than narrowest width between eyes, in dorsal view lateral coronal margins parallel with apex broadly rounded, in lateral view carinate coronal margin strongly sinuate with face flat; in facial view clypellus strongly constricted mesally with short carina at apex of clypeus; pronotum laterally carinate; forewing with four apical and two preapical cells, third apical cell triangular. (This description will be expanded or modified when males are known.)

Krocodona, new genus is most similar to *Krocobella,* new genus. In both genera the crown is very strongly produced and the third apical cell of the forewing is triangular. They are, however, readily separated by other characters as indicated in the key to genera.

Krocodona sauridion, new species. FIGURES 1–5.

Length: Female 6 mm.

Structure: Antennae long, about as long as combined lengths of crown and pronotum (Fig. 3); surface of crown and scutellum finely granular; surface of pronotum weakly transversely rugulose.

Coloration: Venter including legs pale brown; face pale brown sparingly marked with dark brown to black near eyes, at antennal bases, mesally, marginally, and apically (Fig. 1); crown, pronotum, and scutellum pale brown marked with various hues between black and red-brown, coronal markings most distinct, with extreme apex black and discal markings as illustrated (Fig. 2); forewing pale brown hyaline, veins concolorous except apically, inner apical veins orange, outer apical veins dark brown, area of claval apex, costal margin, and area of second apical cell irregularly smoky brown (Fig. 4).

Male Genitalia: Male unknown.

Female Genitalia: Pregenital sternum with posterior margin mesally bilobed (Fig. 5).

Type: Holotype female (USNM Type No. 67141) La Fragua, HONDURAS, 29 October 1940, W. Komp.

KROCOZZOTA, new genus

Type-species: *Krocozzota languria,* new species.

Form elongate and moderately stout; crown strongly produced beyond eyes, median length two and a half times longer than narrowest width between eyes; in dorsal view lateral coronal margins straight in front of eyes, then converging distally to acutely rounded apex; in lateral view carinate coronal margin straight, carina only distinct apically, becoming obsolete toward eye, and with face not flattened; in facial view clypellus with sides parallel and a short carina at apex of clypeus; pronotum laterally carinate; forewing with four apical and two preapical cells, third apical cell quadrangular. (This description will be expanded or modified when males are known.)

Krocozzota, new genus is closest to *Krocobella,* new genus. In both genera the crown is very strongly produced and in lateral view the marginal coronal carina is straight or nearly so. The two genera are, however, readily separated by other characters as indicated in the key to genera.

Krocozzota languria, new species. FIGURES 6–10.

Length: Female 6 mm.

Structure: Antennal length unknown; surface of crown, lateral surfaces of pronotum and scutellum finely granular or scaly; mesal surface of pronotum very weakly transversely rugulose; mesal surface of scutellum nearly smooth.

Coloration: Venter including legs and face stramineous, unmarked except for extreme darkened upper portion of clypeus (Fig. 6); dorsum of abdomen largely red; crown, pronotum, and scutellum dark brown or black with a wide bright yellow mesal stripe, stripe narrowing toward coronal apex (Fig. 7); forewings subhyaline marked with hyaline yellow and dark brown (Fig. 9).

Male Genitalia: Male unknown.

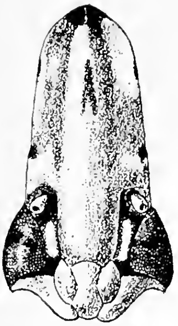
Female Genitalia: Pregenital sternum with posterior margin broadly produced and rounded (Fig. 10).

Type: Holotype female (USNM Type No. 67142) PANAMA, Canal Zone, 25 June 1952, F. S. Blanton.

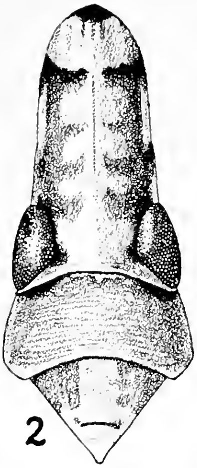
EXPLANATION OF FIGURES

FIGS. 1–5. *Krocodona sauridion* n.g. & n.sp.: 1, face; 2, crown, pronotum, and scutellum dorsally; 3, head and pronotum laterally; 4, apical portion of forewing; 5, pregenital sternum of female.

FIGS. 6–10. *Krocozzota languria* n.g. & n.sp.: 6, face; 7, crown, pronotum, and scutellum dorsally; 8, head and pronotum laterally; 9, forewing; 10, pregenital sternum of female.



1 sauridion



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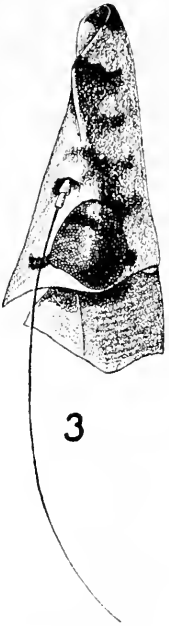

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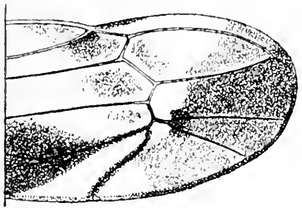

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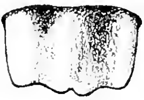

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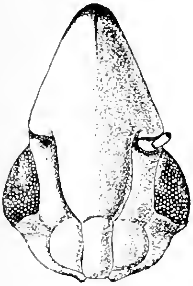
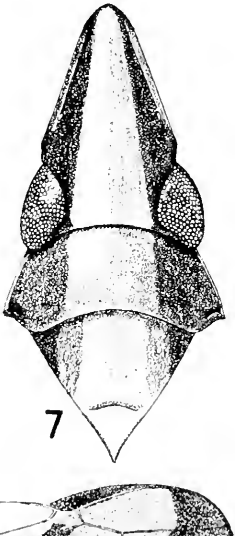


6 languria



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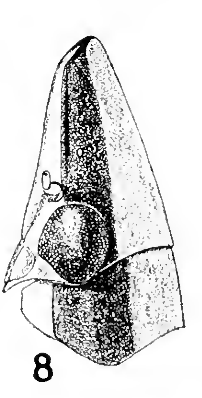

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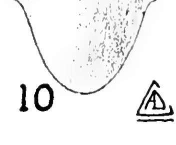


10

KROCOBELLA, new genus

Type-species: *Krocobella colotes,* new species.

Form elongate and moderately stout; crown strongly produced beyond eyes, median length slightly more than two and a half times longer than narrowest width between eyes; in dorsal view lateral coronal margins straight in front of eyes, then converging distally to obtusely angled apex; in lateral view carinate coronal margins straight, or nearly so, with a distinct groove running from ocellus to coronal apex, a distinct oblique ledge above antennal base, and with face concave; in facial view sides of clypellus slightly expanded mesally, a short carina at apex of clypeus, and a single longitudinal submarginal groove along lateral edges of clypeus; pronotum laterally carinate; forewing with four apical and two preapical cells, third apical cell triangular. Male genitalia: pygofer relatively simple and without macrosetae; plates long and fused basally, lightly setose; valve lacking; connective Y-shaped with stalk bifurcate to receive base of aedeagus; style slender and hooked apically in lateral view; aedeagus simple.

Krocobella, new genus is apparently closest to the African genus *Hodoedoccus* Jacobi. Evans (1947: 175) illustrated the forewing (Fig. 17E), face (Fig. 17F), and crown, pronotum, and scutellum (Fig. 17G) of the type-species, *Hodoedoccus acuminifrons* Jacobi. The crown, pronotum, and scutellum are nearly identical in the two genera; compare figure 12 and Evans 1947: figure 17G. The faces are also quite alike; both have the short carina at the apex of the clypeus. However, the shape of the clypellus differs; in *Krocobella* the clypellus is expanded mesally (Fig. 11), while in *Hodoedoccus* the clypellus tapers downward (Evans 1947: fig. 17F). *Hodoedoccus* also apparently lacks the submarginal grooves along the edges of the clypeus found in *Krocobella.* There are many differences in the venation of the forewing; compare figure 14 and Evans 1957: figure 17E. The most obvious venational differences are these: clavus with two veins in *Hodoedoccus* and one in *Krocobella,* third apical cell quadrangular in *Hodoedoccus* and triangular in *Krocobella,* a basal cross vein present in *Hodoedoccus* but absent in *Krocobella.*

Krocobella colotes, new species. FIGURES 11–15.

Length: Male 5.75 mm.

Structure: Antennae long, about one and a half times longer than combined lengths of crown and pronotum (Fig. 13); surface of crown and scutellum finely granular or scaly; surface of pronotum weakly transversely rugulose.

Coloration: Venter including legs pale yellowish brown; irregular touches of dark brown on abdomen and thorax; face pale yellowish brown, darkened at antennal bases and black at apex of clypeus (Fig. 11); crown, pronotum, and scutellum pale yellowish brown, coronal suture and marginal coronal carinae red-brown (Fig. 12); forewing pale yellowish brown hyaline with veins and cells variably darkened with various shades of brown (Fig. 14).

Male Genitalia: Pygofer long with sharp points distally at both dorsal and ventral margins; plates with a few setae distally; aedeagus simple, narrowing and gradually recurving distally (Fig. 15). Aedeagus in ventral view slender with gonopore apical.

Female Genitalia: Female unknown.

Type: Holotype male (USNM Type No. 67143) Jussaral, Angra, Estado do Rio de Janeiro, BRAZIL, October, 1934, Travassos and Lopes.

PENTOFFIA, new genus

Type-species: *Pentoffia nivata,* new species.

Form elongate and broad; crown strongly produced beyond eyes, median length slightly longer than narrowest width between eyes; in dorsal view crown subpentagonal in outline with apical carina and irregular ridges on disc, ocelli highly obscure, head narrower than pronotum; in lateral view carinate coronal margin approximately straight, a distinct perpendicular ledge in front of antennal base; in facial view clypellus narrowing downward with a short carina at apex of clypeus, suture between clypeus and clypellus obscure; pronotum laterally carinate; forewing with four apical and three preapical cells, inner apical cell extraordinarily large, nearly twice longer and broader than second apical cell, basal cross veins present, all veins strongly delineated. (This description will be expanded or modified when males are known.)

Pentoffia, new genus is not close to any other genus of the Nirvaninae, and its inclusion with this subfamily is provisional. The veins of the forewings are strongly delineated and the ocelli are highly obscure (distinctness of ocelli exaggerated in Fig. 18); both of these characters separate *Pentoffia* from all other genera of the Nirvaninae.

Pentoffia nivata, new species. FIGURES 16–19.

Length: Female 11.5 mm.

Structure: Antennal length unknown (Fig. 17 shows broken antenna); most of coronal surface finely but irregularly rugulose, weak ridges delimiting poorly defined pentagonal area on disc and line behind ocelli (Fig. 18), all margins of crown strongly carinate; surface of pronotum weakly transversely rugulose; surface of scutellum with basal angles finely granular and mesal portion irregularly rugulose; inner discal cells of forewing with two or three cross veins.

Coloration: Head, thorax, and abdomen stramineous to yellowish brown without definite markings; forewings milky hyaline and heavily pruinose.

Male Genitalia: Male unknown.

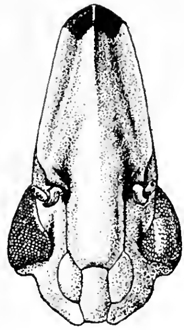
Female Genitalia: Pregenital sternum with posterior margin weakly produced and slightly indented mesally (Fig. 19).

Type: Holotype female (USNM Type No. 67144) Cali Valle, COLOMBIA, 27 April 1939, B. Losada. The type is damaged; it lacks all but one hind leg and the apical portion of both forewings.

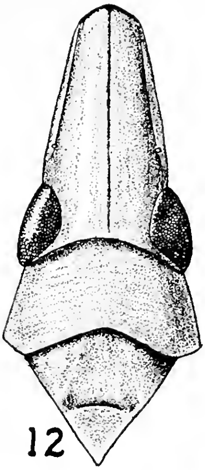
EXPLANATION OF FIGURES

FIGS. 11–15. *Krocobella colotes* n.g. & n.sp.: 11, face; 12, crown, pronotum, and scutellum dorsally; 13, head and pronotum laterally; 14, forewing; 15, male genital capsule laterally.

FIGS. 16–19. *Pentoffia nivata* n.g. & n.sp.: 16, face; 17, head and pronotum laterally; 18, crown, pronotum, and scutellum dorsally; 19, pregenital sternum of female.



11 colotes



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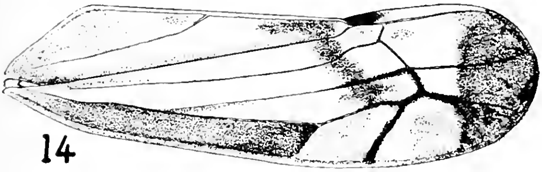

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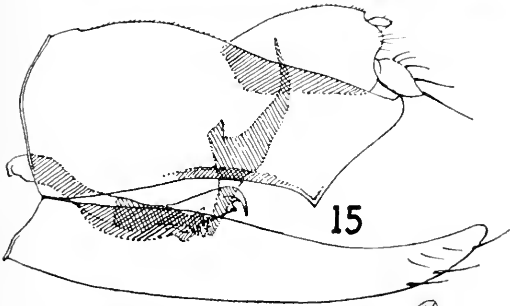

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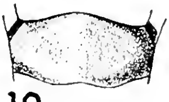

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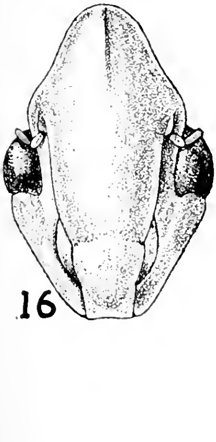

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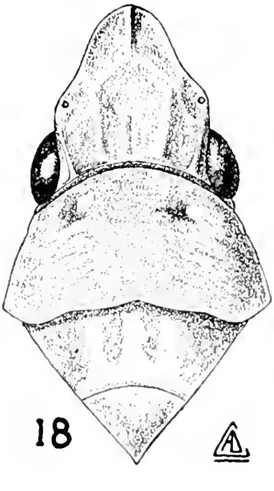
17 nivata



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JASSOSQUALUS, new genus

Type-species: *Carchariacephalus smithii* Baker.

Form elongate and slender; crown strongly produced beyond eyes, median length slightly longer than narrowest width between eyes; in dorsal view crown pointed apically with lateral margins broadly rounded, surface of crown not smooth, ocelli large, head narrower than pronotum; in lateral view carinate coronal margin straight, curving over eye to posterior margin of crown, antennal base in broad, deep, elongate depression in front of eye; in facial view clypellus narrowing downward with sides broadly rounded, a short carina at apex of clypeus, lora slender and elongate; pronotum laterally carinate; forewings with venation highly obscure but with four apical and two preapical cells, surface of forewing at least in part coriaceous. Male genitalia: pygofer with macrosetae along dorsal margin and brush-like modifications or scopae internally at apex; plates long and fused basally, with macrosetae apically; valve poorly developed or lacking; connective subcruciform; style with apex elongate and broadened apically in lateral view; aedeagus furcate apically.

Jassosqualus, new genus can be separated from the Old World genus *Carchariacephalus* Montrouzier by the following characters: In *Jassosqualus* the margins of the crown in dorsal view are broadly rounded with the coronal surface roughened (Fig. 26) and the lora are elongate (Fig. 24); in *Carchariacephalus* the margins of the crown in dorsal view are straight with the coronal surface smooth (Signoret 1879: pl. 1, Fig. 4) and the lora are rounded (Signoret 1879: pl. 1, Fig. 4b).

Jassosqualus smithii (Baker), new combination. FIGURES 24–29.

Carchariacephalus smithii Baker, 1897, p. 153.

Length: Male 5 mm. Female 5.5 mm.

Structure: Antennae of moderate length, about as long as crown (Fig. 25); surface of face finely granular or scaly with vague parallel ridges laterally on clypeus (Fig. 24); crown longitudinally rugulose and irregularly punctate-rugulose basally with coronal suture just barely elevated (Fig. 26); pronotum weakly transversely rugulose; scutellum irregularly punctate-rugulose; forewing with clavus (except apex) and adjacent portion of corium, coriaceous and punctate, rest of forewing somewhat thickened but not coriaceous.

Coloration: Venters of abdomen and thorax, legs, and antennae stramineous; genital capsule and irregular areas on abdominal venter darkened; thoracic pleura, face, crown, pronotum, and scutellum black; forewing dark brown to black with an irregular yellow spot at claval apex and an irregular, elongate, subtriangular, yellow to hyaline area along costal margin, area occurs just anterior to the outer apical cell and about equal in length to the claval suture, the yellow to hyaline costal area broken by a narrow dark brown to black band at level of claval apex.

Male Genitalia: Genital capsule in ventral view with plates irregularly elongate; apex of pygofer with internal tooth and stout scopa on either side; connective twice pronged on either side for attachment to styles, and broadened near aedeagal base; styles slender and avicephaliform apically with "beaks" elongate; aedeagus somewhat rounded basally, shaft narrow, and apex quadrifurcate, gonopore presumably opening at base of quadrifurcation (Fig. 29). Genital capsule in lateral view with plates longer than pygofer; aedeagus somewhat S-shaped; style moderately broad with sharp expansions at apex, dorsal expansion longer and more slender than ventral extension (Fig. 28).

Female Genitalia: Pregenital sternum with posterior margin strongly produced laterally and medianly (Fig. 27).

Types: In Baker's original description of *smithii* he stated, "Described from two females collected at Rio [de] Janeiro [Brazil] in September and October, one female collected at Para [Brazil] in July [H. H. Smith]." The "female" collected at Rio de Janeiro in September is in fact a male; this male is hereby designated as the lectotype. In addition to the lectotype male, the female collected at Para in July and one female Benevides [Brazil] were studied.

NEONIRVANA Oman

Type-species: *Neonirvana hyalina* Oman.

Form elongate and moderately broad; crown strongly produced beyond eyes, median length nearly a third longer than narrowest width between eyes; in dorsal view carinate coronal margins straight in front of eyes, then converging to sharply rounded apex, surface of crown neither carinate nor rugulose, width of head and pronotum subequal; in lateral view carinate coronal margin straight or nearly so and terminating at eyes, a carina above antennal base, face flat; in facial view clypellus tapering downward with sides straight, suture between clypeus and clypellus highly obscure or absent, genae broad, no carina at apex of clypeus; pronotum laterally carinate; forewing with venation highly obscure, but with four apical and three preapical cells, third apical cell triangular, outer preapical short and nearly round, veins with a row of shallow pits along each side except apically, these pits usually set with very fine setae. Male genitalia: pygofer with macrosetae distally and irregular processes internally at apex; plates long and partially folded, beset with hairs and macrosetae; valve not strongly developed; connective Y-shaped; style slender and hooked in lateral view; aedeagus simple and tubular.

Neonirvana hyalina Oman. FIGURES 20–23.

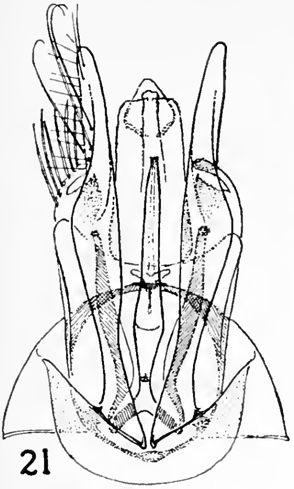
Neonirvana hyalina Oman, 1936, p. 117.

Length: Male 5–5.5 mm. Female 5.6–6.8 mm.

Structure: Antennae moderately long, about as long as combined lengths of crown and pronotum; surface of face finely granular; upper portions of clypeus with faint ridges laterally;

EXPLANATION OF FIGURES

FIGS. 20–23. *Neonirvana hyalina* Oman: 20, crown, pronotum, and scutellum dorsally; 21, male genital capsule ventrally; 22, male genital capsule laterally; 23, pregenital sternum of female. FIGS. 24–29. *Jassosquatus smithii* (Baker), new genus: 24, face; 25, head and pronotum laterally; 26, crown, pronotum, and scutellum dorsally; 27, pregenital sternum of female; 28, male genital capsule laterally; 29, male genital capsule ventrally.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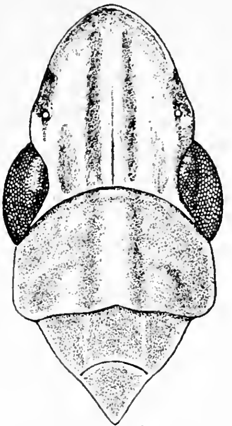
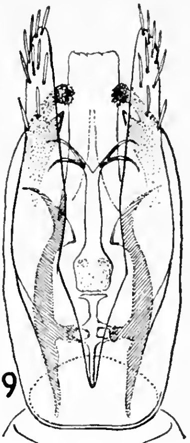

20 hyalina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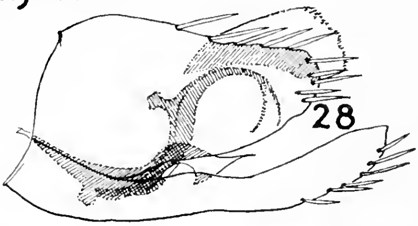
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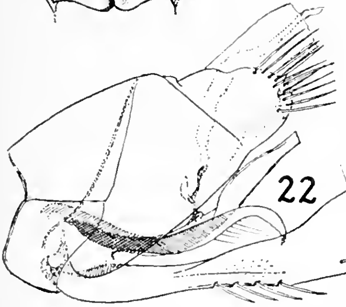
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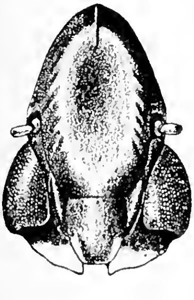
24 smithii


25


26

crown, pronotum, and scutellum mainly smooth but with some weakly defined granular areas; pronotum at times with vague transverse rugulae laterally; forewing hyaline but surface not smooth, basal cross vein usually present, clavus with one proximally forked vein (Oman 1936: Fig. 1C).

Coloration: General ground color stramineous to pale lemon yellow; venter including legs and face stramineous; crown, pronotum, and scutellum sordid stramineous to pale yellow; in well-marked specimens, a pair of narrow longitudinal mesal orange stripes on crown extending posteriorly on to pronotum and scutellum, the stripes often broadened on pronotum fade to white on scutellum, often with additional orange markings in front of eyes on coronal margins (figure 20 shows a heavily marked specimen); forewings heavily suffused with lemon yellow but usually irregularly pale along costal margin and at apex, always with a distinct brown spot at base of third apical cell.

Male Genitalia: Genital capsule in ventral view: plates with both setae and hairs at narrowed apical portion; apex of pygofer with internal tooth and hook on either side; both connective and aedeagus narrowed at point of juncture, aedeagus and connective connected by a movable joint; styles uniformly slender and somewhat rounded apically; aedeagus long, slender, and tapering both basally and apically, gonopore terminal (Fig. 21). Genital capsule in lateral view: plates widest apically, longer than pygofer, hairs dorsally and apically, and setae in two areas ventrally; pygofer with a fold in distal third; valve moderately distinct; aedeagus relatively straight and irregularly truncate at apex; style slender and hooked apically (Fig. 22).

Female Genitalia: Pregenital sternum with posterior margin medianly bilobed and with a partial longitudinal carina at middle (Fig. 23).

Specimens Studied: Holotype male and type series from San Pedro de Montes de Oca, COSTA RICA, 31 January 1936, E. H. Ballou; long series of both males and females collected in light traps at various localities in Panama and the Canal Zone 1951–1953 by F. S. Blanton; two females Jussaral, Angra, Estado do Rio de Janeiro, Brazil, 9 October 1934, Travassos and Lopes.

COLUMBONIRVANA Linnavuori

Type-species: *Columbonirvana aurea* Linnavuori.

I have not seen the type or any specimens representing this monobasic genus. All of the following is extracted from the original description. *Columbonirvana* can be separated from all other Neotropical genera of the Nirvaninae by the placement of the very small ocelli which lie in the anterior margin of the crown and are not visible from above, and by the coronal length which is less than the narrowest width between the eyes.

The type-species and only included species, *Columbonirvana aurea* Linnavuori (1959: p. 35), is based upon a unique female with data Sierra S. Lorenze, Colombia, March 1912, Ujhelyi; the type is in the collection of the Moravian National Museum in Brno, Czechoslovakia. Linnavuori (1959: p. 35) illustrated the crown and pronotum (Fig. 13D) and forewing (Fig. 13C). The species is small, length 4.5 mm., and is colored as follows: venter, legs, and face pale yellow; upper portion of face with a pair of transverse, narrow bright red stripes, lower stripe broken at middle; crown silver-white near anterior margin, bright yellow basally; pronotum bright yellow anteriorly, basal part pale yellow; scutellum mostly golden yellow; forewing hyaline, clavus and adjacent parts of corium broadly golden yellow, costal margin, patches in cells and two faint transverse spots in clavus and corium, whitish hyaline, apical cells with fuscous areas, third apical cell with a conspicuous triangular black-brown spot. Pregenital sternum rather large with posterior margin sharply triangularly produced.

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A Note on the Synonyms of Anaphothrips zeae Moulton (Thysanoptera, Thripidae) *

KE CHUNG KIM

This paper reports a new synonym of *Anaphothrips zeae* Moulton discovered during the compilation of the species index of the genus *Anaphothrips.*

Crawford (1910) first described this species from Claremont, California, as *Anaphothrips longipennis* Crawford. Moulton (1911) also described this species as *Anaphothrips zeae* without reference to Crawford's description. Karny (1912) then transferred this species to the genus *Scirtothrips* Shull, 1909. Subsequently, Hood (1914) transferred *Euthrips longipennis* Bagnall, 1909, to *Scirtothrips,* thus creating homonymy in the genus *Scirtothrips.* Because of this homonymy Priesner (1932) changed Crawford's name *A. longipennis* to *Scirtothrips crawfordi.* Finally, Baily (1944 and 1957) put Crawford's species back in its original genus *Anaphothrips* Uzel, 1895.

When Moulton (1911) described *Anaphothrips zeae* (species no. 57), he used another specific name *Anaphothrips hesperus* in the key (page 17) instead of *A. zeae* Moulton.

However, elsewhere in the same paper he used *A. zeae:* in the catalogue on page 28, in the description on page 41, and in the illustration on plate 5.

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* Paper No. 5298, Scientific Journal Series, Agricultural Experiment Station, St. Paul, Minnesota.

Since Priesner (1932) rejected the oldest name *A. longipennis* Crawford as a homonym of *S. longipennis* Bagnall in *Scirtothrips* and changed it to *A. crawfordi,* the specific name *longipennis* Crawford must be rejected and can not be used according to Articles 52 and 57 of the International Code of Zoological Nomenclature (1961) adopted by the XV Congress of Zoology.

I consider the specific name *Anaphothrips zeae* Moulton as the valid name of this species, since page precedence does not give *hesperus* Moulton seniority (Article 24 of the Code, 1961).

The synonyms of *Anaphothrips zeae* Moulton are as follows:

Anaphothrips zeae Moulton, 1911, U.S.D.A., Bur. Ent., Tech. Ser. No. 21, p. 41, figs. 31–34.

Anaphothrips hesperus Moulton, 1911, U.S.D.A., Bur. Ent., Tech. Ser. No. 21, p. 17. *New Synonymy.*

Anaphothrips longipennis Crawford, 1910, Pomona Coll. Jour. Ent. 2: 150–152, figs. 62, A–D; Baily, 1944, Pan-Pacific Ent. 20(3): 86; Baily, 1957, Bull. Calif. Insect Surv. 4(5): 160.

Scirtothrips zeae (Moulton), Karny, 1912, Zool. Ann. 4: 334.

Scirtothrips crawfordi Priesner, 1932, Bull. Soc. Roy. Ent. d'Egypt 17(3): 152.

I wish to express my sincere gratitude to Dr. S. F. Baily of the University of California at Davis and Miss Kellie O'Neill of the Entomology Research Division of the U.S.D.A. for their kind suggestions and opinions on the synonyms of this species.

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Solution to the Problem of Tetramorium lucayanum (Hymenoptera: Formicidae)

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Cornell University

Of the six species of *Tetramorium* that have been reported as inhabiting the New World, the status and provenience of five have been dealt with in my paper entitled, "Is the ant genus *Tetramorium* native to North America?" (Brown, 1957, Brev. Mus. Comp. Zool. Harvard No. 72). *T. guineense, T. simillimum,* and *T. pacificum,* as has long been recognized, are tramp species of Old World origin (the first two are almost certainly African), and *T. caespitum* is believed to be a post-Columbian immigrant from Europe. The fifth species, *T. rugiventris,* was eliminated from consideration because it was found to belong, not to *Tetramorium,* but to the Holarctic genus *Myrmica.* Subsequent assignment of *rugiventris* to the weak satellite genus *Paramyrmica* seems to me to have been ill-advised, but in any case the ant is definitely not a *Tetramorium.*

The single American species of *Tetramorium* remaining was *T. lucayanum* Wheeler, originally described from the Bahamas, but since reported from the following countries:

Cuba: Cienfuegos, Guantanamo, Cristo (all W. M. Mann leg.)
Puerto Rico: Mayagüez (M. R. Smith leg.)
Jamaica: Kingston (E. A. Chapin leg.), Mill Gully, Green Mts. (? leg.)
Virgin Islands: St. Croix (W. F. Buren leg.)

A variety was also described from specimens taken in Dublin greenhouses (see below).

In my 1957 paper (p. 6), I stated my opinion that *T. lucayanum,* despite its wide distribution in the West Indies, must be a post-Columbian immigrant to the New World, and that it most likely came from Africa. Repeated attempts to match its types with Old World *Tetramorium* species represented in

American museum collections all led to failure; though *T. lucayanum* did seem to be more or less closely related to certain African *Tetramorium,* it was apparently not conspecific with any available samples from the Old World.

In 1963, when I had an opportunity to visit the classical European ant collections, I took along digms of *T. lucayanum* (from Jamaica) in the hope that I would be able to make their match. I am pleased to report that the search was successful. The type of *T. camerunense* var. *waelbroeki* turns out to be the African representative of *T. lucayanum,* and the following synonymy is in order:

Tetramorium lucayanum

Tetramorium lucayanum Wheeler, 1905, Bull. Amer. Mus. Nat. Hist. 21: 100, fig. L, worker. Type locality Nassau, Bahamas. Syntype in American Museum of Natural History, New York.

Tetramorium camerunense var. *Waelbroeki* Forel, 1909, Ann. Soc. ent. Belg. 53: 53, worker. Type locality "Kinchassa" [Kinshasa], Congo. Holotype in Coll. Santschi, Naturhistorisches Museum, Basel; examined 1963. New synonymy.

Tetramorium camerunense var. *Woelbroecki* (!), Santschi, 1914, Boll. Lab. Zool. Portici 8: 367, fig. 29, worker; Lagos, Nigeria.

Tetramorium lucayanum var. *sexdens* Forel, 1915, Bull. Soc. vaud. Sci. nat. 50: 357, worker. Type locality Dublin, Ireland, in greenhouse. Holotype in Muséum d'Histoire Naturelle, Geneva, examined 1963. New synonymy.

Tetramorium rectinodis (!) Menozzi, 1942, Zool. Anz. 140: 176, fig. 2B, worker. Type locality Fernando Po. Types presumably in Istituto di Entomologia della Universitá, Bologna; not seen. Eidmann, 1944, Zool. Jahrb. Syst. 76: 454, fig. 13, worker (good figures). Provisional new synonymy.

So far as one can tell from the material currently available, *T. camerunense* and *T. lucayanum* are separate species. *T. lucayanum* has a longer, lower petiolar node with slightly convex dorsum; a sharp transverse carina separates the dorsum of the node from its anterior face. (The carina is not shown in Wheeler's figure, which is rather sketchy where details are concerned.) The *T. camerunense* samples I have seen, including the type, all have the petiolar node shorter and higher, and more "blocky" as seen from the side. I took what I believe to be *T. camerunense* sympatrically in the Banco Forest Reserve, near Abidjan, Ivory Coast, with two slightly different kinds of what I refer to *T. lucayanum.* One of these (A-109) is very like the West Indian *lucayanum,* except that the postpetiolar costulae are distinct and crowded, giving the appearance of coarse striation; this series came from a nest in a tall red-rotten tree stump, about 2 m above the ground. The other form was collected twice in the Banco Reserve (A-71, A-76), both times as strays in the leaf litter; its petiolar node is slightly higher, without distinct cross-costulation as in the West Indian and A-109 examples, and its postpetiole has no distinct longitudinal costulae and is predominantly smooth and shining discad. This second form might even eventually prove to be a sibling species, but the African *Tetramorium* vary so much that it seems more likely at the moment that these variants from Banco are just different forms of one species.

Wheeler gave 5 as the number of mandibular teeth in his types, but the number is 6 or 7 if one counts all of the irregular denticles on the basal half of the masticatory margins; these small teeth are difficult to see.

A specimen of *T. lucayanum* has also been seen from Monrovia, Liberia (E. S. Ross leg.), showing that this species is widespread in West and Central Africa. It may be that the West Indian stock arrived in ballast or timber, or perhaps with the slave trade, in a ship from Africa during the early days of New World colonization. At any rate, it is now clear that Africa was its original home.

This paper is a by-product of work done in West Africa and in Europe during 1963 toward a reclassification of family Formicidae, sponsored by the National Science Foundation (Grant G-23680).

Effect of Photoperiod on Molting of Chortophaga viridifasciata (De Geer) (Orthoptera: Acrididae)

William H. Halliburton[1] and Gordon Alexander,
Department of Biology, University of Colorado,
Boulder, Colorado

Most species of Acrididae in temperate regions overwinter in the egg stage—in diapause—but a few species pass through the winter in a late juvenile stage. These overwintering nymphs, usually in the third or fourth instar, are dormant during cold weather. They become active whenever there is a warm period during the winter, but they rarely molt during the winter, even during prolonged periods of mild weather. Is this period of suspended molt comparable to what we usually call diapause? If it is a form of diapause, is it facultative or obligatory—to use terms adopted by several previous investigators (Andrewartha 1952, Lees 1955)—and what environmental factors are associated with it?

The most abundant acridians overwintering as nymphs in northern Colorado are *Arphia conspersa* Scudder, *Eritettix simplex tricarinatus* (Thomas), and *Xanthippus corallipes leprosus* Saussure. Less frequent but present in the same region is *Chortophaga viridifasciata* (DeGeer). Juveniles of all these species are active in midwinter during periods of mild temperature, but only one, *Arphia conspersa,* occasionally molts into the adult condition during prolonged periods of warm winter weather. (On one occasion in late January, and a few times in February, the second author has collected adults of this species near Boulder, Colorado.) Molting in the other species is delayed until April or May (March or April for most individuals of *Arphia conspersa*). The nymphs appear to be in

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[1] Present address, Rt. 1, Clarksville, Tenn. The experiments on *Chortophaga viridifasciata* here reported were conducted by the first author in partial fulfillment of the requirements for the Master's degree. This study was under the direction of the second author, who has contributed the general material and has prepared the whole for publication.

diapause as far as development is concerned, and this diapause is not broken by increased temperature. The most likely variable other than temperature that might release them from diapause is the increasing photoperiod (Lees 1955, 1959).

Several observations by the second author suggest that increasing photoperiod is indeed the probable factor that induces molting in overwintering nymphs. On several occasions overwintering nymphs were brought into the laboratory at Boulder, Colorado, after periods of cold weather. Mere exposure to the higher temperature of the laboratory failed to induce molting; in these observations, there was no modification of the natural photoperiod. In specimens that survived long enough, molting began at the end of winter, in March or April, after weeks of exposure to room temperature. The only environmental variable at the time of molting was, apparently, the increasing length of day.

With the possibility in mind that the longer photoperiod is a stimulus for molting in juvenile grasshoppers, the first author undertook a series of experiments at his home near Clarksville, Tennessee. These were based on the assumption that if a long photoperiod releases nymphs from diapause one might expect to find more molts in a group of nymphs exposed to a long day than in a group exposed to a short day. Such a correlation would suggest the stimulus under which a grasshopper might have two broods during a long summer season and still overwinter as a nymph.

The experiments were carried out on *Chortophaga viridifasciata* (DeGeer), a widespread species that overwinters as a juvenile in much of its range— including northern Tennessee, where the experiments were conducted. In the area of study *Chortophaga* is abundant in suitable habitats, particularly south-facing, grass-covered slopes. It persists through the winter in the juvenile condition, though two generations may occur during the long summer. This variation in its life cycle suggests that it might be particularly susceptible to the effect of change in photoperiod.

In the locality of study large numbers could be collected in a short time. The nymphs were collected with care not to injure them; they were not netted but were caught individually in glass jars placed over them. The method of study involved placing third and fourth instar nymphs in cages of uniform size. These cages were eight inches square, nine inches high, with wood tops and bottoms, wood frames, fine wire screen on three sides, and a sliding glass door on the front. Canopies to exclude light from these cages were constructed of plywood; they were three to four inches larger in each dimension than the cages to be covered.

The experiments were conducted in a basement laboratory in which the temperature was maintained constant at 72° F. The relative humidity was not regulated but remained fairly constant at about 55%. Light for each cage was provided by two 100-watt white-light lamps, one about five inches from each side of the cage. In each experiment, each cage was under separate photoperiodic control. All lights were turned on every morning at 6 o'clock. An opaque canopy was placed over each cage as it came to the end of its assigned photoperiod. All lights were turned off at the end of the longest photoperiod of each experiment, at which time all canopies were removed.

At the beginning of each experiment twenty nymphs were placed in each cage. These were provided with fresh food and water daily. The food in early winter was Japanese clover, bluegrass, or Johnson grass, the variety being dependent upon what was available but the same food being used each day in each cage. Later in the winter, cultivated winter rye was supplied. Water was supplied in small vials with cotton wicks. The cages were cleaned daily, and in this process the exuvia were recovered and counted. Thus a daily record of molts was maintained.

The first experiment was begun September 17, 1961, and was carried on 82 days. Three cages were involved, each with 20 nymphs. One was exposed to a 6-hour photoperiod, one to a 10-hour photoperiod, and the third to a 14-hour photoperiod. Twenty-four molts occurred in the cages subjected to a 6-hour day, 30 under the 10-hour day, and 46 under the 14-hour day. Thus, the number of molts was directly correlated with length of photoperiod.

The second experiment was carried on for ten days only, from December 18, to December 27, 1961. Two cages were used, one under a 6-hour photoperiod, the other under 14 hours of light daily. Six molts occurred among the twenty specimens in the 6-hour photoperiod, sixteen under the 14-hour photoperiod.

The third experiment was modified to provide extreme contrast. Two cages were used, one exposed to a 1-hour photoperiod, the other to a 12-hour photoperiod. (It should be noted that although there is a big difference in day length, a 12-hour day is actually not a long photoperiod.) During the 30-day period of this experiment, which lasted from December 28, 1961, to January 26, 1962, twelve molts occurred among the 20 nymphs subjected to the 1-hour photoperiod while 25 occurred under conditions of a 12-hour day.

All these experiments were carried on with temperature controlled at 72° F. Only one experiment testing temperature was conducted. Twenty nymphs under a 12-hour photoperiod at 60° F. molted approximately 20% less frequently than did those in a similar cage maintained at 72° F. In other words, a 12-degree (F.) difference in temperature had much less effect than a difference of a few hours of daylight.

One final experiment was carried on outdoors, during the summer of 1962 (June 14 to July 14). Two cages were used, and they were exposed to natural fluctuations of temperature and relative humidity. One cage was exposed to the natural photoperiod (average 15 hours); the other was covered every day after approximately six hours of daylight. Twenty-nine molts occurred among the nymphs exposed to the 15-hour photoperiod; only nineteen molts occurred under the 6-hour day (even with a temperature range from 75° to 102° F.)

It seems reasonable to assume, on the basis of our observations and experiments, that increasing photoperiod rather than increasing temperature is the major factor in releasing overwintering juvenile grasshoppers from diapause, a diapause that we should probably call facultative. The observations here summarized are, however, merely strong suggestions in that direction. More extensive experiments, involving various species, will be required before this statement may be made a valid generalization for all overwintering juvenile grasshoppers.

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A Note on the Beetle Knausia crassicornis Fall (Heteromera, Alleculidae)

In the process of acquiring study material of the family Alleculidae for a revisionary treatment, two males of *Knausia crassicornis* Fall were received from Dr. Henry F. Howden of the Entomology Research Institute, Canada Department of Agriculture. These were taken by Henry F. and Anne T. Howden, one at Deming, New Mexico, June 9, 1956, and the other at Lordsburg, New Mexico, July 4, 1956. This beetle was described as the sole species of a new genus by Fall (*Journ. Kansas Ent. Soc.* 1931, 4: 15–16) from a single specimen collected by Dr. Warren Knaus at Deming in June, 1905, and now in the Museum of Comparative Zoology. This new finding brings the total of known specimens to three. Eventually one specimen will be returned to Dr. Howden and the other will be retained by the author.—JAMES D. MARSHALL, Department of Entomology, Cornell University, Ithaca, New York.

Review

A SYNONYMIC LIST OF THE NEARCTIC RHOPALOCERA. By **Cyril Franklin dos Passos.** Memoir No. 1, The Lepidopterists' Society. Available from Mr. Sidney Hessel, Entomology Section, Peabody Museum of Natural History, Yale University, New Haven, Connecticut. No price stated. v + 145 pp. 19 February 1964.

This list has been in the hands of the printers for five years or more. Mr. dos Passos submitted the completed manuscript to the editor for the Lepidopterists' Society in 1958. At least half a dozen times the material was ready to be run only to have the editor make format changes that required extensive re-setting of the type. During this time dos Passos added new names as they appeared in publication but could not take advantage of generic and family studies beyond those used for the initial manuscript. The greatest contribution made by this new check-list is to be found in the dates assigned to the names. For many years dos Passos has been known for his meticulous studies of the publication of early entomological works. The dates allow a student, with access to the Zoological Record, to find references to original descriptions. Thus the check-list is only one step removed from being a catalogue of original descriptions. Where the International Commission on Zoological Nomenclature has delivered an Opinion upon a name, the Opinion number and name number has been cited. The names used in the list adhere strictly to the conventions of the Code.

While there are very few nomenclatorial decisions of the author that are debatable—one being the authorship of *L. wiedemeyerii oberfoelli*—there are numerous taxonomic decisions that will be contested by students of particular genera and families. This is a risk that any compiler of a check-list must face. The list departs from all previous lists in the sequence of the families. In this it also departs from the sequence used in the Zoological

Record. The families are ordered "lower" to "higher," following Warren.[1] This reverses the usual sequence.

Users of the check-list will welcome dos Passos's inclusion of generic synonyms and statement of the type species for the accepted generic names.

Although the title implies that the list covers the Nearctic fauna, it does not. It is restricted to that part of the fauna that inhabits the United States, excepting Hawaii, and Canada. It does not include species found solely in the peninsula of Lower California or in those parts of Mexico usually included in Nearctica.

When dos Passos's list is compared with McDunnough's,[2] the last check-list published before this one, it will be seen that there is an over-all decrease in the number of species recognized from 692 to 682. This is some measure of the synthesis achieved by the author. It is best indicated by summaries of the families.

Megathymidae—increased from 8 to 19 species, largely the result of studies by H. A. Freeman and by Stallings and Turner, who have demonstrated the importance of the immature stages as indicators of specific differences.

Hesperidae—increased from 208 to 222 species. Actually there are included as species only five names that are post-McDunnough. The increase has been brought about by better understanding of the family. Dos Passos leaned heavily upon Brigadier Evans's [3] monumental work upon the American Hesperioidea. This has introduced several changes that may puzzle collectors. They are based upon recognition of previously neglected or mis-identified names proposed by the early authors. Two examples will suffice: *oileus* Linnaeus surplants *syrichtus* Fabricius, and *coras* Cramer replaces familiar *peckius* Kirby.

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[1] Warren, B. C. S., 1947. Some principles of classification in Lepidoptera, with special reference to the butterflies. Entomologist 80: 208–217, 235–241, 262–268, 280–282.

[2] McDunnough, James, 1938. Check-list of the Lepidoptera of Canada and the United States of America. Part 1, Macrolepidoptera. Memoirs of the Southern California Academy of Sciences, vol. 1, 275 pp.

[3] Evans, Brig. W. H., 1951, 1952, 1953, 1955. Catalogue of American Hesperiidae. British Museum (N. H.), London.

Papilionidae—reduced from 88 to 87 species. There are no striking changes here, those that have been made represent growth in our appreciation of the family.

Riodinidae—increased from 15 to 19, reflecting normal growth in our knowledge of this obscure family. Edward's *Euselasia abreas,* long omitted from lists, is returned.

Lycaenidae—increased from 124 to 133 species. The increased interest in this family is responsible for the changes, especially among the "Blues." That part of the family is reorganized in the light of studies by Nabokov and by Stempfer based upon world-wide surveys. Clench's splintering and reorganization of the Hairstreaks is not included since most of the work was done after the initial manuscript had been completed and since the segregations proposed by Clench have not yet been fully evaluated by other specialists in the subfamily.

Libytheidae—increased from 1 to 2 species, recognizing Michener's work.

Nymphalidae—decreased from 181 to 147 species. The decrease is almost entirely due to the drastic change in point of view about *Speyeria* in accord with the work of dos Passos, L. P. Grey and their associates. Higgins's and Bauer's studies of the Melitaeine genera have been used.

Danaidae—reduced from 7 to 5 by the long over-due elimination of the Ithomids improperly assigned to the fauna studied.

Satyridae—decreased from 59 to 48 species. This was accomplished almost entirely by dos Passos's studies of *Cercyonis* and *Oeneis,* both unpublished.

Technically, the book is printed in very legible form on good paper and is well organized, but unfortunately it is very poorly bound. A new, and wholly unsatisfactory technique was used at the Society's request to save expense. After a few hours of use my copy has loose pages. The paper-bound edition cannot easily be cased in cloth and made secure. This can be done by having it spiral or plastic bound, a nuisance and an additional expense to the user.

F. Martin Brown,
Fountain Valley School,
Colorado Springs, Colo.

Insects

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CONTENTS

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ENTOMOLOGICAL NEWS

Vol. LXXV JUNE, 1964 No. 6

A New Pelopia from Mexico (Diptera: Tendipedidae)

Selwyn S. Roback, Curator, Department of Limnology,
Academy of Natural Sciences of Philadelphia,
Pennsylvania

The following new species was found in material loaned the author by Dr. J. R. Vockeroth, Research Branch, Canadian Department of Agriculture for a study of the Pelopiinae of America north of Mexico.*

Pelopia catemaco n. sp.

This species differs from the most closely related species, *P. carinata* (Subl.) and *P. stellata* (Coq.) in the more extensive maculation of the wing and the presence of distinct dots in the costal cells, Fig. 2, rather than a more general infuscation, Fig. 1. The markings of the femora and tibiae are less distinct than those generally found in *P. stellata*. The dististyle lacks the large carina of *P. carinata*.

Pelopia catemaco n. sp.

Male—2.4 mm; head brown; antennal pedicel dark brown; antennal ratio 2.0; maxillary palpus four segmented; segments in ratio 18:30:44:78; ratio of interocular space to dorsal eye extension 1.0.

Pronotum brown; dorsal lobes meet at apex of mesonotum but diverge widely from this point; some light hairs latero-ventrally.

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* The support of the National Science Foundation in this project is gratefully acknowledged.

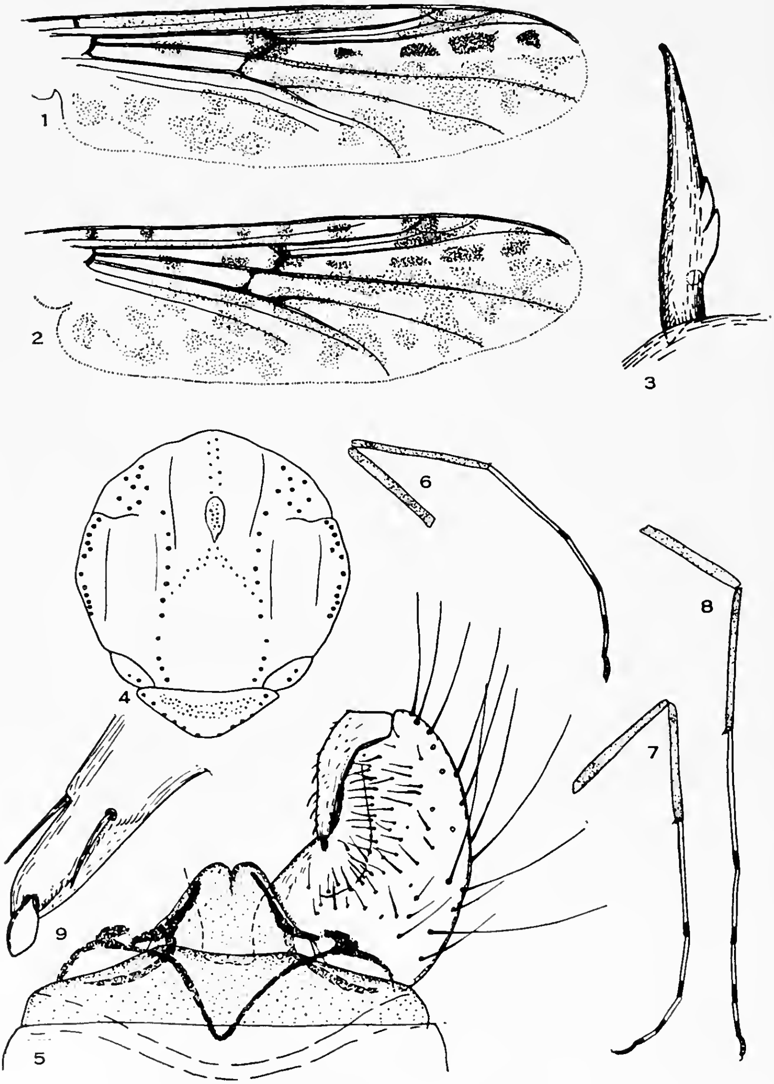

FIG. 1. *Pelopia stellata* (Coq.), Tennessee. Wing.
FIGS. 2–9. *Pelopia catemaco* n. sp. 2. Wing. 3. Spur of tibia I. 4. Mesonotum and scutellum, dorsal. 5. Genitalia. 6. Leg I. 7. Leg II. 8. Leg III. 9. Detail of apex of dististyle.

Mesonotum dark brown, pollinose; humeri slightly lighter; vittae not distinct; humeri with 8 hairs; supra-alars with 13 hairs; dorso-centrals uniserial, continue to base of scutellum; some fine acrosticals present anterior to the low, light-brown mesonotal tubercle; hair pattern of mesonotum as in Fig. 4; pleurae brown; sternum darker brown; both pollinose; scutellum and postnotum dark brown.

Leg maculation as in Figs. 6–8; preapical light band of femora very indistinct as are tibial markings; leg ratio I–.75, II–1.0, III–.97; spur of tibia I, Fig. 3, .053 mm; spurs of tibia II .046 and .038 mm; spurs of tibia III .051 and .031 mm; a preapical comb of about six spines on tibia III; claws spatulate apically; empodium present; no pulvilli.

Wing 2.1 mm; maculation as in Fig. 2; Cu_2 3.75 times length of petiole of *fCu,* distance between crossveins on *M* .42 length of petiole of *fCu,* halteres with shaft brownish, globe light.

Abdominal tergites brown, slightly lighter apically; basistyle brown, .168 mm long, dististyle .097 mm, lighter, Fig. 5; moderately curved with a suggestion of a carina near the apex, Fig. 9.

Holotype.—Lake Catemaco, Veracruz, MEXICO 10–VIII–60 (H. Howden) in Canadian National Collection.

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A New Subspecies of Cerceris robertsonii Fox from the Southeast (Hymenoptera, Sphecidae) [1]

HERMAN A. SCULLEN, Oregon State University, Corvallis

This new subspecies from Florida and Georgia is being described at this time so that a name will be available for Dr. Karl V. Krombein who is publishing biological notes relating to the above subspecies.

Cerceris robertsonii emmiltosus, new subspecies

Female: Length 11 mm. Black with yellow and ferruginous markings; structurally like the nominate subspecies except as indicated below.

Head black except for the face, basal two-thirds of the mandibles and the scape, all of which are yellow; clypeal lamella with little or no emargination, never completely divided at the meson.

Thorax black except the entire pronotum, scutellum, metanotum and the tegulae, all of which are ferruginous; legs ferruginous; wings heavily clouded.

Abdomen black except the first three terga, trace on the posterior margin of tergum 4, the first sternum, band on sternum 3 and the pygidium, all of which are ferruginous.

This subspecies is very similar to another new subspecies, to be described in my forthcoming revision, and differs only in the form of the clypeal lamella.

Male: Unknown.

Type: The type ♀ from Miami, FLORIDA, March 29–30, 1953 (K. V. Krombein) is at the U. S. National Museum, No. 66166. *Paratypes:* FLORIDA: ♀, Avon Park, Okeechobee, April 4, 1953 (C. M. Yoshimoto); ♀, Lake Placid, June 28, 1962 (K. V. Krombein; note no. 62862A); 2 ♀♀, Marco, April 1, 1953, March 28, 1954 (H. E. Evans). GEORGIA: ♀, "Georgia."

Distribution: Florida and one record, without locality, from Georgia.

Prey Record: None. *Plant Record:* None.

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[1] Supported in part by grants from the General Research Fund, Oregon State University, Corvallis and the National Science Foundation.

A New Species of Kurodaia (Mallophaga: Menoponidae), with Additional Notes on the Genus[1]

Roger D. Price, University of Minnesota

Since the revision of *Kurodaia* Uchida, 1926, by Price and Beer (1963), a series has been obtained of an undescribed species of this genus from an owl. The description of this new species, together with pertinent information for several other *Kurodaia* species, is included in this paper.

Kurodaia gnomae, n. sp.

Type host. *Glaucidium gnoma gnoma* Wagler.

Female. As in Fig. 1. Head without evidence of mid-dorsal setae; 2 very long marginal temporal setae; inner occipital setae long, outer setae minute. Gula tapered posteriorly, uniformly pigmented, with 5–6 long setae on each side. Margin of pronotum with 2–3 short and 5 long setae on each side. Metanotum marginally with 10 long and 1–2 short setae; metasternal plate with 9–10 medium setae. Tergocentral setae long to very long: I, 7–11; II–VII, 11–14; VIII, 7–8. No anterior tergal setae on any abdominal segments. Postspiracular setae very long on I–VIII. Margin of tergite IX with short, very long, and long seta on each side. Abdominal sternites with marginal row of long setae (I, 6–8; II–IV, 11–16; V–VI, 20–26; VII, 13–15) and anterior row of shorter setae (I, 2; II–VI, 7–10; VII, 3–4). Sternites III and IV each with single lateral comb row; that on III with 9–17 setae, on IV with 7–11; margin of sternite V laterally with 1–2 setae resembling those of combs. Sternites VII–IX fused, with vulval margin having 22–26 evenly spaced medium setae and anteriorly 11–12 on VIII–IX. Small postvulval plates each with 3 long setae. Anal fringe ventrally with 16–19 setae, longer and stouter laterally; dorsally with 25–28 fine setae. Dimensions (in mm): preocular width, 0.42–0.43;

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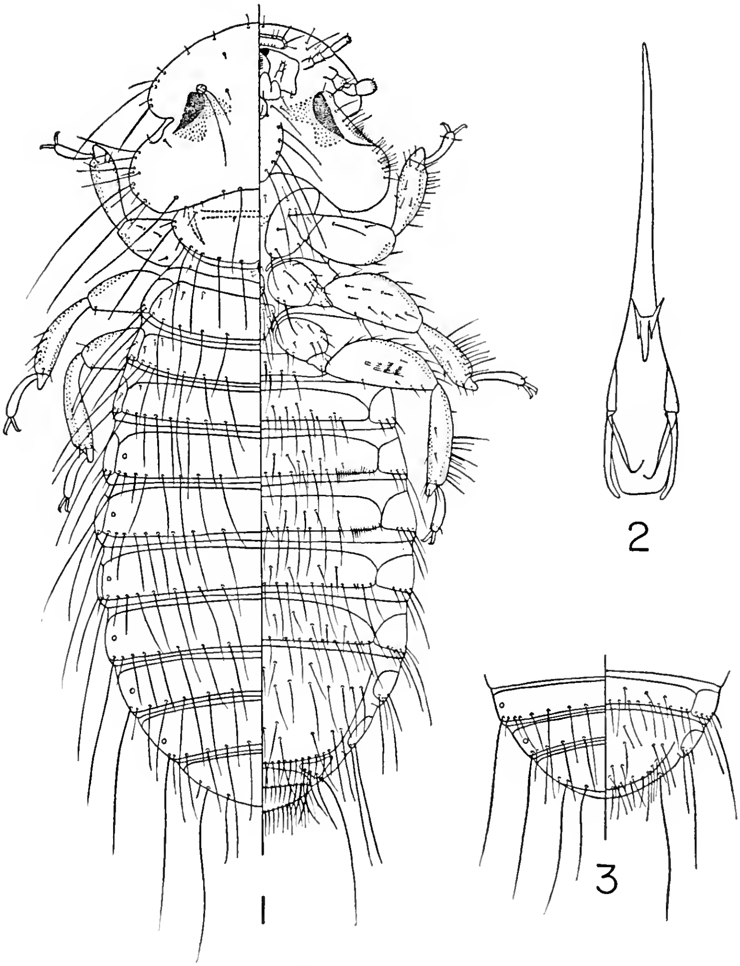
[1] Paper No. 5285, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul, Minnesota 55101.

temple width, 0.52–0.54; head length, 0.34–0.36; prothorax width, 0.33–0.35; metathorax width, 0.45–0.46; total length, 1.54–1.56.

Male. As for female, except for differences in terminal segments (Fig. 3) and for slightly smaller size. Inner posterior seta on tergite IX longer. Sternite VIII with only 7 marginal and 2 anterior setae. Genital plate with approximately 30 setae of varying lengths. Genitalia (Fig. 2) with delicate genital sclerite and penis, rather poorly defined for the only specimen available. Dimensions (in mm): preocular width, 0.40; temple width, 0.47; head length, 0.33; prothorax width, 0.31; metathorax width, 0.40; total length, 1.31; genitalia length, 0.51.

Kurodaia gnomae agrees essentially with the generalized description of the owl *Kurodaia* as given by Price and Beer (1963). Its dorsal chaetotaxy, aside from apparent absence of mid-dorsal head setae and the presence of a longer stouter inner posterior seta on tergite IX, is close to that of *K. cryptostigmatia* (Nitzsch). Ventrally the most striking difference from all other *Kurodaia* known to date is the presence of a single full comb row on both sternites III and IV, and one to several setae on V similar to those of the comb rows. According to the generic concept of *Kurodaia* by both Price and Beer (1963) and Clay (1947), individuals of this genus were believed to have 2 or more comb rows on sternite III and only a suggestion of a few setae forming a limited comb row on IV. Since all other features of *K. gnomae* agree with the definition of *Kurodaia,* I see no reason at least for the present to consider this species as being outside of this genus. The small postvulval plates with their 3 long setae as well as the chaetotaxy of the vulval margin and anus further distinguish females of *K. gnomae* from other species. The male genitalia seem closest to *K. painei* (McGregor), but differ in smaller size and in shape of the genital sclerite. Both sexes also are the smallest of the known owl *Kurodaia.*

Material examined: 3 females, 1 male from *Glaucidium gnoma gnoma,* Victoria, Tamps., Mexico, 31 May 1960, Miles. Holotype female, allotype male at United States National Museum; female paratype both in the collection of Dr. K. C. Emerson and at the University of Minnesota.



Figs. 1–3. *Kurodaia gnomae*, n. sp. 1. Dorsal-ventral view of female. 2. Male genitalia. 3. Dorsal-ventral view of terminal segments of male.

Kurodaia cheelae Price and Beer, 1963

Since the description of this species from a single female, I obtained a male from *Spilornis cheela* (Latham), Mutya, Canon, Philippine Islands, Dec. 25, 1961, Rabor and Gonzales; this specimen presumably is of this species. Although head shape is much like illustration of female *K. cheelae,* the remainder of morphology, including genitalia, and chaetotaxy is quite close to male of *K. fulvofasciata* (Piaget). However, *K. cheelae* differs in lacking anterior setae on abdominal tergites I, III, V–VIII, and having only 1 on II and 2 on IV; this paucity of anterior tergal setae agrees well with the condition of the female of this species.

Additional host records:

Kurodaia fulvofasciata (Piaget)—*Accipiter trivirgatus* (Temminck) from Philippine Islands and Formosa.

Kurodaia platyclypeatum (Piaget)—*Otus bakkamoena* Pennant from Formosa and Malaya; *O. scops* (Linn.) and *O. spilocephalus hambroecki* (Swinhoe) from Formosa.

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Miscellaneous Notes on Ammophila (Hymenoptera, Sphecidae)

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Most of the following data are the result of type studies by the author. In addition, R. M. Bohart, University of California, took valuable notes on some *Ammophila* types in European museums which have enabled me to designate lectotypes for a few species. I would like to thank the following curators for lending types in their care (abbreviations enclosed in brackets are used when referring to these collections): Hugo Anderson, Zoological Institute, University, Lund (LUND); F. Español, Instituto Municipal de Ciencias Naturales, Museo de Zoologia, Barcelona (BARCELONA); Dr. Gross, Landeshaupstat Wiesbaden, Städtisches Museum, Wiesbaden (WIESBADEN). Other type depositories cited are: Museum of Comparative Zoology, Harvard University (MCZ); United States National Museum (USNM); British Museum (Natural History) (BMNH); Museo Civico di Storia Naturale, Genoa (GENOA); Museum National d'Histoire Naturelle, Paris (PARIS).

Ammophila mutica Dahlbom

Ammophila mutica Dahlbom, 1845, Hymen. Europea, vol. 1, fasc. 3, p. 431. Holotype (gynandromorph), "Brasilia" (LUND).

Ammophila moneta Smith, 1856, Cat. Hymen. Insects Brit. Mus. 4: 219. Lectotype ♀, Brazil (BMNH type #21.794b). Present designation. New synonymy.

Ammophila fragilis Smith, 1856, Cat. Hymen. Insects Brit. Mus. 4: 219. Lectotype ♀, Brazil (BMNH type #21.796). Present designation. New synonymy.

? *Ammophila pilimarginata* Cameron, 1912, Timehri, Jour. Royal Agric. Comm. Soc. Brit. Guiana 2: 429. Holotype ♂, Demarara, British Guyana (BMNH). *Teste* Richards, 1937.

I have examined the type of Dahlbom's long forgotten *Ammophila mutica,* and found that it is the common South American species usually referred to as *fragilis* Smith. Bohart's notes on the types of *fragilis* and *moneta* indicate they are synonymous with *mutica*. Richards (1937) synonymized *pilimarginata* Cameron with *fragilis* after comparison of the types of the two species. I place Cameron's name here only tentatively however, until I can personally study the type.

The type of *mutica* is a partial gynandromorph. The left half of the head, prothorax and mesothorax, including associated appendages, is male. The metathorax and abdomen appear to be female. Dahlbom seems to have been aware of this condition since his label on the type says, "Ammoph. mutica nov. sp. ♂, ♀," In *A. mutica* the abdomen may be completely black or display varying amounts of red on the second petiole and first gastral segments. Dahlbom's type is the all black form.

Ammophila lampei Strand

Ammophila chilensis nigripes Reed, 1894, Anal. Univ. Chile 85: 622. Holotype ♀, Valparaiso, Chile (MCZ). Preoccupied by *Ammophila nigripes* Smith, 1856.

Ammophila lampei Strand, 1910, Jahrb. Nassauischen Vereins Nat. Wiesbaden 63: 13. Lectotype ♀, Guaqui, Peru (*recte* Bolivia) (WIESBADEN). Present designation.

Sphex peruvianus Rohwer, 1913, Proc. U. S. Natl. Mus. 44: 453. Holotype ♀, Cuzco, Peru (USNM). New synonymy.

I have examined the types of *nigripes, lampei* and *peruvianus*. The coarse close punctation of the meso- and metathorax and the greatly swollen clypeus of the female are distinctive. The clypeus of the male is covered with silver pubescence, but elsewhere the only appressed silver pubescence on the body occurs on the pronotal lobe and at either side of the petiole socket in the two sexes. The head, thorax and legs are black. The tegulae vary from reddish brown to black. In some specimens only the second petiole segment is red, while in others the entire petiole and first gastral segment may be red. Intermediate color forms also exist.

Ammophila lampei appears to be a high altitude species. The specimens I have examined were collected at elevations ranging from 9,000 to 12,000 feet in southern Peru, Bolivia and northern Chile.

Ammophila rufipes Guérin-Méneville

Ammophila rufipes Guérin-Méneville, 1831, Voy. autour Monde la Coquille, Atlas plate 9, fig. 1. Holotype ♀, Lima, Peru (GENOA).

? *Ammophila variolosa* Giner Mari, 1944, Bol. Soc. Española Hist. Nat. 42: 351. Lectotype ♂, Lima, Peru (BARCELONA). Present designation.

I have studied one of Giner Mari's syntypes of *variolosa* and have selected it as lectotype. *A. variolosa* probably is the same as *rufipes* but I have not seen Guérin-Méneville's type and Bohart's notes on it are not sufficient for purposes of synonymy. Homotypes of *variolosa* are in the author's collection.

Ammophila apicalis Guérin-Méneville and **Ammophila apicalis** Brullé

The works in which these two species were described were published in the 1830's. The title pages of the volumes concerned have compound dates printed on them: 1829–1844 in the case of Guérin-Méneville's work and 1836–1844 in Brullé's paper. Because of confusion as to the dates of publication both species have received new names. In 1856, F. Smith renamed Brullé's *apicalis* as *terminata,* apparently using the first year of publication indicated in each work to determine priority. In 1897 Dalla Torre renamed Guérin-Méneville's *apicalis* as *guerinii.* He used 1840 as the publication date for Brullé's species and 1845 for *apicalis* Guérin-Méneville. It is now known that Smith's action in renaming *apicalis* Brullé was correct, although his dates were not. Stearn (1937) and Van der Vecht (1957) have cleared up the dates of publication of the two works. Accordingly, the proper citation and synonymy of both species is given below.

Ammophila apicalis Guérin-Méneville

Ammophilus apicalis Guérin-Méneville, 1835. Iconographie Regne Animal, Planches des Animaux-Invertebres, pl. 70, fig. 3. (Text, 1844, p. 435). Holotype ♂, Cuba (GENOA).

Ammophila guerinii Dalla Torre, 1897. Cat. Hymenopterorum, 8: 400. New name for *Ammophila apicalis* Guérin-Méneville.

In using *Ammophilus* instead of *Ammophila* Guérin-Méneville compounded Latreille's 1802 error of emending Kirby's name *Ammophila* to *Ammophylus.* Guérin-Méneville refers to Latreille's *Ammophylus* at the beginning of the description of *A. apicalis.* The 1835 date of publication for *apicalis* Guérin-Méneville has priority over 1844 because it satisfies the "indication" requirement of Article 16 (a) (viii) of the International Code of Zoological Nomenclature, 1961.

Bohart studied the type of *apicalis* in Genoa. The specimen is labeled female but it is a male. *A. apicalis* appears to be the only species of *Ammophila* occurring in the West Indies, and it is very similar to *A. pictipennis* Walsh, a common species in the Eastern half of the United States. *A. apicalis,* however, has appressed silver pubescence on the face and pronotum in both sexes. The aedeagus and subgenital plate are nearly identical in the two species.

Ammophila terminata Smith

Ammophila apicalis Brullé, 1839, Hist. Nat. Iles Canaries 10 (livr. 44) : 92 (livr. 50, pl. 3, fig. 22, 1840). Holotype (sex unknown), Canary Islands (? PARIS).

Ammophila terminata Smith, 1856. Cat. Hymen. Insects Coll. Brit. Mus. 4: 210. New name for *Ammophila apicalis* Brullé.

This is an Old World species with a Mediterranean distribution.

Ammophila retusa Gistel

Ammophilus retusus Gistel, 1848, Naturges. Thierreichs Hohere Schulen, p. 142, pl. 12, fig. 28 (figure labeled *Ammophila retusa*).

Ammophila retusus Gistel, 1850, Handb. Naturges. Reiche, p. 466 (exact reprint of 1848 description but lacks figure).

This name does not appear in Dalla Torre's Catalogus Hymenopterorum and seems to have been overlooked by all European workers on the genus. This oversight probably stems from the fact that Gistel's works are rare.

Gistel's characterization of *retusa* is very brief and hardly can be called a description. However his color figure of the wasp gives some indication of the appearance of the insect. The second petiole segment and the first two gastral segments are red, with the remainder of the wasp black. Gistel's brief description is as follows: "Hieher *Ammophilus* mit Gattung *retusus* (gebogene), der seine Tier an Wegrändern in Locher legt; ganz schwarz; Mittelleib roth. In Deutschland. Wie *S. sabulosa*." This description is placed after a discussion of the appearance and habits of *Ammophila sabulosa* (Linn.).

The abdominal coloration would seem to eliminate the possibility of synonymizing *retusa* with *sabulosa* or *pubescens* Curtis, since these latter two species usually have the second gastral tergite black or only red basally. However, *A. campestris* Latreille commonly has the second gastral tergite completely red and it would seem best to synonymize Gistel's name with this species. Gistel's types, if still in existence, probably are in the museum in Munich, Germany.

Ammophila grandis Gistel

Ammophila grandis Gistel, 1857, Achthundert und Zwanzig neue oder unbeschriebene wirbellose Thiere, p. 45. Trieste, Italy.

This is another Gistel name which has escaped notice since its description. The original description is as follows: "A. nigra, fronte argenteo-sericea; abdominis segmentis duobus medianis rubris; alis infumatis. Long. 2 poll. Tergestum." Strand (1917) in his discussion of Gistel's paper listed *A. grandis* but did not attempt to identify the species. In view of the inadequate description this name probably should be suppressed on the basis of the 50 year rule (Article 23 (b), International Code of Zoological Nomenclature, 1961).

Ammophila pubescens Curtis

Ammophila pubescens Curtis, 1829–30. Guide Arrang. Brit. Insects, p. 122. Nomen nudum.

Ammophila pubescens Curtis, 1836. British Ento. 13: pl. 604.

Miscus arvensis Dahlbom, 1843. Hymenoptera, Europaea 1 (fasc. 1): 8. Holotype ♂, "Pensylv." (LUND). New synonymy.

Ammophila adriaansei Wilcke, 1945. Ent. Bericht. 11: 278. Holotype (sex unknown), Holland (type depository unknown).

I have studied Dahlbom's type of *arvensis*. It compares very favorably with material identified as *pubescens* by J. de Beaumont and J. LeClercq. The genitalia are missing on the type. Wilcke's description of *adriaansei* fits the type of *arvensis* except that the fourth abdominal segment (second gastral) is all black in *arvensis*. Undoubtedly the type of *arvensis* is of European origin but was mislabeled.

Both Fernald (1931, 1934) and Murray (1938 and 1951) considered *arvensis* a New World species. Considering that Fernald studied the type himself it is incredible that he applied Dahlbom's name to the United States species that has been masquerading under this name. The type of *arvensis* does not resemble the species called *arvensis* by Fernald. Since no other name exists for Fernald's "*arvensis*" I have recently described it as a new species, *A. evansi* Menke (1964).

Ammophila leclercqi Menke, new name

Ammophila yarrowi Leclercq, 1961, Rev. Española. Ent. 37 (2): 211. Holotype ♀, Extremadura, Badajoz, Spain (BMNH). Preoccupied by *Ammophila yarrowi* Cresson, 1876 (= *aberti* Haldeman, 1853).

Unfortunately Prof. LeClercq was unaware of Cresson's name when he described *yarrowi*. I take pleasure in renaming this species after Prof. LeClercq in recognition of his numerous contributions to Sphecid taxonomy.

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A Flea Named for Michael Grzimek

C. ANDRESEN HUBBARD, Tigard 23, Oregon, and Malaria Institute, Amani, Tanga, Tanganyika

High up on the Rim of Ngorongoro Crater, where the road from the south first threatens to fall into this vast pit and where one gets his first breath-taking view of the floor of this gigantic cauldron, which is eleven miles across, there sits a simple monument of native Tanganyika stone beneath which rests as perpetual warden so that the "Serengeti Shall Not Die" the body of young 25 year old Michael Grzimek. Young Michael and his father, who is director of the Frankfurt, Germany, zoo, had, for some years, been studying the migration routes of the tremendous numbers of game animals in the Serengeti and the Ngorongoro of northcentral Tanganyika, East Africa. On the morning of January 10, 1959, an African scout knocked on the door of the research hut of the senior Grzimek, entered and handed the doctor a note from the local game warden. It read: "I am sorry to tell you that Michael has crashed his aeroplane and been killed. He is lying at my house." That afternoon young Grzimek was laid to rest in a position to look forever over the huge depression which is the Ngorongoro and the vast grass plains to the north which are the Serengeti; in a position to be forever a warden of the keep of these fleet-footed animals which make this their home.

It is not known why this light zebra-striped research plane crashed, for Michael was an experienced pilot, but it is supposed the plane collided with a large bird. Crippled, the plane plummeted to the floor of the Crater, 4,000 feet below the Rim.

During July of 1962 about this monument and for miles around the mouse population had become so large that one had difficulty in not stepping upon mice. A medium sized chocolate brown, tan-bellied mouse taken at the monument carried 7 fleas which were determined as new and shall be called

Ctenophthalmus grzimeki n. sp.

in memory of, as stated on this lonesome Tanganyika monument sentinal,

Michael Grzimek
12.4.1934–10.1.1959
He gave all he possessed for the wild
animals of Africa, including his life.

There are before the writer at this time the holotype male and 3 paratype males, the allotype female and 2 paratype females, all taken off a single specimen of *Lophuromys flavopunctatus aquilus* (True, 1892). Although several hundred other mice of several species were examined from the vicinity none carried this flea so *L. f. aquilus* is designated as type host. The west Rim of Ngorongoro Crater is designated as type locality. The elevation is from 7,500 to 8,000 feet. The collection date is July 22, 1962.

Modified segments: Male. The fingers of Ctenophthalmus so far described from Tanganyika are distinct (Fig. 1). In *C. leptodactylus* it is boomerang shaped, in *C. gilliesi* it is apically war club-shaped, in *C. e. wilkesi* rectangular shaped, in *C. p. hopkinsi* tall dome shaped, in *C. c. hemingwayi* thumb shaped. The new species differs from these in that the finger resembles the finger of the American *Orchopeas sexdentatus* group but without the black spiniforms. The writer has usually referred

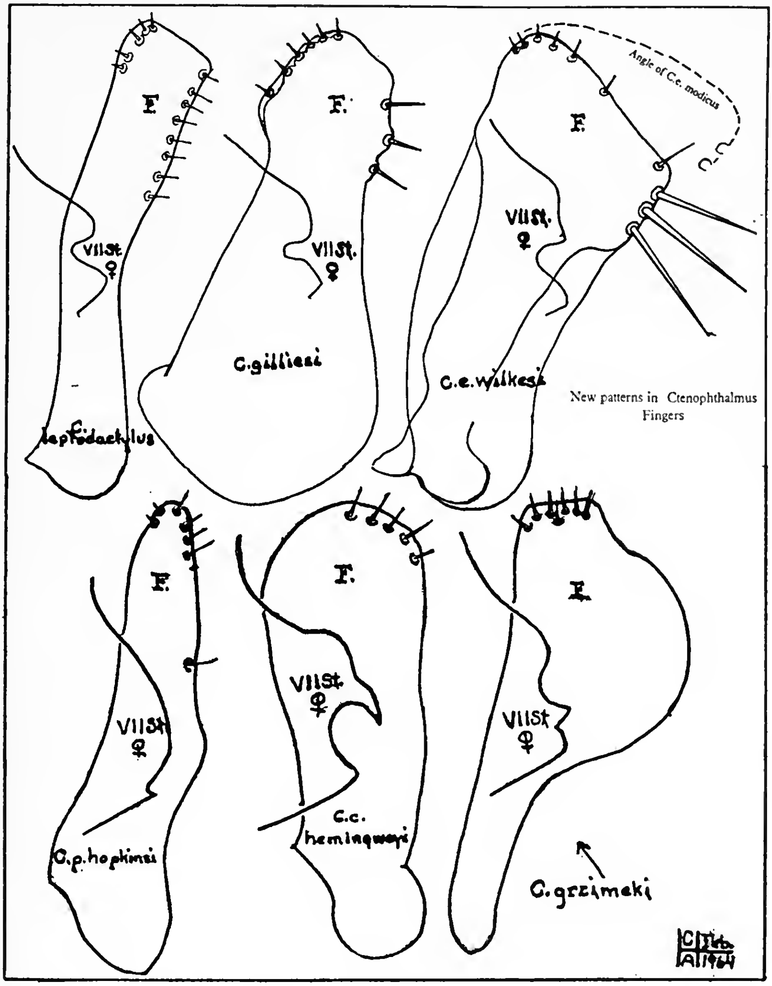

FIG. 1. *Ctenophthalamus leptodactylus* Hubbard, 1963; *C. gilliesi* Hubbard, 1963; *C. evidens wilkesi* Hubbard, 1963; *C. particularis hopkinsi* Hubbard, 1963; *C. cophurus hemingwayi* Hubbard, 1963; and *C. grzimeki* Hubbard, 1964.

to this shape as ham-shaped. At the apex and to the anterior the finger is armed with a few weak bristles. Female. The apical outline of the VII sternite is similar to the *C. cophurus* group but the upper and lower lobes are less prominent. Between the lobes at the midpoint in the valley is a small pointed tip.

Length: A medium sized flea. Male 2.00 mm, female 2.25 mm.

Range: This flea is known only from the type locality.

Deposits: The holotype male and allotype female are deposited in the Tring branch of the British Museum and the first paratypes in the U. S. National Museum. All bear the writer's number T849.

It may be of interest to know that the Michael Grzimek Memorial Laboratory is located at the north end of the Serengeti at Banagi some ten miles north of Seronera Lodge. The buildings at the laboratory are modern and museum-like and there specialists may come and study the natural history of the area. Information regarding the use of this self-contained work shop may be secured through the Director, Tanganyika National Parks, Arusha, Tanganyika, East Africa. Also, it seems to the writer that the easiest route into Banagi is from the west through Musoma on Lake Victoria. The road in from the south, if one can call it a road, is without water or gasoline or help and the 100 miles on beyond Ngorongoro Crater is one sand trap after another in one of which the writer's research truck was fast down to the body for half a day.

This is the first paper published by the writer on Tanganyika fleas and the eighteenth on world fleas under the United States National Science Foundation grant GB 1954, sixteen others having been published under N.S.F. grant G14023.

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Hydroptilidae (Trichoptera) of Maine

R. L. Blickle, Durham, New Hampshire [1]

The following list of Hydroptilidae resulted from the examination of light trap material taken during July and part of August, 1959. The collecting was done in the Boreal region of Maine.

There are forty-eight species in nine genera in the list, including two literature records. Of the forty-eight, five were recently described as new. A total of 19,563 male specimens was determined; however, the majority of these are included in three species. The numbers of these species were *Neotrichia hallia* Denning, 8,393; *Hydroptila jackmanni* Blickle, 3,813; and *Mayatrichia ayama* Mosely, 3,040. The genus *Hydroptila* contained the largest number of species, 20, and the genus *Oxyethira* was next with 13.

A comparison with the list from New Hampshire (Morse and Blickle 1953, 1957) which covers the Transitional (Alleghanian) zone gives some idea of the Hydroptilidae that may occur in the southwestern part of Maine, an area not covered in the present survey. There is a great similarity between the two state lists as to genera and species, although as would be expected the Maine material contains species which are more northern in distribution such as *Agraylea costello* Ross and *Oxyethira araya* Ross. Two genera not listed in the New Hampshire surveys taken recently in that state are *Palagapetus* and *Dibusa;* these were the only two genera not taken in the present Maine survey. It should be emphasized that most of the New Hampshire collections were made within ten miles of the southwestern part of Maine.

The Mt. Desert Region Insect Faunal Survey lists only three Hydroptilidae, two in the genus *Oxyethira* and one in the genus *Orthotrichia*. All of these seem to be species of the Transitional region rather than the Boreal region. Two, *Oxyethira pallida* Bks. and *Orthotrichia americana* (Bks.) have been taken in Florida.

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[1] Published with the approval of the Director of the New Hampshire Agricultural Experiment Station as Scientific Contribution No. 327.

In a few instances the locality is followed by a number system as Oxbow (T9 R5). This refers to the Township 9 Range 5, a system of numbering unincorporated towns in Maine.

The survey was made possible through the cooperation of Dr. A. E. Brower.

Agraylea Curtis

costello Ross, 69 specimens. Allagash, July 19–Aug. 5; East Machias, July 20; Oquossoc, July 31. **multipunctata** Curtis (Ross, 1944).

Hydroptila Dalman

albicornis Hagen, 12 specimens. Baker Lake, July 5; Oquossoc, July 17–25. **ampoda** Ross, 326 specimens. Allagash, July 5–Aug. 1; Baker Lake, July 5; Dennistown, July 14–31; East Machias, July 20, Lower Cupsuptic, July 5; Jim Pond, July 11–Aug. 3; Oquossoc, July 16–30; Oxbow (T9 R5), Tim Pond, July 5–28. **broweri** Blickle, 100 specimens. Allagash, July 22–29; Dennistown, July 14–25; Oxbow (T9 R5), July 19–Aug. 4; Oquossoc, July 17–31; Tramway, Aug. 3. **consimilis** Morton, 9 specimens. Allagash, July 27–30; Dennistown, July 25–31; Oquossoc, July 25–Aug. 4. **dentata** Ross, 3 specimens. Allagash, July 5–8. **fiskei** Blickle, 53 specimens. Allagash, July 29–Aug. 2; Dennistown, July 15–28; Oquossoc, July 17–Aug. 4; Oxbow (T9 R5), Aug. 4. **hamata** Morton, 20 specimens. Allagash, July 27–Aug. 1; Dennistown, July 14; Guerette, July 11; Oquossoc, July 31; Round Pond (T13 R12), July 13; Tramway, August 3. **jackmanni** Blickle, 3,813 specimens. Allagash, July 5–29; Dennistown, July 14–31; Oquossoc, July 19–Aug. 4. **maculata** Banks, 2 specimens. East Machias, Aug. 5. **metoeca** Blickle & Morse, 3 specimens. Allagash, July 5–8; Dennistown, July 19. **novicola** Blickle & Morse, 157 specimens. Allagash, July 29, Dennistown, July 22–25; Oquossoc, July 17–Aug. 4; Oxbow (T9 R5), July 19–20. **quinola** Ross, 11 specimens. Allagash, July 5–Aug. 1; Dennistown, July 17–25; East Machias, July 25–29. **salmo** Ross, 243 specimens. Allagash, July 5–Aug. 2; Baker Lake, July 5; Oquossoc, July 19; Tramway, Aug. 3. **spinata** Blickle & Morse, 2 specimens. Oquossoc, July 30–Aug. 4. **strepha** Ross, 859 specimens. Allagash, July 5–7; Dennistown, July 17–31; Oquossoc, July 28–31; Oxbow (TR R5), July 19–20; Round Pond (T13 R12), July 13. **tortosa** Ross, 7 specimens. Allagash, July 5–10.

valhalla Denning, 71 specimens. Allagash, July 10–Aug. 2; East Machias, July 19–25: Oquossoc, July 30; Oxbow (T9 R5), July 27. **wyomia** Denning, 27 specimens. Allagash, July 5–Aug. 2; Dennistown, July 17–27; Oquossoc, July 27–Aug. 4. **xera** Ross, 434 specimens. Allagash, July 24; Dennistown, July 14–31; Oquossoc, July 17–30. **xoncla** Ross, 5 specimens. Allagash, July 5–30; Oquossoc, July 23–28.

Ithytrichia Eaton

clavata Morton, 627 specimens. Allagash, July 26–Aug. 8; Dennistown, July 14; East Machias, July 28–Aug. 7; Oxbow (T9 R5), Aug. 4; Round Pond (T13 R12), July 13; St. Francis, Aug. 4; Tim Pond, Aug. 5.

Mayatrichia Mosley

ayama Mosely, 3,040 specimens. Allagash, July 22–Aug. 8; Dennistown, July 14; Jim Pond, Aug. 3; Oquossoc, July 28; Oxbow (T9 R5), Aug. 4; Round Pond (T13 R12), July 13; St. Francis, Aug. 4.

Neotrichia Morton

collata Ross, 326 specimens. Allagash, July 5–Aug. 8; Oxbow (T9 R5), July 20–Aug. 4; Tim Pond, July 23. **hallia** Denning, 8,393 specimens. Allagash, July 5–Aug. 8; Dennistown, July 14–17; Lower Cupsuptic, July 5; Tim Pond, July 27. **okapa** Ross, 229 specimens. Allagash, July 22–Aug. 5; East Machias, Aug. 1; Oquossoc, July 30–Aug. 4. Oxbow (T9 R5), July 20–Aug. 4. **vibrans** Ross, 1 specimen. Allagash, July 29. **spp.**, 8 specimens. Allagash, July 30.

Ochrotrichia Mosley

denningi Blickle & Morse, 34 specimens. Allagash, July 10–Aug. 1; Dennistown, July 14–31; Oquossoc, July 17–30. **wojcickyi** Blickle, 10 specimens. Dennistown, July 24–31, Oquossoc, July 28.

Orthotrichia Eaton

americana Banks, Mt. Desert Island (Procter), Salisbury Cove (Kingsolver and Ross). **baldufi** Kingsolver & Ross, 1 specimen. Oxbow (T9 R5), July 20. **cristata** Morton, 2 specimens. Dennistown, July 22.

Oxyethira Eaton

allagashensis Blickle, 44 specimens. Allagash, July 22–Aug. 2; Oquossoc, July 28; Oxbow (T9 R5), August 4. **araya** Ross, 15 specimens. Allagash, July 26–Aug. 1; Tramway, Aug. 3. **coercens** Morton, 3 specimens. Allagash, July 10–29; East Machias, Aug. 1. **forcipita** Mosely, 6 specimens. Chesuncook, Aug. 7–9; Oquossoc, July 31; Tramway, August 3. **grisea** Betten, 1 specimen. Oquossoc, July 20. **michiganensis** Mosely, 155 specimens. Allagash, July 22–Aug. 1; Chesuncook, Aug. 5–9; Dennistown, July 19–27; Oquossoc, July 23–Aug. 4; Oxbow (T9 R5), July 20; Tramway, Aug. 3. **obtatus** Denning, 6 specimens. East Machias, July 28; Oxbow (T9 R5), Aug. 4. **pallida** (Banks), Mt. Desert Island (Procter). **rivicola** Blickle & Morse, 3 specimens. Allagash, July 22, Dennistown, Aug. 27. **rossi** Blickle & Morse, 44 specimens. Allagash, July 23–Aug. 2. **serrata** Ross, 11 specimens. Lower Cupsuptic, July 5; Tramway, Aug. 3. **sida** Blickle & Morse, 4 specimens. East Machias, July 20. **zeronia** Ross, 2 specimens. Oquossoc, July 25; Jim Pond, July 11. **sp.**, 290 specimens. Allagash, July 30; Dennistown, July 14–27; Jim Pond, July 11–30; Lower Cupsuptic, July 5; Oquossoc, July 13–Aug. 4; Oxbow (T9 R5), July 19–Aug. 4; Tim Pond, July 23–Aug. 5. This species is related to *O. aeola* Ross and *O. abacatica* Denning.

Stactobiella Martynov

delira (Ross), 5 specimens. Allagash, July 5–8; Dennistown, July 19–22. **palmata** (Ross), 72 specimens. Allagash, July 5–30; Dennistown, July 19–24; East Machias, July 20; Guerette, July 13; Oquossoc, July 17–28.

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Killing Agents and Containers for Use with Insect Light Traps.[1]

S. W. Frost, The Pennsylvania State University,
University Park, Pa.

For more than fifteen years the writer's chief interest has been constructing and operating light traps for insect survey studies. He has captured and added to the Pennsylvania State University collection more than 2,500 species of insects. Over the years, many styles of traps and many different kinds of killing agents have been used. Fifteen papers have been published by the writer on this subject. Only two, of general interest, are cited, 2 and 3. The present paper may answer the questions often asked, what kind of trap and what killing agent is best for certain species or groups of insects. It briefly summarizes previous studies, emphasizing details often overlooked by those operating traps, and adds notes on a new type of killing container.

Pint mason jars with sodium or potassium cyanide prepared in the usual manner, with a layer of plaster of paris, were most satisfactory. In moist climates sodium cyanide was better because it did not deliquesce as rapidly as potassium cyanide. Calcium cyanide placed in a small container and covered with a piece of loosely woven muslin, gave the quickest kill and yielded the best specimens, but was somewhat inconvenient because it had to be replenished each night. The normal moisture was sufficient to releast cyanide gas.

Pint jars were preferable because they could be cleaned readily. In operation, strips of absorbent paper were placed in the jars to prevent the larger and more active insects from injuring the smaller and more delicate ones. Killing jars should be changed every hour or at least every two hours. If this is not practical, other methods may be used. One solution is a

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[1] Authorized for publication on July 1, 1963, as paper No. 2800 in the journal series of the Pennsylvania Agricultural Experiment Station.

FIG. 1. Separator-type container on light trap.

trap for interval collections.[2] Another method is to place several traps close together with killing jars on each.[3] The lamp of one trap at a time can be illuminated at predetermined periods by means of a time clock and a series of relays. Some method of obtaining samples at relatively short periods is essential to yield specimens in good condition. After removing the insects from the killing jars, they should be thoroughly cleaned and absorbent paper placed in them to remove excessive moisture. Jars thus handled will last at least three months.

Alcohol and kerosene were excellent killing agents for certain insects, especially *Phyllophaga.* Beetles caught in kerosene were in good condition many hours after they had been removed from the liquid. Alcohol was more desirable for trapping Tri-

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[2] Frost, S. W. Light traps for insect collection, survey and control. The Pennsylvania Agricultural Experiment Station Bull. 550: 1–32, 1952. Bibliography.

[3] Frost, S. W. Winter insect light trapping at the Archbold Biological Station, Florida. Florida Entomologist 45(4) : 1–32, 1962, 46(1) : 23–43, 1963.

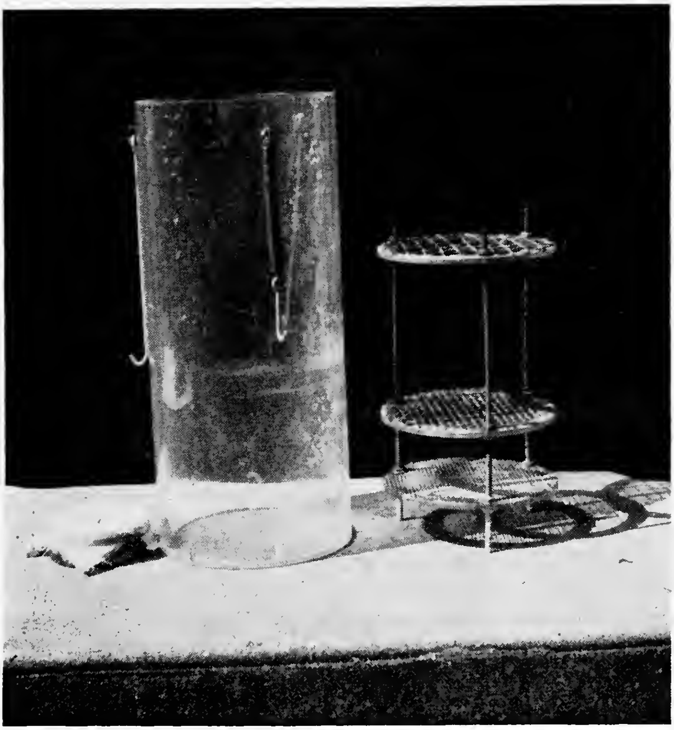

Fig. 2. Details of separator-type container, container with calcium cyanide, cylinder, three screens.

choptera, Psocoptera, Ephemeroptera, and similar insects generally preserved in alcohol.

A special separator-type container was useful when collections were unusually large and traps could not be attended at frequent periods during the night. This container was made of a "plexiglas" cylinder ¼ inch in thickness, 14 inches high and 6 inches in diameter. A bottom of ⅛-inch plastic material was fastened by means of four screws. Three screens of ½, ¼, and ⅛-inch meshes were fastened to three plastic rings by means of water-proof cement. These rings, 5 inches inside diameter and 5½ inches outside diameter, must be tooled accurately to fit the cylinder snugly. The rings were supported on three ⅛-inch threaded posts and held in place by means of brass nuts. The rings bearing the screens were thus adjustable. This container was fastened to the trap by means of three wires engaging the upper edge of the funnel. One of these consisted of a spring so that the container could be easily attached. In operation the larger-mesh screen was placed above and the smaller one below. Calcium cyanide, placed in a 3 inch tin box and covered with muslin, was used as the killing agent. Some prefer ethyl acetate. This type of container yielded excellent specimens and simplified the sorting process.

Nomenclature Notice

Designation of a type-species for **Hypercompe** Hübner, [1819] (Lepidoptera). Z.N.(S.) 1611. Validation of the specific name **Griselda radicans** Heinrich, 1923 (Lepidoptera). Z.N.(S.) 1612. Designation of a type-species for **Baetis** [Leach, 1815] (Ephemeroptera). Z.N.(S.) 1620. Designation of a type-species for **Megalopta** Smith, 1853 (Hymenoptera). Z.N.(S.) 1624. Validation of the family-group name PLAYTPLEURINAE Schmidt, 1918 (Hemiptera). Z.N.(S.) 1626. Suppression of six specific names of mites (Acarina), Z.N.(S.) 1564.

Send comments, with the Commission's file number, in duplicate to Intern. Comm. Zool. Nomenclature, c/o British Museum (N.H.), Cromwell Road, London S.W.7, England. (See Bull. Zool. Nomencl., Vol. 21, Pts. 1 and 2.)

Further Notes about Treehoppers at Light Traps (Homoptera, Membracidae)

CLIFFORD J. DENNIS, East Central State College,
Ada, Oklahoma

Among a group of treehoppers submitted to me for determination by Dorothy H. Custer and Philip W. Smith of the Wisconsin Department of Agriculture were the following new black light trap records. These insects were collected at Madison, Wisconsin, in a 15 watt black light trap.

Archasia belfragei Stal. 3 ♂♂, 1 ♀, collected VI–25–63.
Cyrtolobus fenestratus (Fitch). 1♂, collected VI–9–63.
C. griseus Van Duzee. 66 ♂♂, collected VI–9–63.
C. inermis (Emmons). 2 ♂♂, collected VI–9–63.
Ophiderma definita Woodruff. 14 ♂♂, collected VI–9–63.

A. belfragei, C. griseus and *O. definita* have not been reported previously from any light traps. I have collected *C. inermis* in a white light trap (1964), and both Frost (1955, 1957) and I (1964) have found *C. fenestratus* in a white light trap.

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DENNIS, C. J. 1964. Amer. Midl. Nat. 71: 452–459.
FROST, S. W. 1955. Ent. News 66: 63–64.
——. 1957. Ent. News 68: 77–78.

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Curculionidae of the genus **Curculio** (formerly **Balaninus**) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

Membracidae wanted. Purchase or exchange. T. L. Stringfellow, Military Reservation, Box 11-A, Hudson, Massachusetts.

Buprestidae, Scarabaeidae, and **butterflies** wanted in exchanges for beetles and butterflies. Mr. W. van der Starre, 25 Crawley St., Warrnambool, Victoria, Australia.

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ENTOMOLOGICAL NEWS

JULY 1964

Vol. LXXV No. 7

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ENTOMOLOGICAL NEWS

Vol. LXXV JULY, 1964 No. 7

New Species of Winter Stoneflies of the Genus Allocapnia (Plecoptera, Capniidae)

Herbert H. Ross, Illinois Natural History Survey, Urbana

Due in no small part to collections made by about seventy biologists in response to recent requests, a number of unexpected circumstances have appeared concerning the winter stonefly genus *Allocapnia.* Especially in the southern part of the range of the genus (comprising the temperate deciduous forest of eastern North America), several new species appear to give some of our first tangible evidence pointing to the probable geographic origin of several species complexes.

Descriptions of New Species

Unless otherwise noted, all the species described herein possess the following characteristics: length from tip of head to end of abdomen about 5 mm in the male and 6 mm in the female; color dark brown, the wings slightly smoky with brown veins; general structure as described for other species in the genus. In the females the wings extend beyond the tip of the abdomen. Known diagnostic characters occur only in the genital structures associated with the seventh and eighth segments and posteriorly.

Allocapnia brooksi new species

Male.—Wings reaching only to fourth tergite. Seventh tergite without dorsal process, Fig. 1. Dorsal process of eighth tergite with lateral aspect having a sharp anterior shoulder and sharply pointed tip, its posterior aspect evenly arcuate. Supra-anal process short and stocky.

Holotype ♂ and 1 ♂ *paratype*.—Two miles west of Sevierville, Sevier Co., TENNESSEE, Feb. 1, 1963, Stannard & Brooks.

The process of the eighth tergite indicates that this species is very close to *vivipara* (Claassen), from which it differs in the well developed wings and in the sharp anterior shoulder of the process of the eighth tergite. Thus *brooksi* is an early offshoot of the *vivipara* stem, arising before the loss of wings occurred in the male.

Allocapnia malverna new species

Male.—Wings reaching fifth tergite. Seventh tergite without dorsal process, Fig. 2. Dorsal process of eighth tergite fairly high and abrupt, lateral aspect higher anteriorly, posterior aspect broad and truncate. Upper supra-anal process moderately wide and deep, with the apical portion slightly swollen and the tip somewhat pointed, the apical segment about one and one-half times length of basal segment.

Holotype ♂ and 4 ♂ *paratypes*.—10-Mile Creek south of Malvern, Hot Springs Co., ARKANSAS, Feb. 1, 1961, Ross & Ross.

This species combines characters of the *recta* and *mystica* complexes. From *recta* (Claassen) and its allies this species differs in the deeper and markedly articulated upper supra-anal process; from *mystica* (Frison) and its allies it differs in lacking a deep incision in the posterior aspect of the eighth tergite. From this comparison it is clear that *malverna* is probably the most primitive known species in the *recta* complex.

Allocapnia wrayi new species

Male.—Wings reaching fifth tergite. Seventh tergite with no dorsal hump, Fig. 3. Process of eighth tergite steep and high, the rugose lobes situated near posterior margin and separated by a narrow but deep cleft. Upper supra-anal process fairly narrow and deep, the apical lobe slightly clavate and slightly to markedly longer than basal lobe.

Holotype ♂, *allotype* ♀, and 2 ♂ *paratypes*.—Richmond, Virginia, Feb. 21, 1962, D. W. Adams. *Paratypes*.—Many ♂, ♀ from the type locality and from the following localities in North Carolina: Berea, Burlington, Durham, Pinnacle, Summerfield, and west of Salem.

This species is a close relative of *mystica* Frison, from which it differs in the long apical segment of the supra-anal process. Whereas *mystica* occurs west of the Appalachian system, *wrayi* appears confined to the east of it. Both species appear to be confined to the southern half of the range of the genus.

Allocapnia zekia new species

Male.—Wings reaching fifth segment. Seventh tergite with posterior two-thirds elevated into a round, prominent hump, the portion of the segment anterior to the hump forming a continuous sclerotized band, Fig. 4. Process of eighth tergite high and massive, the rugose lobes set well forward on the process and separated by a fairly deep cleft. Upper supra-anal process only moderately wide, the apical segment slightly bulbous and markedly longer than basal segment.

Holotype ♂.—Zekiah Swamp, La Plata, Charles Co., Maryland, Feb. 28, 1962, J. Allison, T. Hopkins, R. J. Rubelmann.

This species is closely related to *wrayi* and *mystica*, differing in the longer apical segment of the upper supra-anal process and the peculiar dorsal hump of the seventh tergite.

Allocapnia jeanae new species

Male.—Wings just barely reaching fourth segment. Seventh tergite without dorsal process, Fig. 5. Process of eighth tergite high, steep, and massive, its lateral aspect almost as wide as the tergite is long, the rugose lobes placed far forward, separated by a deep but narrow cleft, the posterior corners of the process forming almost right-angled lobes. Basal segment of the upper supra-anal process greatly elongated, about three times as long as the apical segment.

Female.—Seventh and eighth sternites joined by a fairly broad mesal strap; apex of eighth sternite with a triangular smooth area.

Holotype ♂, allotype ♀ and 7 ♂, 1 ♀ *paratypes.*—West Fork of White River, Winslow, Washington Co., ARKANSAS, Feb. 14, 1961, Ross & Ross. *Paratypes.*—♂, ♀ from the following localities in ARKANSAS: Carroll Co. (Dryfork Creek), Madison Co. (Cannon Creek, Combs, Henderson Creek, Huntsville), Washington Co. (West Fork).

This species, a highly specialized offshoot of the *mystica* complex, differs from all described species by the large and massive process of the eighth tergite and the extremely long upper supra-anal process.

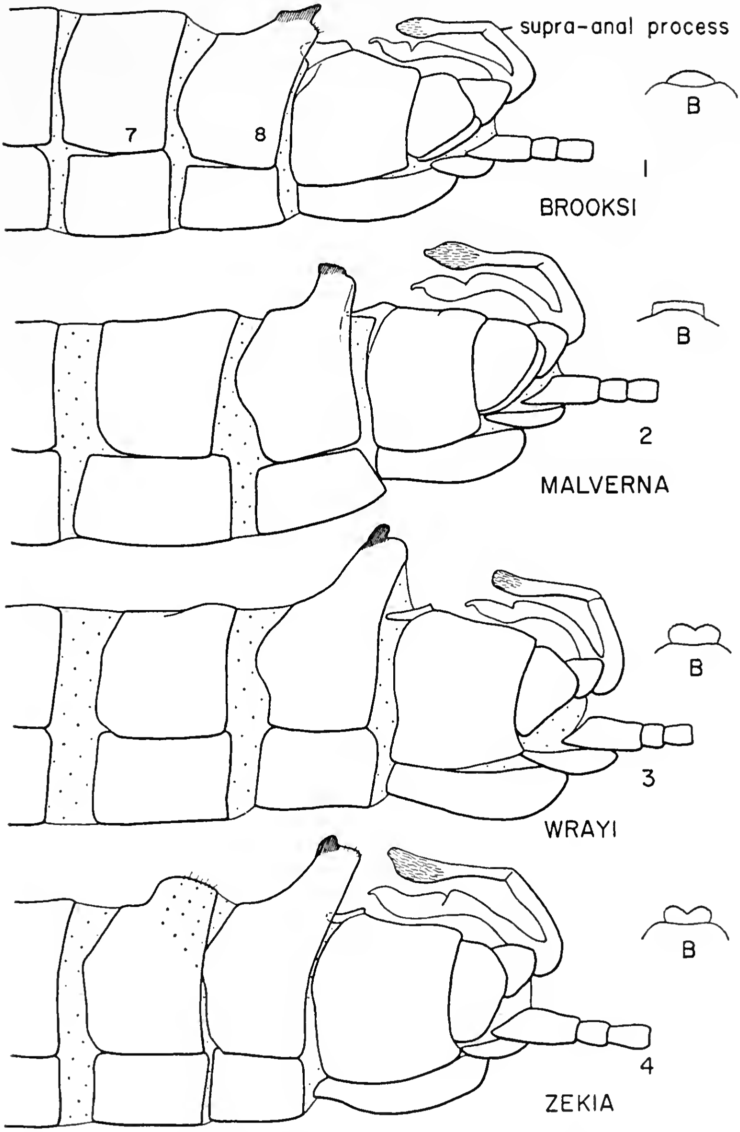
Allocapnia ozarkana new species

Male.—Wings extending only over third tergite. Seventh tergite with a raised process almost as high as that on eighth, situated on the posterior half of the segment, the apical projection narrow in lateral view, fairly narrow and cleft in posterior view, Fig. 6. Process of eighth tergite moderately high, the rugose processes situated near the posterior margin, their posterior aspect wide and separated by a wide, deep notch. Upper supra-anal process with apical segment short and somewhat sagittate, basal segment very long.

Holotype ♂ and 3 ♀ *paratypes.*—Cannon Creek, Madison Co., ARKANSAS, Jan. 26, 1962, L. O. Warren.

In structure of the eighth tergite and supra-anal process this species is almost exactly like *forbesi* Frison, differing from *forbesi* primarily in the small cleft process of the seventh tergite, which in *forbesi* is massive and conical. Although the females of *ozarkana* have not been associated definitely with the male, several specimens from Washington County, Arkansas, resemble those of *forbesi* very closely and would therefore appear to belong to *ozarkana.*

Other relatives of *forbesi* (known from southern Illinois to southern Ohio) occur in the northeastern states. This discovery of *ozarkana* demonstrates that some progenitors of the existing



FIGS. 1–4. Apex of abdomen of *Allocapnia*, lateral aspect. *A*, *B*, posterior view of dorsal process of seventh and eighth segments, respectively.

members of the group effected a dispersal between the Ozark mountain system and the Appalachian region.

Allocapnia fumosa new species

Male.—Wings entirely covering fourth tergite, in slightly contracted specimens reaching the fifth. Seventh tergite without a process, Fig. 7. Process of eighth tergite high, the entire dorsal part of the segment forming a steep and massive prominence; rugose areas V-shaped from dorsal view, flanked on each side by a round lobe which is part of the segment and does not form a finger-like projection. Upper supra-anal process narrow, the apical segment longer than the basal one.

Holotype ♂.—Great Smoky Mountain National Park, 2 miles west of Gatlinburg, Sevier Co., TENNESSEE, Feb. 1, 1963, Stannard & Brooks. *Paratype.*—NORTH CAROLINA: Canton, Poison Cove Branch, Henson Cove, Jan. 20, 1964, C. D. Pless, 1 ♂.

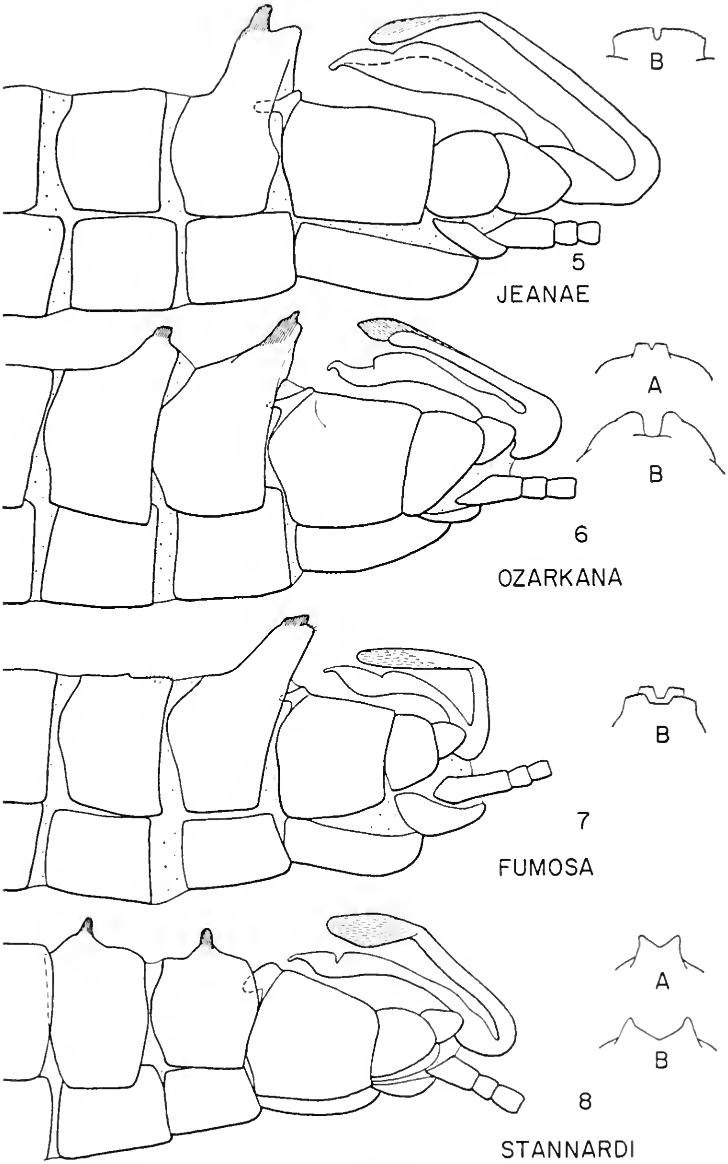
The V-shaped rugose areas of the eighth tergite indicate that this species is a member of the *granulata* complex but *rugosa* differs from any of these species in lacking a finger-like lobe on each side of the rugose areas. This suggests very strongly that *rugosa* may represent the progenitor of the *granulata* complex, and may be an archaic offshoot of the complex that arose before these finger-like lobes evolved.

Allocapnia stannardi new species

Male.—Wings reaching fifth tergite. Seventh tergite with a high process, its lateral view narrow and sharp, its posterior view wide, parallel sided, and cleft at apex, Fig. 8. Process of eighth tergite moderately high and divided into a pair of widely separated, somewhat conical lateral lobes. Upper supra-anal process long, its apical segment short and moderately swollen.

Female.—Seventh and eighth sternites fused, at present indistinguishable with certainty from those of *rickeri* Frison.

Holotype ♂, *allotype* ♀, and 32 ♂, ♀ *paratypes.*—Great Smoky Mountain National Park, one mile east of Walker Prong Branch, Sevier Co., TENNESSEE, Feb. 1, 1963, Stannard & Brooks. *Paratypes.*—Many ♂, ♀ all collected by Stannard &



FIGS. 5–8. Apex of abdomen of *Allocapnia*, lateral aspect. *A, B*, posterior view of dorsal process of seventh and eighth segments, respectively.

Brooks, Jan. 31 or Feb. 1, 1963.—NORTH CAROLINA: Jackson Co. (Cherokee and Dillsboro); TENNESSEE: Same data as *holotype* but Walker Prong Bridge, bridge at Sugarland Branch, and mouth of Cole Branch.

The process of the eighth tergite and the supra-anal process are exactly like those of *rickeri,* to which this species is closely related. The diagnostic feature of *stannardi* is the peculiar process of the seventh tergite.

Another peculiarity of this species is that it is the only one of the genus known to inhabit and be restricted to the cascade-like and practically boreal streams of the Great Smoky Mountains.

BIOGEOGRAPHIC IMPLICATIONS

The identification of relatively primitive forms such as *brooksi, fumosa,* and *wrayi,* together with relatively specialized forms such as *zekia* and *stannardi,* in the southeastern quadrant of the range of *Allocapnia* indicates that a considerable amount of the evolution in this genus has occurred in association with the southern portion of the Appalachian system. An almost identical type of species combination, involving the relatively primitive species *malverna* and *ozarkana* and the highly specialized species *jeanae* found only in the Ozark-Ouachita mountains of western Arkansas and eastern Oklahoma, is excellent evidence that a comparable evolutionary development of *Allocapnia* occurred in this area also. It is evident further, considering previously described species in the genus, that progenitor stocks of these and other species have in the past dispersed between the Ozark and Appalachian systems, that these more extensive ranges were subsequently broken, and the isolated portions evolved into distinctive species. There is therefore emerging a picture of successive dispersals and isolations of these temperate deciduous forest animals, and the consequent evolution of at least two polyphyletic clusters of species, one in the southern Appalachians and one in the Ozarks. It seems probable that climatic fluctuations of some sort associated with the Pleistocene were responsible in large measure for the changes in geographic ranges responsible for this evolutionary pattern.

Acknowledgments

I want to express my gratitude to the many biologists who have cooperated in our survey of the winter stonefly genus *Allocapnia* in eastern North America. Particular individuals who have been responsible for much of the material reported in this paper are those listed as collectors of the type material. I also want to express appreciation to Mrs. Alice Prickett who made the illustrations.

This project has been supported by a research grant from the National Science Foundation.

Additions and Corrections to the World List of Type-Species of Chloropidae (Diptera)

Curtis W. Sabrosky *

In 1941 I published "An annotated list of genotypes of the Chloropidae of the world (Diptera)" (*Ann. Ent. Soc. Amer.* 34: 735–765, with minor corrections in 1942, loc. cit. 35: 478). A few corrections are necessary, a few old genera have been found to belong to the Chloropidae, and a few additional genera have been published since that time. The arrangement of the present supplement is alphabetical under each subfamily, as in the original list; but the format of individual entries has been simplified. Names that are additions to the list are in capital letters. References are given in full only where they are not in the original list.

Subfamily Chloropinae

ARAGARA Walker, 1860, Jour. Linn. Soc. London, Zool. 4: 154. 1 species. Type-species, *A. crassipes* Walker (monotypy). This was originally described in Walker's subfamily

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* Entomology Research Division, Agric. Res. Serv., U. S. Department of Agriculture, Washington, D. C.

Ortalides. *Ochtherisoma* Becker, 1911, is a synonym (**New synonymy**); but the type-species of the two show slight differences. *Aragara imitator* (Becker) is a **new combination.** These odd chloropids, with raptorial front legs resembling those of the ephydrid genus *Ochthera,* are rarely recorded. I have seen only the holotypes of the two type-species and the four specimens of *Ochtherisoma imitator* recorded from Luzon and Samar in the Philippines, by Frey, 1923, Notulae Ent. 3: 72.

CENTEMA Collin, 1911, Ent. Monthly Mag., ser. 2, 22: 146. Invalid emendation for *Cetema* Hendel, but not formally proposed ("surely he [i.e., Hendel] meant to have written *Centema*").

Chlorops Meigen, 1803: I am indebted to J. R. Vockeroth for calling my attention to the long-overlooked fact that Illiger, 1807, in the second edition of Rossi's Fauna Etrusca, vol. 2, p. 483, was actually the first to associate a nominal species with the generic name *Chlorops,* antedating the work of Meigen, 1830. This species, *Musca umbelliferarum* Scopoli, 1763, is then, technically, the type-species of *Chlorops* by subsequent monotypy. Credited to Schrank, 1803, it has been carried in synonymy for many years, first under *Chlorops nasuta* (Schrank, 1781) and later, with *nasuta,* under *C. pumilionis* (Bjerkander, 1778).

In Opinion 348 (1955), the International Commission on Zoological Nomenclature designated *C. pumilionis* as the type-species, under the Plenary Powers; but neither the Commission nor the applicant was then aware of the Illiger action. Perhaps further action by the Commission is required; but if so, *pumilionis* would undoubtedly be confirmed as type-species. It may be noted that if the above specific synonymy were to be recognized, the older *umbelliferarum* would replace *pumilionis;* but the description of the former is so generalized that in my opinion any synonymy is pure guesswork. It would seem preferable to regard *umbelliferarum* as a species dubium in the genus *Chlorops.*

Ectecephala Macquart: 1851, not "1850 (1851?)."

EURIPARIA Nartshuk, 1963, Ent. Oboz. 42: 671. Error for *Euryparia*.

Haplegis Loew: In my list, I accepted the action of Coquillett, 1910: "Type, *Chlorops diadema* Meigen, the first species, by present designation." However, *diadema* was not an originally included nominal species; the first original species was *H. rufifrons* Loew. Undoubtedly Coquillett was following the long accepted synonymy, *rufifrons* = *diadema*, and perhaps his designation should be construed to be acceptable from his mention of "the first species." If it is unacceptable, no valid statement of the type-species of *Haplegis* appears to exist. Duda (1933, Fam. 61, *in* Lindner's Fliegen Palaeark. Region, Lfg. 70, p. 128), in addition to mentioning Coquillett's designation, claimed that Becker (1912) designated *Chlorops flavitarsis* Meigen. I do not find this designation for *Haplegis* in the relevant sentence (Becker, 1912, Ann. Mus. Nat. Hung. 10: 126), and even if it were there, it would be invalid, as *flavitarsis* was also not an originally included nominal species. To fix the matter, and in agreement with the clear intent of Coquillett, I hereby designate as type-species of *Haplegis* the first of the original species, *H. rufifrons* Loew, now a synonym of *H. diadema* (Meigen).

LAGAROSIA Meijere, 1918, Tijdschr. v. Ent. 60: 338. Lapsus for *Lagaroceras* in the citation "*Loxotaenia* (*Lagarosia*) *gracilis*." *Lagarosia* was correctly cited on p. 329 as a van der Wulp genus in the Trypetinae.

Loxotaenia Becker, 1911, is preoccupied. See *Neoloxotaenia*.

Mepachymerus Speiser: Transferred to Chloropinae from the Oscinellinae, with *Steleocerus* as synonym. The respective type-species are also synonyms: *S. lepidopus* Becker = *M. baculus* Speiser. The generic and specific synonymies were published by Sabrosky, 1951, Chloropidae, *in* Ruwenzori Expedition, 1934–5, vol. 2, p. 723.

MINDA Paramonov, 1956, Ann. and Mag. Nat. Hist., ser. 12, 9: 779. 1 species. Type-species, *M. rubra* Paramonov (original designation and monotypy). Equals *Pemphigonotus* Lamb, 1917 (synonymy published by McAlpine, 1958, Rec.

Austral. Mus. 24: 185). The new family Mindidae is thus a synonym of Chloropidae.

NEOLOXOTAENIA Sabrosky, **new name**, for *Loxotaenia* Becker, 1911, Ann. Mus. Nat. Hung. 9: 83, not Herrich-Schaeffer, 1854. Type-species, *Lagaroceras gracile* Meijere (automatic). Neave's Nomenclator Zoologicus cites *Loxotaenia,* an emendation for *Lozotaenia* Stephens, 1829, as dating from Heinemann, [1863]. However, the emendation was first used by Herrich-Schaeffer, 1854, Systematische Bearbeitung der Schmetterlinge von Europa, Heft 65, p. 42. In earlier parts of this work he used the spelling *Lozotaenia;* but in the systematic cataloguing and indexing of genera and species, in the Systema Lepidopterorum Europae, he switched to *Loxotaenia* and used it consistently in numerous places.

Ochtherisoma Becker = *Aragara* Walker, q.v. (**New synonymy**).

OPSICERAS Séguy, 1946, Encycl. Ent., Ser. B, II, Diptera, 10: 12. 1 species. Type-species, *O. bistriatus* Séguy (original designation and monotypy), which equals *Elachiptereicus abessynicus* Becker. The genus equals *Elachiptereicus* Becker, 1909. The generic and specific synonymies were published by Saborsky, 1951, Chloropidae, *in* Ruwenzori Expedition, 1934–5, vol. 2, pp. 720, 721.

Oscinis Latreille: Zetterstedt, whose Diptera section of the Insecta Lapponica dates from 1838 (not 1840 as cited by me), designated *Musca nasuta* Schrank as type-species, but showed *Musca lineata* Fabricius (an originally included species in *Oscinis*) in the synonymy of *nasuta.* This fixes *lineata* as type-species (International Code of Zoological Nomenclature, Article 69a, iv).

Parectecephala Becker: The type-species should be cited as *Oscinis longicornis* Fallén, not as *Chlorops* (or *Oscinis*) *longicornis* Zetterstedt as usually cited. Zetterstedt adopted the name from *Oscinis lineata* var. *longicornis* Fallén, 1820, Oscinides Sveciae, p. 4.

PLANURIA Meigen, 1826, Syst. Beschr., vol. 5, p. 400. Unavailable name, cited as a manuscript name in synonymy in the combination *Planuria tarsata* under Meigen's new genus and new species, *Homalura tarsata* Meigen.

Platycephala Fallén: The designation by Curtis is the valid one. Both Curtis (1839) and Westwood (1840) designated *P. planifrons* (Fabricius), which was not itself an originally included nominal species; but Curtis showed *P. culmorum* Fallén, the first of the two original species, in the synonymy of *planifrons*. Curtis is construed thereby to have fixed *culmorum* as type (International Code of Zoological Nomenclature, Article 69a, iv).

PLATYCEPHALISCA Nartshuk, 1959, Ent. Oboz. 38: 472. 1 species. Type-species, *P. nigra* Nartshuk (original designation and monotypy).

PSEUDOTHAUMATOMYIA Nartshuk, 1963, Ent. Oboz. 42: 672. 1 species. Type-species, *P. macrocera* Nartshuk (original designation and monotypy).

STELEOCERELLUS Frey, 1961, Notulae Ent. 41: 35, as subgenus of *Mepachymerus*. 12 species. Type-species, *Steleocerus tenellus* Becker (original designation).

Steleocerus Becker, 1910 = *Mepachymerus* Speiser, 1910 (q.v.).

URANUCHA Czerny, 1903, Wien. Ent. Ztg. 22: 127. 1 species. Type-species, *Geomyza spuria* Thomson (original designation and monotypy). Equals *Thressa* Walker, 1860. The synonymy was published by Sabrosky, 1956, Rev. Franç. d'Ent. 23: 217. The genus was proposed on the unfounded assumption that the species was an asteiid.

SUBFAMILY OSCINELLINAE

Acanthopeltastes: p. 194, not 104.

Botanobia Lioy: Monotypy (not "two species" with type designation by Coquillett), because one of the two originally included species was a nomen nudum.

CAMPTOSCINELLA Sabrosky, 1951, Chloropidae, *in* Ruwenzori Expedition, 1934–5, vol. 2, pp. 747 (key), 806. 1 species. Type-species, *C. annulitibia* Sabrosky (original designation and monotypy).

Caviceps Malloch: 2 species, and the type is therefore by original designation only. I overlooked the inclusion, in the discussion, of *Oscinella defecta* Becker.

CHAETASPIS Nishijima, 1954, Insecta Matsumurana 18: 84. 1 species. Type-species, *C. katoi* Nishijima (original designation and monotypy). Preoccupied by *Chaetaspis* Bollman, 1887. See replacement name *Togeciphus* Nishijima.

Chaetochlorops Malloch: The type-species is by original designation and monotypy.

CHAETOSCELIS Nartshuk, 1963, Ent. Oboz. 42: 675. 1 species. Type-species, *C. rossica* Nartshuk (original designation and monotypy).

CORSICA. Listed as a genus of Chloropidae, subfamily Heringiinae, in Brues, Melander and Carpenter, 1954, Classification of Insects, p. 379, but there is no such genus of insects. "Corsica" is the type locality for *Heringium,* which is an ephydrid, synonym of *Clanoneurum* Becker.

Crassiseta von Roser: I was in error, nomenclaturally, in saying that this genus is "essentially monobasic." There were five nominal species originally included, regarded since the time of Loew (1845) as synonyms under the first named, *Oscinis cornuta* Fallén (as Meigen). The type-species was designated, as noted in the Annotated List, by Corti, 1909.

Dasyopa Malloch: Vol. 13, not 12.

ECHINIA Paramonov, 1961, Ann. and Mag. Nat. Hist., ser. 13, 4: 97–100. 1 species. Type-species, *E. bisegmenta* Paramonov (original designation and monotypy). Equals *Anatrichus* Loew, 1860 (synonymy published by Sabrosky, 1962, Ann. and Mag. Nat. Hist., ser. 13, 4 (1961): 559). The new family Echiniidae is thus a synonym of Chloropidae.

Epicelyphus Becker, 1911 = *Nomba* Walker, 1859 (q.v.).

Eribolus Becker: The type-species, *sudeticus* Becker, has been found to be a synonym of *E. nana* (Zetterstedt) [*Oscinis*].

FIEBRIGELLA Duda, 1921, Tijdschr. v. Ent. 64: 123, 125, 143. 1 species. Type-species, *F. verrucosa* Duda, by original designation (as "n.gen.n.sp.," p. 143) and monotypy. I have not seen the type, but Willi Hennig has informed me that it is "probably a chloropid."

HYPERATES Collart, 1934, Rev. Zool. Bot. Africaines 26: suppl. vol. 11: 11. Apparently a lapsus or printer's error for *Hippelates*.

KWAREA Sabrosky, 1954, Bull. Brooklyn Ent. Soc. 49: 44. 1 species. Type-species, *K. pallidihirta* Sabrosky (original designation and monotypy).

Melanochaeta Bezzi: Vol. VI, not V. This was proposed as a new name to replace *Pachychaeta* [sic] Bezzi, 1895, not Loew, 1845. Actually Bezzi's genus was *Pachychoeta,* but it is in turn preoccupied by *Pachychoeta* Bigot, 1857, and the new name is still appropriate.

Mepachymerus Speiser: Transferred to Chloropinae, q.v.

MERODONTA Malloch, 1940, Proc. Linn. Soc. N.S. Wales, 65: 261 (key), 263. 1 species. Type-species, *M. crassifemur* Malloch (original designation and monotypy).

MIMOSEPSIS Sabrosky, 1951, Chloropidae, *in* Ruwenzori Expedition, 1934–5, vol. 2, pp. 744 (key), 748. 1 species. Type-species, *M. mallochi* Sabrosky (original designation and monotypy).

MIRMEMORPHA Dufour, 1833, Ann. des Sci. Nat. 30: 220. Error for *Myrmemorpha* Dufour, 1833, loc. cit.: 218.

Myrmecomorpha (emendation of *Myrmemorpha* Dufour) actually dates from Blanchard, 1840, Hist. nat. des Insectes (= vol. 3 of Castelnau's Hist. nat. des Animaux Articulés), p. 629, prior to the use by Agassiz, 1846, as given in the Annotated List and in Neave's Nomenclator Zoologicus.

Neoelachiptera Séguy: The type species is *lerouxi,* not *lerouri.*

NOMBA Walker, 1859, Jour. Proc. Linn. Soc. London, Zool., 4: 169. 1 species. Type-species, *N. tecta* Walker (monotypy). *Epicelyphus* Becker is a synonym. The long-lost type of Walker's species was recently discovered in the Hope Department of Entomology at Oxford (K. G. V. Smith and E. Taylor, in press).

OSCINELLOIDES Malloch, 1940, Proc. Linn. Soc. N.S. Wales 65: 262 (key), 267. 1 species. Type-species, *Oscinella bispinosa* Becker (original designation and monotypy). Equals *Lasiopleura* Becker, 1910 (**New synonymy**).

Pachychoeta Bezzi, 1895, not *Pachychaeta* as cited in the Annotated List and as cited by Bezzi himself (1906) in proposing the replacement name, *Melanochaeta.* The spelling *Pachychoeta* is also preoccupied, by Bigot, 1857, Ann. Soc. Ent. France, ser. 3, 5: 545, in the Asilidae. The type-species of *Pachychoeta* Bezzi is by original designation as well as by monotypy; the former was overlooked in Bezzi's introductory discussion.

PARASTIA Pandellé, 1898, Rev. d'Ent. (Caen) 17: special p. 18. No species are cited, but from the description it appeared to me to be based on *Dicraeus raptus* (Haliday). This was kindly verified by Professor Séguy, from the Pandellé collection in the Museum National d'Histoire Naturelle in Paris. Accordingly that species is here designated as type-species of *Parastia,* which disposes of the latter as synonym of *Dicraeus* Loew (**New synonymy**). The name *Parastia* has generally been overlooked; it is not included in the nomenclators of Neave and Schulze, nor does it appear in the Katalog der Paläarktischen Dipteren.

POLIODASPIS Duda, 1933, Fam. 61, Chloropidae, *in* Lindner's Fleigen Palaeark. Region, Lfg. 72, p. 245 (Index). Error for *Polyodaspis* Duda. The latter version is used twice on p. 224, where the genus was formally proposed, and on p. 246 in its regular place in the Index, and is undoubtedly the intended spelling.

PROTOSCINIS Cockerell, 1917, Proc. U. S. Natl. Mus. 52: 380. 1 species. Type-species, *P. perparvus* Cockerell (original designation and monotypy). Fossil.

Siphunculina Rondani: Collin (1946, Trans. Roy. Ent. Soc. London 97: 123) has stated that the type-species is *Siphonella aenea* Macquart, *brevinervis* Rondani not being described but "having been claimed to be the same as *Siphonella aenea.*" However, contrary to Collin's interpretation, *Siphunculina* does not fall under Opinion 46 ("Status of genera for which no species was distinctly named in the original publication") but under Opinion 43 ("On the status of genera the type species of which are cited without additional description") and also under Article 16a (vi) of the International Code of Zoological Nomenclature. The case is exactly that of *Alloderma* and *Aphobetoideus,* considered in Opinion 43, which "were published in tabular keys, which also contained the designation of the genotype; no additional specific characters were given." Accordingly the type-species is *brevinervis* Rondani (original designation and monotypy), as stated in the Annotated List. The specific identity of *brevinervis* is uncertain, however, as the brief description could apply to various species of *Siphunculina.*

TERRAEREGINA Malloch, 1940, Proc. Linn. Soc. N.S. Wales 65: 261, 268, 270. Error (or emendation?) for *Terraereginia* Malloch, 1928.

TOGECIPHUS Nishijima, 1955, Insecta Matsumurana 19: 53. New name for *Chaetaspis* Nishijima, 1954, not Bollman, 1887. Type-species, *Chaetaspis katoi* Nishijima (automatic).

TYLOPTERNA Bezzi, 1916, Philippine Bur. Sci., Monog. 10: 31. 1 species. Type-species, *T. monstrosum* Bezzi (original designation and monotypy). This was originally described as an aberrant ortalid (i.e., Otitidae), and was subsequently placed by Frey in the platystomatid subfamily Plastotephritinae. Specimens in the U. S. National Museum show the species to be clearly a chloropid, albeit a most unusual one. A note on this was published by Sabrosky (1951, Proc. Ent. Soc. Wash. 53: 49).

New Record of Coelotanypus cletic Roback (Diptera: Tendipedidae) *

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Academy of Natural Sciences of Philadelphia

C. cletis is known only from a single male from the Island of Jamaica (Roback 1963). Recently in studying collections at the United States National Museum the author found three additional specimens of this species from Cuba. These specimens, each mounted on a slide, were 2 ♂♂ and 1 ♀ with the following data.

La Jiquima, Pinar del Rio, Julio 27, 1956 (J. Acuña). I should like to offer a brief description of the female of this species, based on the single slide mounted specimen.

Length 3.3 mm; head brown; antennal flagellum 13 segmented; last four segments in ratio 20:20:20:47; palpus four segmented; segments in ratio 25:45:70:124; thorax appears dark brown with humeri lighter; LR I–.61 II–.62, III–.69; tibia I with base and apex dark, femur I and all tarsal segments dark; tibia II and III with base and apex more narrowly black; tarsus 1 of II, III with only apex dark; T_{2-5} of II and III all dark; apical spurs on T_1 and T_2 of leg I and on T_{1-3} of legs II, III; wing 2.4 mm; abdomen brown; spermathecae (3) with apical half dark; basal half and duct clear.

Literature

Roback, S. S. 1963. New Neotropical *Coelotanypus* (Diptera, Tendipedidae, Pelopiinae). Ent. News 74 (No. 7): 169–176.

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Biological Notes on the Leaf Beetle Acalymma gouldi (Coleoptera; Chrysomelidae)

G. W. Lammers, Purdue University, Lafayette, Indiana

The leaf beetle, *Acalymma gouldi,* is the type of its genus and was described by H. S. Barber (1947) from specimens collected from squash blossoms at Lafayette, Indiana in 1942. It was not taken again from this area until 1962 (Gould). It has been collected, but never in large numbers, from several other states (Smith).

A. gouldi differs from *Acalymma vittata* (Fabricius) in its yellowish abdomen and widened black stripes on the elytra versus the black abdomen and narrowed black stripes of *A. vittata.* There is also a difference in genitalia structure between the two species. The external color characters of *A. gouldi* make it easily distinguishable from *A. vittata,* the only other member of the genus found in the area of Lafayette, Indiana.

In June of 1962, *A. gouldi* was taken in small numbers near Lafayette from cantalouge, cucumbers and squash. Prompted by this discovery, investigations were begun in regard to the life history and distribution of *A. gouldi.*

Distribution and Collection Data—The first collection of *A. gouldi* on host plants other than truck crops was July 20, 1962 when six beetles were taken on the wild cucurbit, *Echinocystis lobata,* a plant that is very common on the flood plains of the Wabash River and similar areas. In eight one-hour collections from July 20, 1962 to October 17, a total of 134 beetles was collected at one location, an area approximately 100 feet wide by ¼ mile long and parallel to the Wabash River. The maximum number of beetles taken on a single collection was 32 on October 14.

At another location, ¾ of a mile downstream, 60 beetles were taken on October 19, 1962. Beetles were present here in such large numbers that the *Echinocystis* plants were damaged extensively. In all collections, the numbers of *A. gouldi* exceeded that of either *A. vittata* or *Diabrotica undecimpunctata howardi* (Barber), although these were always present.

On October 22, 1962, the Lafayette area experienced its first killing frost. After the frost, all collection areas were again searched and, even though temperatures ranged as high as 70° F, only two beetles were found. These were discovered beneath leaf litter and died soon after being brought inside.

In April and May of 1963, all collection areas were re-examined. No beetles were found although the host plant was abundant. No additional searches were made after this time, so that it is not known whether the beetles occurred in 1963.

Life History—Almost all the females of *A. gouldi* collected in October were gravid to the point where eggs were discernible through the abdominal wall. They mated very actively at this time, whereas no attempts to mate were observed during the summer months. This is in contrast with *A. vittata,* collected at the same time, which mated only during the summer months.

All attempts to rear *A. gouldi* from egg to adult proved futile. Mating pairs of beetles collected in October were placed in petri dishes containing moistened filter paper and cucumber seedlings. Eggs were collected daily and put into two-dram vials with a drop of water for moisture. The eggs were held at approximately 75° F until hatching, whereupon the larvae were transferred with a camel's hair brush to the rootlets of potted cucumber plants. The latter were placed in cages and observed for adult emergence; however, none of the larvae completed development. Using this method of rearing, it was impossible to determine at what stage the immature beetles perished.

Fifteen females yielded a total of 360 eggs or an average of 24.0 per individual. The maximum and minimum numbers per female were 74 and zero. None of these females lived longer than 10 days, with the majority dying much sooner. After 30 days, some eggs from all egg laying individuals had hatched, yet the total was only 39, or 10.8 per cent. The average length of the egg stage at 75° F was 12.2 days, with a minimum of 10 days and a maximum of 20 days.

In another rearing attempt, the last collection of 60 beetles was put in a single cage with numerous cucumber plants growing in the soil. The beetles fed and deposited numerous eggs near the base of the plants; after 7 days, all beetles had died. After 25 days, a careful examination of the roots of some of the plants failed to reveal any larvae. Likewise, no adults emerged from the remaining group of plants.

It is clear that *A. gouldi* is not nearly so rare as previously thought, and more intensive searching should reveal its presence on *E. lobata* in other areas.

References

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A Note on Auplopus Spinola in Trap-nests in Wisconsin (Hymenoptera: Pompilidae)

J. T. Medler [1]

It is of interest to report on *Auplopus* nests found in $\frac{3}{16}$- or $\frac{1}{4}$-inch holes drilled to the depth of six inches in sumac sticks, and thus add another record to the variety of protected places where the members of this genus are known to nest. Information on the ecology and nesting behavior of *Auplopus* in the northeastern United States was reviewed by Evans and Yoshimoto (1962).[2] The mud-cell nests of the various species have been reported under stones, prostrate logs, exposed tree roots and the loose bark of standing trees; also within burrows of the mining bee, *Anthophora*, in old nests of *Sceliphron*, *Trypoxylon*, and *Polistes*, inside an oak apple gall, in a crease in a wagon cloth, etc.

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[2] Ent. Soc. Amer. Misc. Pub. 3: 67–119.

Twelve nests of *Auplopus caerulescens subcorticalis* (Walsh) were found among the many hundreds of trap-nests utilized by bees and wasps in Wisconsin during 1952–1962. In some nests the individual mud cells were strung together like beads, in others they were separated from each other by spaces of no consistent pattern. The mean number of cells was 4.5± 2.2, range 2 to 8. Each cell had a roughened or "pebbled" exterior. The interior was smooth, but apparently unlined by salivary secretions. The cylindrical cells were rounded at the bottom and flattened at the top. They normally were 8–9 mm × 4.5–5 mm, and had a cell wall $\frac{1}{2}$ mm thick.

Each cell was provisioned with a single spider with its legs amputated prior to being placed in the cell. In most cells the larva consumed all of the prey and left no fragments. Rarely a palpus or chelicera was found. The cocoon was thin, white, paper-like, and firmly attached to the base of the cell by the white meconium. The adult wasp emerged through a hole cut in the side of the cell near the top. Nests were taken representing both a summer and an overwintering generation.

Rearing records from six nests are given in Table 1. There was no consistent pattern in the sequence of sexes, and males were produced before females in five nests.

A spider was obtained from cell 6, nest 4. According to A. L. Turnbull, *in litt.*, "It is an immature female and lacks all appendages except the pedipalps. This makes it virtually impossible to identify the species. However, there is no doubt at all that it belongs to the genus *Clubiona* (Family Clubionidae)."

Evans and Yoshimoto (*op. cit.*) reported immatures of *Trachelas tranquillus* (Hentz) (Clubionidae) and *Phidippus audax* (Hentz) (Salticidae) and a female *Anyphaena pectorosa* Koch (Anyphaenidae) as prey of *A. subcorticalis.* They described the method used by the wasp to carry prey; the spider with its amputated legs is straddled and held by the spinnerets, venter-up.

In addition to the localities given in Table 1, nests were obtained in Lincoln and Washburn counties. Although the records represent widely separated localities, all of the nests were found in densely wooded areas, and were associated with swamp habitats.

TABLE 1. *Rearing records of Auplopus subcorticalis (Walsh) in trap-nests, showing the sequence of sexes.*

Nest Number	Year and Location	Cell							
		1	2	3	4	5	6	7	8
1	1962, Waukesha Co.	†	♂						
2	1962, Ozaukee Co.	†	♂	♀					
3	1962, Ozaukee Co.	†	♀	♂	♀	†			
4	1962, Ozaukee Co.	♀	†	♂	†	♀	s		
5	1959, Dane Co.	♂	†	♀	♀	♀	Mc	*	
6	1961, Dane Co.	♀	♀	♂	♀	♀	♀	†	*

Explanation of symbols: † = died during rearing; s = spider; Mc = *Melittobia chalybii* Ashm.; * = empty cell.

A specimen of *Auplopus mellipes variitarsatus* (D.T.) was also obtained from a trap-nest in 1956 at the Kettle Moraine State Forest, Waukesha Co.

A Note on Hemyda aurata R.D. (Diptera: Tachinidae), a Parasite of Podisus maculiventris (Say) (Hemiptera: Pentatomidae) [1]

H. C. COPPEL and P. A. JONES [2]

Studies of the predator complex associated with the introduced pine sawfly, *Diprion similis* (Htg.) in Polk Co., Wisconsin, showed that one of the most common pentatomid species collected in the field was *Podisus maculiventris* (Say) (Coppel and Jones, 1963). Field collected *P. maculiventris* were main-

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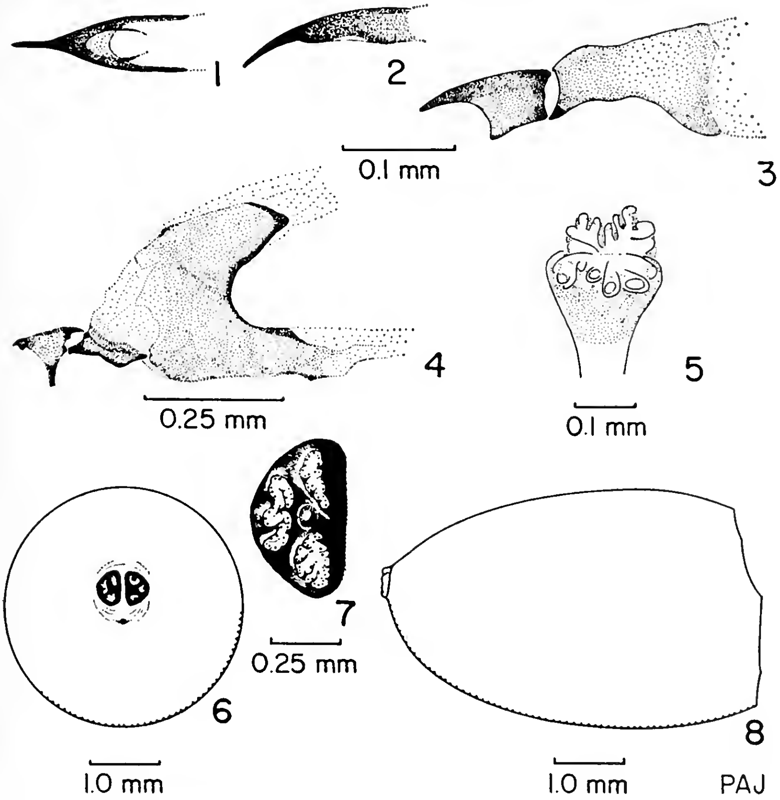
tained in the laboratory from 1960–1962 inclusive and had an apparent parasitization of less than one percent. The following note provides data on one parasitic species reared from its host and emphasizes the usefulness and possibility of associating reared adults with both their immature stages and their host (Sabrosky, 1952).

A female *P. maculiventris* was collected in September, 1961, and maintained in the laboratory. Approximately six months later on March 30, 1962, when the pentatomid died, a dipterous larva emerged and formed a puparium within 24 hours. A tachinid fly emerged on April 5, 1962 and was subsequently identified by C. W. Sabrosky, U. S. National Museum, as *Hemyda aurata* R.D. According to Sabrosky (in litt.) *H. aurata* is often collected, easily identified, and widely distributed, but little is known of its biology. It occurs from British Columbia to New Hampshire, south to California, Mexico to Georgia.

The adult head and wing of *H. aurata* were illustrated by Williston (1908), but no information on the immature stages was available. Consequently, it was possible, by simple dissection and association, to accumulate data on the immature stages. The host, *P. maculiventris,* was dissected in warm water and provided the first and second stage buccopharyngeal apparatuses. Both were located in the abdomen of their host, appressed to an inner surface. The interior of the puparium provided both the buccopharyngeal apparatus of the third stage larva and the internal pupal spiracle. All parts were cleared slightly in 10% KOH and mounted on slides before illustrating. A binocular zoom microscope fitted with an ocular grid was used for the illustrations.

Certain specific characters of the puparium and larval stages of *H. aurata* (Figs. 1–8) are useful in identification. The buccopharyngeal apparatus of the first stage larva is joined anteriorly to form a single or common mouth hook (Figs. 1–2) and is apparently unjointed. Though not shown in Figs. 1 and 2 the apparatus has closely associated plates. The apparatus of the second stage larva consists of an anterior segment comprising the paired mouth hooks and a posterior segment not too distinct in outline (Fig. 3). The buccopharyngeal apparatus of the mature or third stage larva (Fig. 4) is three segmented, consisting of paired anterior mouth hooks, an intermediate region not clearly separated posteriorly, and a posterior region consisting of prominent dorsal and ventral wings.



FIGS. 1–8. *Hemyda aurata* R.D. 1. Buccopharyngeal apparatus of first instar larva, dorsal view. 2. Buccopharyngeal apparatus of first instar larva, lateral view. 3. Buccopharyngeal apparatus of second instar larva, lateral view. 4. Buccopharyngeal appartus of third stage larva, lateral view. 5. Internal anterior spiracle of pupa. 6. Puparium, posterior view. 7. Posterior stigmal plate. 8. Puparium, lateral view.

The pupal spiracles (Fig. 5) are located laterally within the puparium on the posterior portion of the first abdominal segment, close to the dorsoventral suture. The surface of the spiracle is appressed to the interior surface of the puparium but no pupal respiratory horns are formed. Additional characters of the puparium which are most reliable for specific determinations are the stigmatal plates, their spiracular openings, and the relative position of the stigmatal plates to each other, to the anal opening, and to the horizontal axis of the puparium (Figs. 6–8). It should be noted that in *H. aurata* the orifices on the stigmatal plates (Fig. 7) are small pores rather than continuous slits as ocur in many tachinids.

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GUIDE TO THE INSECTS OF CONNECTICUT. Part VI. The Diptera or True Flies of Connecticut. 9th Fasc. SIMULIIDAE and THAUMALEIDAE by **Alan Stone.** Pp. vii + 126. Bull. 97 of State Geological and Natural History Survey of Connecticut, 1964. Distribution and Exchange Agent: State Librarian, State Library, Hartford, Conn.

Gives keys for the subfamilies and tribes of the world, genera of North America, and species of the Northeastern region (Virginia to Labrador, westward to the Great Plains).

INTRODUCTORY INSECT PHYSIOLOGY by **Robert L. Patton.** Pp. 245, illus. Sept., 1963. W. B. Saunders Co., Philadelphia 5, Pa. Price: $5.50.

Review

EXPERIMENTAL BIOLOGY: MEASUREMENT AND ANALYSIS. **R. H. Kay.** 347 pp., illustrations, New York (Reinhold). 1964. Price: $12.00.

As biology becomes more and more specialized and sophisticated, it becomes increasingly apparent that physical and chemical principles underly all biological phenomena, which thus become amenable to precise measurement. The modern experimental biologist is therefore obliged to cope with a burgeoning array of instrumentation which his limited knowledge of math and physics allows him to use but all too often not understand. He therefore must accept on blind faith the information thereby obtained.

In an attempt to rectify this situation, a number of physicists-turned-biologists have published extremely helpful information on instrumentation that includes only the salient points of concern to biologists. This book is such a publication. Dr. Kay is basically a physicist whose avowed purpose herein is to give the biologist an intellectual acquaintance with the physical principles governing his instrumentation. In some very readable discussions, the author gently leads the reader through the physics of the instrumentation for neurophysiological, optical, and gas analyses. Also included are some minor digressions with perhaps less practical value, such as a chapter on model systems. In general, the principles rather than the specific applications of a measurement or an experimental manipulation are discussed along with the types of devices used.

Although many senior investigators may benefit from certain interesting discussions, such as the one on unwanted signal and noise, the quality and plane of presentation make it a highly desirable book for graduate students and junior investigators. Furthermore, a lecturer or a lab instructor in search of an uncomplicated presentation of the principles of operation of an instrument may find this a useful source.

FRANK E. HANSON

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ENTOMOLOGICAL NEWS

Vol. LXXV OCTOBER, 1964 No. 8

Termite Prey of some African Ants

Neal A. Weber, Swarthmore College,
Swarthmore, Pennsylvania

The most extensive account of ants preying on termites is that by Wheeler (1936). Several more recent records of African termites fed by ants to their larvae appeared in Weber (1948). That year Professor A. E. Emerson of the University of Chicago and I were independently collecting in Africa. Some of the 1948 termite-ant records appeared in Weber, 1949a, 1949b, 1950 and 1952.

The ants taken by Professor Emerson with termites, mostly in the former Belgian Congo (now the Republic of the Congo), were sent to me together with his determination of the termites. These unpublished records, together with several of mine, appear below arranged according to the ants.

Megaponera foetens (Fabr.)

All accounts of this large, black African ant indicate that it is peculiarly a predator of termites. The following records by Dr. Emerson, all from the former Belgian Congo, are the most extensive for identified termites.

"Returning from raid in forest carrying *Odontotermes sladdeni* Emerson, and *Microtermes calvus* Emerson, Yangambi, 30.v.48.

About 150 seen massing in leaf debris where they collected small *Protermes;* dead soldiers about. Camp Putnam, Epulu, 14.v.48.

Raiding *Odontotermes* that I had been collecting; 200 in column; bed of stream. Sona Mpunga, 12.iv.48.

Raiding broken galleries of *Odontotermes planiceps* (Sjostedt); forest gallery, 225 ants, 90% with termite worker-soldier, 6–7 termites each 15 minutes going and coming. Sona Mpunga, 12.iv.48.

Returning from raid on *Microtermes calvus* Emerson 4:05 PM. Camp Putnam, Epulu, 22.v.48.

Returning from raid on *Pseudacanthotermes militaris* (Hagen). Yangambi, 29.v.48.

Returning from raid on *Acanthotermes acanthothorax* (Sjostedt). Camp Putnam, Epulu, 16.v.48.

Ants carrying small *Odontotermes* through grassland near shore of Lake Edward. 7.v.48.

Returning from raid with *Pseudacanthotermes;* Sunshine 2:25 P.M Camp Putnam, Epulu, 22.v.48.

Raiding *Pseudacanthotermes.* Camp Putnam, Epulu, 13.v.48."

An unpublished record of mine (Weber) is from former French Equatorial Africa (Bangassou, latitude 4° 40′ N, longitude 22° 48′ E, 12.iii.48). The *Megaponera* were first seen at 8:05 AM emerging from a hole in the concrete foundation of the regional schoolhouse. The file was about 3½ meters long and consisted of 2–5 workers marching abreast. At this moment no single ant was in the lead but at 8:15 one took this position, about 30 cm in advance of the file. At 8:16½ it was daubed with red lacquer, whereupon it ran back into the file and caused a general swarming of the head of the column, the ants stridulating markedly. The sound could probably have been heard at a distance of 3–5 meters by an average human ear.

At 8:20 the file split up, half going back along its same path and the remainder proceeding into a patch of grass, milling about for a few minutes, then returning to the others. Several workers were carrying other live workers who quickly ran off when I would pick up the carrier. One pair had terminal antennal segments missing on each ant. At 8:26 the file, still about 3½ meters long, returned to the hole from which it had emerged 21 minutes earlier, and the ants disappeared. Two stragglers at the rear were carrying smaller workers beneath their bodies, head forward. One of these carried had terminal antennal segments missing. By 8:31 the last straggler had returned but at 8:32 ants started out again. Only about one-third of the file came out, followed by a gap of a meter, then more emerged. The ants went into thick grass at 8:35 and were temporarily lost sight of.

Another file from the same nest must have left earlier for at 8:36 it suddenly emerged from the grass about 16 meters away from the hole. Two workers were preceding the column by about one meter, then came a single ant 25 cm in front of the file. The file had been successful and was carrying dead termites, which slowed their progress compared with the other file. One ant came up to a large *Odontomachus* ant beside the file, darted at it but did not seize it. One ant carried two soldier and two worker termites, all by the "necks" and heads forward. Others carried single termites, soldier or worker. At 9:10 another part of a file returned, laden with termites.

At 8:40 the next morning a file only about two-thirds of a meter long returned back of me while I was otherwise occupied and went down the entrance. These ants were also laden with termites.

At another Bangassou building stray workers were seen foraging singly from their hole in the wall. Between Bangassou and Zemio along the Haut Mbomu River a file about 3½ meters long was seen at 11:30 AM but without prey. My companion and I disrupted them, whereupon they went on a few meters to the base of a *Macrotermes* mound. They clustered together here, mostly in the shade and with heads directed toward the mound. Then they gradually turned about and returned the way they had come. Across the river in the former Belgian congo near Zemio March 4, a file was returning without prey at 10:20–30 AM. They were estimated to be about 100–300 ants. March 2, west of Niangara 69 miles, former Belgion Congo a file was seen travelling without prey at 12:10 PM.

Additional unpublished records of mine are from Kenya, January 1948, mostly about 6200 feet above sea level. A file

January 17, 8:20 AM, was without prey and traveling 4–6 abreast. One worker January 21, 8 AM, was walking at the edge of a ravine, a second was found quietly stationary under leaves and a third stray was seen. These ants may have become lost from a file. Another single worker January 22, at 9:45 AM, was struggling with a dead one which was mud-covered and at the entrance to what seemed to be an old termite mound; other workers were about this mound, none with loads. Nearby at 8:45 AM of the same day, however, the return of a successful termite raid was witnessed. By 8:55 the ants had disappeared down a hole 55 × 70 mm in what appeared to be an old termite mound about 28 cm high and about 90 cm in diameter. The hole led straight downward for at least 90 cm. One ant carried five worker termites. A few straggling ants came in to the hole until 9:05 but were mostly without prey.

Centromyrmex congolensis Weber 1949

Worker. Length 6 mm, of thorax 1.8 mm. Agreeing well with the original description (holotype in A.M.N.H.) except for more rounded cutting margin of mandibles and other minor details.

Mulungu, Congo, March, 1953, No. Z433, F. H. Hendricks. The ants were in a nest of *Odontotermes patruus* (Sjostedt) (det. A. E. Emerson).

Female and *male* (undescribed). Camp Putnam, Epulu, 12.v.48, in nest of *Apilitermes longiceps, Protermes prorepens* and other species (Emerson No. 18).

Centromyrmex appears to be an obligate predator of termites and has striking morphological adaptations for this habit.

Bothroponera, probably n. sp.

Polymorphic, smooth and shining workers whose maxima are eyeless, minima with minute eyes, and female with large eyes. In nest containing *Trinervitermes, Coactotermes, Amitermes, Furculitermes.* Keyberg, 25.iv.48.

Pheidole punctulata Mayr

From deserted clay termite nest on forest floor, also containing *Microtermes feae* Silvestri. Sona Mpungu, 21 km N Lufu, 20.iv.48.

In stick on ground in gallery forest with *Microtermes.* Keyberg, 9 km S Elizabethville, 17.iv.48.

In nest of *Cubitermes fungifaber* var. *elongata* Sjostedt. Brazzaville, former French Equatorial Africa, 1.iv.48.

From small dirt mound of *Ophiotermes mandibularis* Sjostedt. Brazzaville, 7.vi.48.

In dead wood of *Polyscias fulva* with *Odontotermes patruus* Sjostedt. Mount Biega, 2500–2550 m, v.48, F. Henbricks 3112. Large termites may grasp the worker ants and amputate segments.

In vial of *Microcerotermes durbanensis* Fuller, Durban, Natal, iv.35, H. Kirby T-4300.

In large mound of *Cubitermes* 1 × 2 ft, grassy woodland, Keyberg, 22.iv.

Pheidole sp.

In nest of Cubitermes. Epulu, 11.iv.48.

P. speculifera Emery

From old termite mound occupied by *Microcerotermes.* Camp Putnam, Epulu, 11.v.48.

P. nr. **rotundata**

In mound of *Megagnathotermes katangensis* Sjostedt. Keyberg, 23.iv.48.

In mound of *Cubitermes* in dembo surrounded by grass including also *Anoplotermes, Micromatermes, Microtermes, Ophiotermes.* Keyberg, 23.iv.48.

Crematogaster (Sphaerocrema) lotti Weber

In nest, 6 inches high, of *Cubitermes* with *Pericapritermes, Chiasognathus* and *Orthotermes mansuetus.* Leopoldville, 5.iv.48.

In nest, 6 inches high, of *Pericapritermes chaisognathus* on ground in woods. Leopoldville, 4.iv.48.

In nest of *Noditermes.* Leopoldville, 5.vi.48.

From deserted termite nest on ground in Kalina woods. Leopoldville, 4.iv.48.

In dirt termite nest on ground with *Pericapritermes.* Leopoldville, 6.iv.48.

C (C.) near **brunneipennis**

From arboreal nest of *Nasutitermes usambarensis* (Sjöstedt). Rwindi Camp, 5.v.48.

C (Sphaerocrema) near **kneri** Mayr

Living in mound of *Trinervitermes ibadanicus* Sjöstedt. Grassland on 4000 ft plateau, Plateau Province, Nigeria, 23.iii.50, G. C. Webb No. 58.

C. (Sphaerocrema) bequaerti Forel

In mound with *Termes.* Keyberg, 23.iv.48.

Monomorium (Parholcomyrmex) destructor (Jerdon)

From nest of *Cubitermes sankurensis* and *Microcerotermes macaoensis,* Keyberg, 8 km south of Elisabethville, 17.iv.48. In mound with *Ancistrotermes cavithorax* and *Trinervitermes oeconomus,* Bangui, former French Equatorial Africa, 3.vi.48. Tropicopolitan.

Monomorium sp. near **floricola** Jerdon

A small, blackish brown species with paler appendages and densely punctate on the pedicel, epinotum and mesonotum appears to be an indigenous species. In mound nest of *Cubitermes,* edge of Dembo No. 2, Keyberg, 24.iv.48. Ndjili, 18 km on rr. S of Leopoldville, 11.vi.48, in mound of *Odontotermes.*

Solenopsis punctaticeps kibalensis Wheeler

In *Crinitermes* mound, Keyberg, 23.iv.48, Winifred Emerson.

Myrmicaria eumenoides congolensis Forel

Preying on *Microtermes feae* Silvestri in broken fungus garden (see *Dorylus bequaerti*). Sona Mpungu, 21 km north of Lufu, 12.iv.48.

These ants are generally insectivorous and have also been taken by the author in Kenya (Barakitabu R., 22.i.48) carrying dead termites. In one file of ants two were carrying termites, a third was carrying a small locust. Another *Myrmicaria* near a *Megaponera* file was carrying a worker and a soldier termite but appeared to have gathered them from leavings of a successful *Megaponera* raid.

Camponotus (Myrmoturba) maculatus subsp. **brutus** Forel

From old fungus gardens in mound of *Apilitermes longiceps* (Sjöstedt), Camp Putnam, Epulu, 14.v.48. Generalized in habits. All worker castes.

C. (Orthonotomyrmex) vividus (F. Smith)

One media worker from nest of *Microcerotermes,* Keyberg, 17.iv.48, an arboreal nest 30 feet up in a tree in gallery forest along a stream.

C. (Orthonotomyrmex) sericeus (Fabr.)

From nest of *Macrotermes natalensis* (Vial 12, photo), Rwindi Camp, 6.v.48 and one of two species from Keyberg (photo 2), 23.iv.48 in a mound with *Cubitermes, Crinitermes, Microtermes, Ancistrotermes* and *Microcerotermes.*

C. (Myrmotrema) perrisii subsp. **grandior** (Forel)

From mound of *Trinervitermes bettonianus* (Sjöstedt), 18 km south of Leopoldville, 9.vi.48.

C. (Myrmotrema) bayeri Forel

From mound of *Trinervitermes ebnerianus* Sjöstedt, Ibadan, Nigeria, 13.ii.50 (G. C. Webb, No. 49).

The above two species, *perrisii grandior* and *bayeri,* are closely related and both may be facultative predators on *Trinervitermes.*

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Insect Predation by Conocephalus fasciatus (Orthoptera, Tettigoniidae)

Byron C. Marshall, Hot Springs National Park, Arkansas

While collecting insects at my livingroom window with an ultra-violet light in the summer and fall of 1963 there was an opportunity to observe that the small katydid, or meadow grasshopper, *Conocephalus fasciatus* (De Geer), feeds actively on insects. On several nights this species was attracted to the window, and at times two or three individuals occurred there at once. Their principal activity, while resting on the glass of the window or nearby, was catching and eating small insects which were attracted by the light. Leafhoppers were the chief prey, though small Diptera and a variety of other small insects were consumed. Many of the larger leafhoppers managed to escape when seized, but the smaller species usually were caught securely and they seldom escaped. The method of capture was to lunge when a leafhopper came close, and to grab it with the mouth. In doing so, *Conocephalus* did not release its foothold, and much of the action was with the head and neck. A considerable number of small insects would be caught, one after the other, and each one chewed up and swallowed. Apparently after getting their fill, the little katydids would fly away in the darkness of the night.

It is well known that *Conocephalus* spp. feed on insects to some extent (Gangwere, 1961, pp. 105–107, 160–161; Isely and Alexander, 1949). However, I have seen no records of insect food taken by *C. fasciatus,* and Gangwere recorded only plant flowers or spikelets as food of *fasciatus.* He concluded that in *Conocephalus* spp. "animal foods are probably preferred over plant foods, but that they are less often taken because of lesser availability." My observations indicate that *C. fasciatus* preys actively on insects when suitable opportunities occur.

I am grateful to Dr. Ashley B. Gurney, U. S. Department of Agriculture, for assistance with the references cited.

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The Male of Eucerceris sinuata Scullen (Hymenoptera: Sphecidae)[1]

HERMAN A. SCULLEN, Oregon State University

Eucerceris sinuata Scullen was described from a single female specimen in 1939 (*Oregon State Monographs, Studies in Entomology,* No. 1, p. 47). The type of this interesting but rare species was taken at Devils River, Tex. Later a second female was recorded from Leon Creek, Bexar Co., Tex. (*Pan-Pacific*

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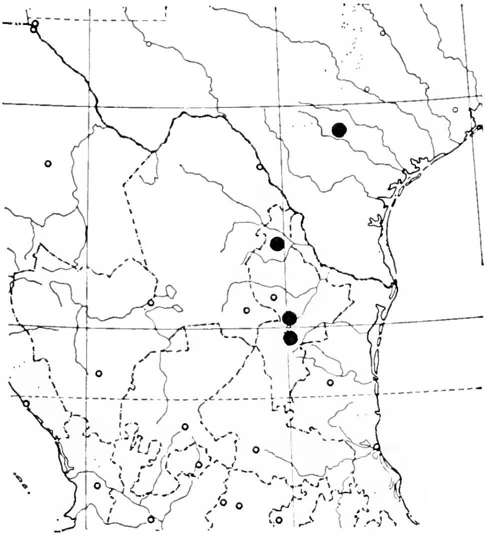
[1] Financial support for the research upon which this paper is based came from a National Science Foundation grant. (GB 963.)

Ent. 33: 155–6, 1957). Since the above published records, females have been identified as follows: 50 miles southeast of Monterrey, N. L., Mex. (Near a small air field at Montemorelos, on *Baccharis glutinosa,* 1,700 ft elevation, Oct 13, 1957 (H. A. Scullen); Leon Creek, Bexar Co., Tex., Oct 12, 1952 (M. Wasbauer); 4 ♀♀, Montemorelos, N. L., Mex., Sept 8, 1963 (Scullen and Bolinger).

When the writer collected the above females at Montemorelos in 1957 a series of eleven males was taken on the same patch of *Baccharis glutinosa.* At that time it was noted these could be the male of *C. sinuata.* To make further observations on this point the writer again visited the same location Sept 8, 1963 in company with Dr. Duis Bolinger. At this later time 4 additional females and 47 males were taken. Although mating was not observed and the nesting area was not found the following facts convinced the writer that the males taken at this location were the males of *E. sinuata* Scullen. (1) No other specimens of the genus belonging to either sex were taken at either visit

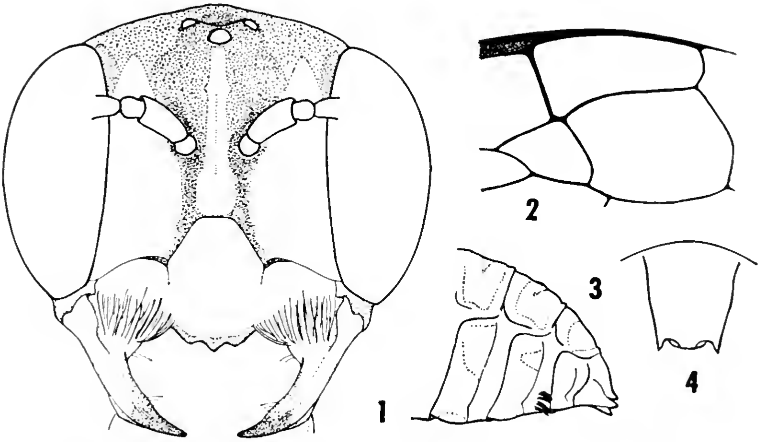


Map 1. Distribution of *Eucerceris sinuata* Scullen.

to the area, (2) the two sexes closely agreed in size and color pattern and (3) the two sexes were closely associated in their adult feeding on *Baccharis.* The male is here described.

Eucerceris sinuata Scullen. Figures 1–4, Map 1.

Male: Length 14 mm. Largely ferruginous infused with black over limited areas and with yellow markings; punctation small and crowded; pubescence very short; abdominal bristles limited to one small divided row on the 5th sternum.



Eucerceris sinuata Scullen. Figs. 1–4, Male. 1. Face, 2. Venation, 3. Ventral abdominal bristles, 4. Pygidium.

Head one fourth wider than the thorax; ferruginous except for a black area which embodies the ocelli and extends over the face through the antennal scrobes to the clypeal area where each extension narrows to a black line; a narrow black patch borders the eye near the vertex; face otherwise yellow; clypeal border with three subequal denticles; hair lobes extend along the entire lateral clypeal lobes; mandibles without denticles but showing a slightly elevated area medially; antennae normal in form.

Thorax ferruginous becoming very dark in depressed areas and with yellow markings; pronotum, band on the scutellum, the metanotum, large patches on the pleuron below the wing, a smaller elongate spot on the sterno-pleural area, the medial area of the sternum and a patch on the tegulae, all of which are yellow; tegulae low and smooth; enclosure with a medial groove and strongly ridged laterally parallel to the base except at the extreme lateral angles; mesosternal tubercles absent; legs ferruginous except for much of the coxae, the trochanters, spot on the apical end of the third femora and all segments of the tarsi, all of which are yellow; wings subhyaline posteriorly but deeply clouded in the anterior area, the third submarginal cell not petiolate.

Abdomen ferruginous with a broad emarginate band on tergum 1, a broad band on tergum 2 showing a small ferruginous patch in the center, two bands with the more basal one evanescent on terga 3, 4 and 5, broad band on tergum 6, an evanescent band on sternum 2, band on sternum 3, lateral patches on sterna 4 and 5, all of which are yellow; pygidium as illustrated; ventral abdominal bristles forming a single short divided row on the apical border of sternum 5.

Superficially the male of *E. sinuata* Scullen is very similar to the male of *E. canaliculata* (Say) from which it is separated by the ventral abdominal bristles. The latter species has three distinct rows of bristles. The male of the former species also closely resembles the male of *E. rubripes* Cresson from which it is separated by the very much longer row of ventral abdominal bristles on *rubripes*. The distribution of all of the three species overlap in the central part of Texas.

Specimens examined: Mexico: ♂, 4 miles west Linares, N. L., 1,300 ft elev., Sept. 7, 1963 (Scullen and Bolinger); ♀, 11 ♂♂, Montemorelos, N. L., 1,700 ft elev., Oct. 12, 1957 (H. A. Scullen); 11 ♂♂, *ibid.*, Oct. 13, 1957 (H. A. Scullen); 4 ♀♀, 47 ♂♂, *ibid.*, Sept. 8, 1963 (Scullen and Bolinger); 2 ♂♂, 23 miles north Sabinas, Coah., Aug. 10, 1959 (Menke and Strange). Texas: ♀, Devils River, May 5, 1907 (F. C. Bishopp): ♀, Leon Creek, Bexar Co., Oct. 17, 1952 (B. J. Adelson); ♀, *ibid.*, Oct. 12, 1952. (W. Wasbauer).

"The Feculae ("Feces") of some Orthoptera (sens. lat.) of Tunisia [1]

S. K. Gangwere [2] and E. Morales Agacino [3]

The feculae ("feces") of insects are of considerable biological significance. Unlike the feces of mammals, these pellets are the products of two organ systems, the digestive and excretory, whose complex interplay is responsible for shaping them. They can be viewed as a veritable study in adaptation. Notwithstanding their fundamental importance, little is known about them. The first comprehensive treatment of orthopteran feculae was given in Gangwere (1962). This report included observational and experimental data relative to the factors responsible for the conformation, texture, color, and size characteristic of each of nine arbitrarily proposed fecal categories. Among these factors were included variations in food selection and in the structure and use of the insects' mouthparts and alimentary canal, as well as their habits.

Some questions relative to orthopteran feculae have, therefore, been answered, but others await an answer. For example, are the classes of feculae noted above encountered in orthopterous faunas throughout the world? One would assume that they are, on the basis of the ubiquity of the insect groups, as well as their food-plants. Are new types of feculae obtainable from exotic groups with feeding habits that differ from those of the Michigan species on which Gangwere (1962) was largely based? What is the nature of the size relationship between feculae and the insects that void them?

An obvious way in which to gain insight into these matters is to analyse the feculae of an exotic fauna, and compare the results with those from Michigan. In such an investigation it is essential that the feculae of each insect be kept separate, for

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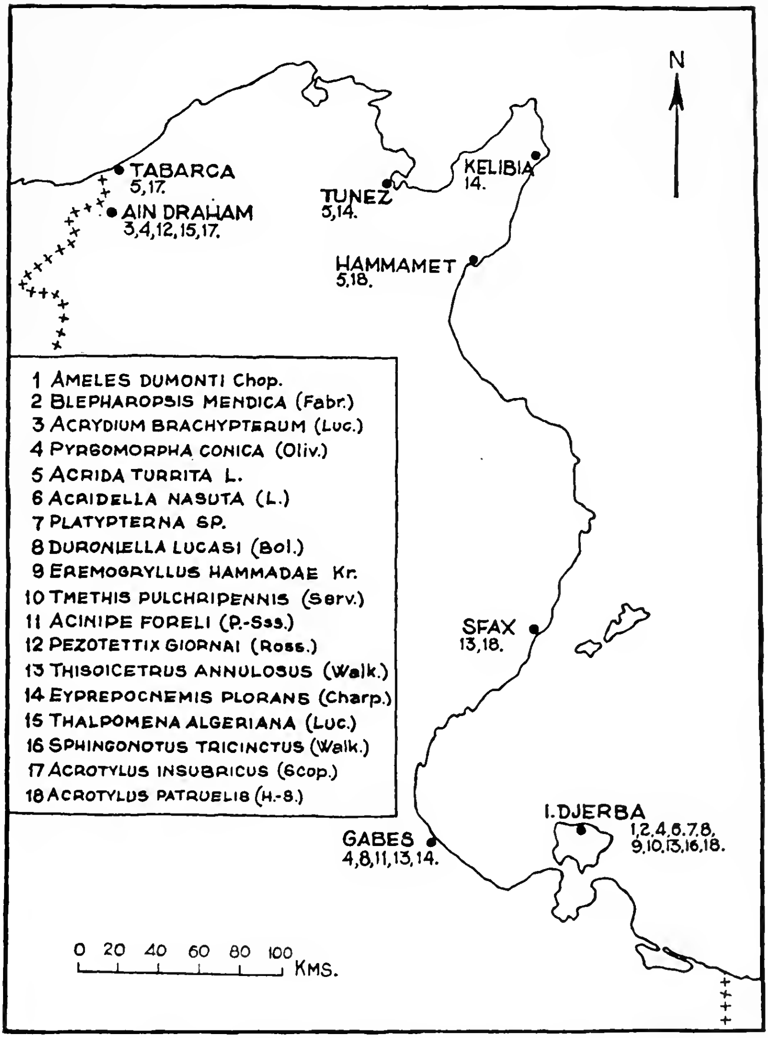
only in this manner can material be obtained that will permit simultaneous study of the above questions.

A recent meeting of the *Commission Internationale pour la Lutte Biologique contre les ennemis des cultures* furnished an opportunity to pursue these questions. The proximity of Túnez, the site of the conference, to a number of good localities gave ample opportunity to obtain feculae. The coastal and desert areas of Tunisia are fairly typical of the Mediterranean region; hence, the area, though selected by accident rather than by design, was a fortunate choice, and the material obtained may be considered fairly representative of this important region.

Methods

The individual specimen containers each consisted of a small rectangular piece of paper rolled spirally into a cone-like object, or cornucopia. The apex of each was bent on itself for closure, after which one of the living animals was thrust inside, and was trapped there as the base flap of the cornucopia was bent in place and its edges folded to hold it tight. The collection data were written directly on the resulting cone. Large numbers of animals, each in its own cone, were collected, transported, and stored in pasteboard boxes. This technique, originally perfected by Morales, obviated the need for killing apparatus, and presented a practical means of keeping all specimens, even fragile ones, unbroken. Orthoptera collected in this manner lived for several days, and usually defecated many times.

In the laboratory, the feculae of each orthopteran were placed (with a paper label bearing the specimen number) in an individual shell vial, stoppered by a cork, and stored dry. At a later time they were investigated in the following order: 1) they were examined cursorily and classified as to type; 2) crude taxonomic determination was attempted on the basis of the feculae alone, which served to avoid bias arising from preconceived notions concerning the distribution of fecal types among the insect groups; 3) the feculae were photographed, using a Leica 35 mm camera and extension tubes, and the resulting prints, made to scale, facilitated comparison of pellet conformation, texture, and size; 4) the feculae were studied in detail, using a binocular dissecting microscope, and careful notations were made of their conformation, texture, and color; 5) their



Map 1. *Tunisia with localities and list of species.*

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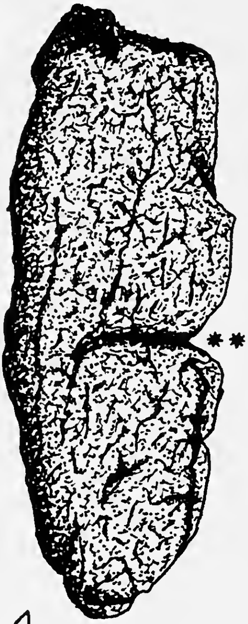

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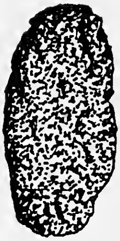

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FIG. 1. A Type IA′ fecula of the graminivore *Acrida turrita* (Acrididae, Acridinae).

FIG. 2. A Type IC′ fecula of the non-graminivore *Pyrgomorpha conica* (Acrididae, Pyrgomorphinae). Note the apical projection * often characteristic of this type of fecal pellet.

FIG. 3. A Type IC″ fecula of the non-graminivore *Pyrgomorpha conica.*

FIG. 4. A Type ID fecula of the non-graminivore *Acinipe foreli* (Acrididae, Pamphaginae). Note the transverse crease or furrow ** characteristic of this type of fecal pellet.

length (exclusive of any apical projections) and width were measured in millimeters by an ocular micrometer; 6) one or more of each type of feculae from each animal was made into a permanent microscope preparation, using a polyvinyl alcohol mounting medium; and 7) these slides, representing each fecal type (hence, each content) of each orthopteran, were then analyzed in the manner of Gangwere (1961) to determine food content.

These studies on feculae were followed by 8) measurement of each defecator. These measurements, made with calipers, were of the distance in millimeters between the most anterior extension of the head capsule and the distal end of the hind femora, with the latter projecting caudad and parallel to the main axis of the body. This particular index of size is readily measured and involves few sutures, possible sources of error because of their tendency to telescope. Furthermore, it corresponds rather well to the actual effective length of the animal. A ratio between measurements, as suggested by Dirsh (1953), yields a more accurate determination of size, but the latter is somewhat more difficult to calculate, and does not give the same ready impression of size as the method here employed.

Results

During the period of March 26 to April 6, 1962, collections were made in Tunisian oases at Ain Draham, Tabarca, Túnez, Kelibia, Hammamet, Sfax, Gabes, and Djerba. Small series of each of eighteen species belonging to seventeen genera and eight subfamilies were obtained and studied. The results of the study of these materials are presented in Table 1, which lists the characteristics of the orthopteran specimens and their feculae; Map 1, which shows the localities of the species; and Figs. 1–6, which illustrate the new types of feculae encountered.

An examination of Table 1 discloses that four of the kinds of feculae found in this study belong to types formerly described as

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FIG. 5. A Type IVE fecula of the predator *Blepharopsis mendica* (Mantidae, Empusinae).
FIG. 6. A Type IVE′ fecula of the predator *Blepharopsis mendica*.

IA, IB, IC, and IVA (Gangwere, 1962). Two types, ID and IVE, the latter including a subtype, IVE′, are new. Also new are three other subtypes, IA′, IC′, and IC″. These new kinds, Figs. 1–6, are non-ridged and non-granular. The first four of the six, as listed below, are elongate kinds.

Subtype IA′ (Fig. 1). Feculae similar in type to IA, but more narrow and elongate in form. Like Type IA they are elongate, spindle-shaped, and composed of numerous obliquely aligned grass fibers. They tend to be shades of brown or tan, often touched with salmon. They are characteristic of certain Acridinae, particularly the more extreme slant-faces (*e.g., Acrida*), but also of some Oedipodinae (*e.g., Acrotylus*).

Subtype IC′ (Fig. 2). Minute, cylindrical or ovoid feculae. Their fibers, if any, are unaligned, and they are similar to IC, differing in their less contorted, more regular form, their smaller size, and frequent possession of an apical projection. They are composed of forbs, which impart a brown or black color, with touches of tan, gray, salmon, or red. They are characteristic of *Pyrgomorpha* (Pyrgomorphinae), and are encountered also in nymphs of *Thisoicetrus* (Cyrtacanthacridinae), and, less commonly, in some individuals of *Eremogryllus* (Acridinae).

Subtype IC″ (Fig. 3). Minute, highly twisted and irregular feculae of unaligned kind. They are similar in type to IC, but are narrower and smaller. Their color, not surprisingly, is similar to that of Subtype IC′, of which they are a variation.

EXPLANATION OF TABLE 1

* For discussion of types of feculae see Gangwere (1962), as well as the foregoing text.

** The code used to describe the composition of feculae is as follows: (1) "grasses" (*i.e.,* narrow-leaved herbs, including true grasses, sedges, and rushes); (2) "grasses" and minor amounts of "forbs" (*i.e.,* broad-leaved herbs and perhaps also shrubs, the leaves of which cannot be separated accurately); (3) mostly "grasses," but moderate amounts of "forbs"; (4) mostly "regular" (non-bristly or fibrous) "forbs" and fibrous, spinous, or pubescent ones, together with moderate amounts of "grasses"; (5) mostly "regular forbs," but moderate amounts of "grasses"; (6) fibrous, spinous, or pubescent "forbs"; (7) fibrous, spinous, or pubescent "forbs," together with "regular" ones; (8) "regular" (non-bristly or fibrous) "forbs"; (9) "regular forbs," especially their floral parts; (10) leaves of woody plants (?) or perhaps forbs, as well as their floral parts; (11) leaves of woody plants (?) or perhaps forbs; (12) sclerites and other insectan remains.

TABLE 1. *List of specimens, their characteristics, and their feculae.*

Group & Species	No. Insect Specimens	Stage & Sex	Av. Length Feculae	Av. Length Insect/s	Ratio Av. Length Feculae to Av. Length Insects	Type/s Feculae*	Composition Feculae**
TETRIGIDAE							
Acrydium brachypterum	1	Adult F	1.2 mm	9.0 mm	1:8	IVA toward IVC	8
PAMPHAGINAE							
Acinipe foreli	1	" F	8.5 mm	38.0 mm	1:4	ID	11
" "	1	" M	5.3 mm	31.7 mm	1:6	ID	11
Tmethis pulchripennis	1	" F	14.8 mm	36.0 mm	1:2	ID	No analysis
" "	2	" M	5.4 mm	24.6 mm	1:5	ID toward IB	10
CYRTACANTHACRIDINAE							
Eyprepocnemis plorans	3	" M	4.4 mm	29.1 mm	1:7	IB; some between IB & IC	1, 2, & 9
Pezotettix giornai	2	" M	1.7 mm	13.5 mm	1:8	IC; some IC toward IB	6 & 8
Thisoicetrus annulosus	2	" F	5.8 mm	37.1 mm	1:6	IC	7
" " "	1	Juv. M	1.9 mm	15.0 mm	1:8	IC'; few IC"	8
Thisoicetrus annulosus?	1	" M	2.2 mm	18.9 mm	1:9	IC'; few IC"	8
OEDIPODINAE							
Acrotylus insubricus	2	Adult M	2.9 mm	17.3 mm	1:6	IC; IC toward IB	6 & 7
Acrotylus patruelis	4	" F	3.9 mm	20.7 mm	1:5	IA'; IB; IC; intermediates	2>7 & 1
" " "	2	" M	1.9 mm	16.4 mm	1:9	IA'; IB; IB toward IC	2 & 3
Sphingonotus tricinctus	1	" F	4.5 mm	23.4 mm	1:5	IB; IB toward IC; IC	4
Thalpomena algeriana	2	" F	3.9 mm	21.1 mm	1:5	IC; IB; intermediates	4 & 6
" " "	1	" M	2.8 mm	18.3 mm	1:7	IC; some IC toward IB	4
ACRIDINAE							
Acrida turrita	1	" F	7.7 mm	63.7 mm	1:8	Mostly IA; one IC	2
" "	5	" M	4.7 mm	48.9 mm	1:10	IA'; few IB	1
Acridella nasuta	1	" M	3.3 mm	40.8 mm	1:12	IB; one IC	2
Duroniella lucasi	1	" F	4.6 mm	22.2 mm	1:5	IB; few IC	2
" "	1	Juv. F	3.7 mm	17.7 mm	1:5	IB; one IC	2
" "	3	Adult M	2.7 mm	15.3 mm	1:6	IB; two IC	1>2
Eremogryllus hammadae	4	" M	1.7 mm	12.6 mm	1:7	IC'; some IB & intermediates	7>6 & 5
Platypterna sp.	1	" M	2.9 mm	20.2 mm	1:7	IB; one IC	2
PYRGOMORPHINAE							
Pyrgomorpha conica	7	" F	2.1 mm	21.1 mm	1:10	IC'; some IC"	8>7
" " "	1	Juv. F	1.2 mm	16.9 mm	1:14	IC'	8
" " "	6	Adult M	1.2 mm	15.4 mm	1:13	IC'; few IC"	8
AMELINAE							
Ameles dumonti	1	" M	1.1 mm	22.2 mm	1:20	IVE'; few IVE	12
EMPUSINAE							
Blepharopsis mendica	5	" M	1.6 mm	44.2 mm	1:28	IVE & IVE'	12

They are found in *Pyrgomorpha* and, less commonly, in nymphs of *Thisoicetrus*.

Type ID (Fig. 4). Feculae of unaligned type and cylindrical form, and characterized especially by one or more transverse creases, or furrows. They are generally large, and their color is often fuscous, but may be other shades of brown, or even yellow or gray. They are found in the two genera of Pamphaginae here examined, *viz.*, *Acinipe* and *Tmethis*.

Type IVE (Fig. 5). The feculae of the carnivorous mantid genera *Ameles* and *Blepharopsis* (Amelinae and Empusinae, respectively) proved to be either Type IVE or its subtype, IVE′. Type IVE feculae are non-elongate, subtriangular or strongly angulate objects of dull, powdery texture and variable color, usually shades of brown or gray, often with touches of rust.

Subtype IVE′ (Fig. 6). These are similar to Type IVE, but possess a more regular, subovoid outline. In form they approach Type IVC and IVD but differ in their dull, powdery texture.

DISCUSSION

THE SIZE RELATIONSHIPS OF FECULAE

The correlation in size that may exist between an individual orthopteran and its feculae is of interest. It seems clear that there should be a direct, positive correlation, but actual records are scarce. Day (1950) noted that the feculae of the large cockroach *Macropanesthia* have over 300 times the volume of those of the smaller *Blattella,* a ratio in proportion to the weight relationship between the two species.

In Gangwere (1962), without the support of quantitative data, it was asserted that there is, indeed, a positive correlation. It was noted that small species tend to defecate comparatively small feculae. Males, which are smaller than females of the same species, tend to void smaller feculae, and early-stage nymphs produce smaller feculae than do the larger instars of the same species. Size appears to be a function of food selection, as well as size of defecator. Soft, succulent, and less fibrous foods are associated with smaller feculae. Another factor is the size of individual morsels ingested, which, in turn, is determined by the insects' behavior during feeding, as well as the size and form of their mouthparts. Also important is senescence, which may result in the production of smaller feculae through resulting changes in food selection and food consumption.

Analysis of Table 1 discloses that the ratio of average length of feculae to length of animal varies somewhat from group to group of Orthoptera. The lowest ratio (therefore, longest feculae with respect to body size) is in the Pamphaginae, in which it varies from 1:2 to 1:6. In most acridids this ratio varies from about 1:5 to 1:8 or occasionally 1:9, but in *Pyrgomorpha* it is relatively great, most often higher than 1:10. In *Acrida* and *Acridella* it is also great, often reaching 1:11 or greater. The highest ratio (1:20 or more) is found in the mantids. These ratios correlate generally with the body conformation and habits of the animals. The pamphagines are usually squat, comparatively short, geophilous insects of large size, whereas the phytophilous *Acrida, Acridella,* and *Pyrgomorpha* and the two mantids (one geophilous, the other phytophilous) are relatively elongate, slender organisms. It follows that those insects having intermediate ratios should be intermediate in their body proportions; invariably this is the case.

The fact that females produce larger feculae than do their males is also documented in Table 1. Not only are the feculae larger, but they are disproportionately so. The single female of *Acinipe* was found to have a ratio of 1:4, whereas the male of that insect had one of 1:6. The only female of *Acrida* proved to have a ratio of 1:8, whereas the males had ratios of 1:11, 1:11, 1:10, 1:9, and 1:11, respectively.

Data on the size trend among feculae of nymphs are too incomplete to disclose much about the ratios in these stages.

The explanation of the disproportionately large feculae of females is obscure. It might be explicable on the basis of sexual disparities in food selection, but such do not appear to exist (Gangwere, 1961). It might possibly be explained by differences in food consumption, the larger females simply eating more food and egesting more food residues. This hypothesis fails, for, although females do eat somewhat more food, they actually eat less in proportion to their body size (Gangwere, 1959). Perhaps the answer lies in the females' more sluggish nature, from which one would deduce a comparatively lower metabolic rate. Indeed, Uvarov (1948) cited records that, at temperatures of 30 to 35° C., the rate of respiration in adult male locusts is almost twice that in adult females of the same species. Such a difference in metabolism might, for example, contribute to comparatively retarded digestive processes in females, leaving larger amounts of undigested food residues. Another possible explanation lies in the fact that food apparently passes through the length of the digestive tract in a comparatively unbroken column, interrupted finally when the rectal muscles pinch off lengths, which are extruded as feculae. A lower metabolic rate could result in greater intervals of time between contraction of these sphincter muscles, hence, longer feculae.

Types of Feculae

On the basis of the feculae of the forty-seven species of Michigan Orthoptera studied earlier (Gangwere, 1962), and the eighteen species of Tunisian Orthoptera here examined, a number of arbitrary types and subtypes of these pellets can be recognized. A synopsis of all classes originally designated is available in the earlier work, and descriptions of the new types and subtypes are given herein. These classes are not to be construed as anything more than a convenient, though artificial, way of describing certain characteristics; in view of their observed variation no other interpretation is tenable. Indeed, consecutive feculae from a single animal may be of different types or subtypes, largely in response to the varying influence of food, and the feculae of animals of large, variable groups may well run the entire gamut of form, size, color, and texture between several types.

It was demonstrated in Gangwere (1962) that food selection largely determines the form, texture, size, color, and fiber alignment, if any, which characterize feculae. In general, the more succulent, softer, and less fibrous a food, the smaller, more irregular, and more twisted the feculae. This is well-illustrated in the present study. The feculae of forbivores proved to be proportionately smaller and less regular than those of comparable-sized graminivores, and lacked the fiber alignment characteristic of the latter. Nevertheless, a number of Cyrtacanthacridinae and Oedipodinae voided feculae somewhat intermediate between Types IC and IB. The basis of this structural gradation was clarified by microscopic analysis. It was found that the partial alignment of these basically IC feculae, which caused them to resemble IB types, was a result of an unusual concentration of non-grass fibers, epidermal "hairs," or spines. It was not a consequence of grass content.

(To be continued)

Collembola from Mexico

H. RANDOLPH HEPBURN[1] and GARY N. ROSS[2]

Excepting the works of Handschin (1928) and Bonet & Tellez (1947), the collembolous fauna of Mexico remains, for the most part, little known. During his studies of the butterflies of Veracruz, the junior author collected the 11 species treated in this paper.

Collections were made in the Tuxtla Mountains in the southern part of the state of Veracruz, Mexico. The collections were made by G. N. Ross in the village of Ocotal Chico (elevation 1,900′), a small Popoluca Indian settlement situated on the leeward slope of Volcán Santa Marta (elevation 5,000′), and the date was August 3, 1963. The village is situated on one of a series of narrow ridges that radiate down from the volcano and is covered with a fine growth of pine (*Pinus oocarpa*). The slopes of these ridges are usually rather steep and are covered with various species of oak (*Quercus* sp.) and other deciduous hardwoods.

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Mull humus samples, scraped from beneath a decaying log (the 4th stage of decay, Kendeigh, 1961), and leaf litter were placed in a Berlese funnel and put out in the sunlight for two days. The complete absence of electricity in the region may account for the paucity of specimens collected. All specimens are in the museum of the Department of Zoology, Louisiana State University, Baton Rouge, La. Unless otherwise stated, species listed constitute new national records.

Hoffia robusta Scott, 1961.

Xenylla nitida Tullberg, 1871. The same species is recorded from Tlaloc, D.F., Mexico by Handschin (1928).

Proisotoma titusi Folsom, 1937. Except for minor variations in the color pattern, the specimens herein recorded agree with Folsom's original description of this species.

Isotoma violacea Tullberg, 1876 f. *mucronata* Alexson, 1900. The specimens agree with the *mucronata* form in the relationship of the postantennal organ to the eyes; but, in color, most agree with the *caeruleata* form. Since the postantennal organ is generally a more reliable character than is color, the authors have considered these specimens as belonging to the *mucronata* form.

Isotoma violacea Tullberg, 1876 f. *caeruleata* Guthrie, 1903. This specimen at hand agrees perfectly with the *caeruleata* form both in structure and in color.

Archisotoma besselsi (Packard), 1877.

Tomocerus flavescens (Tullberg), 1871.

Lepidocyrtus summersi (MacGillivray), 1894.

Cyphoderus bidenticulatus (Parona), 1888.

Salina sp. A single specimen of this genus remains unidentified but might easily be *S. wolcotti* Folsom recorded from Puerto Rico.

Entomobrya griseoolivata Packard, 1873.

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Mastoremus idahoensis, a New Species of Pedilinae (Coleoptera, Anthicidae) from Southern Idaho [1, 2]

MOHAMMAD ABDULLAH, Department of Zoology,
University of Reading, England

Professor William F. Barr of the University of Idaho has kindly sent me his collection of pediline beetles for identification. In it I discovered a third species of *Mastoremus* from his State which is described below. The two known species (*longicornis* Casey, 1895—type of the genus—and *diversicornis* Abdullah, 1964) are recorded from Arizona (Abdullah, 1964). I also found a male specimen of *diversicornis* from Pinal Mts., Arizona, collected on July 3, 1941 by W. F. Barr.

Only the female of *diversicornis* is known. The female of other species and the immature stages of all of them remain to be discovered. It should be helpful to collectors to note that the antennae are serrate in the male and filiform in the female.

The following key should serve to separate the males of the three species of *Mastoremus* Casey:

1. Antennae nearly as long as the body, less serrate from the sixth segment onwards; eyes separated by about twice their own width above (Arizona) .... **longicornis** Casey.
   Antennae shorter than the body, less or not serrate from the ninth segment onwards; eyes separated by about their own width above .... 2.
2. Seventh abdominal sternite, eighth sternite and eighth tergite entire (Idaho) .... **idahoensis**, new species.
   Seventh abdominal sternite, eighth sternite and eighth tergite emarginate (Arizona) .... **diversicornis** Abdullah.

Mastoremus idahoensis Abdullah, new species

Holotype. Male (author's No. 610), U.S.A., IDAHO, Cassia County, 4½ miles east of Idahome, August 14, 1955 (R. A. Mackie), will be deposited at the California Academy of Sciences.

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[1] Coleopterological contribution Number 27.

[2] Work supported by a research grant from the University of Reading.

Differs from the holotype of *diversicornis* (see Abdullah, 1964: 123–125) as follows. Elytra dark brown. First two antennal segments black, rest brown. Median line on vertex not distinct. Eyes brown (artificially) slightly depressed. Median pronotal sulcus distinct but not impressed. Seventh (= fifth visible) abdominal sternite entire. Eighth sternite entire, small. Eighth tergite entire, small. Tegmen slightly narrower, shape similar, apex more tapering than suggested by the figure (Abdullah, 1964: 124, fig. 12). Median lobe with median struts shorter and divergent. Length: 4.5 mm.

Paratypes. 7 designated. Records and Variation. All are males. Three were collected along with the holotype and are at the University of Idaho. Labrum and clypeus are reddish-brown; elytra are less dark than in the holotype and have some small bare areas.

Idaho, Cassia County, Malta, August 24, 1958 (W. F. Barr), 1 paratype, at the University of Idaho. Elytra dark, clypeus reddish-brown, distal antennal segments brown.

Idaho, Oneida County, 4 miles south of Black Pine, on *Kochia vestita* (as mentioned on label), August 12, 1953 (T. B. O'Connell), 2 paratypes, at the University of Idaho; 1 paratype, in the British Museum (Natural History) London. In one specimen the median pronotal sulcus is impressed. Elytra are light brown becoming dark towards apex in one.

Anal (= Wedge) cell of the wing is both open and closed in the species. Length varies from 4.5–6 mm among males.

Seasonal distribution. August 14–24.

Bionomics. The specimens near Black Pine were collected on Red Sage or *Kochia americana* var. *vestita* (Chenopodiaceae).

Remarks. The antennae are 12-segmented in all the specimens examined.

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Book Reviews

Emerson, K. C. CHECKLIST OF THE MALLOPHAGA OF NORTH AMERICA (North of Mexico). Part I. Suborder Ischnoptera, Pp. 1–171. Part II. Suborder Amblycera. Pp. 1–104. Both volumes are by offset, 8 × 10½, paper covers, stapled. Published by Dugway Proving Ground, Dugway, Utah. Distribution was free and copies may be obtained from: Chief, Ecology and Epidemiology Branch, Dugway Proving Ground.

This is the first such checklist to be published since Kellogg's of 1889, and the only one anywhere that includes an up-to-date classification. The features of listing hosts, in addition to the type host; and listing expected hosts, are unique. It is hoped that these features will assist collecting, and interest new students in Mallophaga taxonomy.

Richards, O. W. THE SOCIAL INSECTS. A "Harper Torchbook" (paperback) TB 542. Pp. 219, 51 photos, 12 figs. Harper and Brothers, New York 16, N. Y. Price $1.50. Originally published in London in 1953. This edition (1961) includes some corrections and additions.

Borror, Donald J. and **Dwight M. DeLong.** AN INTRODUCTION TO THE STUDY OF INSECTS. Revised edition. Pp. xi + 819. Holt, Rinehart and Winston. New York, 1964. Price $14.50.

This work was first published in 1954 (see *Ent. News* 65: 250). The revision shows many minor refinements and additions; especially the classification has been brought up-to-date, and the keys greatly improved. The illustrations are all clear and clean looking, and, in its new format—now double column—the book presents a fine appearance. It is an excellent practical book for the study and keying of actual insect specimens.

This is intended for a beginning course in college entomology. If so used the reviewer would urge that this course never becomes an only course for any student, but that other courses accompany or follow it in order to present the true breadth and depth of modern entomology.—R. G. SCHMIEDER.

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ENTOMOLOGICAL NEWS

Vol. LXXV NOVEMBER, 1964 No. 9

The Classification and Evolution of Digger Wasps as Suggested by Larval Characters (Hymenoptera: Sphecoidea)[1]

Howard E. Evans, Museum of Comparative Zoology,
Cambridge, Mass.

A current issue of the *Transactions of the American Entomological Society* contains a report on the larvae of digger wasps, this report being a supplement to a series of papers published in the *Transactions* and in Entomological News (Evans and Lin, 1956a, b; Evans, 1957, 1958, 1959a, b, 1964). My research in this field is now concluded. Since it consumed a great many hours of research time and over 300 pages of space in entomological journals, it seems fitting to ask whether it was all worthwhile. What, in fact, did this extended study of larvae teach us about the classification of the Sphecoidea?

Although I presented a summary and conclusions in Part V of this series of papers (1959a), I have now had time to give further thought to the matter. Also, the work resulting in the current supplementary report has given me confidence in the validity of the generic and subfamilial characters which I have found. The present paper is an attempt to bring together some of the ideas emerging from this work, in particular to suggest certain changes in classification which deserve consideration by those working with adult structure or with the ethology of these wasps.

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[1] A portion of the publication expenses of this paper were paid from the William Morton Wheeler Fund of the Museum of Comparative Zoology.

THE CLASSIFICATION OF DIGGER WASPS

The digger wasps are commonly considered to form a superfamily, the Sphecoidea. This is a large complex of several hundreds of genera and thousands of species. The classification of the group is difficult and has undergone many metamorphoses; scarcely any two textbooks or catalogs will provide classifications that are anywhere near alike. Dalla Torre's *Catalogus Hymenopterorum* (1897) recognized a single family of 17 subfamilies. Brues and Melander (1932) recognized 17 families, by no means of completely the same content as Dalla Torre's 17 subfamilies. Leclercq (1954) has recently treated the sphecoids as a single family of 15 subfamilies, while the *Synoptic Catalog* (Muesebeck *et al.,* 1951), places them in two families, the Ampulicidae and the Sphecidae, the latter with eight subfamilies. Still other sources provide other classifications.

It seems unlikely that we shall arrive at a common consensus so long as we concern ourselves with the rehashing of a limited number of features of adult structure—many of which, incidentally, involve reduction or loss of body parts, especially tibial spurs and wing veins. A growing body of workers is studying the comparative ethology of these wasps, a rewarding field but one of such complexity that the ethologist must for the present seek more sustenance from comparative morphology than he is able to repay in valid new characters derived from behavior. The need for new characters in this group is desperate, and it was for this reason that I undertook a study of the larvae which had been collected in the course of behavior work by myself and several other workers. I do not pretend for a moment that larval characters have any special importance; they merely provide additional, but much-needed, characters. As in the case of adult structure and behavior, larval characters are subject to parallelisms and convergences (although these are fewer than might be supposed, as discussed further below).

Of special interest is the fact that in several instances larval characters show fuller concordance with behavior than with adult structure. For example, the subfamily Sphecinae is not any more distinctive on the basis of adult structure than are several other groups. But there are some important differences in nesting behavior, among which is the fact that Sphecinae pack the nest closure with blows of the head, while other Sphecidae use the pygidium for this purpose. Study of the larvae reveals that the spinnerets of the Sphecinae are quite different from those of other Sphecidae (except Ampulicinae), and the mandibles are unusual in lacking conspicuous lateral setae.

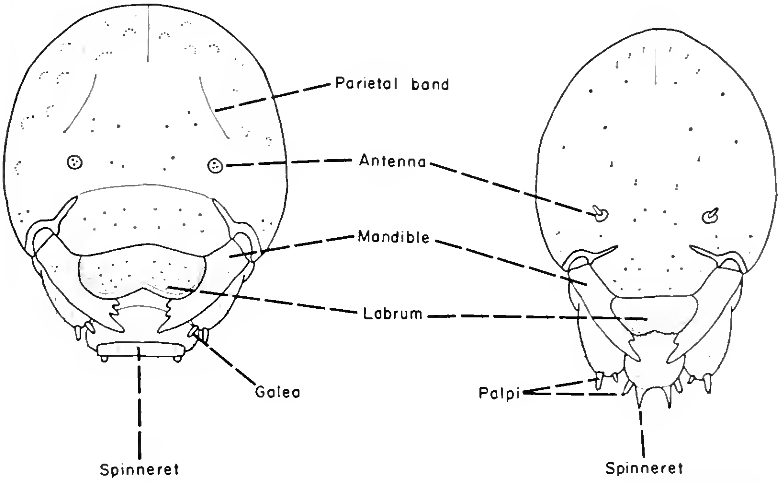

FIG. 1. Head of larva of a generalized digger wasp, *Sphex ichneumoneus* (L.) (left) as compared to that of a more advanced species, *Cerceris fumipennis* Say (right).

Another example is provided by the genus *Bembix,* which exhibits two quite distinct larval types, one with large galeae terminating in numerous sensilla, the other with slender galeae terminating in one or two sensilla. It happens that adult females of the first group lay their egg in the empty cell glued erect to the floor, while members of the second group lay their egg on the prey, or in a few cases loose in the empty cell. This sharp discontinuity in ethology and in larval structure is not paralleled by any similar discontinuity in adult structure.

Examples such as these give us confidence in the importance of larval characters. These cases are, however, exceptional: for the most part larval characters suggest groupings of the species and genera which bear much resemblance to those defined on the basis of adult structure. This fact is, of course, a source of further confidence in the value of these characters. The points of dissimilarity between larval and adult classifications are of special interest, since they suggest portions of the family deserving further consideration, preferably using still other types of characters. (Neither adult nor larval morphology has by any means been exhausted; comparative ethology is still in its early stages; a careful comparative study of cocoons and of pupal structure has yet to be made; and no one has yet studied the chromosomes or made a study of venoms or blood proteins.) The remainder of this paper is largely devoted to an examination of the points of incongruence between adult and larval structure (Fig. 2).

First of all, it should be noted that the most striking discontinuity in larval structure occurs not between the Ampulicidae and the Sphecidae, but between the Ampulicinae and Sphecinae on the one hand and all other sphecoids on the other. Since adult structure shows no really impressive break at this point, I hesitate to suggest that the two groups be given family status. However, the larvae of Ampulicinae are so similar to those of Sphecinae that, on the basis of larvae alone, one would be hard put to justify more than tribal status for the *Ampulex* group. Leclercq (1954), on the basis of adult structure and ethology, ranked the Sphecinae and Ampulicinae as closely related subfamilies, and I am inclined to regard this arrangement as most realistic.

Within the Sphecinae, larval characters show a discontinuity between the *Ammophila* group (concordant with adult structure) and the remainder of the complex, then a second discontinuity between the *Sphex* group and the remainder, including such key genera as *Chlorion, Podium,* and *Sceliphron.* Thus, larval characters are in perfect accord with the recent reclassification of the Sphecinae by Bohart and Menke (1963), who propose three tribes, Ammophilini, Sphecini, and Sceliphronini, the last group to include *Chlorion, Podium, Sceliphron,* and

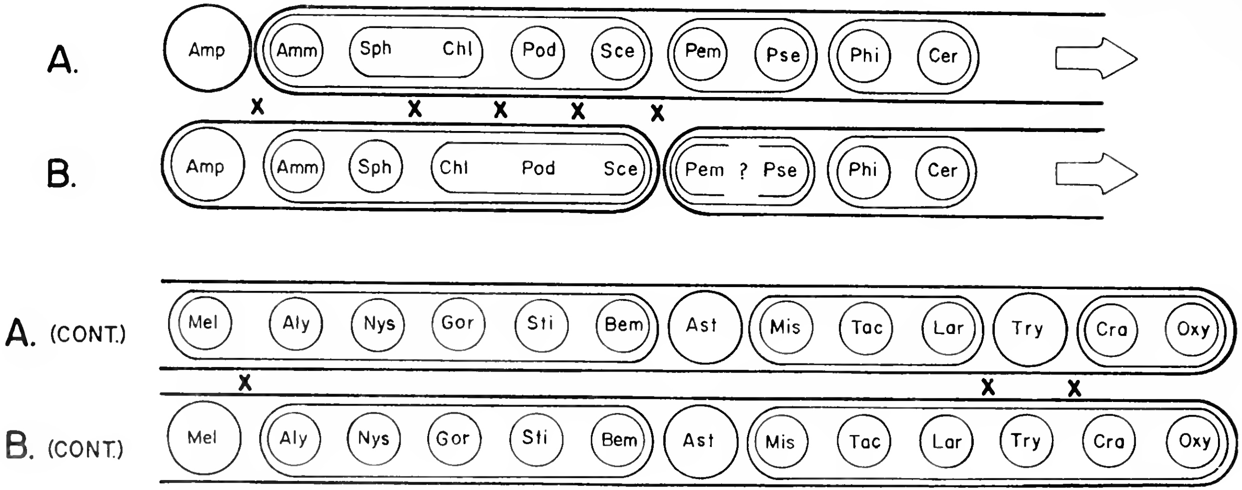

FIG. 2. A comparison of a classification of Sphecoidea based on adults (A, from Muesebeck *et al.*, 1951) with one based on larvae (B, from Evans, 1959a, 1964) (suggested by a model in van Emden, 1957, after Hennig). An "X" indicates a point of incongruence. The largest circles indicate separation at the family or strong subfamily level, medium-sized circles at subfamily level, smallest circles at tribal level. The genera which form the basis of each complex are as follows: Aly: *Alysson;* Amm: *Ammophila;* Amp: *Ampulex;* Ast: *Astata;* Bem: *Bembix;* Cer: *Cerceris;* Chl: *Chlorion;* Cra: *Crabro;* Gor: *Gorytes;* Lar: *Larra;* Mel: *Mellinus;* Mis: *Miscophus;* Nys: *Nysson;* Oxy: *Oxybelus;* Pem: *Pemphredon;* Phi: *Philanthus;* Pod: *Podium;* Pse: *Psen;* Sce: *Sceliphron;* Sph: *Sphex;* Sti: *Stizus;* Tac: *Tachytes;* Try: *Trypoxylon.*

several related genera. I have also found the cocoons of *Chlorion* to be very similar to those of *Sceliphron* and quite different from those of *Sphex*, from which genus *Chlorion* was said until recently to be only subgenerically distinct.

The genus *Mellinus* has most commonly been placed in the Nyssoninae in recent years, although some earlier authors placed it in a subfamily or family of its own. The larvae are quite different from those of the Nyssoninae, and the ethology of this genus also tends to disqualify it as a nyssonine. I might add that to include it in the Nyssoninae also forces one to stretch that subfamily to the breaking point with respect to adult structure. This genus undoubtedly deserves a subfamily of its own.

Another major incongruence occurs among those groups usually placed in the subfamilies Larrinae, Trypoxyloninae, and Crabroninae. As a matter of fact, the larvae of these three groups cannot be separated except by arbitrary selection of certain minor and relatively undependable characters. Several larval characters (especially the preapical anus, lack of antennal papillae, and mandibles of the more generalized members) tie this group together closely, and the discontinuities which do occur are not in close accord with those found in adult structure. I have proposed (1964) an arrangement of the groups conventionally placed in the Larrinae into four tribes, and I further suggest that the Trypoxylonini, Crabronini, and Oxybelini be regarded as three additional tribes of Larrinae.

This move is less rash than it may seem at first. That *Trypoxylon* and its allies may be no more than a specialized group of larrine wasps has been suspected by some workers for a long time. In fact, both larvae and adults of the genera *Pison* and *Pisonopsis* link *Trypoxylon* nicely to more typical Larrinae. This is clearly a case in which a single feature of adult structure (the emarginate eyes) has been grossly over-valued.

The Crabroninae are not so easily disposed of, since this is a large group which has undergone much diversification in structure and behavior. Nevertheless, as I pointed out in 1959, some genera of Larrinae in the more restricted sense (e.g., *Bothynostethus*) are remarkably *Crabro*-like in most characters other than wing venation. Also, the *Crabro* type of venation is easily derived from that of Larrinae and is, in fact, approximated by *Trypoxylon*. Preliminary studies indicate that the male genitalia are basically similar throughout the groups formerly considered the subfamilies Larrinae, Trypoxyloninae, and Crabroninae, the volsellae not being divided into the usual digitus and cuspis in these groups. I suggest that more harm than good is done by making three subfamilies of this complex, especially when these subfamilies are often catalogued at some distance from one another. Again, I feel that this is a case where a few adult characters (chiefly loss of wing veins) have been overemphasized in the past.

On the generic level, one also finds occasional lack of concordance between larval and adult structure. For example, the larvae of *Clypeadon* are sufficiently distinct from those of *Aphilanthops* to suggest that full generic status is justified, and I also feel that this is supported by ethology. Larval characters raise questions as to whether *Gorytes* and *Hoplisoides* deserve generic separation (again, so does ethology). But, as I pointed out above, both larval characters and ethology suggest that *Bembix* be split into two genera. Obviously there are places where we must emphasize adult structure, for to split *Bembix* would mean leaving many species of unstudied larvae and behavior unclassified. Nevertheless, the additional characters supplied by study of the larvae must be weighed in any future studies of the classification and evolution of these wasps. Unfortunately, the larvae of a good many genera are still uncollected (nearly a third of the Nearctic genera). The larvae of several striking and enigmatic genera remain unknown (e.g., *Xenosphex* Williams, *Karossia* Arnold). Hopefully, these studies have demonstrated the value of larval characters to the extent that future workers will have a great deal more material available to work with.

The Evolution of Larval Characters

There exists no commonly accepted phylogenetic scheme for the Sphecidae. Leclercq (1954) presented a dendrogram based primarily upon adult structure, and in 1959 I presented an arrangement based upon larvae (presented in modified form here as Fig. 3) and attempted to rationalize the differences between my scheme and that of Leclercq. My arrangement is based upon the premise that primitive larval characters are those shared with other families of wasps (especially Scolioidea) and that derived characters are those unique within the Sphecidae or paralleling developments in other higher wasps. Since paired spinnerets, for example, do not occur among other aculeate Hymenoptera but do occur in a large section of the Sphecidae, including many groups which exhibit reductions in wing venation and specializations in behavior, it seems clear enough that paired spinnerets are specialized. On the same basis, it seems apparent that generalized larvae have a terminal anus, relatively large galeae, and stout mandibles with four or five strong apical teeth (see Fig. 1 for a comparison of some features of a generalized and a more advanced larva).

Similar considerations lead us to believe that the acquisition of conspicuous body setae and spinules and the acquisition of distinct, protruding antennal papillae are specializations. This at first seems illogical, since the most primitive hymenopterous larvae (sawflies) have well developed antennae and various setae and spines on the body. However, the larvae of Scolioidea which have been described lack antennal papillae and their integument is smooth; this is also true of several groups of sphecids considered primitive on most other grounds (including the four larval characters mentioned in the preceding paragraph). It should be remembered that the aculeates as a whole probably evolved from a now-extinct stock of parasitic Hymenoptera, in which the larvae were fastened to the host or actually bathed in its body fluids. These larvae undoubtedly underwent a great deal of simplification in structure because of their intimate association with their hosts. With the evolution of nesting behavior, the larvae were confronted with the necessity of moving about in a cell and consuming several host organisms. Such structures as antennae and various types of tactile and ambulacral spines and setae, present in their remote ancestors, the sawflies, may once again have become useful. At one time selected against, these structures were now selected for, and were reacquired independently by various stocks of aculeates. Antennal papillae appear to have been acquired independently by at least two stocks of Sphecidae. They also occur in the Pompilidae and in the quite unrelated family Chrysididae, although absent in most other groups of wasps.

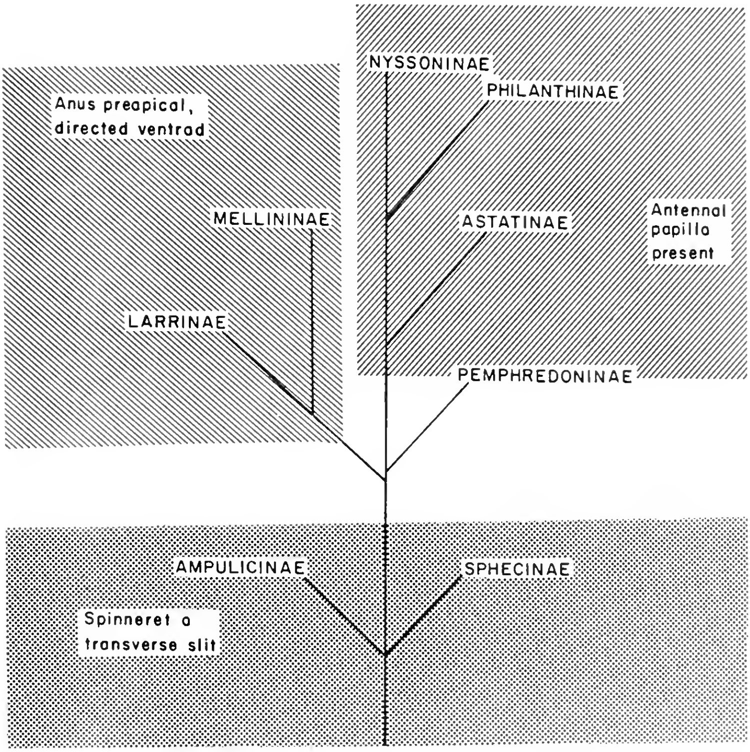

FIG. 3. Phylogenetic tree of the subfamilies of Sphecidae as defined on larval characters.

Michener (1953), in his study of bee larvae, encountered an almost exactly parallel situation. That is, body setae and antennal papillae were found chiefly in groups of bees considered specialized on the basis of most other characters. He concluded that these structures were lost in the very early evolution of bees and later regained. Since the bees are believed to have arisen from sphecoid ancestors, and these in turn from scolioid wasps, I would suggest that body setae and antennal papillae were lost long before bees "became bees." As Michener says, "Dollo's law" is known to have many exceptions, and in the present instance the structures involved are so simple that "exact reversion might occur as a result of reverse mutations." Furthermore, an antennal papilla is not an antenna; it merely simulates a simple, unsegmented antenna, although arising from the true antennal orbit.

The characters emphasized in figure 3 are those which have proved most conservative and most in accord with other characters of larval and adult structure and ethology. Other larval characters, often very useful in defining genera, are subject to too much convergence to assist in defining major evolutionary trends. One notes, for example, that many different and often obviously unrelated genera lack spines guarding the spiracular openings. Such spines may be present in one genus (e.g., *Tachytes*) and absent in a closely related genus (*Tachysphex*). Generally, the smaller the wasp the more likely it is to lack these spines. Doubtless the spines function to prevent soil particles from clogging the tracheae. With reduction in total size, the spiracular openings themselves become small enough to keep out particles, and the spines are lost.

One notes, too, that larvae developing in twigs may be more cylindrical and have other characteristics of body shape different from related forms living in the soil. But on the whole, one finds much less convergence in larval form than might be predicted. One might expect, for example, much variation in mandibular structure associated with different kinds of larval food. This is true only to a limited extent. Basically, one finds, in generalized Sphecidae, stout mandibles with four or five apical teeth which tend to surround a cavity. In several phyletic lines, the mandibles tend to become more elongate, with fewer teeth, these teeth largely in the same plane. The more primitive type of mandibles may be employed to consume Orthoptera (*Sphex, Tachytes*), spiders (*Sceliphron, Trypoxylon*), bugs (*Astata, Plenoculus*), or even flies (*Crabro*), with no consistent modifications. The more specialized types of mandibles are used mostly for feeding upon holometabolous insects, but these include such things as adult weevils and buprestid beetles (*Cerceris*), flies (*Bembix, Mellinus,* etc.), and ants (*Tracheliodes, Aphilanthrops*). *Psen* and related genera have specialized mandibles but feed upon insects without complete metamorphosis (leafhoppers). There is a striking similarity among the mandibles of such genera as *Psen* (Pemphredoninae), *Stictiella* (Nyssoninae), and *Euplilis* (Larrinae-Crabronini), although each of these genera utilizes very different larval food and each belongs near the top of quite a different phyletic line.

Other trends include (1) lengthening of the paired spinnerets, (2) reduction of the galeae, (3) lengthening of the antennal papillae, (4) development of body setae, spinules, or accessory lobes, (5) loss of parietal bands, and (6) development of lobes and dense spinules on the maxillae and labium. In each instance the more specialized conditions have been reached polyphyletically and differ in details in different lines. These trends are reasonably consistent with phyletic schemes based upon adult structure or upon behavior. For example, I experienced no serious difficulty in superimposing data regarding mode of prey carriage upon a phylogenetic tree based largely upon larval characters (Evans, 1963).

SUMMARY

Comparative study of the larvae of Sphecidae has provided a host of new characters. Some of these are subject to convergence and parallel evolution and are mainly useful on the generic level. A few appear highly conservative and prove valuable in defining subfamilies. All are important in any at-

tempt to understand the evolution of the Sphecidae and to establish a sound and realistic classification.

Study of larvae suggests the following changes in the classification:

(1) The Sphecoidea should be considered to constitute a single family with eight subfamilies, there being little to justify the recognition of the Ampulicidae as a separate family.

(2) In the Sphecinae, *Chlorion, Podium, Sceliphron,* and their immediate relatives, should be placed in a tribe together (Sceliphronini), separate from the Sphecini.

(3) The subfamily Larrinae should be conceived in a broad sense to include the following tribes: Miscophini, Tachytini, Larrini, Trypoxylonini, Crabronini, and Oxybelini (also Palarini and probably Karossiini, which do not occur in the New World and are not included in Fig. 2).

(4) *Mellinus* should be placed in a subfamily by itself.

While the last word has surely not been said on this subject, I do feel that the study of larvae has provided a large amount of valuable new information. Workers in all parts of the world are urged to collect wasp larvae and to deposit them in major museums for future reference.

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Description of the Tanyderid Pupa Protanyderus margarita Alexander from Colorado

Allen W. Knight, University of Utah

On June 15, 1962, the author encountered a pupa, believed to be that of the rare Tanyderid *Protanyderus margarita* Alexander. A sketch of the pupa sent to Dr. Charles P. Alexander elicited the response that it represented a Tanyderid, probably *Protanyderus margarita* Alexander, the only Tanyderid known to occur in Colorado. Apparently there are no accounts of the structure and habitat of the pupa of *Protanyderus*. Adults of *P. margarita* have been reported from British Columbia, Oregon (N. E., Great Basin area, Idaho and Colorado (Alexander, personal communication).

Of two pupae secured, one was found to be in the process of shedding its last larval skin. The partially cast skin was identical with those encountered much earlier (June, 1961) and already described by Knight (in press) as *Protanyderus margarita* Alexander. The second specimen was in excellent condition and was used almost exclusively in its description.

The pupae were collected about two feet from the north bank of Gunnison River near the Junction of West Elk Creek, Gunnison County, Colorado. The river at the time was somewhat swollen and the actual site would normally be stream-side shore area. The pupae were found on a sand and gravel substrate among small stream-side growths of willow. The water velocity in the vicinity was very low.

I thank Dr. Charles P. Alexander for his opinion on the identity of the pupa and for his very generous supply of information pertaining to Tanyderidae, and also Alan V. Nebeker for his assistance and preparation of the figures. Grateful acknowledgement is also made to Arden R. Gaufin, George F. Edmunds, Delbert W. Argyle and Hugh Hogle, for their aid in the field and in various phases of the preparation of this paper.

DESCRIPTION OF THE PUPA

General Appearance: The pupa superficially is similar to that of *Eriocera*. The female pupa (Figs. 1–4) is 10 to 11 mm long with a greatest width of about 2 mm and a maximum thickness of 1.9 to 2 mm.

Head: The head (Figs. 2 and 4) has two conspicuous frontal horns or frontocornua that bear frontocornual setae which arise about midway on the horns and extend dorsally and somewhat beyond the tip. Three lateral epistomal processes or epistomacornua project outward just ventral to the frontocornua. The medial frontocornu appears to be borne on a protuberance and curves slightly ventrad, tapering apically. Lateral epistomal setae project from their basal origin on the lateral epistomal processes (Figs. 2 and 4). The dorsal region of the head has two pair of chalaza processes. The anterior and posterior parietal papillae each bear a parietal seta. The preorbital setae are borne on a slight chalaza and appear superimposed upon the eye. The prefrontal setae are borne on slight protuberances located medially from the preorbital setae. The genal process

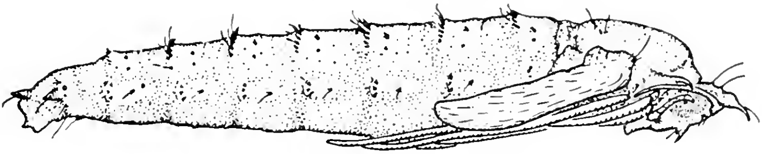
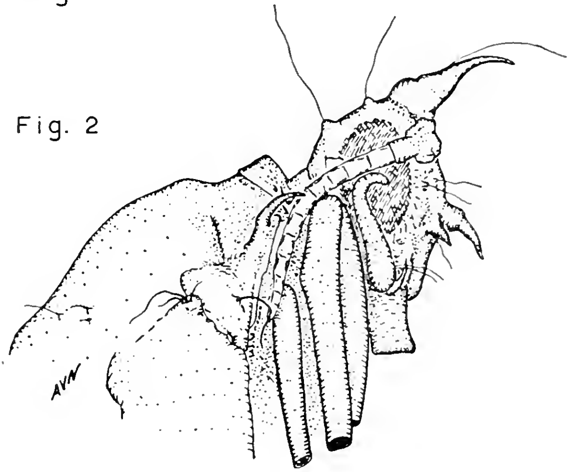


Fig. 1

Fig. 2



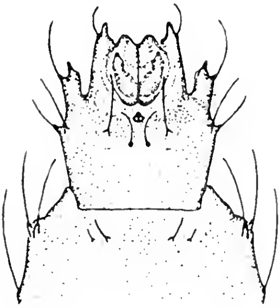


Fig. 3

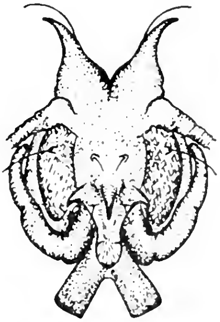


Fig. 4

FIGS. 1–4. Pupa of female *Protanyderus margarita* Alex.
1. Lateral view of pupa. 2. Lateral view of anterior region. 3. Ventral view of the terminal abdominal structures. 4. Frontal view of head.

also bears a pair of subgenal setae (Fig. 2) projecting from behind the maxillary palpus. The antennae lie back over the ocular areas and the tips of the maxillary palpi appear to angle forward along their contour. The antennae continue dorsoventrally, passing ultimately dorsal to the forelegs. The small process just ventral to the epistomal process is, according to Crampton (1930), probably the mandibles. The galeae, small protuberances on the maxillae, are not figured because they are covered by the legs. The maxillary palpi are bent upward and along the contour of the antennae. The labial palpi are rectangular, slightly divergent, and lie below the labrum. The tips of the labial palpi are rounded structures immediately inside the labial palpi sheaths.

Thorax: The pronotum is divided into an antepronotum and a postpronotum as in *Protoplasia* (Crampton, *ibid.*). The pronotal breathing horns arise just ventrad of the postpronotum and extend forward with the tips ultimately lying on the antennae. The forelegs are shown in Figs. 1 and 2. All of the leg-pods lie parallel to one another with the fore pair being the shortest and the hind pair extending furthest anteriorly.

The scutal region of the mesothorax bears two anterior and one posterior seta on each side. The tegual region bears three setae. The basalar lobe bears a conspicuous seta on a protuberance with two small, barely discernible setae near the base of the protuberance. The postpronotal setae just in front of the breathing trumpet in *Protoplasia* were not discernible in *Protanyderus* (Crampton, *ibid.*). The venation of the wing cases was not complete enough to show a pattern. Each prehalteral lobe bears three bristles. The metanotum also has a pair of setae just dorsal to the prehalteral lobes.

Abdomen: Each tergum has an anterior and a posterior region, bearing, respectively, the anterior and posterior tergal setae. Two anterior tergal setae are borne on small bifurcated chalaza-like protuberances and five setae appear to arise from the area of the origin of the bifurcation in the protuberance. The posterior tergal setae are borne on nearly conical protuberances. The pleural region has a raised area that bears one anterior and three posterior setae. The spiracles on segments 1–7 are on the pleurites, those on segment 8 are located posteriorly and just dorsad of the base of the lateral process. The sterna have a rather sparce assemblage of setae. There are three pairs of setae posteriorly borne on papilla-like protuberances which are progressively more developed posteriorly. A pair of minute setae are present near midventrally on each segment. The sterna of the eighth and ninth segments are shown in Fig. 3. The lateral processes of the eighth and ninth project prominently posteriorly and slightly laterally. The posterior portion of the tenth segment also contains the structures referred to as cerci by Crampton (*ibid.*). Just anterior to the cerci lie the papilla-like lobes, which, according to Crampton (*ibid.*), lie on each side of what appears to be the location of the genital opening of the female.

Critical examination of the female *Protanyderus* pupa shows that it differs little from *Protoplasia fitchii* O.S., described in articles by Crampton (*ibid.*) and Alexander (1930). The main differences are that the frontal horns of *Protanyderus* are slender and taper gradually, becoming nearly thorn-like, while those of *Protoplasia* (Crampton, *ibid.*) are stouter and not as sharply drawn out. The prefrontal setae are borne on a protuberance in *Protanyderus* but not in *Protoplasia*. The prehalteral lobes of *Protanyderus* bear three bristles as opposed to one pair in *Protoplasia*. The setae borne on the postpronotum just in front of the breathing trumpet in *Protoplasia* are apparently absent in *Protanyderus*.

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The Feculae ("Feces") of some Orthoptera (sens. lat.) of Tunisia

S. K. Gangwere and E. Morales Agacino

(*Continued from Page 219*)

The Analysis of Fecal Materials

Groups that have been studied previously have essentially the same food habits in Tunisia. There is one partial exception, *viz.*, the Acridinae, or slant-faced grasshoppers. These, based largely on studies of American species (Gangwere, 1961; Isely, 1944), were thought to be absolutely graminivorous or almost so, except for certain anomalous western United States genera, which are forbivorous. Now, however, on the basis of fecal analyses in the Tunisian acridine *Eremogryllus* (which proved to eat forbs), it seems that these western genera are not alone in their forbivory, but that a proportion, albeit a small one, of the genera of slant-faces is forbivorous or predominately so. Indeed, the apparent existence of forbivory in the Acridinae is not as surprising as one might think, for the Oedipodinae (a group in which forb-feeding is common, though not predominant) and the Acridinae are known to be phylogentically close and, in places, virtually inseparable. This fact recently led Rehn and Grant (1960) to transfer the genera of Oedipodinae to the Acridinae, which classification is not adopted here simply because food selection is different in the two groups.

A discussion of food selection of species based on analysis of their fecal materials is, at best, tenuous. When, as in this study, the flora is not well-understood by the writers, and when the feeding behavior of many of the Orthoptera in question is largely unknown, such analyses may be misleading. Nevertheless, because so little is known of the food-habits of some of the species, the authors would be remiss not to attempt tentative description of their food selection. A brief synopsis, together with pertinent information from the scant literature on the subject, follows:

TETRIGIDAE (*Grouse Locusts*)

Acrydium brachypterum (Luc.). Microscopic analyses of the feculae of *Acrydium* disclosed forbaceous materials as might have been expected. Grouse locusts eat sprouts of "lower" plants, as well as monocotyledonous and dicotyledonous ones, and even the decaying muck of their mesic habitations (Gangwere, 1961). The existence in desert regions of these hygrophilous species, as well as certain Mediterranean species listed below, is made possible by the oases where abundant humidity supports a rich fauna.

ACRIDIDAE, PAMPHAGINAE

Acinipe foreli (P.-Sss.) and *Tmethis pulchripennis* (Serv.). The genera *Acinipe* and *Tmethis* are composed of flightless, robust forms that live a saxicolous or deserticolous life in open country with scant vegetation (Uvarov, 1938). Their fecal materials were derived from leaves of woody plants (?) or forbs.

ACRIDIDAE, CYRTACANTHACRIDINAE (*Spine-Breasted Grasshoppers*)

Eyprepocnemis plorans (Charp.). This Mediterranean species is found on shrubs, edges of roads, and often near water (Chopard, 1951); in deserts it frequents the oases. Its feculae were composed of both "grasses"[4] and "forbs,"[5] which content agrees with Joyce's data (1952) on *E. noxius*, but not with information he gave relative to *E. ibandana*. The apparent ability of *E. plorans* to eat both grasses and forbs is consistent with the habits of many United States spine-breasts (Gangwere, 1961).

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[4] The term *grass*, when enclosed within quotation marks, as above, is used loosely to refer to all grass-like plants, including members of the Gramineae, Cyperaceae, and Juncaceae.

[5] The term *forb*, when enclosed within quotation marks, as above, is intended to apply to all forbs, or broad-leaved herbs, but may also refer to certain woody plants, usually shrubs, the materials of which cannot readily be separated from forbaceous ones.

Pezotettix giornai (Ross.). This brachypterous insect of wide distribution inhabits cultivated and uncultivated land, grasslands, and woods, where it lives on herbs and low shrubs (Chopard, 1951; Morales, 1942). The feculae of the Tunisian individuals were composed of "forbs." These results agree with unpublished data on this species recorded in 1962 at the Guadarrama Mountain Estación de Biología of the Instituto Español de Entomología (Gangwere, MS). The feeding of *P. giornai* on shrub leaves was recorded in nature four times, once on *Sarothamnus scoparius,* and three times on *Syringa vulgaris.* Furthermore, in three laboratory differential feeding tests carried out at that time the leaves of various genera, including the forbs *Carduus, Lactuca, Santolina,* and especially *Verbascum* proved attractive; those of the shrubs *Cistus, Sarothamnus,* and *Syringa* were mildly so, as were fronds of the fern *Pteris;* and leaves of various grasses, sedges, a juniper, and ground meat were rejected. Künstler (1864) noted the species' propensity to damage tree plantations in Austria. Clearly, *Pezotettix* must feed in nature on the leaves of the forbs and woody plants on which it dwells.

Thisoicetrus annulosus (Walk.). *Thisoicetrus,* according to Chopard (1938), is a steppe form with arbusticolous habits similar to those of *Sphingonotus* (see below). Its feculae were of "forbs," *i.e.,* true forbs and/or shrubs, in agreement with Joyce's findings (1952) on a related species, *T. leani,* which is described as non-graminivorous, and with those of Maxwell-Darling (1934), whose feeding tests on *Thisoicetrus* showed that it feeds on various shrubs, while rejecting grasses.

ACRIDIDAE, OEDIPODINAE (*Band-Winged Grasshoppers*)

Acrotylus insubricus (Scop.) and *A. patruelis* (H.-S.). These geophilous Mediterranean species of dry sand and sometimes dunes have feculae composed of "forbs" (*A. insubricus*) or mostly "grasses" (*A. patruelis*). Little is known about food selection in *A. insubricus. A. patruelis* was said by Key (1930) and Nolte (1939) to eat grasses, and by Joyce (1952) to select a number of wild herbs and cotton, as well as sorghums. Relatives whose habits have been discussed include *A. deustus* (Key, 1930) and *A. hottentotus* (Nolte, 1939), both termed graminivores. As regards *A. angulatus,* Chesler (1938) found that it can be fed in the laboratory on grass, lettuce, apricot leaves, and apples, and Nolte (1939) described it as graminivorous. It appears that *A. patruelis* and perhaps the other species of the genus, like many American oedipodines, are capable of living on a wide variety of forbs and grasses, though perhaps emphasizing the latter. At any rate, the genus does not appear to be, as suggested by Joyce (1952), non-graminivorous.

Sphingonotus tricinctus (Walk.). The Genus *Sphingonotus* includes many species of deserticolous grasshoppers. They penetrate to the very center of the Sahara, and inhabit arid steppes, sandy stretches, and even dune regions. In their sparsely vegetated environment they make rapid flights of comparatively great distance from one tuft of plants to another (Chopard, 1938). Feculae of only one individual were available for analysis, and disclosed a content of both "forbs" and "grasses," typical of many oedipodines.

Thalpomena algeriana (Luc.). This dweller of arid land and bare rocks had a fecal content of "forbs," together with some "grasses."

ACRIDIDAE, ACRIDINAE (*Slant-Faced Grasshoppers*)

Acrida turrita L. This grassland species of Mediterranean distribution apparently feeds on the tall grasses in which it roosts and with which it blends so well. Its series of feculae were composed entirely of "grasses," with one exception, that one including a minor component of "forbs" along with the expected "grasses." The literature supports this view of complete or virtually complete graminivory, which is typical of the Acridinae. Key (1930) found *A. turrita* a feeder on grasses. A relative, *A. pellucida,* is also known to be graminivorous (Joyce, 1952). Furthermore, Chapman (1952) noted that the genus feeds only in tall grasses, never short ones, and Chesler

(1938) demonstrated that these slender insects can be fed grasses in the laboratory.

Acridella nasuta (L.). On the basis of its body form, which is typical of the highly graminivorous slant-faces, its dry grassland habitat, and its feculae, which were composed almost entirely of "grasses," *A. nasuta* must be presumed to be strongly graminivorous. Maxwell-Darling's feeding tests (1934), in which its relative *A. procera* ate the grass *Panicum* and rejected various non-grasses, support such a view.

Duroniella lucasi (Bol.). The Genus *Duroniella* is termed graminicolous by Uvarov (1938). These insects must also be graminivorous, for the series of feculae of *D. lucasi* disclosed a content completely or almost completely of "grass."

Eremogryllus hammadae Kr. The graminivory typical of the *Acridinae* (Gangwere, 1961; Isely, 1944), and observed in other Tunisian genera, seems *not* to be true of *E. hammadae,* the feculae of which were largely of "forbs." If so, this information furnishes one of the surprises of the study. This saxicolous species dwells under desert and semidesert conditions (Chopard, 1938).

Platypterna sp. Chopard (1938) noted that insects of the Genus *Platypterna* are phytophilous, living in tufts of grasses, both in sandy places and in dunes of semidesert, and flying rapidly for short distances from one patch of grass to another. Salfi (1931) described its typical habitat as thickets or tufts of various grasses, near or in water, yet in semidesert or desert situations. The feculae of the Tunisian *Platypterna,* composed as they were of "grasses," with only a minor content of "forbs," showed the extent to which they are dependent on grasses, apparently being graminivorous, as well as graminicolous. Such a view is supported by Maxwell-Darling, in whose feeding tests *Platypterna* spp. (1934) ate the grass *Panicum* and rejected or nibbled all forbs and shrubs offered them.

Acrididae, Pyrgomorphinae

Pyrgomorpha conica (Oliv.). *P. conica* is widely distributed in the Old World in arid situations. A comparatively large series of feculae of this interesting grasshopper were composed entirely of "forbs." This is in agreement with information on *P. kraussi,* said to be a pest of potato, tobacco, and turnips (Golding, 1948), and with most data on *P. cognata.* The latter was described as a feeder on a species, each, of Compositae and Euphorbiaceae (Golding, 1948). Furthermore, in feeding tests (Maxwell-Darling, 1934), this insect accepted forbs and shrubs, and rejected grasses. Published accounts show, however, that *P. cognata* may select more widely during the dry season, when, according to Joyce (1952), it feeds on almost any green food available, especially *Acacia* and *Ipomoea.* Normally, however, when not suffering lack of food and water, the insect undoubtedly is more selective and probably avoids grasses. At any rate, the evident forbivory in the genus is the more striking in view of its superficial resemblance to the Acridinae, a subfamily of strongly graminivorous habits, many of whose structural adaptations, yet not food selection, they appear to share.

Mantidae, Amelinae

Ameles dumonti Chop. The praying mantis *A. dumonti,* an inhabitant of uncultivated, warm, dry situations, lives on the ground under herbs and shrubs. The females move rapidly by short hops and runs, and the males by flight as well (Morales, 1947). Presumably the rigorous selection by the desert or semidesert conditions under which the animals live has resulted in their abandonment of the typical mantid behavior of patiently awaiting prey to blunder close enough for capture, substituting instead a behavior adapted to pursuit. Analyses of their feculae disclosed the insect remains expected of mantids, which are obligatory predators.

Mantidae, Empusinae

Blepharopsis mendica (Fabr.). Chopard (1938) noted that *B. mendica* penetrates the steppe regions of North Africa, where it dwells on shrubs. Feculae of these insects, like those of *Ameles,* contained only insect remains.

Summary and Conclusions

Living orthopterans belonging to eighteen species were collected at several localities in Tunisia during spring of 1962. The insects were placed in individual containers, from which, at a later time, they were removed and studied, along with their feculae. The length of both the animals and their feculae was measured, and the latter were examined to determine their conformation, texture, color, and food content.

It was found that a positive correlation exists between the size of the insects and their feculae; small species egest smaller feculae. Nymphs void smaller feculae than do their adult counterparts. Males of a given species yield smaller feculae than do the larger females; in fact, their feculae are disproportionately smaller. The explanation is obscure, but may lie in the females' comparatively lower metabolic rate.

The feculae of the Tunisian orthopterans included four types (IA, IB, IC, and IVA) described in Gangwere (1962), as well as six new types and subtypes (IA′, IC′, IC″, ID, IVE, and IVE′) herein described.

The food contents of the feculae were essentially those expected on the basis of earlier work in other parts of the world. The Mantidae (2 species studied) was characterized by feculae composed of insect materials; the Tetrigidae (1 sp.) by a content of forbs; the Pamphaginae (2 spp.) by a content of either leaves of woody plants or forbs; the Pyrgomorphinae (1 sp.) by forbs; the Cyrtacanthacridinae (3 spp.) by a content largely of forbs; the Oedipodinae (4 spp.) by both forbs and grasses; and 4 of the 5 species of Acridinae by grass materials, the diet expected in this subfamily. The remaining acridine species, *Eremogryllus hammadae,* with a content of forbs, proved unusual in its food selection.

Food selection appears responsible for much of the specificity encountered in feculae. Such fecal characteristics as size, form, apical projections, fibrous texture, and color seem largely a consequence of food selection. Twisted, comparatively small feculae are produced on a diet of succulent forbs, whereas relatively symmetrical, larger feculae with obvious alignment of fibers result from a grass diet. Both of these fecal types, forb and grass, tend to be elongate. Non-elongate, irregular feculae often with a jagged outline are produced on an insect diet. There exist many other possible kinds, based on food selection.

Another factor involved in the production of fecal specificity is the structure of both mouthparts and gut, and the insects' behavior. Mouthparts determine the conformation of individual morsels incised and masticated. Well-developed, jagged dentes loosen small, irregular morsels, which, within the gut, do not align with other food particles; they produce irregular, twisted feculae. Still other types of mouthparts (*viz.*, those adapted for graminivory) bite loose long, slender morsels that become aligned within the digestive tract; they result in elongate, often relatively symmetrical feculae. This elongate type is correlated with a comparatively straight alimentary canal, reduced gradation in gut diameter, and weak tract armature. Only a canal of this type can pass successfully the long, slender, fibrous morsels that produce elongate feculae. In contrast, the non-elongate type of feculae is characteristic of insects in which the gut is tightly coiled or twisted, its lumen much constricted in places, and its armature well-developed. In such a canal, small, irregular food particles can proceed without causing obstruction; they become compacted together, and are extruded as non-elongate feculae.

Before this investigation was undertaken it was assumed that the classes of orthopteran feculae produced in one part of the world would be encountered in other regions. The cosmopolitan or, at least, wide distribution of certain groups of Orthoptera, whose taxa necessarily share many structural and behavioral characteristics, and the ubiquity of their food-plants make this result inevitable. Similar animals eating essentially the same foods must produce the same kinds of feculae. Conversely, it was also believed that additional types of feculae may be expected when different kinds of foods are eaten, as in the case of exotic with unique or, at least, unusual food-habits. Both assumptions were verified during this study of some Tunician

Orthoptera and their feculae, and can be expected to hold in future investigations on other faunas.

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Bishop Museum Opens

Bishop Museum's new research building, Pauahi Hall, opened 22 June to welcome more than one hundred visiting scientists, friends of the Museum, and staff to a symposium devoted to various aspects of entomological research. The four-story building has over 27,500 square feet of floor space and is expected to be completed and occupied by the Entomology and Botany departments within the next few months. Three floors were provided by the National Science Foundation, and the fourth through the generous support of local individuals and foundations and a drive coordinated by the Bishop Museum Association. The entomology program under the direction of Dr. J. L. Gressitt, centers upon the zoogeography, systematics, and evolution of Pacific insects and is the most comprehensive operation of its kind in the Pacific area. Collections under study number more than four million specimens.

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Curculionidae of the genus **Curculio** (formerly **Balaninus**) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

Membracidae wanted. Purchase or exchange. T. L. Stringfellow, Military Reservation, Box 11-A, Hudson, Massachusetts.

Buprestidae, Scarabaeidae, and **butterflies** wanted in exchanges for beetles and butterflies. Mr. W. van der Starre, 25 Crawley St., Warrnambool, Victoria, Australia.

Butterflies of the World wanted in exchange for those of my locality. Louis Clarke, 10435 Georgetown Drive, Rancho Cordova, California 95670.

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ENTOMOLOGICAL NEWS

DECEMBER 1964

Vol. LXXV **No. 10**

CONTENTS

Notes and News in Entomology

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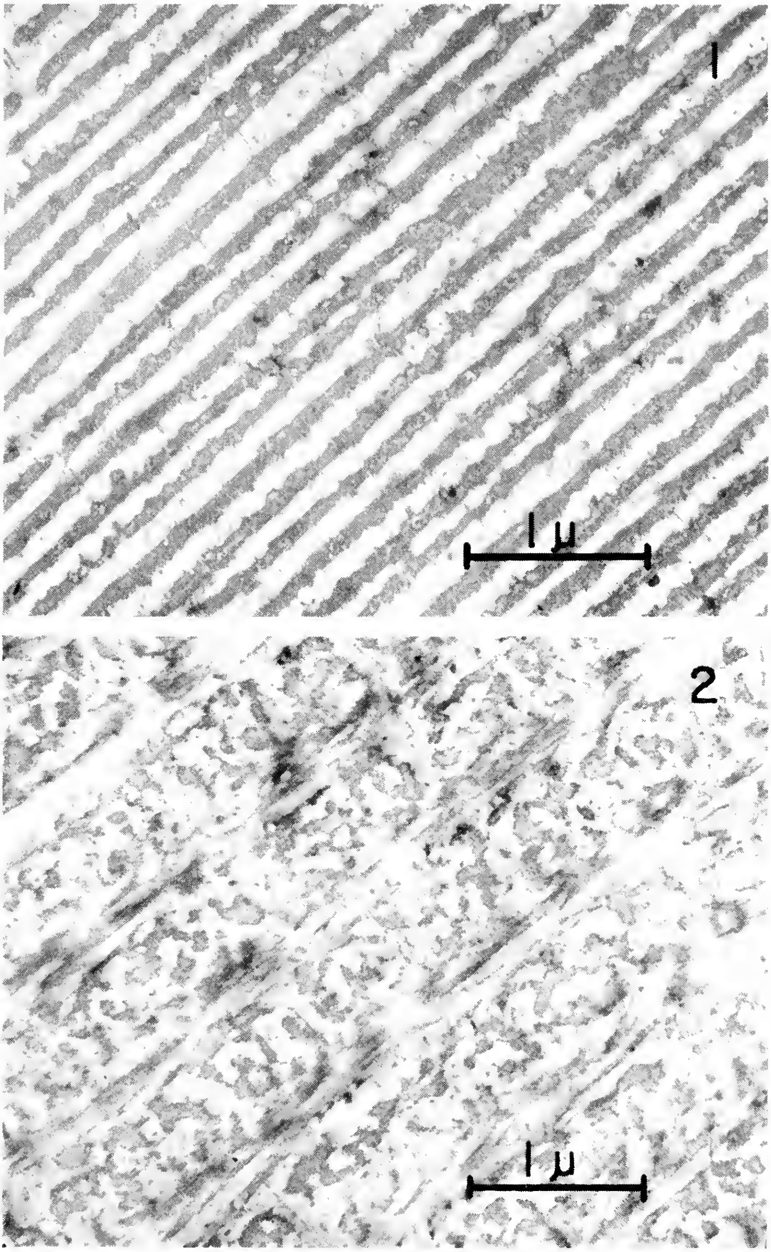

Figs. 1 and 2—Taylor.

ENTOMOLOGICAL NEWS

VOL. LXXV DECEMBER, 1964 No. 10

The Metallic Gold Spots on the Pupa of the Monarch Butterfly [1, 2]

RONALD L. TAYLOR,[3] Department of Entomology, Fisheries, and Wildlife, University of Minnesota, St. Paul.

The most attractive feature of the pupa of the Monarch butterfly, *Danaus plexippus* L., is the metallic gold spots on the cuticle. This paper describes a brief examination into the nature of the gold spots and their possible function.

At two hours after pupation, the spots are pigmented yellow, but are not yet metallic. The remainder of the cuticle is a light green, except for a band of black spots paralleling the abdominal gold spots. (The black spots are due to a pigment in the exocuticle.) Histological examination at this time reveals no difference between the yellow spots and the surrounding cuticle. By 24 hours after pupation the spots are distinctly a metallic gold; the cuticle is approximately eight times thicker

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[1] Paper No. 5425, Scientific Journal Series, Minnesota Agricultural Experiment Station, St. Paul, Minnesota 55101.

[2] Acnkowledgment is made for financial support from the National Science Foundation (Grant No. GB 365).

[3] Present address: Division of Biological Sciences, University of California, Irvine, California 92650.

EXPLANATION OF FIGURES

FIG. 1. Cuticular lamellae of Monarch pupa at metallic gold spot.
FIG. 2. Cuticular lamellae of Monarch pupa at non-metallic portion of cuticle.

Lamellae shown at an angle in the illustrations are actually parallel to the surface of the cuticle. Note that there are approximately 4 times as many lamellae per unit thickness at a gold spot as there are at a non-metallic portion of the cuticle. The lamellae of non-metallic areas are much too widely spaced to produce color by interference phenomena.

than it was at two hours. Upon examination with the light microscope, the cuticle at the gold spots now appears different from the non-metallic cuticle. The lamellae appear more parallel, distinct, thinner and loosely packed. Also, the reactions of the gold spot cuticle are distinct with various staining reagents. The greater portion of the non-metallic cuticle is endocuticle, that is, blue with Mallory's triple stain and green with Masson's trichrome stain. This same area is also weakly alcian blue-positive and sudan black B-positive. The gold spot cuticle, however, gives the staining reactions of mesocuticle (red with Mallory's stain) and is alcian blue-negative and sudan black B-negative. Both gold spot cuticle and non-gold spot cuticle are weakly periodic acid Schiff-positive.

After most of the cuticle has been digested by the moulting fluid and the cuticle cast, the spots still appear a metallic gold, though the metallic appearance is considerably diminished. After 24 hours in 3% hydrogen peroxide, the spots on the exuvia appear colorless in both transmitted and reflected light. After 24 hours in xylol the spots appear yellow (not gold) and without any metallic appearance. Such data, plus the previously noted observation that the spots of a young pupa are yellow and not metallic gold, are clear evidence for the presence of a pigment in the cuticle of the gold spots. That the metallic appearance, however, is due to something in addition to the pigment is evidenced as follows.

With fine forceps several layers of lamellae can be peeled free of the inner surface of the cuticle. Such layers are highly iridescent only in the area of the gold spot. After as many lamellae as possible have been peeled free from the inner surface of the cuticle, the gold spot still appears a metallic gold, but is now more highly iridescent. That is, colors of yellow, gold, green and violet are reflected as the angle of incidence of the light is changed; gold is the predominant color reflected.

The gold spots of exuviae which have been soaked in phenol and then rinsed in water exhibit a red iridescence at one stage during the drying of the cuticle. On further drying the red iridescence disappears. The spots on a pupa preserved in 75%

ethanol appear strongly iridescent, changing color with the angle of light incidence through green, gold, and red; the latter color predominating. On drying, the color changes back to gold. Under the stereoscopic microscope the metallic appearance can clearly be seen to arise beneath the surface of the cuticle. Observations as described above support the existence of multiple thin films. Such evidence is corroborated by electron microscopical examination. The appearance of the lamellae in the region of the gold spots contrasts distinctly with their appearance in the surrounding non-metallic cuticle (Figs. 1 and 2). Measurements give the distance from one reflecting surface to the next as approximately 200 mμ. Making allowance for the refractive index of cuticle (1.5–1.6) this is approximately the correct thickness for the reinforcement of yellow light. However, measurements may be complicated by shrinkage as has been shown to be the case for butterfly scales (Anderson and Richards, 1942). All one can safely conclude is that the planes are of the correct order of thickness for producing interference colors in the gold spot areas but much too thick for such in other areas. [A simple explanation of the optical phenomena involved in the production of iridescent interference colors is given by Richards, 1951.]

It appears then that both a yellow pigment and reflection from multiple thin films (lamellae) are responsible for the metallic gold spots on the Monarch pupa.

Urquhart (1960) suggests that the gold spots may act as light receptors that delay emergence of the adult butterfly during periods of adverse weather conditions. To test this hypothesis, the gold spots of newly emerged pupae were blocked from light insolation of any sort by a variety of means. All of the gold spots from one pupa were cut off (in some areas going clear through the epidermis) and then the pupa was dipped in paraffin. In a second case, a pupa was simply dipped in paraffin. In both the above cases the paraffin blocking the spiracles was removed. In two specimens, all of the spots were painted black, and a final specimen was untouched but placed in total darkness for the duration of the pupal period. In all cases normal adults emerged from the pupae at the expected time. Considering these observations, and the apparent lack of any innervation in the gold spots, it would appear that the gold spots do not function as light receptors playing a role in the timing of adult emergence. It is difficult to believe that the spots are functionless or purely ornamental, and it is suggested that they possibly function in warning coloration, though this is a debatable point.

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A New Species of Mallophaga from the Mikado Pheasant

By K. C. EMERSON, Stillwater, Oklahoma and C. J. STOJANOVICH, Communicable Disease Center, Atlanta, Georgia

A collection of Mallophaga taken on Formosa, by personnel of the Parasitology Department of the U. S. Naval Medical Research Unit No. 2, Taipei, Taiwan (Formosa), under the direction of Dr. Robert E. Kuntz, Captain, MSC, USN, during the period 1957–1962,* included specimens representing a new species. That species is herewith described and illustrated.

Goniodes sinensis, new species

Holotype male. External morphology and chaetotaxy as shown in Fig. 2. Genitalia as shown in Fig. 3. Total length, 2.76 mm.

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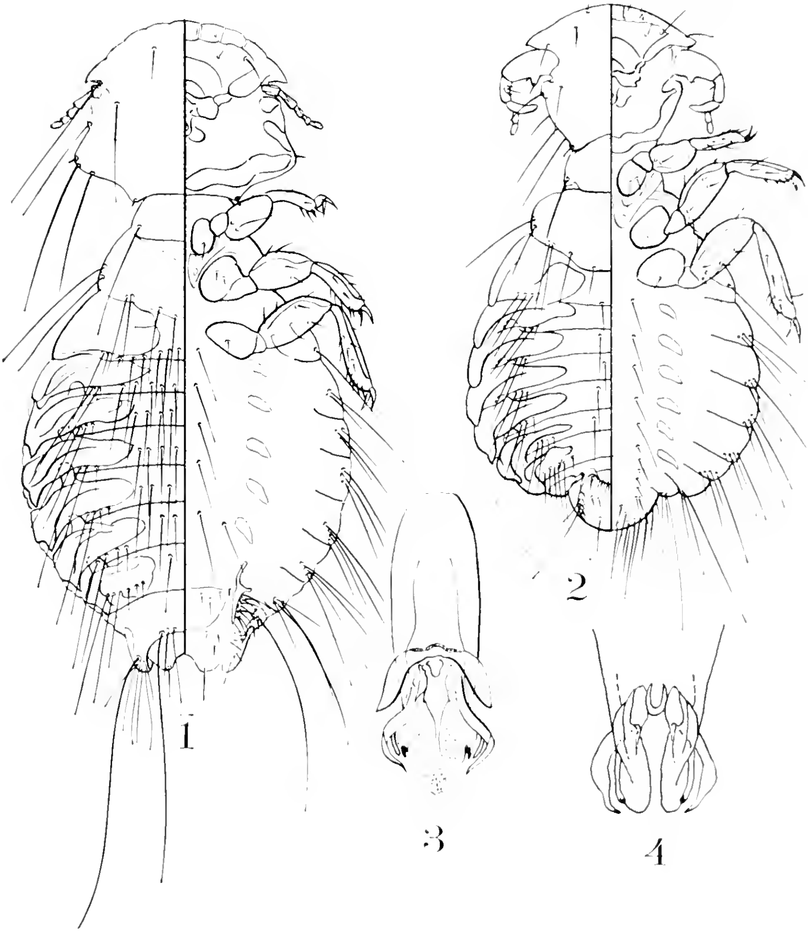
* This work was supported in part by funding under Public Law 480, Section 104(c).

Allotype female. External morphology and chaetotaxy as shown in Fig. 1. Total length, 3.49 mm.

Discussion. This species belongs in "Species Group J" as defined by Clay, and is closest to *G. humiae* Clay, 1940. Minor



FIGS. 1–3. *Goniodes sinensis,* new species. 1. Dorsal-ventral view of female. 2. Dorsal-ventral view of male. 3. Male genitalia.
FIG. 4. *Goniodes humiae* Clay, 1940. Male genitalia.

differences in chaetotaxy between the two species is not significant except for that on the terminal abdominal segment of the female. The vulva, in both species, has concentrations of medium-length setae on the lateral margins. Posterior to the lateral margins of the vulva are small patches of setae; which are small and medium-length setae and dense in *G. humiae*, while in *G. sinensis* they are small setae and not numerous. Major differences in the males of the two species are contained in the genitalia, which may be seen by comparing Figs. 3 and 4.

The male of *G. sinensis* is only slightly larger than for *G. humiae;* however, the female is considerably larger. Total lengths for females of *G. humiae*, given by Clay, are 2.84 to 3.18 mm.

Type host: *Syrmaticus mikado* (Ogilvie-Grant).

Type material: Holotype male, allotype female and twenty-two paratypes collected on 1 February 1962; thirty-eight paratypes collected on 31 October 1961; and twenty-six collected on 16 February 1962 off the type host on Formosa. Holotype, allotype and paratypes have been deposited in the U. S. National Museum, and paratypes have been distributed to other major Mallophaga Collections.

Reference

Clay, T. 1940. Genera and species of Mallophaga occurring on Gallinaceous hosts—Part II. *Goniodes.* Proc. Zool. Soc. London, Series B, 110: 1–120.

The Collembola of New Mexico. XIII. Sminthurinae: Sminthurini [1, 2]

HAROLD GEORGE SCOTT [3]

None of the 9 species reported herein has been recorded previously from New Mexico. Specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Subfamily SMINTHURINAE Borner, 1906

KEY TO THE GENERA OF NEARCTIC SMINTHURINAE

1\. Tenent hairs 0–1. Tribe SMINTHURINI 2
Tenent hairs 2 or more. Tribe BOURLETIELLINI .... **Bourletiella** Banks, 1899
2\. Ant IV subsegmented 3
Ant IV not subsegmented ..... **Neosminthurus** Mills, 1934
3\. Ant III with some long strong setae .... **Sminthurus** Latreille, 1802
Ant III without long strong setae 4
4\. Claw tunicate .... **Sphyrotheca** Borner, 1906
Claw not tunicate .. **Pararrhopalites** Bonet and Tellez, 1947

Tribe SMINTHURINI Borner, 1913

Genus **NEOSMINTHURUS** Mills, 1934

KEY TO SPECIES OF NEARCTIC NEOSMINTHURUS

1\. With clavate bristles on abdominal dorsum .... **clavatus** (Banks, 1897)
With truncate bristles on abdominal dorsum 2
Without bristles on abdominal dorsum .... **sminthurinus** Mills, 1934
2\. Tenent hairs absent 3
Tenent hairs present 4

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[1] A portion of a dissertation submitted to the Graduate Faculty of the University of New Mexico in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

[2] Part XII, ENT. NEWS 75(2): 47–53.

[3] Senior Scientist, Training Branch, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta, Georgia.

3. Manubrium longer than dens .... **purpureus** sp. nov.
   Manubrium shorter than dens ... **curvisetis** (Guthrie, 1903)
4. Eyespots yellow .... **longisetis** (Guthrie, 1903)
   Eyespots black .... **occidentalis** Mills, 1935

Neosminthurus sminthurinus Mills, 1934

NEW MEXICO RECORD. Berlese sample of acorn hulls, 7,400 ft, Bernalillo Co., Jul 1951.

DISTRIBUTION. Iowa, N. M.

Neosminthurus purpureus sp. nov. Fig. 1

TYPE LOCALITY. Holotype plus 4 paratypes, N slope, Tejano Canyon, Sandia Mts., Bernalillo Co., NEW MEXICO, from Berlese sample of fir litter, 8,300 ft, Sep 1951. Type specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

DESCRIPTION. Body segments essentially fused, but segmentation indicated; integument smooth; purple to black; clothed by truncate bristles; bothriothricha absent; head hypognathous; antenna to head as 11:10; antennal segments as 1:2:3:5; Ant III without long strong setae or pegs; eyes 8 and 8, on dark eye patches; mouthparts chewing; tibiotarsus without distal subsegment; claws tunicate; unguiculus subequal to unguis; tenent hairs absent; unguis with 1 tooth; unguiculus without teeth; abdominal papilla absent; Abd V and VI not fused; furcula without ankylosis, reaching collophore; manubrium to dens to mucro as 4:3:1; dental spines absent; dentes not crenulate dorsally; mucro nonlamellate; anus terminal; length 0.9 mm.

DISCUSSION. This species is distinguished from other species of *Neosminthurus* by the following combination of characters: (1) color; (2) dentition of the unguis; (3) absence of tenent hairs; (4) ratio of antennal segments; and (5) ratio of manubrium to dens.

DISTRIBURION. N. M.

Genus **SMINTHURUS** Latreille, 1802

KEY TO SPECIES OF NEARCTIC SMINTHURUS

NOTE: Not included in key are *S. mammouthius* Banks, 1897, or *S. trilineatus* Banks, 1903.

1. Tenent hairs present .... **sylvestris** Banks, 1899
   Tenent hairs absent 2
2. Both edges of mucro smooth 3
   At least one edge of mucro serrate 5
3. Unguis with paronychia 4
   Unguis without paronychia .... **facialis** Banks, 1903
4. Subanal appendage pointed . . **adirondackus** Maynard, 1951
   Subanal appendage not pointed . . **viridis** (Linnaeus, 1758)
5. One edge of mucro serrate 6
   Both edges of mucro serrate 12
6. Great abdomen with high dorsal protuberance ....
   .... **floridanus** (MacGillivray, 1893)
   Great abdomen without dorsal protuberance 7

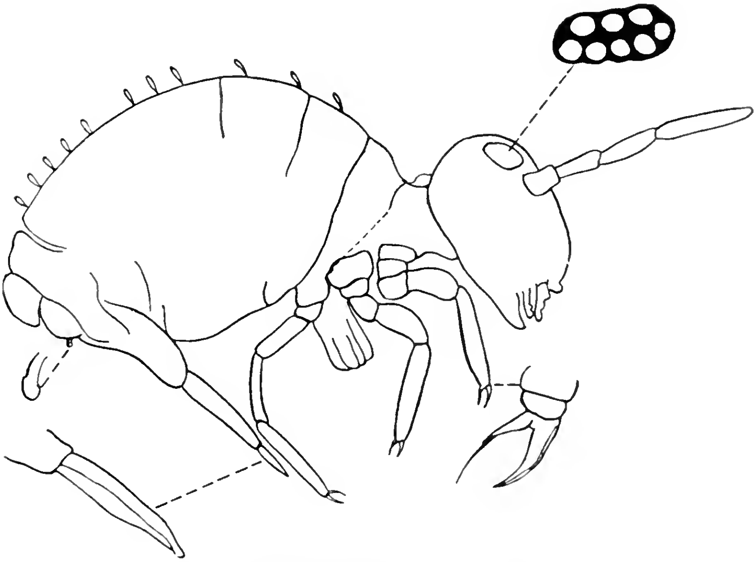

FIG. 1. *Neosminthurus purpureus* sp. nov.

7. Unguis with paronychia 8
   Unguis without paronychia ....
   .....**S. dorsalis** Banks, 1899 and **longicornis** Schott, 1896
8. With mucronal seta 9
   Without mucronal seta ....**medialis** Mills, 1934
9. Ground color of body yellowish dorsally 10
   Ground color of body light bluish dorsally 11
   Ground color of body dark brown to bluish-black dorsally ..
   ....**fuscus** (Linnaeus, 1758)
10. With dorsal black spots ....**packardi** (Folsom, 1896)
    Without dorsal black spots ....**fitchi** (Folsom, 1896)
11. Unguis with 1 inner tooth ....**virginidari** Wray, 1948
    Unguis with 2 inner teeth ....**yonahlosee** Wray, 1948
12. With mucronal seta 14
    Without mucronal seta 13
13. Dark purple to black with white spots ....
    ....**quadripunctatus** Edinger, 1937
    Reddish with black and white markings ..**eiseni** Schott, 1891
14. Subanal appendage simple 15
    Subanal appendage fringed ....
    ....**purpurescens** (MacGillivray, 1894)
15. Deep purple to black ....**obscurus** Mills, 1934
    Greenish-purple to bluish-brown to orange-brown ....
    ....**argenteornatus** (Banks, 1899)

Sminthurus argenteornatus Banks, 1899

New Mexico Record. Berlese sample of fir litter, 8,300 ft, Sandia Mts., Bernalillo Co., Sep 1951.

Distribution. Md., N. M., N. Y.

Sminthurus dorsalis Banks, 1899

New Mexico Records. Four collections sweeping grasses; 7,800 to 10,000 ft; Bernalillo, Sandoval, San Miguel, and Valencia Co.; Jul–Sep 1951–53.

Distribution. N. M., N. Y.

Sminthurus fitchi Folsom, 1896

New Mexico Records. Two collections sweeping grasses and herbs; 7,400 and 7,900 ft; San Miguel and Torrance Co.; Jul 1952 and Aug 1953.

Distribution. Del., Md., Mass., N. J., N. M., N. Y., N. C., Penna.

Sminthurus fuscus (Linnaeus, 1758)

New Mexico Record. Beneath bark of yellow pine stump, 7,600 ft, Gallinas Mts., Lincoln Co., Jul 1951.

Distribution. Minn., N. M.; Europe.

Sminthurus obscurus Mills, 1934

New Mexico Records. Sweeping spruces, sifting aspen litter, from under bark of fir log, and 2 Berlese samples (grass clumps, fir litter); 8,300 to 9,200 ft; Bernalillo, Sandoval, Santa Fe, and Socorro Co.; Jul–Sep 1951–54.

Distribution. Iowa, N. M.

Genus **SPHYROTHECA** Borner, 1906

Key to Species of Nearctic Sphyrotheca

Note: *S. aleta* Wray, 1953, is reported from Puerto Rico

1. Eyes 1 and 1 .... **binoculata** sp. nov.
   Eyes 8 and 8 .... **minnesotenis** (Guthrie, 1903)

Sphyrotheca binoculata sp. nov. Fig. 2

Type Locality. Holotype plus 9 paratypes, along N. M. Route 85, 19 mi. E of Santa Fe, Santa Fe Co., New Mexico, from Berlese sample of Gambel oak litter, 7,200 ft, Jul 1953. Type specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Description. Segments essentially fused; integument minutely roughened; yellow with reticulations of purple; clothed by sparse short to medium setae; head hypognathous; antenna to head as 8:5; antennal segments as 3:6:10:10; Ant III without long strong setae; Ant IV not clearly annulate, but with 11 whorls of setae; eyes 1 and 1, on black eyepatches; thoracic segmentation not indicated; claw tunicate; unguiculus to unguis as 3:5; tenent hairs absent; unguis with 1 tooth; unguiculus untoothed; Abd V and VI not fused; abdominal papilla present; furcula not ankylosed; manubrium to dens to mucro as 28:25:19; mucro non-lamellate; anus terminal; length 0.5 mm.

Discussion. All previously known *Sphyrotheca* have eyes 8 and 8 except *S. bernardi* Delamare Deboutteville, 1953, from Algeria which has eyes 2 and 2. Thus *S. binoculata* is distinguished by its eye number.

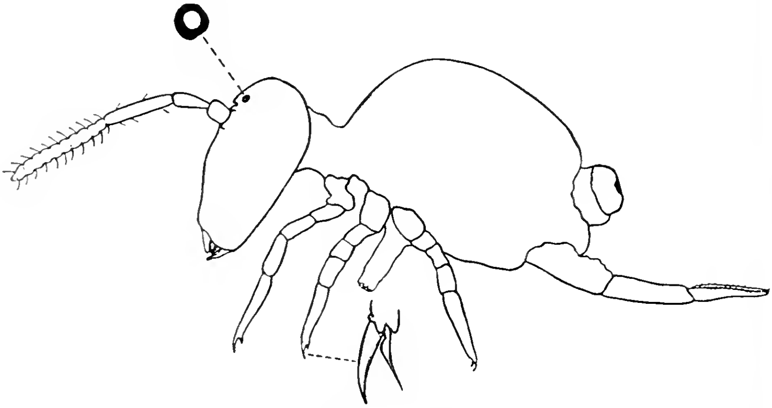

Fig. 2. *Sphyrotheca binoculata* sp. nov.

Genus **PARARRHOPALITES** Bonet and Tellez, 1947

Key to Species of Nearctic Pararrhopalites

1. Eyes absent (Nuevo Leon, Mexico) .... **anops** Bonet and Tellez, 1947
Eyes 2 and 2 (Guerrero, Mexico) .... **oculatus** Bonet and Tellez, 1947
Eyes 8 and 8 (New Mexico) .... *neomexicanus* sp. nov.

Pararrhopalites neomexicanus sp. nov. Fig. 3

Type Locality. Holotype plus 12 paratypes, near Tres Ritos, Taos Co., New Mexico, sweeping grasses in yellow pine-spruce-fir area, 8,500 ft, Jul 1953. Type specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

DESCRIPTION. Segments essentially fused; yellow with brownish-yellow antennae; integument smooth; clothed with long setae; bothriotricha present; head hypognathous; antenna to head as 2:1; antennal segments as 2:4:5:23; Ant III without long strong setae; Ant IV with 21 subsegments; eyes 8 and 8 on dark eyepatches; thoracic segmentation not indicated; claws not tunicate; unguiculus to unguis as 4:5; tenent hairs absent; unguis and unguiculus each with 1 tooth; furcula not ankylosed, reaching collophore; manubrium to dens to mucro as 3:7:2; mucro with 7 teeth on outer edge, non-lamellate; anus terminal; length 1.2 mm.

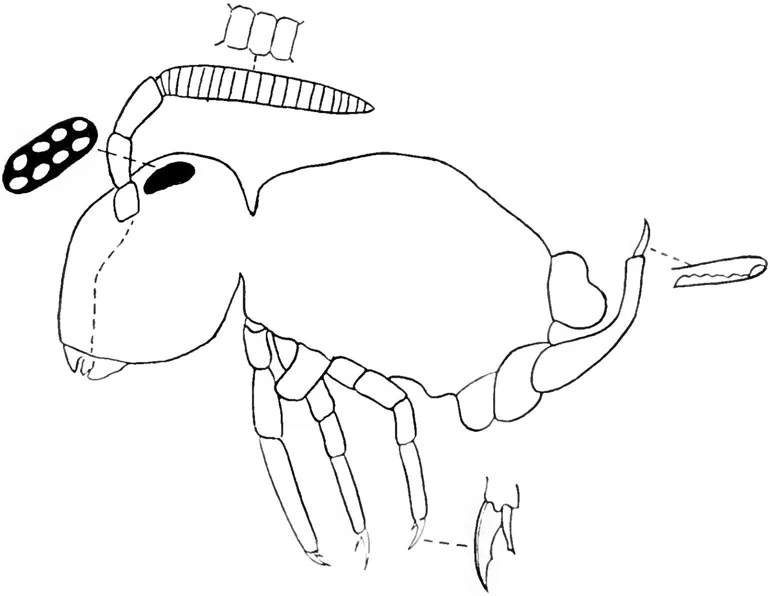

FIG. 3. *Pararrhopalites neomexicanus* sp. nov.

NEW MEXICO RECORDS. Type collection plus sweeping grass; 8,400 ft; San Miguel Co.; Aug 1953.

DISTRIBUTION. N. M.

DISCUSSION. The number of eyes clearly distinguishes *P. neomexicanus* sp. nov. from all other *Pararrhopalites*.

SUMMARY

Two species of *Neosminthurus,* 5 of *Sminthurus,* 1 of *Sphyrotheca,* and 1 of *Pararrhopalites* are recorded for the first time from New Mexico. *Neosminthurus purpureus, Sphyrotheca binoculata* and *Pararrhopalites neomexicanus* are described as new. Keys are presented to genera of Nearctic Sminthurinae, and to Nearctic species of the four genera discussed.

A New Species of Sphecomyia (Diptera: Syrphidae.) from California *

KENNETH E. WEISMAN, Department of Biological Sciences,
Western Illinois University, Macomb, Illinois

The discovery of a new species of *Sphecomyia* has resulted from a revisionary study of the genus which is to be published at a later date.

The new species differs most sharply from the known members of the genus and from *nasica* Osburn, which it closely resembles, in the absence of pollinose crossbands on the third and fourth tergite and the absence of pollinose areas on the fourth sternite; the pollinose areas of the body being decisively grayish rather than yellow.

Sphecomyia fusca, new species

Length: 9 mm–12 mm.

Male. Face grayish pollinose, with a small medial, shining black, triangle which has its base confluent with the epistome and its apex reaching to about the basal $\frac{1}{3}$ of the face. In profile the face is strongly concave below the antennal prominence, then convex medially, below which it is slightly receding to the epistome. An oblique narrow band of long pile, grayish in color, extends from the lateral apex of the antennal promi-

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* With partial support of the Research Council of Western Illinois University.

nence to about the middle of the anterior margin of the eyes and is continuous with the eye margin to about the ventral margin of the eyes. Cheeks shining black. Dorsal surface of the antennal prominence to the lateral $\frac{1}{2}$ of the prominence is shining black. Ocellar triangle with long darkish sparse pile. Postocular area grayish pollinose with concolorous pile, long and dense ventrally becoming progressively sparser and shorter dorsally. Antennae black; length of segments $1:1:1\frac{1}{3}$; with the third segment orbicular. Arista dark brown to black, and $\frac{1}{3}$ longer than the combined antennal segments.

Thorax shining black; the dorsum covered with light to medium dark pile; humeri grayish pollinose, area internal to humeri concolorous with humeri. Posterior $\frac{1}{2}$ of the mesopleuron and the posterior apical area of the sternopleuron light gray pollinose with long gray pile; anterior apical area of the pteropleuron with like colored pile. Dorsum of scutellum concolorous with the thorax and with similar colored pile, which is longer and denser on the posterior border; margin of undersurface with short sparse light colored pile.

Coxae black, with the hind coxae having the outer surface gray pollinose. Femora black, except for a narrow yellow apex. Tibiae yellow to about the basal $\frac{1}{3}$ then dark brown to black. Basitarsi dark yellow with the remaining segments progressively darker.

Wings slightly tinted with smoky brown, the veins brown. Middle cross-vein angled gently downward at basal $\frac{1}{4}$. Absence of microtrichia as follows: first basal cell adjacent to radial vein and continuing to the fork; third basal cell with a narrow area adjacent to and confluent with the first anal vein; axillary cell with a narrow area confluent with the vestige of the third anal vein.

Abdomen shining black, appearing highly polished; the tergites, and to a much lesser degree the sternites, covered with moderately dense short grayish pile; the pollinose areas being grayish. Second tergite with the anterior $\frac{1}{3}$ of the lateral borders with long gray pile. First tergite with an indistinct, sometimes widely interrupted, pollinose band; second tergite with a widely interrupted pollinose crossband which has the outer ends distinctly wider; some individuals exhibiting a very faint pair of light pollinose areas which are lateral to the midline on the third tergite; fourth tergite shining black. Second and third sternites of most individuals each exhibit a pair of pollinose areas which are widely separated.

Genital system having the claspers rather elongated, curved upward, and produced into a hook-like process at the apical $\frac{1}{5}$ which is directed caudo-ventrally. Dorsal surface of the claspers with pile on the medial $\frac{3}{5}$ which is longer towards the base; the ventral surface presents minute spines on the apical $\frac{2}{3}$; the base with a small keel-like evagination laterally. Penis sheath with an open area, internal to and continuous with the superior lobes, which appears 'broken' on its cephalad border. Axial system with a keeled and sclerotized sustentacular apodeme. Chitinous box without a dorsally projecting horn, but with two tubercles. Horn of ejaculatory hood pointed on the apico-cephalad border.

Female. Similar to male except for a shining medial facial stripe reaching almost to the apex of the antennal prominence, in profile the middle has a moderately conspicuous tubercle; front with a distinct medial longitudinal depression; abdomen always wider.

Distribution: Sierra and Nevada Counties, California.

Deposition: University of California at Davis.

Males. Holotype: CALIFORNIA; Sierra Co., Gold Lake, July 8, 1954 (Blaylock). Paratypes: CALIFORNIA; Sierra Co., Gold Lake, July 8, 1954, 5 individuals (Bohart).

Females. Allotype: CALIFORNIA; Nevada Co., near Hobart Mills, June 23, 1962 (Parker). Paratypes: CALIFORNIA; Nevada Co., Sagehen Creek near Hobart Mills, June 18, 1963, 3 individuals (Irwin).

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OSBURN, R. C. 1908. British Columbia Syrphidae, new species and additions to the list. Can. Ent. 40 (1): 13–14.

Notes and News in Entomology

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

The Lyman Entomological Museum was begun in 1914 under the will of the late Henry H. Lyman. For 47 years the collections were housed at the Peter Redpath Museum, on the Montreal campus of McGill University, under the curatorship of Mr. A. F. Winn, 1914–1931, and Mr. G. A. Moore, 1931–1961. In 1961, the collections were moved to Macdonald College of the University, at Ste Anne de Bellevue, some 25 miles west of Montreal. The collection is now growing rapidly and, in Canada, is second only to the National Collection in Ottawa. The associated library is extensive and contains many old and rare books. Donations and exchanges would be welcomed.

The Museum celebrates its 50th Anniversary on December 22, 1964, and will assist in a joint meeting of Canadian entomological societies at the annual meeting of the A.A.A.S. in Montreal. A Lyman Museum commemorative number of "The Canadian Entomologist" will appear in December, 1964.

Chairman, Lyman Bequest Committee: DR. D. K. McE. KEVAN, Dept. of Entomology, Macdonald College, P. Q., Canada.

Secretary and Curator: DR. V. R. VICKERY, Lyman Entomological Museum, Macdonald College, P. Q., Canada.

A note from Frankfurt, Germany. In the June 1964 issue of Entomological News, C. A. Hubbard described a new insect, *Ctenophthalmus grzimek,* in honor of Michael Grzimek, a young German naturalist who lost his life in a plane crash in the Ngorongoro Crater of Tanganyika. A memorial to young Grzimek is the Michael Grzimek Memorial Laboratory located at Banagi, 100 miles north of Ngorongoro Crater, a tract of sand and grass where there is no water, gasoline, or help. Dr. Hubbard had suggested that investigators might find it easier to reach Banagi from the west via Lake Victoria.

In response to Hubbard's paper and reprints and paratype sent to Dr. Bernhard Grzimek, father of Michael and director of the Frankfurt Zoo, the senior Grzimek writes that during the year Hubbard has been absent from Tanganyika the road into Banagi from Ngorongoro has been greatly improved; also that the second paratype of *Ctenophthalmus grzimek* has been deposited in Senckenberg Museum in Frankfurt, and that during December, 1964, and January, 1965, "we have a meeting [in Banagi] of Prof. Lorenz, Prof. Tinbergen, Oxford, and others, because we want to build up still more the research station in Banagi."

Entomologist's Market Place

ADVERTISEMENTS AND EXCHANGES

Advertisements of goods or services for sale are accepted at $1.00 per line, payable in advance to the editor.

Notices of wants and exchanges not exceeding three lines are free to subscribers.

All insertions are continued from month to month, the new ones are added at the end of the column, and, when necessary, the older ones at the top are discontinued.

Acanthomyops (Citronella ants) wanted for revisionary study. Will sort from yellow *Lasius.* M. W. Wing, State University College, Cortland, N. Y.

"New York Weevil" Larvae (*Ithycerus noveboracensis*) **urgently required.** Anyone having larvae, or knowing where they may be obtained, please inform Elwood C. Zimmerman, R.F.D. 2, Peterboro, New Hampshire.

Carabidae of the genus **Ceroglossus** wanted for revisional study. Will purchase, loan, or exchange Coleoptera. Carl Farr Moxey, 414 Woodland Ave., Wayne, Pennsylvania.

Curculionidae of the genus **Curculio** (formerly **Balaninus**) wanted for revisional study. State locality and "nut tree" found on if at all possible. Kenneth E. Weisman, 4 Balmoral Ave., Bartonville, Illinois.

Syrphidae. Exchange or purchase. Will collect any order or family in the New England area. F. C. Thompson, Dept. Entomology, University of Massachusetts, Amherst, Mass.

Membracidae wanted. Purchase or exchange. T. L. Stringfellow, Military Reservation, Box 11-A, Hudson, Massachusetts.

Buprestidae, Scarabaeidae, and **butterflies** wanted in exchanges for beetles and butterflies. Mr. W. van der Starre, 25 Crawley St., Warrnambool, Victoria, Australia.

Butterflies of the World wanted in exchange for those of my locality. Louis Clarke, 10435 Georgetown Drive, Rancho Cordova, California 95670.

Research Assistant in Butterflies wanted at Carnegie Museum for 1965-66; $2400 plus partial tuition in Graduate School, Univ. Pittsburgh where he must be accepted as a Ph.D. candidate. Send personal data to Dr. Richard M. Fox, Carnegie Museum, Pittsburgh, Pa. 15213, except between Mar. 1 and Dec. 1 when data should be sent to Dr. Fox at British Museum (N.H.), Cromwell Road, London S.W. 7, England.

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(* Indicates new genera, names, etc.)

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